

2016 Annual Report

Federal Geographic Data Committee



Federal Geographic Data Committee
IVAN DELOATCH, Executive Director

Federal Geographic Data Committee, Reston, Virginia: 2016

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Message from the FGDC Chair

I am pleased to present the Federal Geographic Data Committee's (FGDC's) annual report for fiscal year 2016. This report provides a summary of program, management, and performance information and describes the FGDC's actions over the past year to facilitate sustainable development and dissemination of geospatial data and technology. In 2016, the FGDC continued its focus on achieving the goals in the 2014–2016 National Spatial Data Infrastructure (NSDI) Strategic Plan. The strategic plan describes a shared national vision for the NSDI, includes goals and objectives for the Federal role in achieving this vision, and responds to General Accountability Office recommendations to the FGDC. We have made great progress over the past 3 years in achieving the goals we set forth in the plan, and are especially proud of our work in meeting the NSDI goals this year. The FGDC's accomplishments in 2016 include the following:

- The FGDC continued to make significant progress in developing the Geospatial Platform, which is a critical component of the Administration's Information Technology (IT) Shared Services initiative to help agencies more effectively produce and share their geospatial data, services, and applications across the Government and with external partners. The GeoPlatform team implemented a new performance dashboard to manage and track Federal geospatial resources, developed an enhanced service status checker Web service, and released the GeoPlatform's new cloud services environment.
- In 2016, the FGDC partnered with the Department of Homeland Security to develop an online knowledge base and training resource to support the national implementation of the Geospatial Interoperability Reference Architecture (GIRA), which provides an integrated governance and oversight framework to support the management of Federal geospatial resources across the civil, defense, and intelligence community domains.
- The FGDC continued its efforts to implement the National Geospatial Data Asset (NGDA) Management Plan, supporting implementation of the Office of Management and Budget (OMB) Circular A–16, "Supplemental Guidance." 2016 achievements included completion of the NGDA Dataset Lifecycle Maturity Assessment (LMA) and its associated reporting dashboards, release of the NGDA Dataset and Theme Summary reports, finalization of the "Geospatial Investment Definitions for Tracking and Reporting Geospatial Investment Costs" document, and development of strategic plans for each data theme. The FGDC also evaluated the NGDA Management Plan to identify lessons learned and opportunities for improvement.
- The FGDC approved the creation of a new NGDA address theme in 2016 to support a collaborative national approach to address data. We commend the Lead Agencies for the Address Theme—the Departments of Transportation and Commerce (U.S. Census Bureau) for their leadership, pilot activities, and engagement with the many stakeholders. A new FGDC Address Theme Subcommittee will support and promote the development of a National Address Database and will engage stakeholders from multiple levels of government.
- The FGDC initiated a collaborative planning process in 2016 to develop a new strategic plan framework for the NSDI. This effort included a series of planning and listening sessions with key stakeholders, including Federal agency representatives, an NSDI Leaders Forum session to seek involvement and gather input from key partner organizations, meetings with the Coalition for Geospatial Organizations (COGO), listening sessions at geospatial conferences and partner meetings, and focus group sessions with Tribal representatives and other key partners. The FGDC will use this input to develop a strategic plan framework in 2016 that will provide a basis to engage the next Administration on national geospatial priorities and opportunities.
- The National Geospatial Advisory Committee (NGAC), which includes members from all levels of government, the private sector, nonprofit organizations, and academia, continued its role in providing constructive and highly valued advice and recommendations on key geospatial issues to the FGDC agencies.

Fiscal year 2017 will focus on partner collaborations to advance critical national geospatial initiatives. We will continue to develop and implement the new NSDI Strategic Plan, advance the NGDA portfolio management process, and enhance the Geospatial Platform to benefit our Federal and non-Federal communities. We are looking forward to continued progress and partnerships in the coming year.

In closing, I would also like to recognize the contributions of my predecessor as FGDC Chair, Jennifer Gimbel. Jennifer served as Chair from 2015 to 2016 and provided effective and proactive leadership in helping to drive FGDC activities forward, while challenging the FGDC community to identify priorities and achievable actions. Jennifer continued a tradition of strong FGDC leadership from the U.S. Department of the Interior (DOI), which has included proactive support from DOI Secretaries Ken Salazar and Sally Jewell. I am confident that this strong leadership role from DOI will be continued across the transition into a new Administration in 2017.

I would also like to express my sincere appreciation for the opportunity to chair the FGDC, work with the FGDC Office of the Secretariat, and engage with the geospatial stakeholder community. It has been gratifying to participate and work with this outstanding group of thought leaders and experts, and I wish you all the best as you continue to pursue the vision of the National Spatial Data Infrastructure.

Sincerely yours,

Camille Touton
FGDC Chair
Deputy Assistant Secretary for Water and Science
Department of the Interior

Doug D. Nebert NSDI Champion of the Year Award

In September 2016, the Oak Ridge National Laboratory Distributed Active Archive Center (ORNL DAAC) Moderate Resolution Imaging Spectroradiometer (MODIS) team was selected as the first recipient of the Federal Geographic Data Committee (FGDC) Doug D. Nebert National Spatial Data Infrastructure (NSDI) Champion of the Year Award. The award recognizes exemplary technical achievement and leadership in supporting the development and advancement of NSDI. The award honors Doug Nebert, who was a respected FGDC colleague, technical visionary, and recognized national and international leader in the establishment of spatial data infrastructures.

The ORNL DAAC MODIS team is recognized by the FGDC as an early pioneer in remote sensing-based Spatial Data Infrastructures and your commitment to continued innovation, persistence, and creativity in the development of the MODIS tools to support research. The ORNL DAAC MODIS system and tools epitomize the NSDI framework of the FGDC by following data and architecture principles as defined in OMB Circular A-16, implementation of FGDC-endorsed standards and metadata guidelines, and adoption and delivery of National Geospatial Data Assets in accordance with the framework.

For 13 years, the Oak Ridge National Laboratory Distributed Active Archive Center (ORNL DAAC) MODIS system and tools have served as an exemplar of success through integrating and delivering spatial data, tools, and services to a broad global community of practitioners, educators, and students. Their resources support synthesis and analysis to improve societal understanding and decision making in agriculture, biodiversity, energy, ecosystems, climate, and disasters. The ORNL DAAC MODIS system and tools serve an audience of over 7,000 distinct users and handle an average of 20 million global requests each year. The user-driven ORNL DAAC MODIS system and tools are globally recognized and are highlighted in a variety of journals ranging from “Remote Sensing of the Environment” to the “Journal of Paleolimnology.”



ORNL DAAC representatives accept the FGDC Doug D. Nebert NSDI Champion of the Year Award. Left to right: Ivan DeLoatch, Executive Director, FGDC; ORNL representatives Dr. Robert Cook, Dr. Makhani Virdi, and Suresh Vannan; Camille Touton, Deputy Assistant Secretary for Water and Science, Dept. of the Interior; Kevin Gallagher, USGS Associate Director for Core Science Systems.



Doug Nebert's parents, Myrna and Robert Bernstein, at the 2016 Doug D. Nebert NSDI Champion of the Year Award Ceremony at the South Interior Auditorium, Washington, D.C.



Doug D. Nebert

In 2014, the FGDC announced the establishment of the Doug D. Nebert National Spatial Data Infrastructure (NSDI) Champion of the Year Award in honor of a respected colleague, technical visionary, and recognized national and international leader in the establishment of spatial data infrastructures.

The vision of the NSDI is to assure that spatial data from multiple sources—Federal, State, Tribal, regional, and local governments, academia, and the private sector—are available and easily integrated to enhance the understanding of our physical and cultural world. Each year, the award will be announced in the FGDC Annual Report and will be presented to an individual or team representing Federal, State, Tribal, regional, and (or) local governments, academia, or nonprofit and professional organizations for development of an innovative and operational geospatial tool, application, or service capability used by multiple organizations.

Highlights for Fiscal Year 2016

The implementation of the 2014–2016 of National Spatial Data Infrastructure (NSDI) Strategic Plan continued into its third year. The FGDC community worked collaboratively to complete actions and tasks related to the nine objectives called out in the plan. For more information, see page 7 and Appendix E.

FGDC Web Reengineering. The FGDC launched a revamped Web site in May 2016 to support outreach, communication, and support for the FGDC Committee activities. The primary objective of the Web site redesign was to make our information more readily available, accessible, and usable by a broad group of stakeholders. In addition to having a redesigned, clean, and modern look and feel, the new site includes performance enhancements, new features, and improved support for mobile devices. For more information, see page 7.

Geospatial Interoperability Reference Architecture. The Geospatial Interoperability Reference Architecture (GIRA) provides integrated governance and an oversight framework to support management and acquisition and provides technical architecture guidance on the design and implementation of an interoperable geospatial solution. The GIRA was endorsed by the FGDC in 2015. In 2016, the FGDC partnered with the Department of Homeland Security to develop an online knowledge base and training resource to support national implementation of the GIRA. For more information, see page 7.

Geospatial Platform. In its second full year of development and operations under a skilled technical development

team, the Geospatial Platform stepped up its game and improved geospatial data discovery, access, and use, and developed new collaboration communities where Federal agencies and partners can integrate data services to understand and address national issues. Additionally, *GeoPlatform.gov* became fully operational in a cloud environment; it unveiled the first National Geospatial Data Asset (NGDA) data lifecycle management assessment (LMA) dashboard, supporting transparency, Open Data, and the implementation of the Office of Management and Budget's (OMB) Circular A–16, "Supplemental Guidance." The Supplemental Guidance directs Federal agencies to manage their NGDA as a single portfolio for use across Federal agencies and by their partners and the public, making it available through the Geospatial Platform. For more information, see page 9.

Implementing the NGDA Management Plan. The FGDC Federal agencies continue their efforts to complete the objectives and actions described in the NGDA Management Plan, which support implementation of the Office of Management and Budget (OMB) Circular A–16, "Supplemental Guidance." This year, many activities were accomplished, including completing the NGDA Dataset LMA, releasing the NGDA Dataset and Theme Summary reports, finalizing the "Geospatial Investment Definitions for Tracking and Reporting Geospatial Investment Costs" document, developing Strategic Plans for each Theme, and creating a Theme Implementation Plan template. In addition, an evaluation of the 2014–2016 NGDA Management Plan was conducted to assess the value, benefit,

and challenges met as a result of actions undertaken while implementing the Plan. The evaluation summarizes feedback from users, agency staff, and stakeholders to provide recommendations for advancing A–16 NGDA Portfolio management as part of the future NSDI Strategic Plan Framework and the next version of the NSDI Strategic Plan. For more information, see page 12.

Advancing NGDA Portfolio Management. The FGDC Steering Committee approved the expansion of the A–16 NGDA Portfolio through the establishment of the Address Theme to support activities related to this topic. The FGDC Steering Committee also approved changing the Biota Theme to the Biodiversity and Ecosystems Theme. This name change better reflects the datasets within the Theme and aligns more closely with terminology used in the community. In addition, NGDA Theme Leads and Dataset Managers worked together to advance portfolio management and fulfill the responsibilities identified in the NGDA Management Plan. The focus at the end of the fiscal year involved improving access to NGDA Datasets by identifying Web services and data downloads in metadata records. For more information, see page 15.

Standards. The FGDC continued its leadership and participation in the development and coordination of national and international standards in support of Objective 3.1 of the NSDI Strategic Plan. It announced endorsement of Part 2, Digital Orthoimagery (revised), of the Geographic Information Framework Data Standard, in early FY 2016. Standards that advanced through the FGDC standards process in 2016

were the revised draft United States Thoroughfare, Landmark, and Postal Address Data Standard; INCITS/ISO 19115-1:2014 Geographic information—Metadata—Part 1: Fundamentals; and INCITS/ISO 19157:2013[2014] Geographic information -- Data quality standard. For more information, see page 21.

National Geospatial Advisory Committee (NGAC). The National Geospatial Advisory Committee (NGAC) was established by the Department of the Interior to provide external advice and recommendations to the FGDC. During the past year, the NGAC has analyzed and provided feedback and recommendations regarding the NSDI Strategic Plan Framework, the NGDA Portfolio Management Process, and is also developing a transition recommendations paper for the next presidential administration. In addition, the NGAC developed papers on the Changing Geospatial Landscape, on 3DEP (3D Elevation Program) Data Acquisition Coordination, and on the Landsat program. In fiscal year 2017, the NGAC will continue to provide advice and feedback on key geospatial topics, including the development and implementation of the 2017 NSDI Strategic Plan, continued development of the Geospatial Platform, the development of portfolio management approaches, and effective communication and engagement with partners in the geospatial community. For more information, see page 24.

International Activities. The FGDC actively supported international efforts through several groups. The FGDC participated with the Intergovernmental Group on Earth Observations (GEO), Global Spatial Data Infrastructure (GSDI) Association, and the United Nations Committee on Experts on Global Geospatial Information Management (UN–GGIM) and national SDI development efforts in Poland, Peru, and Kazakhstan. These efforts help advance the NSDI Strategic Plan Objective 3.1 and 3.2 efforts to develop, coordinate, and promote international standards, the NSDI vision, and to raise awareness of the benefits of spatial data infrastructures. For more information, see page 25.

Establishment of the Address Theme

The FGDC Steering Committee, in concurrence with the OMB, approved creation of the NGDA Address Theme on August 8, 2016. The addition of the new Theme represents an official change to the list of NGDA Data Themes established as part of previous updates to OMB Circular A–16, Appendix E.

The lead agencies of the newly created Address Theme are the Department of Transportation (U.S. DOT) and the Department of Commerce, U.S. Census Bureau (Census Bureau). The Address Theme will be supported by a FGDC Subcommittee that will promote the ongoing work to develop a national address database and engage Federal stakeholders in this arena.

Recognizing Successes and Planning for the Future

As 2016 draws to a close and the Administration sunsets, the Nation is poised for change with its many challenges. The FGDC community is actively planning for the future while building on its past successes. This is a great opportunity, considering how ubiquitous geospatial data and services have become and how they are engrained in our daily lives, enabling the business and businesses of the government and underpinning a \$1.6 trillion growth engine for the U.S. economy (www.bcg.com/documents/file109372.pdf). From our personal use of phones, in cars, at home, at work, to addressing local, regional, national, and international issues, from private and (or) public sources, the innovative services and underlying spatial data upon which they depend are so integral to how we live, work, and play, it is easy to forget that individually and as a nation, we depend on their availability, currency, and responsiveness. Like the management of our Nation's physical infrastructure (another example of how spatial data and tools are used), the level of investment we make in our capital data assets—so foundational to our digital infrastructure—impacts the delivery of the information and services demanded by our citizens and in supporting our economy.

While spatial data and services span many business sectors, levels of government, and public and private investments, the Federal Government has had a pivotal impact across data, technology, and services fronts in advancing our national spatial data infrastructure and in helping to fuel innovation. Significant examples include the Landsat satellites' 44-year image history of the Earth's surface—the longest continuing data record of the Earth's surface and its changes; the Global Positioning System (GPS) constellation, a technology that is used by every personal and business service relying on accurate real-time position information; and, the collaborative development of riverine and tidal flood modeling tools that help predict inland and coastal flooding impacts and help first responders reduce impacts to life and property. While the majority of Federal agency use of geospatial technology and data supports the daily missions of the agencies and their non-Federal partners, Federal agencies continue to work with experts, vendors, academia, scientists, and others to identify innovative and cost-saving geospatial technologies.

States, counties, localities, Tribes, academia, private businesses, and citizens are all a part of this national spatial infrastructure. Local, county, and Tribal governments manage some of the richest and highest resolution data, such as local roads, addresses, and parcels. Understanding regional and natural issues, such as drought, natural disasters, and health impacts, requires integrating local data into regional

Where spatial data hits home

From the first light of day, utilities, such as your electricity and water, are managed to facilitate the following:

- Traffic, commuter transit, and weather
- School buses, delivery, and personal routing
- Finding a home, school, or job
- Local, county, and Tribal communities' schools
- resource, and service management
- Cellular and mobile services
- Air, land, and water transportation
- Disaster planning, response, and recovery
- Local-to-national emergency response
- Energy exploration, infrastructure, and delivery
- Air, land, and groundwater resource management
- Water quality, availability, and flooding
- Recreation, conservation, and wildlife management
- Health care and humanitarian missions
- Agriculture, food production, and shipping
- Waste disposal and impact protection
- National defense and homeland security
- Global positioning and asset location
- Mapping the voting districts and election results

Spatial data are a key part of an underlying national infrastructure of technology, standards, people, partnerships, and services that helps enable our way of life—the National Spatial Data Infrastructure.

applications and often national views to understand and take steps to address the challenges. Private sector companies collect and manage data both for their own use and for use by public entities, while also integrating publically funded data into their public and private facing services (for example, federally developed maps, nautical charts, imagery, and elevation data). This is, after all, a “national” infrastructure and determining where the Federal agencies have roles and responsibilities, and how their activities may have the largest impact and return on investment, is a part of the strategic planning activities, which the FGDC agencies are collaboratively pursuing with their partners and stakeholders.

The ability to use visualization and mapping to help understand the impacts of events and how they affect citizens and government missions is very powerful. Whether it is a response to a natural disaster or viewing patterns of economic impact to our communities, visualizing where, when, and how these events occur and using that information



Imagery before and after Hurricane Matthew near Interstate 95, Lumberton, NC, October 11, 2016. (Before imagery from Mapbox and OpenStreetMap through NOAA: storms.ngs.noaa.gov/storms/matthew).

The Geospatial Platform is needed to:

- Put events in context of location, environment, and people affected.
- Discover trends and relationships we might otherwise miss.
- Communicate more effectively through maps.
- Streamline geospatial data collection, delivery, visualization, and analysis.
- Distill large amounts of complex tabular and spatial information into user-friendly formats.

to develop solutions to make communities and the Nation more resilient to future occurrences, lays a foundation for action. The Geospatial Platform is the FGDC's shared service solution that couples information visualization tools with a data access and discovery engine integrated with Data.gov, and provides a shared online environment where communities of interest can meet virtually to share and aggregate local-to-international data into information products to understand and address important issues.

Assessing and solving issues and events that affect the economy, employment, the environment, public health and welfare, security, and quality of life—all of these benefit from decision-support tools, shared data and applications, and collaborative problem solving in a shared environment where all constituents can contribute their data and information. Data and information resources are among the most valuable assets any agency possesses.

The Geospatial Platform is breaking through many of the barriers that have prevented effective integration of widespread local-to-national data sources to enable collaborative problem solving through the application of accessible online collaboration tools, interoperable data services, innovative search and discovery technology, shared cloud infrastructure, and intuitive interfaces. Federal, State, local and Tribal agencies, private companies, academic institutions, and the public can feed their locally hosted data into a shared online resource to visualize conditions from multiple perspectives to understand what local, regional, and national impacts and resources are involved, and to work on collaborative solutions. This minimizes the need to expend time and energy on duplicative data collection, reformatting, complicated access steps, and storage, and instead allows the opportunity to spend that time and resources on addressing the issues. Increasing investment in the jointly funded development of the Geospatial Platform and key national datasets helps expedite and expand the utility of this shared service and the breadth of issues that can be used to address.

The FGDC (that is, the 32 Federal member agencies) are working with partners on the strategic planning for the NSDI using a three-pronged approach:

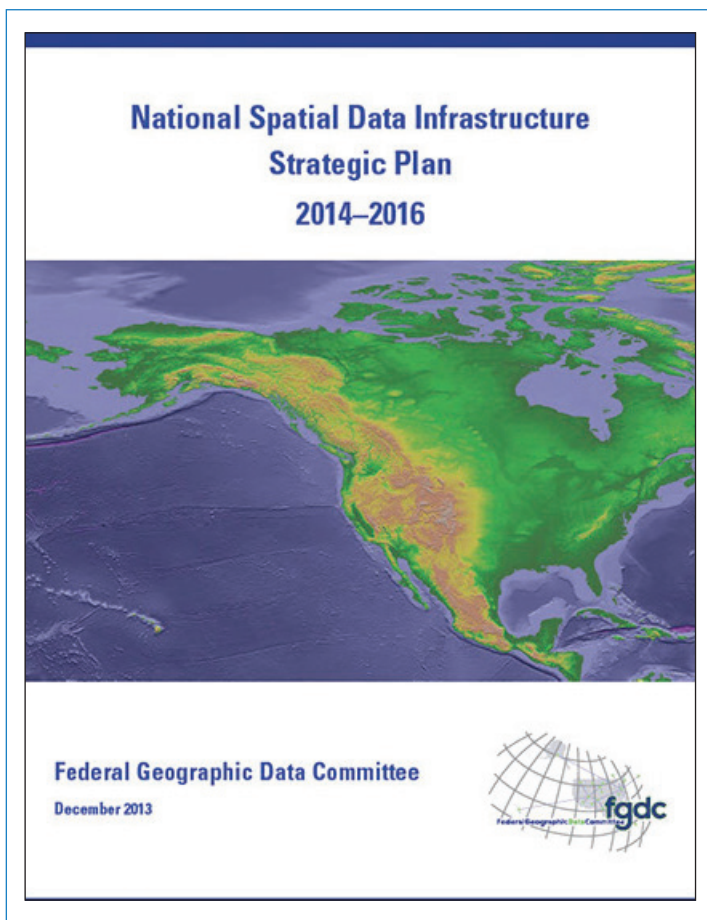
1. Strategic Plan Draft Framework (2016) – Identify the current Strategic Plan's high-value actions on which to build; identify additional ongoing efforts that need to be included (such as development of the national address database); and identify new strategic actions and issues of national importance.
2. Administration Transition Plan (2016) – Provide recommendations to the pending transition teams on the activities, success, and investment value of FGDC and NSDI activity priorities from constituents for consideration by the new Administration and alignment with their priorities.
3. NSDI Strategic Plan 2017–202X – Combine the inputs and recommendations from items 1 and 2 above into the next NSDI Strategic Plan with input and vetting from Federal and non-Federal constituents.

In 2013, the Federal agencies began the process of developing the *National Spatial Data Infrastructure (NSDI) Strategic Plan 2014–2016*. This was a time when

sequestration and other factors were reducing agency funding and causing agencies to make hard decisions on which programs and activities to reduce or end, including a number of programs that provided grants or other support to State, local, Tribal and other NSDI partners. Likewise, the Government Accountability Office (GAO) released the first of two reports recommending Federal agencies take more action to coordinate and implement OMB policies intended to reduce duplication and implement a Federalwide geospatial data portfolio management process (basically requiring agencies to manage their spatial data assets on behalf of all agencies, not just their own, and verifying and reporting on the data's condition). While a number of strategic planning outreach and feedback events occurred with non-Federal representatives during the development of the plan, for the reasons cited above, this current plan has more of a Federal agency action focus. This has had the benefit of allowing the Federal agencies to focus on improving data, services, and tools, but with the consequence of impacting some coordination and data integration activities with non-Federal agencies and partners. As the current plan comes to an end this year, analysis and feedback on the successes and challenges of the current plan are one of the influencing factors for the next strategic plan.

As we look back over the past 8 years, many successes have been achieved, some of which are discussed further in this report; however, there are too many to list here. Some of the larger impact successes include:

- The National Geospatial Advisory Committee (NGAC) has provided impactful advice and recommendations on geospatial issues to the Federal government and passed resolutions supporting important initiatives, including the Geospatial Platform, a robust 3-D Elevation program, increased engagement in Federal privacy policy discussions, and the development of a National Address Data Theme and database. The NGAC members represent all levels of government, Tribes, academia, and private companies, and the level of applicants and members for the committee represent true leaders from their sectors and a high value to the Government.
- From strategic visioning to the development of a value proposition, a strategic roadmap, and a business plan, to the initial unveiling of a capability in support of the understanding and monitoring of the Gulf of Mexico oil spill, the Geospatial Platform has transformed from concept to operational capability. This jointly funded OMB shared service has cross-agency support, spans multiple mission spaces, and is part of the Federal enterprise architecture. The Geospatial Platform both utilizes cloud services for its operations and provides them as a service offering to FGDC agencies. Its underlying data catalog is integrated with Data.gov, reducing operating costs, and supporting non-Federal agency data record registration utilizing the FGDC metadata standard. To improve the data and services access, the FGDC is also developing tools to assist agencies and partners in the improvement of their catalog records to enable direct discovery of, and access to, the actual data services, putting the data directly onscreen. Geoplatform.gov provides a set of tools that enable communities of interest to work together in an online environment, across agency boundaries, to share information and data and create geospatial and map products to understand, view, analyze and address important issues utilizing shared geospatial information.
- The Federal government manages many sets of geospatial data and the FGDC agencies developed a portfolio management approach for the National Geospatial Data Assets (NGDA). The supporting business processes align with OMB and government policy, and require agencies to manage their capital investments in spatial data on behalf of all agencies—not just for their own mission needs—saving money and reducing data duplication. The NGDA-managing agencies developed and applied a data LMA to each of the 177 NGDA datasets providing the first detailed analysis of the geospatial portfolio's assets' health. The results of these



assessments are presented online through reporting dashboards on the Geospatial Platform.

- A foundational hallmark of the FGDC, geospatial standards are the basis for interoperability. Numerous internal and external geospatial standards have been developed, endorsed, or advanced through the FGDC process, including standards for wetlands classifications, addresses, Federal trails, and coastal and marine ecological classifications, metadata, and data services, to name a few. Coordination and technical development with other standards organizations, including the Open Geospatial Consortium, the International Organization for Standardization, and the Geospatial-Intelligence Standards Working Group, have also increased, leveraging the expertise of each group.
- The FGDC's Cooperative Agreements Program (CAP) grants program provided cost-share funds to non-Federal partners to advance the NSDI through: implementation of standards, training, improving technology, partnerships,

and the development of Geospatial Strategic and (or) Business Plans. A testament to its value and interest, all 50 States, Washington D.C., and the Virgin Islands participated in this exemplar of Federal to non-Federal partnerships. While the last project was officially completed in 2016, this program continues to receive kudos from constituents across the Nation as an example of a high-value, partnership effort in advancing the Nation's spatial data infrastructure and repetitive requests to fund its reestablishment are echoed in strategic-planning discussions.

These are just a few of the efforts and initiatives that have advanced the NSDI, some of which are envisioned as foundational components of the next strategic plan. Certainly collaboration, partnerships, outreach and communications, shared technology and infrastructure, and the development of core datasets that enable governments, businesses, academic institutions, and citizens to innovate and interact with their environment will continue to be areas of investment of prime importance to the Nation.

Fiscal Year 2016 Accomplishments

2014–2016 NSDI Strategic Plan—Recognizing Success

The FGDC community is working collaboratively to implement the 2014–2016 NSDI Strategic Plan. The FGDC Executive Committee has the lead responsibility for overseeing and monitoring the implementation of the plan. Designated Federal officials, appointed from the FGDC Executive Committee, are serving as the champions for each of the objectives in the plan. The champions are responsible for overseeing the implementation of each objective and its supporting actions.

Performance Summary

The NSDI Strategic Plan includes three strategic goals, nine objectives, and 29 actions. The NSDI implementation plan includes more detailed tasks and performance metrics for each of the objectives and actions in the strategic plan. The following is a summary of the implementation status:

- FY 2014: The status report includes 28 tasks for FY 2014. Of these tasks, 26 are reported as complete, and 2 are reported as in progress.
- FY 2015: The status report includes 36 tasks for FY 2015. Of these tasks, 32 are reported as complete, and 4 are reported as in progress.
- FY 2016: The status report includes 24 draft tasks for FY 2016. Of these tasks, 11 are reported as complete, and 13 are reported as in progress.

The implementation of the strategic plan has resulted in multiple accomplishments that have enhanced shared services, improved access to geospatial data and services, and increased participation of the NSDI stakeholder community, including the following:

- Establishing and advancing the **Geospatial Platform** as an OMB shared service, providing data, tools, and services to the Federal and partner communities.
- Implementing **geospatial portfolio management** approach described in the Supplemental Guidance to OMB (Circular A–16) and in the National Geospatial Data Asset Management Plan, providing a more efficient and systematic approach to the development and management of National Geospatial Data Assets.
- Developing and implementing the **Geospatial Interoperability Reference Architecture**, providing a framework for common reference architecture to guide solutions to effectively govern, manage, support and

achieve interoperability through geospatial system integration, acquisition or development.

- Continuing FGDC Standards and Metadata activities, including the adoption and advancement of multiple geospatial standards, and continuing collaboration with Federal partners and voluntary standards organizations.
- Providing a leadership and convening partners and stakeholders to collaborate on common goals, working with groups such as the NGAC to pursue national approaches to issues such as 3D Elevation Data, Address Data, Parcel Data, Geospatial Privacy, and Geospatial Workforce Development.

The tables in Appendix E of this report provide a summary of the FGDC's 2016 performance in implementing the current strategic plan.

FGDC Web Reengineering

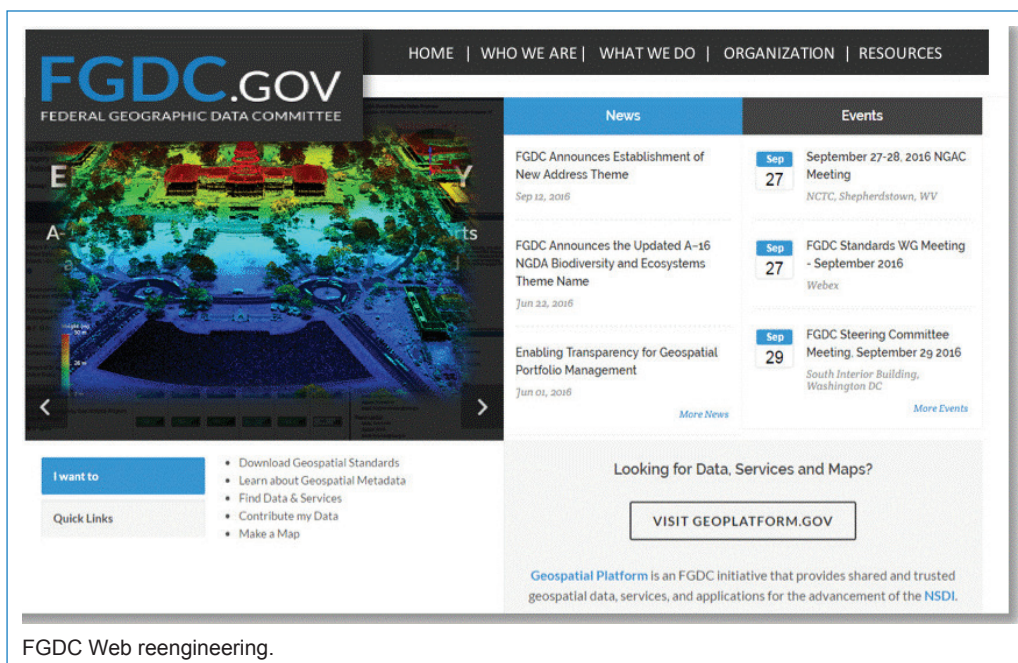
In May 2016, the FGDC launched a revamped Web site. As part of revamping the Information Architecture to support an improved stakeholder experience, the navigation was reorganized to reflect the current activities, initiatives, and messages of the FGDC community. Existing content with limited use was archived to improve access and performance. The Web site has been enhanced with improved services to integrate and provide FGDC membership management and committee support tools to improve committee administration. The Web site incorporates a newly established social media presence for the FGDC, which will help the committee reach a broader audience across the public and leverage the communication channels of our many partners.

As part of the redesign, the FGDC rebranded its logo and visual identity, which will be incorporated in all online and print materials.



Geospatial Interoperability Reference Architecture

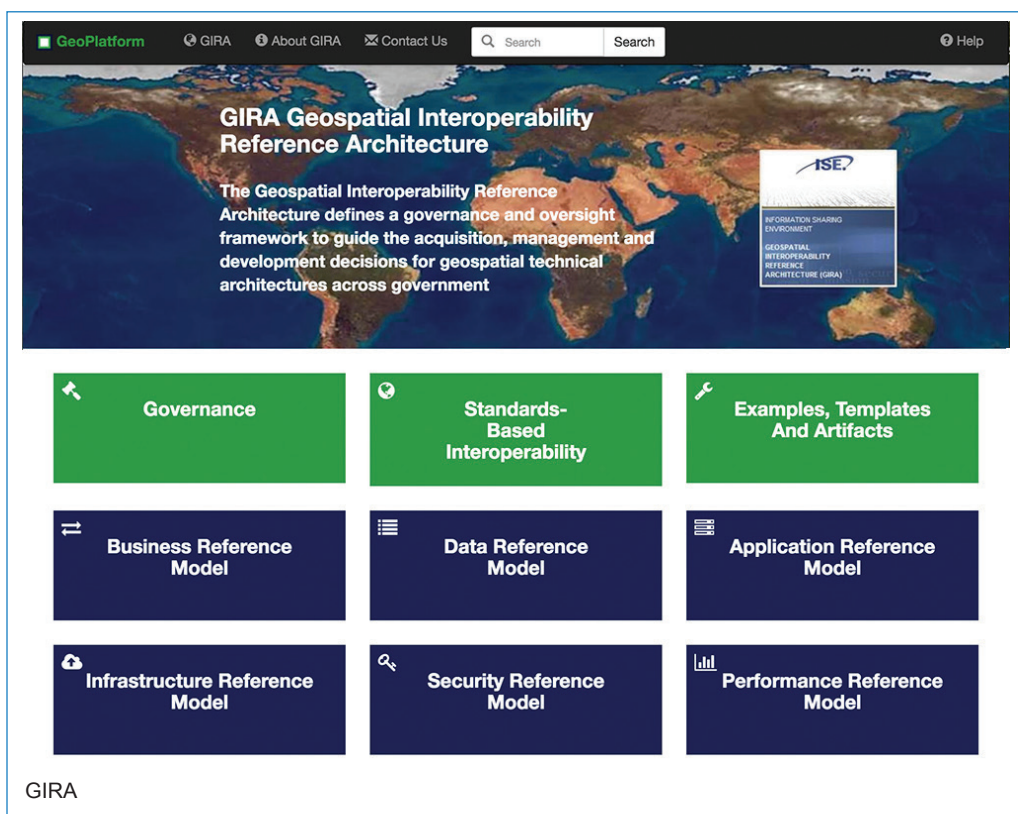
In 2015, the FGDC community endorsed the establishment of the GIRA as a framework for common reference architecture to guide solutions to effectively govern, manage, support, and achieve interoperability through



FGDC Web reengineering.

geospatial system integration, acquisition, and collaborative development. In 2016, the FGDC partnered with the Department of Homeland Security (DHS) to develop an online knowledge base and training resource to support national implementation of the GIRA. The tool is integrated into the Geospatial Platform (GeoPlatform) and provides

reference authoritative practices, and will continue to evolve to provide practical guidance tools, including templates, charters, exchange agreements, baseline requirements matrices, and architecture artifacts (www.geoplatform.gov).



GIRA

Sharing Information via the GeoPlatform



The Geospatial Platform is a cornerstone implementation initiative of the NSDI and a key shared service investment by 26 of the FGDC agencies, making it a primary cornerstone of their NSDI Strategic Plan 2014–2016. This effort is also a component of the Administration's Information Technology (IT) Shared Services initiative to help agencies more effectively produce and share their geospatial data, services, and applications across the Government and with external partners. Guided by the U.S. Department of the Interior (DOI), Office of the Chief Information Officer, as the FGDC designated Geospatial Platform managing partner, and a management team of cross-agency representatives, significant progress was made in advancing the Geospatial Platform's (*Geoplatform.gov*) shared data, services, and applications Web-based collaboration environment. These efforts address Strategic Plan goals 1 and 2 and include the completion of tasks to meet Objectives 1.1, 1.2, 1.3, 1.4, 2.12, and 3.3.. See Appendix E for further Plan status.

New features of the Geospatial Platform released in fiscal year 2016 improve interoperability, integration with leading vendor services, improved service interfaces, and new asset reporting dashboards, and a full-service, cloud-hosting offering the following:

- Established the GIRA as an online collaboration community within the GeoPlatform.** The GIRA provides a framework for the management, design, and development of new or newly aligned existing geospatial system/solution investments. It recommends guidance considerations in the areas of governance, business, data, applications/services, infrastructure, standards, and security and performance measures for validating and reporting results. The GIRA is intended to support implementation of the NSDI by providing a practical roadmap to increase Government geospatial information sharing through interoperable capabilities that result in reduced operational costs within and across an organization's mission systems. It documents geospatial and architecture policy alignment, references authoritative practices, and provides practical guidance and document templates. The GIRA is aligned with current Federal policy, principles, and practices for enterprise architecture and further adds to the authoritative body of knowledge of geospatial architecture documentation that supports the civil, defense, and intelligence communities. The community's audience consists of executive leaders, program managers, and solution architects across Federal, State, Tribal, territorial and local governments, and private sector stakeholders. In coordination with the Program Manager-Information Sharing Environment (PM-ISE), the GeoPlatform Managing Partner implemented the GIRA as an online collaboration community within the *Geoplatform.gov*, to facilitate its availability and use, and to enhance its sustainment by enabling users to provide additional guidance and best practices as capabilities and technology innovations continue to develop.
- Incorporated ArcGIS OnLine environment in the GeoPlatform.** As the leading geospatial analysis, mapping, technology, and services vendor, Esri tools are used extensively across all levels of government. Working with Esri, the Geospatial Platform Managing Partner and technical team developed interoperable capabilities that enable GeoPlatform data publishers' direct access to the ArcGIS Online (AGOL) communities and the ability to save and publish maps to the AGOL community Map Gallery. Likewise, agencies who have published map products through AGOL can access those maps in the Geospatial Platform, reducing the need to recreate products in either environment.
- Significant upgrades to the Geospatial Platform to improve user experience through agile development processes.** Expanded GeoPlatform capabilities span the spectrum of content and services, including the following: an enhanced common map viewer for 2,131 disparate integrated map services; an enhanced common map manager where community and user published maps can be shared with others; strengthened system security; a new Platform resource manager (Registry+) for managing and providing rapid access to geospatial data, service, layer, and map assets; and enhanced content management system capabilities for community support that enables community leads to manage their community content.
- Add services to increase collaborative data investment to reduce costs and improve service reliability.** The Geospatial Platform Marketplace is where agencies and partners can post information on where and what type of data they plan to collect. This enables agencies to fulfill their A-16 responsibility of checking for existing and planned data investments prior to expending funds. This year also saw the release of the shared marketplace tool, which enables Federal agencies and non-Federal partners to post planned elevation data development projects. When common areas are identified, partnering efforts leverage governmental buying power, while enabling vendors to plan for more efficient captures, reducing costs.
- Development and release of the new service dashboard for monitoring geospatial service availability and reliability.** The FGDC Service Status Checker (statuschecker.fgdc.gov) has been enhanced for integration into the Geospatial Platform. Supporting over a dozen types of metadata and data services,

the current release is now monitoring over 55,000 registered services. The Service Status Checker provides services to validate, test, and score geospatial Web services, returning a set of summary and test diagnostic information about the tests performed on each service, presenting dashboard readouts, sending alerts when services are down, and enabling application programming interface (API) access to data for integration into other sites, applications, and portals. The GeoPlatform is using these services to help improve NGDA service reliability by identifying poorly performing services and by working with host agencies to improve system capabilities or to migrate services to the GeoPlatform cloud-hosted environment.

- **Updated content and capabilities of National Geospatial Data Asset Lifecycle Maturity Assessment Dashboard.** In support of the National Geospatial Data Asset (NGDA) Management Plan's objective to establish online planning and reporting tools, the Geospatial Platform team developed the NGDA Dataset LMA Survey and dashboard. These tools assist NGDA Dataset Managers in the evaluation of each dataset's maturity, based on the Geospatial Data Asset LMA process described in the Supplemental Guidance to OMB Circular A-16. The dashboard summarizes the detailed data assessments across the NGDA portfolio and helps identify data and lifecycle elements that require improvement, completion, or updates (that is, areas where additional resource investment may be needed, and helps managers and programs plan for these needs). As a whole, the dashboards provide the first synopsis of the health of the Federal geospatial portfolio, and its fitness for use for addressing local-to-national issues and priorities.
- **Redefined the workflow for creating new communities on Geospatial Platform.** As the demand for new communities increase, the Managing Partner and technical development team continue to improve the workflows for creating and serving new communities. As communities are designed to enable self (community) management once established, reducing the time to initiate a new community and turn it over to its users improves user satisfaction and reduces development costs. These refined workflows are being developed while incorporating new communities into the Geospatial Platform, including the following topical communities focused on: the GIRA, the Chesapeake Bay Foundation's efforts, fisheries, and the NGDC Collaboration Community (NCC), which is being used to coordinate data development and management across the 17 NDGA data themes and the associated 177 datasets.
- **Leveraging Cloud Technology to Support the Geospatial Platform and its FGDC Partner Agencies:**
 - **Providing cloud services through an automated interface.** During FY 2016, the Geospatial Platform

Management Team met NSDI Strategic Plan Action 1.3.1 by adding a cloud services Web page containing information about the Geospatial Platform's cloud-hosting offering and automating the request process for cloud services. The submission of an online form triggers interaction with the cloud onboarding and GIS specialist team. The onboarding workflow, security package, and concept of operations (CONOPS) for the cloud service offering are in their final review with all documents expected to be available in the first quarter of FY 2017. The workflows for DOI and non-DOI agencies differ and require separate processes; both processes are being tested and documented at this time. Once complete, workflow documentation will be available to all FGDC partners who want to consider leveraging cloud services. As of the end of FY16, there were four DOI Bureaus and two non-DOI agencies utilizing the services contract.

- **DOI provides dedicated GIS specialists and cloud onboarding coordination** to assist all FGDC partners with consultation services regarding GIS asset appropriateness for the cloud hosting offering, fulfilling NSDI Strategic Plan Action 1.3.2. Consultants evaluate partner needs, explain offered services, assist in onboarding and workflow development, and help agencies understand and establish billing processes. DOI offers cloud workshops for potential FGDC partners, working together with their cloud services support vendor. These workshops last from 4 to 8 hours and often result in an architectural plan, the components of which can then be incorporated into the cloud cost estimation worksheet to approximate the investment required for each GIS asset or program.

Advancing Cloud Services

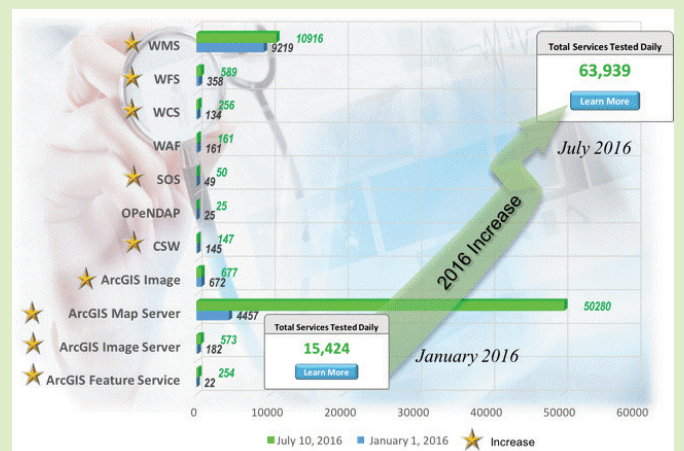
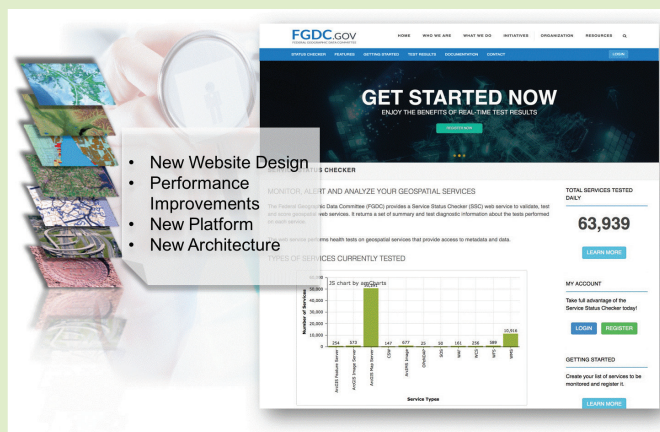
The FGDC and its 32 Federal agency members have embraced a "cloud first" strategic direction to support the development of geospatial interoperability; data, technology and services; and the adoption and integration of new and efficient technologies. All of these strategies support a shared service environment, reduce operational costs, and increase service reliability.

Over the past 5 years, the FGDC's Geospatial Cloud (GeoCloud) initiative sponsored research, development, and operational deployment of key public-facing geospatial Web services and engaged Federal, State, local and Tribal governments as part of the shared services strategy to advance the Geospatial Platform, which supports expanding the use of cloud computing (NSDI Strategic Plan Objective 1.3). The GeoCloud served as an incubator for approximately 39 projects for 19 organizations providing data, information, applications, tools, and services related

Monitoring and Improving the Health of Geospatial Services

The Service Status Checker (SSC) provides service health analytics diagnostic information about the tests performed to assist service providers understanding and improving service health.

The FGDC announced the release of version 2.0 of the SSC. This version has a new streamlined interface, a new platform for performance and scalability, and provides new monitoring services. Since the launch of version 2.0 and significant engagement and outreach this year, the number of registered services has increased by 270%. For more information, visit our new Web site (statuschecker.fgdc.gov).



Monitoring and improving health of geospatial services.

to national efforts in biodiversity, climate, public health, environmental health, housing affordability, water use and availability, disaster, social, economic, and environmental subject areas.

In 2015, the FGDC awarded a contract for shared services provided through the GeoPlatform and received authority to operate in January 2016. With this success, the FGDC worked with asset owners in the GeoCloud incubator to migrate assets into a scalable platform to make these resources operationally capable to meet a wide range of mission requirements. For more information, see www.fgdc.gov/initiatives/geopatform/geocloud.



The FGDC—with DOI as its managing partner—has established the Geospatial Platform (*GeoPlatform*) within a cloud environment to provide shared and trusted geospatial data, applications, and services for use by the public and by government agencies and partners to meet their mission needs. Implementing the GeoPlatform cloud advances the vision of the *NSDI* by leveraging an operational cloud environment. The GeoPlatform cloud resource stands as a pinnacle of success, bringing together



people, data, technology, and services that are being utilized to provide local-to-global place-based understanding for decision making.

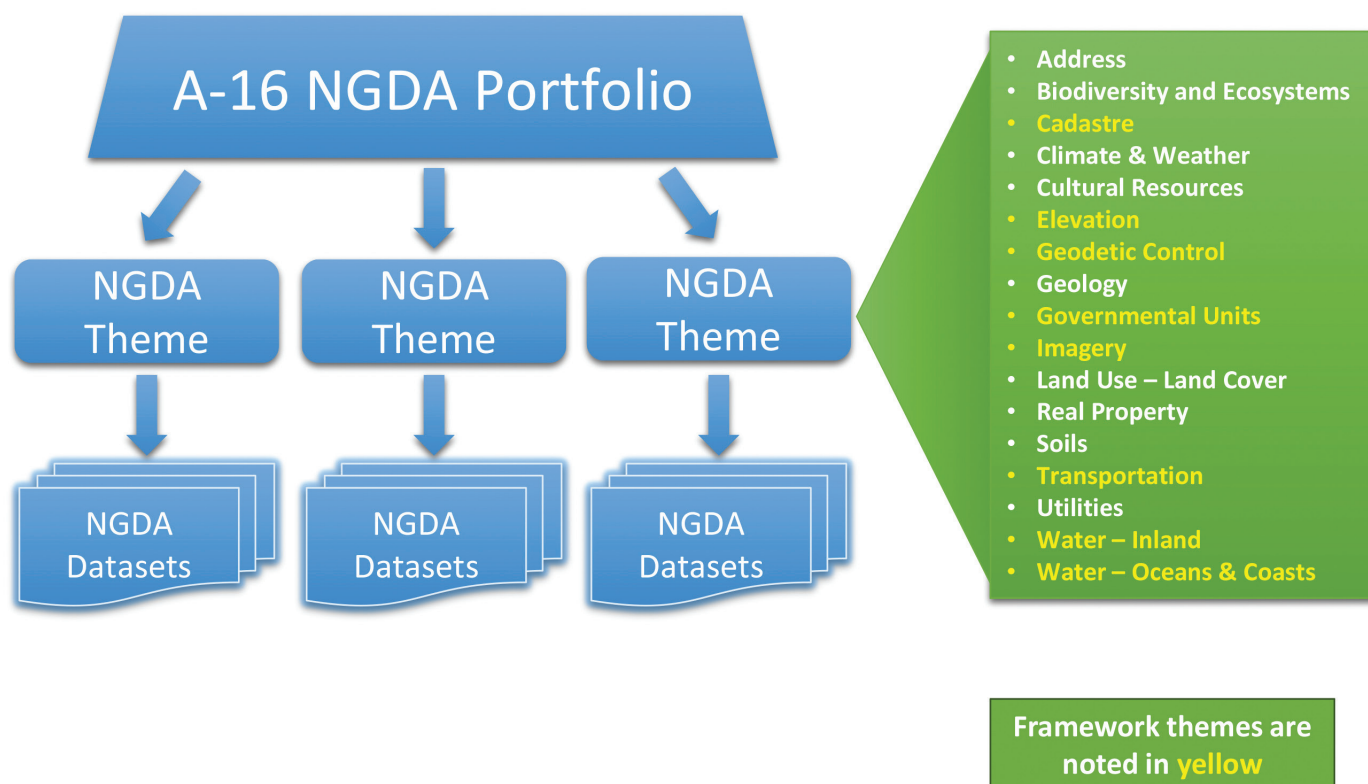
Implementing the National Geospatial Data Asset Management Plan

The NGDA Management Plan, approved by the FGDC Steering Committee in March 2014, outlines a vision to develop an NGDA Portfolio as part of the NSDI, consisting of a core set of NGDA Datasets that is sufficiently complete, current, and accessible to support the critical business and mission requirements of the Federal Government and its partners and stakeholders. In order to realize this vision, the Plan encompasses a series of phased actions and milestones to implement a systematic and efficient A-16 NGDA Portfolio management process. The process aims to support and optimize investments in Federal geospatial assets for effective sharing, collaboration, and use of core geospatial data in an environment that supports efficient and effective decision making.

The A-16 NGDA Portfolio management process has been defined in the OMB Circular A-16, "Supplemental Guidance" (November 2010). Portfolio management is described "as the coordination and management of Federal geospatial data assets and investments to most efficiently support national priorities and government missions. Portfolio management applies consistent management approaches that help increase the quality of data through the use of best practices and documentation in a manner that reduces duplication and cost, provides greater accessibility, and supports shared services across the Federal Government." In addition, the NGDA Management Plan supports the outcomes noted in Objective 2.1 of the NSDI Strategic Plan, and advances Goal 2 to ensure accountability and effective development and management of Federal geospatial resources.

Over the past 3 fiscal years (2014–2016), the NGDA Management Plan has supported two main phases to support establishing the A-16 NGDA Portfolio management process: (1) preparing the management and reporting

NGDA Themes and Structure



Structure of the A-16 NGDA Portfolio and list of NGDA Themes.

framework and (2) executing the portfolio management process. The 2014 and 2015 accomplishments should be noted briefly:

- Identified Federal staff to fill the Theme Lead and Dataset Manager roles. They continue to be a critical factor in plan implementation. In addition, a process was developed to allow for changes to NGDA personnel roles as needed to maintain the NGDA Themes and NGDA Datasets.
- 177 National Geospatial Data Assets have been officially identified, registered, and published on the *Data.gov/Geoplatform.gov* Catalog.
- Established the process for nominating, changing, or removing NGDA Datasets within the A–16 NGDA Portfolio.
- Released the LMA questions and tool for the NGDA Dataset Managers to conduct the NGDA Dataset baseline maturity assessment.
- Each Theme has a public Web site on *Geoplatform.gov* with information about their associated NGDA Datasets, stakeholder communities, and other resources.
- Developed a consistent template for Theme Strategic Plans that identify goals, objectives, and anticipated outcomes for the next 5 years, with the intent that each plan will encompass the entire Theme.
- Since early 2014, the Theme Leads and Dataset Managers have participated in regular conference calls and face-to-face meetings, when possible, to discuss ideas and collaborate on A–16 NGDA activities.

Many of the processes, assessments, and templates established in the first 2 years of the NGDA Management Plan are ongoing and have become integrated into NGDA Portfolio management. The 2016 accomplishments primarily focused on executing the portfolio management process are discussed below.

Lifecycle Maturity Assessment

To support the A–16 NGDA Portfolio management, OMB Circular A–16, “Supplemental Guidance,” requires that NGDA Dataset Managers regularly assess the maturity of their datasets based on the geospatial data lifecycle [OMB Circular A–16 (Revised); Sections 8(e)(d), 8(e)(f), and 8(e)(g)]. The LMA provides users with curated datasets, the dataset owners with information about priorities, and the FGDC community with a consistent approach for communicating maturity and identifying joint opportunities to improve the NGDA Datasets. The NGDA Dataset LMA was completed by the NGDA Dataset Managers in December 2015. An online tool simplified the input of information for the initial baseline assessment questions, including the justification comments needed to support the metric selected. The results are organized and

visualized in the LMA Dashboard, NGDA Dataset Report, and NGDA Theme Summary Report. A review of the LMA process also provides suggestions for best practices and potential changes to refine the maturity assessment questions in future iterations. For more information, see cms.geoplatform.gov/A-16-NGDA-Theme-Community/LMA.

LMA Dashboard

The NGDA LMA Dashboard provides a mechanism to analyze and visualize NGDA Dataset maturity for each lifecycle stage, including overarching general questions. The LMA Dashboard also includes interactive maturity descriptions, as well as comparative analysis and visualization between NGDA Datasets and Themes. The increasing darker color indicates a higher level of maturity.

NGDA Dataset Report

The NGDA Dataset Report summarizes information about the NGDA Dataset, including points of contact, metadata registration, and LMA submission information. Based on input from the NGDA Theme Leads, Dataset Managers, and FGDC community, the report template also provides sections to identify the LMA reviewer(s) and verifier, overall and stage-based maturity levels, specific LMA question selections, complete justification comments, and the number of attachments. The NGDA Dataset Report contributes to the aggregation of information in the NGDA Theme Summary Report.

NGDA Theme Summary Report

The Theme Summary Report provides an overview of the status, overall maturity, and other characteristics for the NGDA Datasets within a Theme. The report identifies NGDA Datasets that have completed the LMA and presents the results by the stages in the geospatial data lifecycle. This information can assist the Theme Leads in evaluating progress and assessing overall maturity for each NGDA Theme.

Geospatial Investment Definitions

In April 2016, the FGDC Steering Committee approved the “Geospatial Investment Definitions for Tracking and Reporting Geospatial Investment Costs” document. The document describes a standard set of geospatial definitions with specific examples for each. The goal is to improve reporting on geospatial data investments that will enhance budget planning and execution. The team members who developed the document included personnel from the Department of Commerce, Census Bureau; DHS; DOI; Environmental Protection Agency (EPA); General Services Administration (GSA); National Geospatial-Intelligence

Maturity	Maturity Characteristics for All Lifecycle Stages
No Activity Rank = no activity	Dataset meets project or local business needs of the primary owner, secondary or additional uses or users were not considered, not recognized as an authoritative data or is part of a similar dataset. Not managed to any of the benchmarks in the approved lifecycle.
Planned; Initial Development Rank = 1	Dataset limited in meeting business needs of the primary owner. Benchmark activities in the approved lifecycle are just starting to consider secondary uses, partnerships are forming to support additional dataset uses. Dataset development is in a very early stage. Minimal or limited management against the benchmarks in the approved lifecycle.
Transition; Transformation Rank = 2	Dataset meets business needs of the primary owner and has moderate use by secondary users. Benchmark activities are occurring in at least three stages. Efforts to integrate funding, include partners, and obtain data are not supported in a sustained manner. Management practices in relation to the stages of the approved lifecycle is limited.
Managed; Predictable Rank = 3	Dataset meets a significant number of the business needs of the primary owner and is widely used as an authoritative resource by secondary users. Benchmark activities are occurring in at least four of the approved lifecycle stages. Management practices in relation to the approved lifecycle is moderate but consistent. Dataset is integrating changing business requirements in lifecycle stages impacting overall maturity.
Mature; Consistent Rank = 4	Dataset meets all the business needs of the primary owner and most of the secondary users. The dataset is curated and used as authoritative by the primary owner. Dataset is used widely by secondary users actively engaged in sustaining the dataset. Future needs are identified and steps are planned to address these. All stages are supported and reviewed on a recurring basis. The dataset is well managed in relation to the approved lifecycle.
Optimized; Established Rank = 5	Dataset meets virtually all business needs of all users. The dataset is considered authoritative by owners and secondary users. It is curated across all stages of the approved lifecycle. Future needs are defined on a regular basis and resources for addressing both current and future business requirements are available.

National Geospatial Data Asset Dataset maturity characteristic definitions for all lifecycle stages.

Agency (NGA); and the U.S. Department of Agriculture (USDA). The FGDC Executive Committee began discussing the next steps for the process. For more information, see: www.fgdc.gov/initiatives/resources/geospatial-investment-definitions-with-appendices.

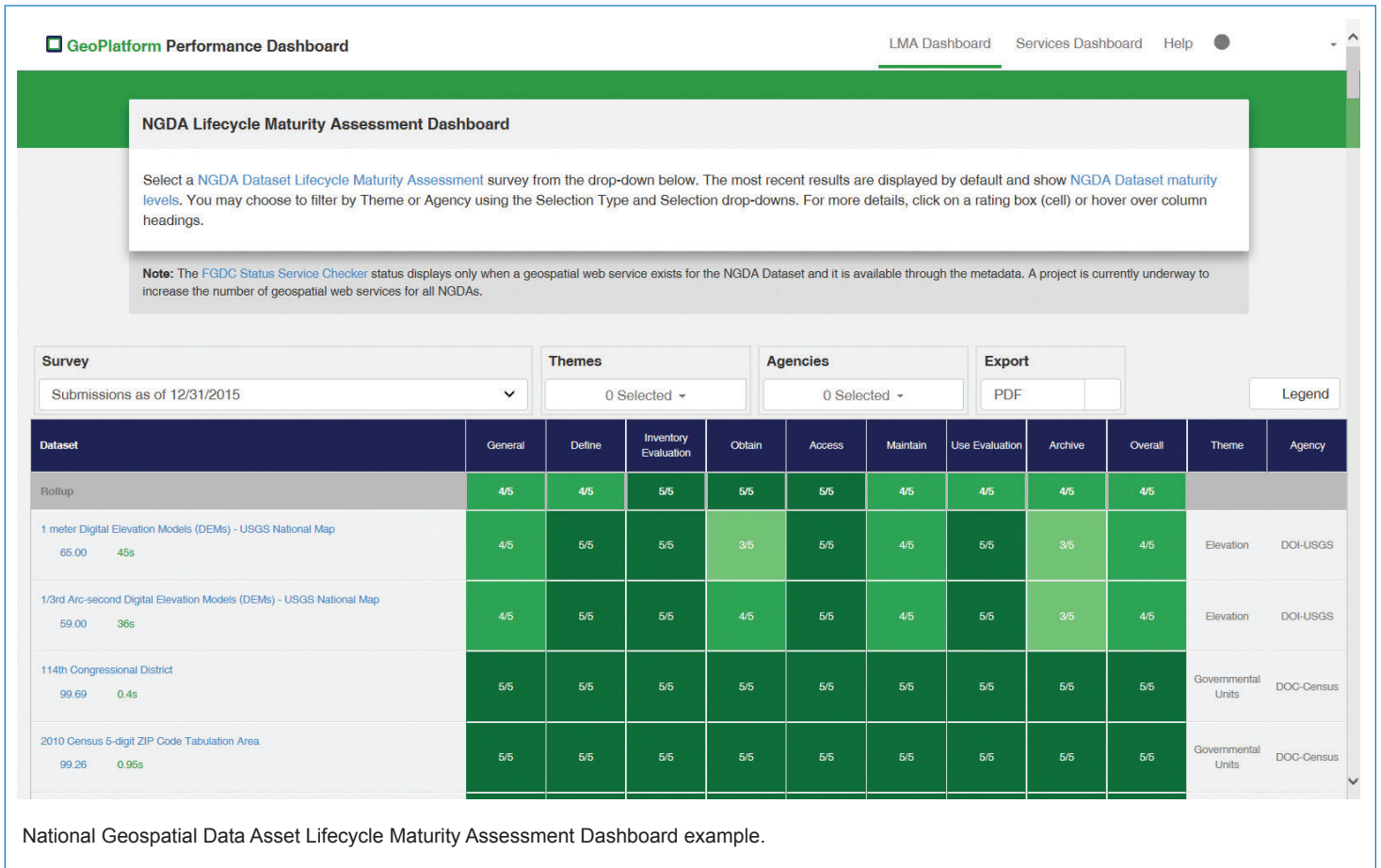
Theme Strategic Plans

Based on the template developed in 2015, each Theme released their Theme Strategic Plan in 2016 (except Real Property Theme, which will be completed in FY 2017). The Strategic Plans contain activities over a 5-year timeframe that include goals, such as a set of authoritative datasets that are utilized by all stakeholders to meet their needs; objectives—specific, measurable, audience- or issue-directed, realistic, and time-bound; and anticipated outcomes that include specific statements explaining how an objective will be accomplished. Each Theme also

considered external factors, challenges, and opportunities as part of the Plan, including addressing questions such as what important trends could influence the Strategic Plans implementation—technology, standards, committees, management, workforce, initiatives, policy and legal issues, and so forth; what challenges exist; and what opportunities exist to support the Theme's goals. The next step will be establishing implementation plans as described later in the report. For more information about the Theme Strategic Plans, see cms.geoplatform.gov/A-16-NGDA-Theme-Community.

NGDA Collaboration and A-16 NGDA Theme Communities

The NCC supports online collaboration by providing a mechanism for those involved in A-16 NGDA Portfolio management to share experiences, lessons learned, and



management practices. The NCC requires *GeoPlatform.gov* login credentials. The NCC augments the public A–16 NGDA Theme Communities on the *GeoPlatform.gov* Web site that are designed to increase exposure of NGDA Datasets, participation in NGDA Theme development and requirements, and the use of the Theme’s datasets. The public A–16 NGDA Theme communities are available at www.geoplatform.gov/A-16-NGDA-Theme-Community.

NGDA Management Plan Evaluation

As the NGDA Management Plan 2014–2016 comes to a close in fiscal year 2016, an evaluation of the plan has been conducted to provide recommendations related to advancing the NGDA Portfolio content and process, which are critical for managing core Federal geospatial assets that represent a foundational component of the Nation’s spatial data infrastructure. The report includes analysis and recommendations based on a comprehensive review of completed and in-progress activities, as well as input gathered from the Federal and non-Federal community about those activities. The results of the evaluation will be essential in informing the A–16 NGDA Portfolio

management components of the NSDI Strategic Plan framework and the next version of the NSDI Strategic Plan.

Advancing NGDA Portfolio Management

The A–16 NGDA Portfolio is organized by NGDA Themes made up of one or more associated NGDA Datasets. NGDA Datasets support the critical business and mission requirements of the Federal Government, as well as its partners and stakeholders. Currently, 17 NGDA Themes and 177 NGDA Datasets make up the portfolio (2 were removed in FY 2015); a full list is available on the A–16 NGDA Theme Community Web site (www.geoplatform.gov/A-16-NGDA-Theme-Community). The NGDA Themes are managed by Theme Leads who provide cross-agency leadership and coordination. The NGDA Datasets are managed by Dataset Managers who provide coordination for the NGDA Datasets at a national level.

In fiscal year 2016, the NGDA Theme Leads and Dataset Managers worked together to fulfill the responsibilities identified in the NGDA Management Plan. These included the following:

Overview

The NGDA Collaboration Community (NCC) is a centralized space for supporting implementation of the [A-16 Supplemental Guidance](#). It is a collaboration space allowing those involved in NGDA management to share experiences, lessons learned, and management practices on A-16 NGDA Portfolio management. The NGDA Collaboration Community is an internal page requiring login permission and provides a space to host documentation and information for A-16 implementation, training, and GeoPlatform-related activities.



National Geospatial Data Asset Collaboration Community home page.

- Completed the LMA using the online tool to fulfill the NGDA Dataset baseline maturity assessment. As part of the NGAC's NGDA review, the members commended "the Federal geospatial NGDA community for its approach and efforts to assess the progress and performance of the NGDA data resources through the inaugural LMA and related performance dashboard." For more information, see: www.fgdc.gov/ngac/meetings/june-2016/ngac-paper-comments-on-ngda-portfolio-management.pdf.
- Contributed to the release of the NGDA Dataset and Theme Summary Reports.
- Released Theme Strategic Plans that identify goals, objectives, and anticipated outcomes for the next 5 years with the intent that each plan encompasses the entire Theme.
- Facilitated the development of a draft Theme Implementation Plan template to identify actions, milestones, and the responsible party to address Theme Strategic Plan goals and objectives.
- Participated in A-16 NGDA meetings, discussions, document reviews, metadata updates, and other activities that directly support portfolio management.
- Established the Address Theme.
- Updated the Biota Theme to the Biodiversity and Ecosystems Theme to better reflect the content of the Theme NGDA Datasets.
- Three Theme Leads presented updates to the FGDC Steering Committee.

In addition, there were numerous accomplishments within Themes.

Address Theme. The Address Theme was established on August 8, 2016, as the 17th National Geospatial Data Asset (NGDA) Theme. The Lead Agencies are the Department of Transportation and the Department of Commerce, Census Bureau. The new Address Theme will be supported by a subcommittee that will support the ongoing work to develop a National Address Database.

Biodiversity and Ecosystems Theme. In 2016, the FGDC Steering Committee approved the proposal to change the name of the Biota Theme to the Biodiversity and Ecosystems Theme. This change echoes significant support from across the community. The Biodiversity and Ecosystems Theme name better reflects the content of the theme and aligns more closely with common terminology used by professionals and subject matter experts using the data. Benefits of the name change include improved clarity; improved accuracy of placement for datasets related to biota, biodiversity, and ecosystems; and increased interest in the Theme datasets from broader communities.

Cadastre Theme. The Bureau of Land Management (BLM) facilitated and (or) completed the standardization of the Public Land Survey System (PLSS) for all 30 PLSS States in fiscal year 2016. Fifteen States saw significant updates

and enhancement in 2016, with 12 States now migrated to Esri's parcel fabric format for ongoing maintenance. BLM offered training on maintenance with parcel fabric, which has been completed in six BLM administrative State offices. Training materials and exercises have been published to assist Federal and non-Federal data stewards.

Climate and Weather. In fiscal year 2016, the Climate and Weather Theme developed a strategic plan for moving forward in the next 5 years, as well as completed LMAs for the five NGDA Datasets in the Theme. Most of the datasets within the Theme are very mature. One of the challenges identified in the Theme Strategic Plan is getting users access to the data. To address this, the Theme has been focusing on documenting and making data available.

To better meet the needs of the Nation, the Theme coordinates with related projects that rely on access to climate and weather datasets. Some highlights of interactions with related projects are as follows:

- The National Oceanic and Atmospheric Administration (NOAA) has implemented an operational GIS infrastructure to provide timely and reliable dissemination of weather, water, and climate data, forecasts, and warnings supporting the National Weather Service's mission to protect life and property and enhance the national economy. At present, there are over 70 mapping services available. The Climate and Weather Theme personnel actively participate in the development of this integrated system.
- Real-time data can be accessed as part of the nowCOAST system. This system (nowcoast.noaa.gov) is a map-based portal to real-time coastal observations, forecasts, and warnings. Within nowCOAST, tools are being developed to work with and visualize observational and model datasets.
- The Theme is also providing access to new datasets. An example includes storm surge data that is used in a new storm surge project developed by the National Hurricane Center (NHC). This is a GIS-based project (www.nhc.noaa.gov/surge/inundation/) that can be used by multiple agencies for emergency planning.
- The Theme's efforts on enhancing access to climate data records are important to the 4th National Climate Assessment, which is currently in development.

Cultural Resources Theme. The Cultural Resources Theme Lead coordinated with the Dataset Managers to complete the Theme Strategic Plan. This work gave the Theme Lead the opportunity to open discussions with the Dataset Managers and the Cultural Resources Subcommittee to develop practical goals and actions for the Theme to pursue in the coming years.

To support the NGDA Datasets within the Cultural Resources Theme, progress was made on creating a cultural resource spatial data transfer standard. The work included developing a working draft of the standard, including feature level metadata fields and domain values, as well as a data structure for the standard itself.

Elevation Theme. The FGDC 3D Nation Elevation Subcommittee facilitates coordination of topographic, coastal, and bathymetric mapping activities across the Federal Government. Member agencies are working through the 3DEP and the Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM) to continue to improve coordination. Collaboration activities include sharing mapping data acquisition information via the U.S. Federal Mapping Coordination site (seasketch/2wQidh0EGy), finalizing Version 1 of the IWG-OCM's National Coastal Mapping Strategy focused on topobathymetric light detection and ranging (lidar), and issuing the USGS Broad Agency Announcement (BAA) for 3DEP to support partnerships for the acquisition of high-quality 3D Elevation data.

Geodetic Control Theme. In fiscal year 2016, the Geodetic Control Theme developed a strategic plan and completed the LMAs for the four NGDAs within the theme. In addition, the Theme focused on updating and maintaining the NGDA Datasets as follows:

- **Continuously Operating Reference Station Dataset—**Data from the Continuously Operating Reference Station (CORS) Network is used by U.S. citizens for positioning throughout the country, including all States and territories. Approximately 2,000 sites are maintained by National Geodetic Survey (NGS), and these provide positions for over 400,000 users a year using the Online Positioning User Service (OPUS). Additionally, over a million downloads of the data are used by citizens for their own positioning needs.
- **Geoid Models Dataset—**Geoid Models continue to connect GPS users to heights above the North American Vertical Datum of 1988 (NAVD 88) throughout all States and territories of the United States. An annual Experimental Geoid model was developed for 2016 (xGEOID16B) by combining the latest satellite gravity model, terrestrial gravity, and airborne gravity, including 41% of the total Gravity for the Redefinition of the American Vertical Datum (GRAV-D data). This series of models will culminate in the future U.S. vertical datum eventually replacing NAVD 88.
- **Airborne Gravity (GRAV-D) Dataset—**In April 2016, collection of airborne gravity for the Gravity for the Redefinition of the American Vertical Datum (GRAV-D) Project reached 50% coverage for all of the United States. As of August 2016, the total completed was

53.96% on track for completion in 2022. A Small Business Innovative Research (SBIR) grant with Aurora Flight Sciences collected airborne gravity with a new, smaller gravimeter on an optionally piloted vehicle, run in unmanned mode with a safety pilot on board.

- **Geodetic Control Information on Passive Marks Dataset**—For Geodetic Control Information on Passive Marks, the NGDA Dataset LMA survey was completed and published for these NGS datasets. Strategic plans were developed identifying key activities and milestones in support of dataset LMA. The development of Web services for NGS datasets is underway to provide wider access and usability.

Geologic Theme. The National Geologic Map Database continues to be updated as a NGDA Dataset. In 2016, this widely used resource for geologic and related geoscience reports and maps consisted of citations and links to more than 100,000 publications and datasets from more than 650 publishers in the United States. This dataset is directly supported by numerous technical standards (for example, the U.S. Geologic Names Lexicon) and by an interactive Web site for viewing geologic maps.

Governmental Units Theme Strategic Plan and Administrative and Statistical Boundaries Theme. The Governmental Units Theme Strategic Plan (FY 2017–FY 2021) completed in 2016 reflects input from the collection or management units of 41 NGDA Datasets and Dataset Managers, as well as associated working groups and subcommittees. The strategic plan outlines long-term priorities to evaluate, maintain, and disseminate legal, administrative, and statistical boundaries through the effective management of ongoing geographic update programs that are designed to improve the geospatial data quality of authoritative datasets.

This year, the Census Bureau completed the initial collection phase of the Block Boundary Suggestion Project (BBSP) and implemented the verification phase to be completed in 2017. The continuation of the Boundary Quality Assessment and Reconciliation Project (BQARP) and the 2016 Boundary and Annexation Survey (BAS) provides government agencies and the public with geographic boundaries and geographic areas that are current, accurate, consistent, accessible, and integrated. Metadata records for all Governmental Units NGDA Datasets have been published on the Geospatial Platform and have incorporated direct URL links to data and, in some cases, to Web mapping services (WMS).

Individual agencies either have published or are planning to publish WMS for all NGDAs in this Theme. Interagency collaboration on special jurisdiction boundaries from the

EPA, the Department of Housing and Urban Development, the NOAA, as well as international boundaries from the International Boundary Commission (IBC) and the International Boundary and Water Commission (IBWC), have contributed to the Theme's assets. Stakeholder communities within working groups such as the National Boundaries Group, the Federal Lands Subgroup, and the Tribal Boundaries Subgroup have increased awareness of publicly available and consistent national boundaries.

Imagery Theme. The Imagery Theme, coleads USDA–FSA (Farm Service Agency) and DOI–USGS, completed the strategic plan for collection of open data to meet imagery requirements across the Federal Government and to promote partnership with State, local, Tribal, and private organizations. The USGS transitioned their lead position to the Land Remote Sensing Program, a move that facilitates the full spectrum of aerial and satellite imagery acquisition and reflects this Theme's dynamic requirements to observe the planet at all scales throughout the year.

Land Use Land Cover Theme. Theme members developed a strategic plan that formalizes Theme management and provides a framework for maintaining and updating component datasets. In addition, the USGS, working in partnership with the interagency Multi-Resolution Land Characteristics (MRLC) Consortium, (www.mrlc.gov), completed the design of the National Land Cover Database (NLCD) 2016 for the conterminous United States. This design represents the most comprehensive and complex NLCD database design ever completed, and is now under production with completion targeted for 2018.

Real Property Theme. The Real Property Theme completed the LMA.

Soils Theme. The annual update of the NGDA Soil Survey Geographic Database (SSURGO) for 2017 is scheduled to be completed by November 2016, when it will be made available to land use decision makers, researchers, and modelers via Web Soil Survey and the Geospatial Data Gateway. Every 10 years, the NGDA Major Land Resource Areas (MLRA) Dataset is updated through a significant effort involving input from numerous Federal and university partners. In 2016, planning and coordination was ongoing to meet the scheduled 2017 completion. The MLRA Dataset contains groupings of physiography, geology, climate, water, soils, biological resources, and land use as described in USDA Agricultural Handbook 296 (2006).

Transportation Theme. In fiscal year 2016, the Transportation Theme is updating the transit layer with the addition of the National Transit Map data. The National Transit Map combines voluntarily provided General Transit

Feed Specification (GTFS) data on stops, routes, and schedules for both fixed-guideway and fixed-route service into a national level geospatial database for the purpose of supporting research, analysis, and planning. The NGDA Transportation Theme Community on *GeoPlatform.gov* has been expanded by adding the Committee on the Marine Transportation System (CMTS) to our Stakeholders section and Maritime to our Communities section.

Water – Inland. The Theme strategic plan was completed in June 2016 and is aligned with the Open Water Data Initiative (OWDI). The OWDI is an activity managed by DOI on behalf of the community that will integrate currently fragmented water information into a connected, national water data framework, and leverage existing systems, infrastructure, and tools to underpin innovation, modeling, data sharing, and solution development. The OWDI is coordinated through the Subcommittee on Spatial Water Data (see the subcommittee report later in this document). The Water-Inland Theme strategy incorporates many aspects of the OWDI, and the NGDA datasets provide a foundational structure upon which to build the OWDI. The strategy aligns the Theme goals with those of the OWDI, and improves the synergy between these closely related activities.

The Hydrography Requirements and Benefits Study has been completed, and collected 420 Mission Critical Activities (MCA) from 23 Federal agencies, all 50 States, 53 regional or county government agencies, 8 Tribal governments, and 38 private or nonprofit organizations. Current annual benefits realized across the 420 MCAs total approximately \$540 million. Additional future potential annual benefits, which could be realized if all user requirements were met, exceed \$600 million. Thus, the total benefits realized could reach \$1.14B if all user requirements identified are met. Major requirements identified include better integration with elevation data, improved positional accuracy, and more frequent and regular update cycles. USGS is currently working to understand the costs of implementing different scenarios and will produce a program recommendation in 2017. More information and results from the study may be found at nationalmap.gov/HRBS.html.

The USGS has continued development of the High-Resolution National Hydrography Dataset Plus (NHD+HR), modeled after the highly successful 1:100,000-scale NHDPlus. The NHD+HR will provide a robust set of network attributes and routing capability for a much more detailed network, while adding scalability, to provide a unified geospatial framework of reference for water data. The initial “beta” version of NHD+HR has been completed for approximately one-fourth of the conterminous United States, and public distribution of the beta datasets will begin early in FY 2017.

Modification of the Watershed Boundary Dataset (WBD) coastline representation to the NOAA 3-nautical-mile boundary is nearing completion at the end of fiscal year 2016. This modification is intended to promote a common coastline representation across the Theme datasets.

The USGS has continued the harmonization of hydrographic data (NHD and WBD) along the border with Canada, working with Natural Resources Canada and Environment and Climate Change Canada, and facilitated by the International Joint Commission. Harmonization of the NHD with National Hydrography Network data from Canada is complete for the swath of eight-digit hydrologic units spanning the United States-Canada border. Additionally, two meetings have taken place for the purpose of coordinating a binational pilot study in which harmonized Canadian hydrographic data are incorporated into NHD+HR for a pilot river basin (or basins), to support cross-border applications. The pilot study will begin in fiscal year 2017.

The National Wetlands Inventory (NWI) Version 2, which includes never-before-served legacy NWI linear data augmented with NHD to produce a comprehensive wetlands and surface-waters dataset, was made available to the public via an improved mobile-enabled, Web-based mapper. This comprehensive dataset allows the accurate, consistent calculation of area and ecological classification to best support geospatial summaries and ecological modeling.

The U.S. Army Corps of Engineers (USACE) collected updated information from all 50 States, Puerto Rico, and 18 Federal agencies to update the National Inventory of Dams (NID). A new NID will be published early October 2016. The new database will include structural and regulatory information (more than 70 data fields) on more than 90,000 dams in the United States. Non-Government users no longer need a user name and password to access the NID database; however, Government users must still obtain a user name and password should they need access beyond the public site to accomplish their official duties. All previous Government accounts have been deleted and new accounts must be reestablished. For more information, visit nid.usace.army.mil.

The USACE continues to update information concerning the location, condition, and associated consequences about levees in the United States in the National Levee Database (NLD). The Federal Emergency Management Agency (FEMA) Mid Term Levee Inventory has recently been encompassed within the NLD. A major update to the NLD is also being conducted that will provide a new user interface, a new account management process, and increased access to geospatial Web services. Along with the system update, the USACE will be leveraging Geoplatform and Geoplatform

The National Transit Map

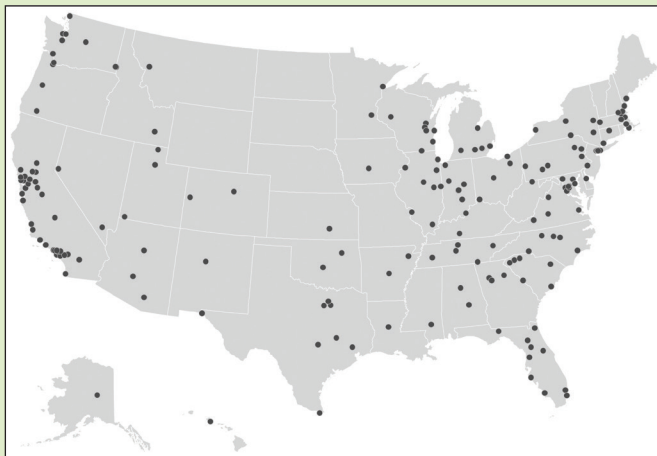
The national transit system provides critical access, connectivity, and ladders of opportunity for millions of Americans. A key element of understanding this access and connectivity is having accurate data about the transit system—such as where transit stops are, how frequent transit service is, and where transit routes go. Yet researchers and planning and government agencies could not easily study and describe the significance of transit at regional and national levels because the United States lacked a national transit dataset.

Until recently, providing a national transit dataset had been a challenge. Although many transit agencies, including almost all the largest agencies, already publish this data locally through the General Transit Feed Specification, there was difficulty in gaining access to it and compiling these feeds into one national dataset. Transit agencies set a variety of restrictive terms on the use of the data, requiring the public, planning agencies, researchers, and government agencies to request data on a case-by-case basis with each transit agency.

The U.S. Department of Transportation (DOT) solved the problem by creating a national repository of voluntarily provided, public domain transit data with standard terms of use. The repository, known as the National Transit Map, is a critical missing element in our National Spatial Data Infrastructure. The National Transit Map includes a geospatial database containing the information from transit agencies that provides open, machine-readable data about their stops, routes, and schedules.

The National Transit Map increases the availability of data necessary to ensure our transportation system provides ladders of opportunity for millions of people who need access to jobs and training, health care, and other essential goods and services. Furthermore, with this information, the DOT, planning agencies, and researchers can do a far better job demonstrating the importance and role of transit in American Society, and identify and address gaps in access to public transportation.

Please visit The National Transit Map Web site (www.rita.dot.gov/bts/ntm) to learn more about this new and exciting initiative.



The National Transit Map is a geospatial database containing the information that provides open, machine-readable data about the stops, routes, and schedules from 270 transit agencies.

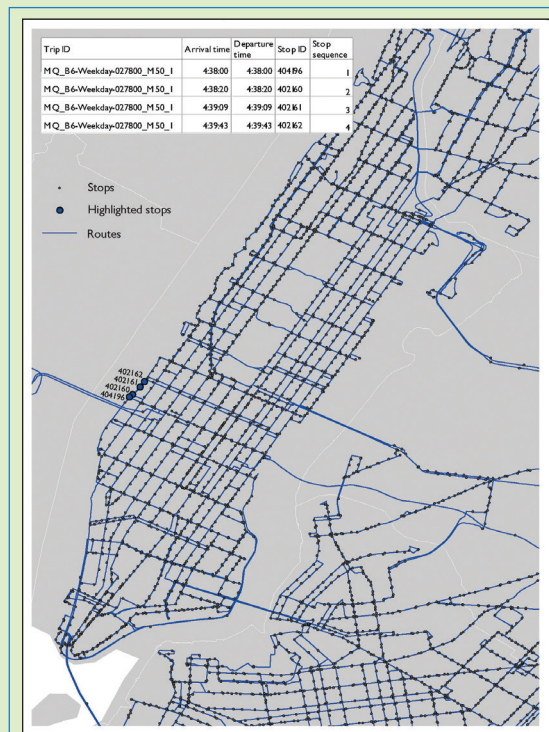


Figure above shows a sample of the New York City routes and stops data contained in the National Transit Layer. It highlights schedule and stop information for a specific bus trip that is available from the data.

Cloud Services for hosting the NLD. In fiscal year 2016, a memorandum of understanding agreement for hosting and a development/testing environment had been established. The updated NLD in the new cloud-hosting environment will be completed in fiscal year 2017.

Water–Oceans and Coasts Theme. The Water–Oceans and Coasts (W–O&C) Theme completed all of the A–16 NGDA Portfolio management requirements during fiscal year 2016. The NGDA LMAs showed that the majority of the W–O&C Theme NGDAs are very mature. The creation of the W–O&C Theme Strategic Plan was a rewarding process and will provide a strong foundation for future Theme activities.

Maintaining and Endorsing Standards

The FGDC continued its leadership and participation in development and coordination of national and international standards applicable to the geospatial community that support Objective 3.1 of the NSDI Strategic Plan. It also advanced four standards through the FGDC review and approval process.

FGDC endorses Part 2, Digital orthoimagery (revised), of the Geographic Information Framework Data Standard.

In early FY 2016, the FGDC announced endorsement of Part 2, Digital Orthoimagery (revised), of the Geographic Information Framework Data Standard. The primary purpose of the orthoimagery standard is to facilitate interchange and use of digital orthoimagery data.

The orthoimagery standard establishes a common baseline for semantic content of orthoimagery databases. It specifies data content and the logical structure for description and interchange of framework digital orthoimagery. The standard includes a data dictionary based on the conceptual schema: an orthoimagery dataset shall satisfy the requirements of the data dictionary. This standard stresses complete and accurate reporting of information relating to quality control and standards employed in testing orthoimagery data. To a certain extent, it provides guidelines for acquisition and processing of imagery and specifies documentation of those acquisition and processing steps. Finally, the orthoimagery standard replaces analog camera references with digital sensors and recognizes satellite technology for digital orthoimagery production.

Three standards advance through the FGDC standards process:

United States Thoroughfare, Landmark, and Postal Address Data Standard

The United States Thoroughfare, Landmark, and Postal Address Data Standard (“Address Data Standard”) supports the (newly established) NGDA Address Theme.

The public review and comment period for the revised draft Address Data Standard closed on April 25, 2016. Public review comments are being resolved, and comments that concern specific issues, changes, and additions may result in changes to the Address Data Standard.

The primary purposes of the Address Data Standard are to: develop content specifications for address information; provide classifications for different types of addresses; establish appropriate standards and measures for evaluation of address data quality; and support exchange of address data. The FGDC endorsed the previous Address Data Standard in 2011, and numerous Federal, State and local government agencies have since used it to manage their address data.

Proposed revisions to the previous Address Data Standard include the following: corrections to typographic and minor grammatical errors; minor corrections to the .XSD definitional document (for XML data exchange) and SQL code examples; updating of all links and references (URLs, and so forth); and addition of a MapPosition element to describe the position of an address point. MapPosition allows multiple coordinate positions to be associated with an address.

INCITS/ISO 19115-1:2014, Geographic information—Metadata— Part 1: Fundamentals

Metadata are critical for documenting, preserving, and protecting agencies’ spatial data assets. Metadata, structured in a standardized manner, facilitate search and access of online datasets or geospatial services and ensure that geospatial data are used appropriately and that resulting analyses are credible.

The FGDC Coordination Group ballot to approve International Committee for Information Technology Standards/International Organization for Standardization (INCITS/ISO) 19115-1:2014, Geographic information—Metadata—Part 1: Fundamentals, for FGDC endorsement closed on September 20, 2016.

INCITS/ISO 19115-1:2014, Geographic information—Metadata—Part 1: Fundamentals is a foundational geospatial metadata standard that provides information about identification, extent, quality, spatial and temporal

aspects, content, spatial reference, portrayal, distribution, and other properties of digital geographic data and services. It has similar information elements as contained in FGDC Content Standard for Digital Geospatial Metadata (CSDGM) and ISO 19115:2003, but improves on those two standards.

The FGDC metadata program recognizes that government agencies are at varying levels of advancement in the use of metadata standards: for this reason, the FGDC will retain the CSDGM and ISO 19115:2003 as legacy standards after endorsement of ISO 19115-1:2014. The goal is to migrate to the International Organization for Standardization (ISO) as agencies are able to do so.

INCITS/ISO 19157:2013[2014] Geographic information—Data quality standard

Data quality is an important component of data management practices. The FGDC Coordination Group ballot to approve INCITS/ISO 19157:2013[2014], Geographic information—Data quality, for FGDC endorsement closed on September 20, 2016.

INCITS/ISO 19157:2013[2014] facilitates description of geospatial data quality and defines standardized components and structures of data-quality measures. It improves on data-quality reporting in the CSDGM and ISO 19115:2003 through added elements of value such as principles for describing quality of geographic data; components for describing data quality; components and content structure of a register for data-quality measures; general procedures for evaluating quality of geographic data; principles for reporting data quality; and data-quality measures for use in evaluating and reporting data quality.

With FGDC endorsement of INCITS/ISO 19157:2013[2014], ISO/TS 19138:2006, Geographic information—Data quality measures, will be concurrently withdrawn as an FGDC-endorsed standard, as INCITS/ISO 19157:2013[2014] revises ISO/TS 19138:2006.

Open Geospatial Consortium

FGDC sponsored two work items this year. The first is the Arctic Spatial Data Pilot Activity, sponsored by the USGS and Natural Resources Canada. The goal is to demonstrate the diversity, richness, and value of Spatial Data Infrastructure (SDI) Web services to Arctic SDI stakeholders. The diversity of Arctic data available via the Open Geospatial Consortium (OGC) specifications shall be assessed within the context of domestic, continental, and international requirements. The project is being executed in two phases. The first phase, now complete, was organized as an OGC concept development study. The second phase, kicked off September 27–28, 2016, in Ottawa, Canada, is

an OGC pilot initiative with active involvement of a number of OGC member organizations. The second phase will be complete in spring of 2017.

The second sponsored activity is the OGC Interoperability Testbed 12, a fast-paced, multivendor, collaborative effort to define, design, develop, and test candidate interface and encoding specifications. The FGDC/U.S. Geological Survey (USGS) sponsored this effort, adding additional capabilities into the GeoPackage Standard, and a unique activity of providing data service and Web client development to support the Arctic Spatial Data Pilot.

This work in OGC supports the FGDC strategic plan Objective 3.1—“Lead and participate in the development and coordination of national and international standards applicable to the geospatial community.” The Arctic Spatial Data Pilot will provide for greater adoption and utilization of standards resulting in enhanced interoperability of geospatial data, services, and systems. The Pilot is also enabling collaboration with the existing Canadian SDI and the emerging Arctic SDI geospatial communities, and as a result, advancing common standards and approaches. Additionally, working with OGC strengthens our strategic partnerships with existing standards development organizations.

Additionally, the results of this Arctic Spatial Data Pilot will inform the Data and Technical Interoperability Objective of the Arctic SDI Strategic Plan 2015–2020. For additional information on the cooperative efforts of the National Mapping Agencies of the eight Arctic countries to guide the development of an Arctic Spatial Data Infrastructure, please visit the Arctic SDI Web site.

Metadata Serves As Foundation for NSDI Initiatives

Metadata standards facilitate development, sharing, and use of geospatial data and services. The FGDC adopts geospatial standards that support NSDI implementation. Federal agencies are required to use FGDC-endorsed standards and non-Federal organizations are encouraged to use these standards to facilitate data sharing.

This year, the FGDC Geospatial Metadata Program, with support from the FGDC Metadata Working Group, recommended two **ISO standards for FGDC endorsement**. The first is the INCITS/ISO 19115-1:2014, Geographic information—Metadata—Part 1: Fundamentals, which is a foundational geospatial metadata standard that provides information about identification, extent, quality, spatial and temporal aspects, content, spatial reference, portrayal, distribution, and other properties of digital

geographic data and services. The second standard is the INCITS/ISO 19157:2013[2014] Geographic information—Data quality standard, which facilitates description of geospatial data quality and defines standardized components and structures of data-quality measures. These are key metadata standards that improve upon existing FGDC-endorsed standards and will enhance geospatial data documentation of agencies' spatial data assets. For more information, see the Standards Program section.

As the fundamental component critical for data discovery and use, metadata continued to play a key role across FGDC-related initiatives.

An updated version of the **National Geospatial Data Asset (NGDA) Metadata Guidelines** was published to provide a consistent approach to document geospatial Web service and data download links.

NGDA Theme Leads and Dataset Managers are actively updating their metadata content in accordance with the guidelines and the number of NGDA-related services discoverable at *GeoPlatform.gov* has significantly improved. Service reliability and availability is also provided through the FGDC Service Status Checker on *GeoPlatform.gov*. The guidelines have improved both human and machine readability of metadata. While the guidelines were developed for the NGDA Datasets, the documentation details are being included in best practices to support all agency metadata records in the *Data.gov/GeoPlatform.gov* Catalog. For more information, see: cms.geoplatform.gov/sites/default/files/document_library/NGDA_Metadata_Guidelines.pdf.

Geospatial data technologies, concepts, and supporting standards constantly evolve. To support the community in navigating these changes, the Metadata Program continued education and outreach efforts.

Tools for creating, managing, and publishing ISO geospatial metadata comprise an important aspect of implementation efforts. The **ISO Geospatial Metadata Editors Registry** continues to expand as several ISO metadata editor developers have provided information to the Registry and have been able to easily update and modify their information. The Registry includes features about the editor, its functionality, supported standards, and points of contact. User reviews provided by FGDC Metadata Working Group members describe additional aspects of the tools from an implementation perspective. This resource is available on the FGDC Web site for the NSDI stakeholder community to identify and compare relevant ISO metadata editors that meet their requirements. For more information, see www.fgdc.gov/metadata/iso-metadata-editor-review-v2.

The **ISO Geospatial Metadata Implementation Forum** continued in 2016. The purpose of the Forum is for

ISO Geospatial Metadata Editors

Feature	GeoNetwork Opensource	CatMDEdit V.5.0	Esri Geoportal Server	QSphere
	View Full Record	View Full Record	View Full Record	View Full Record
Geospatial Metadata Content Standards Supported				
ISO 19115:2003 - Metadata	full	full	full	partial
ISO 19115-2 - Gridded Imagery Extension	full	none	full	none
ISO 19110 - Feature Catalog	full	full	full	none
ISO 19119 - Services	full	full	full	none
ISO 19115-1 - Metadata Fundamentals	full	none	full	partial
Other Related Metadata Standards	View	View	View	View
User Interface				
GUI				
Edit XML Directly				
Other / Comments	View	View	View	View

International Organization for Standardization (ISO) Geospatial Metadata Editors Registry.

the FGDC Metadata Working Group and other NSDI stakeholders to present and discuss ISO geospatial metadata standards and implementation efforts through shared experiences and resources. This year, the Forum included speakers from Federal, State, local, and provincial governments, and from the international, academic, and private sectors. The presentations included “NASA’s Implementation of ISO 19115: the Common Metadata Repository,” “Metadata for the Infrastructure for Spatial Information in the European Community (INSPIRE) Directive in Europe,” “EPSCoR/EGIS Metadata: FGDC to ISO Transformation,” “Department of Energy’s Geothermal Data Repository’s Strategy for Proper Data Management,” and the “FGDC’s Service Status Checker.” Sessions are held on a monthly basis and all materials are available through the FGDC Web site.

Metadata Education and Outreach

The FGDC Metadata Web site improvements continued and focused on creating informative content that can serve as educational material. Geospatial metadata education materials such as “What is Metadata” and the “Business Case for Metadata” have been updated to incorporate ISO standards related information at www.fgdc.gov/training/metadata-curriculum. Coordination with the broader standards community continued with active participation in INCITS L1 Geographic Information Systems Technical Committee, ISO Technical Committee 211, Open Geospatial Consortium Technical Committee, and the FGDC Standards Working Group. In addition, FGDC staff have continued

to provide committee support for ISO 19165 Geographic information—Preservation of digital data and metadata. Presentations related to metadata activities and FGDC initiatives were delivered at the URISA 2015 GISPro conference, ESRI Metadata Special Interest Group meeting, in June 2016, as well as during the SciDataCon workshop in September 2016 that was an element of International Data Week.

Collectively, the metadata efforts support the following NSDI Strategic Plan objectives to:

- Develop geospatial interoperability reference architecture.
- Establish the Geospatial Platform as the Federal geospatial data, services, and applications Web-based service environment.
- Advance the portfolio management process for National Geospatial Data Assets.
- Lead and participate in the development and coordination of national and international standards applicable to the geospatial community.

National Geospatial Advisory Committee

The National Geospatial Advisory Committee (NGAC) is a Federal advisory committee sponsored by DOI to provide external advice and recommendations to the member agencies of the FGDC. The NGAC includes a balanced membership of 29 committee members representing a

ISO 191** SUITE OF GEOSPATIAL METADATA STANDARDS

Home / Geospatial Metadata / ISO 191** Suite of Geospatial Metadata Standards

ISO geospatial metadata standards have been developed as a suite of standards. The base Fundamental standard (ISO 19115-1) is the core of the suite. Fundamentals includes information common to most geospatial data resource types.

Additional standards have been developed to:

1. **extend** the Fundamental standard by adding content that must be used **in conjunction with** the Fundamental standard
2. document **related** information that can stand alone or **associated with** a Fundamental metadata record
3. **encode** and validate a standardize XML metadata record

The suite approach enables metadata creators to select and apply only those standards relevant to their organization and data types. The suite also enables the one time documentation of information, e.g. Data Acquisition and Processing, Feature Catalogs, Data Quality Methods and Measures, etc., that may be applied to multiple geospatial resources and their associated metadata records.

Geospatial Metadata Web site Enhancements.

variety of organizations involved in geospatial issues, including all levels of government, the private sector, nonprofit organizations, and academia. The NGAC meets three or four times per year and has established subcommittees that conduct research and develop draft products between committee meetings. Over the past year, the NGAC has analyzed and provided recommendations on a number of key geospatial policy issues. Highlights of the NGAC's 2016 activities include the following:

- In 2016, the NGAC provided extensive input and comment in the development of a new strategic plan framework for the National Spatial Data Infrastructure (NSDI). This included providing comments on the current (2014–2016) NSDI Strategic Plan and advice and recommendations related to the FGDC policy framework, key emerging technologies, and geospatial standards coordination.
- The NGAC is also developing a transition recommendations paper for the next presidential Administration. The transition paper will include advice and recommendations on geospatial policy issues for the next Administration from the perspective of the organizations and interests represented on the NGAC.
- The NGAC adopted a set of papers summarizing the activities and feedback provided by NGAC subcommittees, including the following:
 - The Changing Geospatial Landscape—A Second Look
 - 3DEP Data Acquisition Coordination
 - Landsat Advisory Group Analysis of Sentinel data use policies
 - Landsat Advisory Group Analysis of Non-Federal Landsat User Requirements
 - Comments on the National Geospatial Data Asset (NGDA) Portfolio Management Process
- The NGAC is also developing papers identifying key questions regarding future issues facing the geospatial

community, including the following topics:

- FGDC Policy Framework
- Key Emerging Technologies
- Standards Coordination Activities

In 2017, the NGAC will continue to provide advice and feedback on key geospatial topics, including the development and implementation of the 2017 NSDI Strategic Plan, continued development of the Geospatial Platform, the development of portfolio management approaches, and effective communication and engagement with partners in the geospatial community. These multifaceted activities will be a major focus of the NGAC's work over the coming year.

Supporting International Activities

This year, the FGDC provided leadership and support in advancing open data sharing and interoperability standards for accessing, discovering, and utilizing geographic data, information, knowledge, technologies, and services. The FGDC actively participated with the Intergovernmental Group on Earth Observations (GEO), Global Spatial Data Infrastructure (GSDI) Association, and the United Nations Committee on Experts on Global Geospatial Information Management (UN–GGIM) and national SDI development efforts in Poland, Peru, and Kazakhstan. These efforts help advance the NSDI Strategic Plan Objective 3.1 and 3.2 efforts to develop, coordinate and promote international standards, the NSDI vision, and raise awareness of the benefits of spatial data infrastructures.

The Group on Earth Observations (GEO) endorsed the new GEO Strategic Plan 2016–2025: Implementing Global Earth Observations System of Systems (GEOSS) that will guide global efforts to endorse continued efforts to make Earth Observation assets available through GEOSS. Over the past decade, the FGDC has been an active partner, component provider, and contributor to GEOSS. The FGDC Executive Director served as co-chair on the GEOSS Development Working Group (GDWG), providing leadership and oversight of efforts to support implementation, operation, and evolution of GEOSS. Key accomplishments are as follows:

- Developed a Draft GEOSS Service Framework (GSF) to support engagement, advocacy, and delivery of Earth observations for understanding and decision making.



NGAC Members April 2016

- Developed prototypes and pilots working with flagships, initiatives, and activities to test and evolve the GSF. The participants included AmerGEOSS, GEOGLOWS, BluePlanet, Aquawatch, Marine Bon, Sustainable Development Goals indicator development, and the Ecosystems Accounts Framework.
- Continued efforts to provide the GEOSS Common Infrastructure Component Systems Registry (CSR) for registration of new partners and Earth observation assets and services. The CSR now contains approximately 870 registered resources and continues to grow.
- Development and adoption of the Data Management and Technical Principles to improve the discoverability, accessibility, and usability of Earth observation assets.
- Improved the Discovery and Access Broker (DAB) and monitoring tools. The number of discoverable and accessible Earth observation resources increased from approximately 71 million to approximately 190 million assets—a 168% increase.

The FGDC actively participated in the U.S. Group on Earth Observations (USGEO), a subcommittee of the Committee of the Environment, Natural Resources and Sustainability (CENRS) with representatives from 16 Federal agencies and the Executive Office of the President. The USGEO continued efforts to advance the use of Earth observations by agencies and their stakeholders. Key activities are:

- The Common Framework for Earth Observation Data (CFEOD) was published to support national efforts to improve discoverability, accessibility, and usability of Earth Observations.
 - The second National Earth Observation Assessment is underway and scheduled to be completed in the summer of 2017.



The Global Geospatial Information Management Working Group. The FGDC Global Geospatial Information Management (GGIM) Working Group (WG) represented the United States and served as the U.S. Delegation to the UN Committee of Experts on Global Geospatial Information

Management (UN–GGIM). The United States was elected by the Member States to cochair the UN–GGIM. Several international meetings were held throughout the year where members presented and participated in events with specific geospatial themes. The FGDC WG supported the creation of two new sectors to advance the work of the UN–GGIM: an Academic Network and a Private Sector Network. The purpose of the FGDC GGIM WG is to coordinate and align the U.S. position with the efforts of the UN–GGIM. The primary activity of the GGIM WG is to participate in UN–GGIM meetings and related conferences. Members of the group are from several Federal agencies, including DHS, EPA, FEMA, National Geospatial-Intelligence Agency, NOAA, Census Bureau, DOI, USDOT, U.S. Department of State, Agency for International Development, NASA, and the USGS.

In support of the UN–GGIM, representatives from the FGDC GGIM Working Group attended several meetings of the UN–GGIM. One of the five regional entities, the UN–GGIM Americas in which the United States is a member, convened their second meeting in Mexico City in November 2015. As the U.S. cochair of the UN–GGIM, one member participated in a UN–GGIM Bureau meeting in December to plan the year’s activities and schedule. Members presented on a collaborative pilot between NASA representing the USGEO, and the Census Bureau representing the UN–GGIM in a side event session on Sustainable Development Goals (SDGs) in advance of the annual UN Statistical Commission meeting in March. In April, 2016, members participated in the UN–GGIM Fourth High Level Forum in Addis Ababa, Ethiopia, with a central focus on land administration and management. The United States organized a workshop on the importance of the 2020 Round of Censuses and the role of national mapping organizations for that effort. At the request of OMB, the FGDC UN–GGIM prepared a paper for the United States on “A Common International Conceptual Framework for Geospatial and Statistical Data” for the UN European Economic Commission Conference of European Statisticians (CES) Plenary Session in Paris in April 2016. During that event, U.S. members advanced the work of the UN’s Expert Group on the Integration of Statistical and Geospatial Information. A member gave a keynote address at the Geospatial World Forum in Rotterdam, Netherlands, held May 23–26, 2016.

On July 27, 2016, the UN Economic and Social Council adopted a draft resolution entitled “Strengthening institutional arrangements on geospatial information management” following a year-long consultative process that was cosponsored by the United States and continues the work of the UN–GGIM. The FGDC GGIM U.S. Delegation participated in the 6th Session of the UN–GGIM, held at UN Headquarters in New York from August 1–5, 2016. The U.S. Delegation joined 313 participants from

93 member States, 5 representatives for 2 nonmember States, and 68 representatives of organizations of the UN system and observers for intergovernmental, nongovernmental, and other organizations. Outcomes of the 6th Session included the following: continued efforts of defining global fundamental geospatial data themes; identification of several legal and policy issues; recent standards development and recognition that the SDGs are stimulating needs for new or modified standards; acceptance of a Global Statistical Geospatial Framework; completed work on geospatial inputs for developing a global indicator framework for the 2030 Sustainable Development Goals; determined priorities for geospatial information and services for disasters; and conducted an international forum on geospatial information and services for disasters in Barbados. An additional outcome from the session included the selection of the United States as a cochair of the UN–GGIM, along with China and Mexico.



Members of the Global Geospatial Information Management (GGIM) Working Group attending the 6th Session of the UN–GGIM.

Goals for Fiscal Year 2017

2017 NSDI Strategic Planning Process—Planning for the Future. The FGDC initiated a comprehensive planning process in 2016 to develop a new strategic plan for the NSDI to chart a path forward for national geospatial programs. This new plan will be developed in two phases. First, a high-level strategic plan framework will be developed by December 2016, describing priorities and opportunities for the next Administration. Second, following engagement and coordination with the new Administration in 2017, a final version of the next NSDI strategic plan will be developed by the end of 2017.

As part of the planning process, the NGAC has provided extensive comments and input into the development of the NSDI framework. The NGAC has established subcommittees to explore the following topics:

- **NSDI Strategic Plan** – Assess and provide feedback on 2014–2016 NSDI Strategic Plan.
- **NGDA Management Plan** – Assess and provide feedback on National Geospatial Data Asset (NGDA) Management Plan.
- **New and Emerging Technologies** – Describe how new technologies will impact the geospatial community and how these changes might be reflected in the NSDI strategic plan framework.
- **Policy Framework** – Provide perspectives and advice on how Circular A–16 and the geospatial policy framework might be updated to reflect changes in technology, organizational capabilities, partnerships, and the evolution of the geospatial community.
- **Standards Coordination** – Provide advice on greater adoption and utilization of standards resulting in enhanced interoperability of geospatial data, services, and systems, and provide collaboration with voluntary standards organizations to enhance the implementation of endorsed standards.

In addition, the FGDC has held a series of planning meetings and listening sessions with key stakeholders, including the following:

- NSDI workshop for Federal agency representatives to gather initial input and build the foundation for the NSDI plan.
- NSDI Leaders Forum session to seek involvement and gather input from key external partner organizations.
- Meeting with Coalition for Geospatial Organizations (COGO) to coordinate activities.

- Listening sessions at multiple geospatial conferences and partner meetings.
- Focus group sessions with Tribal representatives and other key partners.

Next Steps. Based on this input, the FGDC and the interagency NSDI Core Team will develop a strategic plan framework by December 2016, which will provide a basis to engage the next Administration on national geospatial priorities and opportunities.

A–16 NGDA Portfolio Management. The coming year will focus on several A–16 NGDA Portfolio management activities. Currently, each agency is working to establish or identify Web services and data downloads and update their metadata records in the *Data.gov/GeoPlatform.gov* Catalog to improve accessibility of NGDA Datasets. This effort, anticipated to be completed in fiscal year 2017, will result in increased accessibility to NGDA Web services and data as well as more consistent human- and machine-readable metadata. In addition, incorporating the FGDC service status checker will inform users about reliability and availability of the NGDA Web services. Also, the FGDC Steering Committee identified an additional 2016–17 FGDC priority for each Theme to develop a Theme Implementation Plan (TIP) that documents and assesses Theme Strategic Plan activities while continuing to advance geospatial portfolio management. The NGDA community initiated the development of a TIP template that will be completed in early fiscal year 2017. The initial focus will be on development of Theme Implementation Plans for the Framework A–16 NGDA Themes with a target completion date of December 31, 2016. The other NGDA Themes will also develop Implementation Plans and their target completion date will be determined as part of the ongoing NSDI Strategic Plan Framework development. In fiscal year 2017, the NGDA community will work towards evaluating each NGDA Dataset's maturity through the LMA process. A key activity will be incorporating the contributions of A–16 NGDA Portfolio management into the NSDI Strategic Plan Framework and the next NSDI Strategic Plan. The continuation of activities in fiscal year 2017 will further the implementation of portfolio management of geospatial data and will include the combined efforts of the FGDC Steering Committee, NGDA Executive Theme Champions, NGDA Theme Leads, NGDA Dataset Managers, FGDC Office of the Secretariat, and the *GeoPlatform.gov* Team.

Challenges/Opportunities: Continued engagement by the FGDC Federal agencies on the many concurrent activities

is crucial for developing meaningful and consistent reporting for NGDA Themes and Datasets, and ensuring adequate resources are applied to implement the A-16 NGDA Portfolio and its supporting tools. Active participation in the development of the NSDI Strategic Plan Framework will provide an opportunity to address these challenges and will enable core Federal geospatial assets to be available for effective sharing, collaboration, and use to support efficient and effective decision making.

Standards. The FGDC standards program will advance standards actions of the NSDI Strategic Plan. It will seek FGDC endorsement of the United States Thoroughfare, Landmark, and Postal Address Data Standard; INCITS/ISO 19115-1:2014, Geographic information—Metadata—Part 1: Fundamentals; and INCITS/ISO 19157:2013[2014], Geographic information—Data quality.

Challenges/Opportunities: The main challenges facing the FGDC standards program is obtaining necessary support from and cooperation with NGDA Dataset Managers, Theme Leads, Executive Theme Champions, and Theme Lead Agencies, as well as FGDC Subcommittees/Working Groups to fulfill actions and tasks in the NSDI Strategic Plan.

Geospatial Metadata. Continue involvement in NSDI Strategic Plan Framework development and implementation, including *GeoPlatform.gov* and A-16 National Geospatial Data Asset Portfolio management. Finalize FGDC endorsement for INCITS/ISO 19115-1:2014, Geographic information—Metadata—Part 1: Fundamentals and INCITS/ISO 19157:2013[2014] Geographic information—Data quality standard. Additional relevant ISO geospatial metadata standards will be considered for FGDC endorsement. Provide practical guidance for ISO metadata transition/implementation via the FGDC Geospatial Metadata Web site, ISO Geospatial Metadata Implementation Forum, ISO Geospatial Metadata Editors Registry, and possible continuation of the Metadata Summit series (2011 and 2013). Continue to promote and manage the ISO Geospatial Metadata Editors Registry. Identify metadata-related issues and actions in support of the GIRA.

Challenges/Opportunities: The opportunity to expand FGDC endorsement of ISO metadata standards to improve documentation of key agency data assets will be ongoing. The challenge of meeting the technical demands to stay current on actively evolving ISO 19100 series of geospatial standards can be supported through identifying ISO metadata implementation activities that can serve as shared learning experiences, coordinating metadata activities at the national and international level, and compiling efforts of effective geospatial metadata education and outreach resources.

Collaboration with the National Geospatial Advisory Committee. The National Geospatial Advisory Committee (NGAC) will hold three to four public meetings in fiscal year 2017. The FGDC will manage the review, disposition, and implementation of NGAC recommendations. Goals for the NGAC in fiscal year 2017 include the following:

- The NGAC will provide ongoing review, feedback, and recommendations regarding the development and implementation of key issues and initiatives, including the development and implementation of the 2017 NSDI Strategic Plan, continued development of the Geospatial Platform, the development of portfolio management approaches, and effective communication and engagement with partners in the geospatial community. These areas will be the initial focus of the NGAC's work in FY 2017.
- The FGDC will review and respond to advice and recommendations from the NGAC.
- The FGDC will complete the next cycle of NGAC nominations and appointments in FY 2017.

International. A goal for the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) is to continue work on geospatial data required for meeting the Sustainable Development Goals. Each of the work items mentioned above have goals associated with them in which most have FGDC-GGIM participation. A new item that will be proposed by the United States and others in 2017 is the formation of a working group on Ocean and Marine Global Geospatial Data.

FGDC Subcommittees and Working Group Reports

FGDC Subcommittees and Working Group Reports

The FGDC is supported by subcommittees and crosscutting working groups to address geospatial issues for the specific data types. The FGDC subcommittees and working groups are comprised of representatives from Federal agencies and FGDC-recognized stakeholder groups who share a common interest. Each subcommittee focuses on issues that pertain to coordination and standards associated with a geospatial data focus area with regard to data collection, access, exchange, and applications using those data. Working groups address activities that crosscut or affect several subcommittees. Many of the FGDC subcommittees actively assist in the implementation of the A-16 NGDA Portfolio management activities and, in fact, many members of the subcommittees are designated as NGDA Theme Leads or NGDA Dataset Managers. Further information is available at www.fgdc.gov/organization/index_html#wg-sc.

Cadastral Subcommittee

The Cadastral Subcommittee develops and implements plans to coordinate cadastral data-related activities among Federal, State, Tribal, and local governments and the private sector. The BLM Geospatial Sciences Cadastral Survey Program is responsible for the land descriptions, surveys, and titles on federally managed lands. This report is a summary of the 2016 activities for the subcommittee and BLM Cadastral Survey as it pertains to national datasets and standards. This was an implementation year with a focus on implementing and completing datasets. Some highlights from 2016 are as follows. Planned activities are more fully described in the FGDC National Spatial Data Infrastructure (NSDI) Strategic plan (www.fgdc.gov/nsdi-plan).

Indian Country Public Land Survey System GIS. The Land Buy-Back Program for Tribal Nations implements the land consolidation component of the Cobell Settlement, which provided \$1.9 billion to purchase fractional interests in trust or restricted land from willing sellers at fair market value. Consolidated interests are immediately restored to Tribal trust ownership for uses benefiting the reservation community and Tribal members.

There are approximately 245,000 owners of nearly three million fractional interests across Indian country who

are eligible to participate in the Buy-Back Program. The Program has identified 105 locations where implementation will occur through mid-2021.

The BLM is a partner of the Buy-Back Program and provides mappings of the PLSS within Indian country. In 2016, BLM completed the initial collection and update to the PLSS and mapped 60 Indian reservations. For reservation lands not currently participating in the Buy-Back program, BLM collected and (or) updated PLSS on 41 additional Indian reservations.

In 2017, the BLM plans to complete PLSS mapping on approximately 100 Indian reservations in cooperation with the Buy-Back Program and the Bureau of Indian Affairs (BIA). The BIA is the lead agency for Indian reservation boundary updates. However, the BLM retains responsibility for PLSS data in Indian country. The BLM and the BIA continue working together to improve records and update reservation boundaries that are critical to supporting all Indian lands programs.

Federal Rights and Interests. The BLM published the Specification for Descriptions of Land (www.blm.gov/wo/st/en/prog/more/cadastralsurvey.html) in 2015. In 2016, the full implementation of these specifications included establishing cadastral review for all land descriptions affecting Federal lands and to verify conformance to this standard. The standard will also assist lands and realty personnel with providing standard land descriptions for land transactions.

Standardized PLSS – Nationwide Status. The PLSS dataset is considered a National Geospatial Data Asset. The BLM facilitated and (or) completed the standardization of all 30 PLSS States in FY 2016. Fifteen States saw significant updates and enhancement in 2016 with 12 States now migrated to Esri's parcel fabric format for ongoing maintenance. BLM training on maintenance with parcel fabric has been completed in six BLM administrative State offices. Training materials and exercises have been published to assist Federal and non-Federal data stewards.

National Parcel Data, Federal Lands Working Group, and State Stewardship. The subcommittee and BLM participated in the DHS-sponsored national parcel dataset workshops in June and October by presenting at both workshops. The BLM Eastern States Office presented to the Federal Lands Working Group (FLWG) in September and all BLM offices continue to improve the quality and

completeness of Federal lands inventory and status across the country. The subcommittee continues to support the advancement of State stewardship for the assembling, aggregation, standardization, and publishing of locally sourced parcel data. Through the wildland fire support, homeland security data needs, and Census boundary quality improvement efforts, it is very apparent that State-hosted standardized accessible parcel data are essential to support many Federal, State, and local programs.

2017 Planned Activities

The subcommittee and BLM Cadastral activities for 2017 will follow the planned activities as described in the FGDC Cadastral Strategic Plan. The following is a summary from the strategic and implementation plans:

Goal 1: Cadastral Reference - Including the Public Land Survey System (PLSS) and Other Frameworks

- Continue to provide updates and enhancements to the 30 States PLSS data, including establishing a release schedule for all States. This will include extremely complex areas with numerous minerals surveys.
- Define and maintain a framework for reference in non-PLSS States and define a maintenance approach and schedule.
- Complete the conversion of all PLSS data to the parcel fabric for ease of maintenance.

Goal 2: Public Lands Surface Agency Management

- Review current maintenance and update approaches to the Surface Management Agency (SMA) in all BLM administrative States.
- Automate standardized reporting for SMA updates.
- Initiate the positional realignment of SMA with the PLSS.

Goal 3: Federal Subsurface Management Areas - Including offshore and continental

- Establish standards and workflows for subsurface interest maintenance, tracking, and reporting.
- Begin the development of a national subsurface dataset. The PLSS standard dataset will be used to establish this dataset.

Goal 4: Land Management Agency Coordination

- Continue with discussions and coordination among other Federal land agencies.

Goal 5: Parcel Data - Including Federal Rights and Interests and coordination of non-Federal datasets

- Publish a Web service for inventory and status of State and regional parcel-data aggregation progress and links to data.

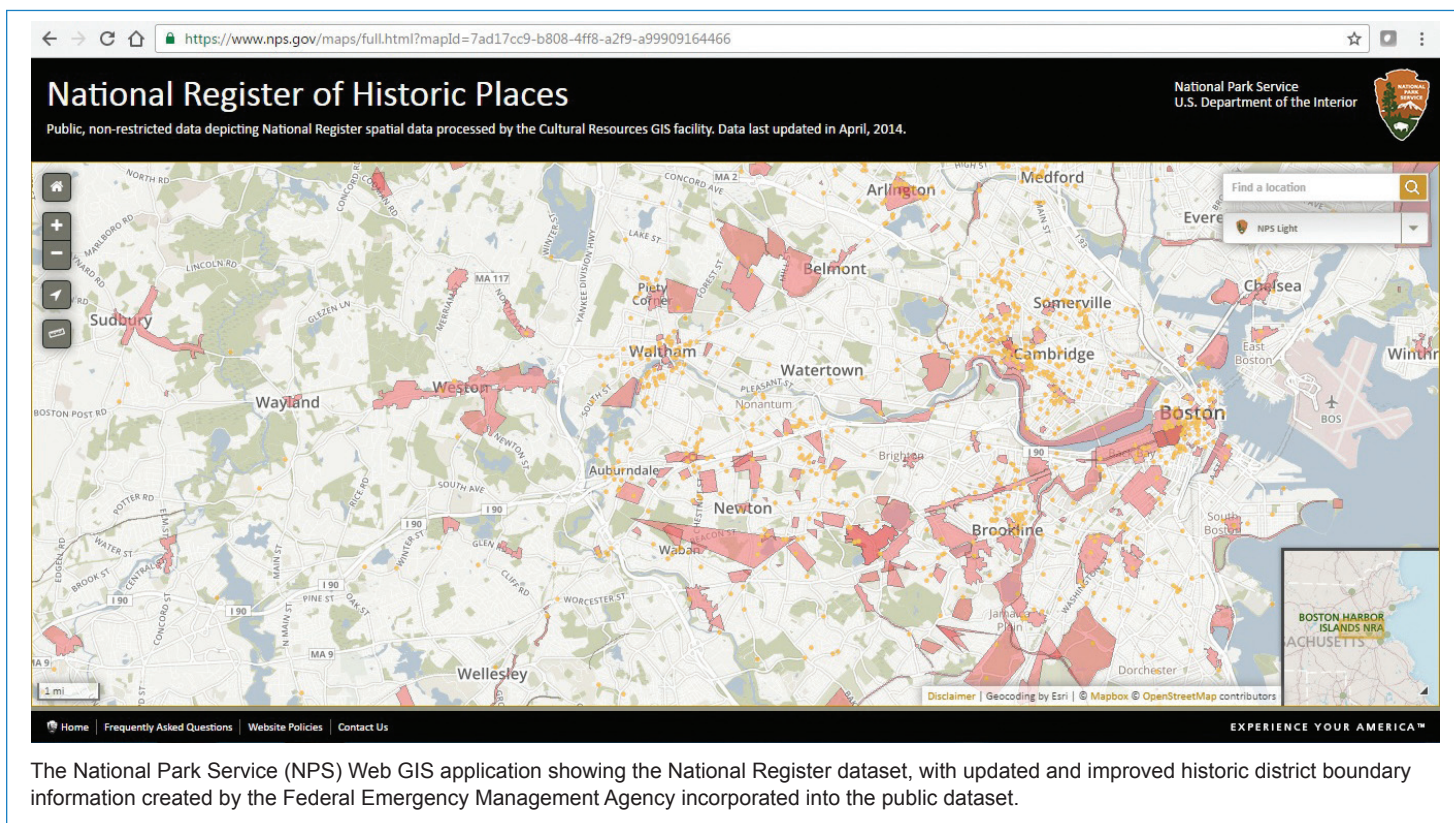
Goal 6: Coordination

- Continue to coordinate with other FGDC WGs and subcommittees on activities related to cadastral information.

Cultural Resources Subcommittee

The purpose of the Cultural Resource Subcommittee is to identify, prioritize, implement, coordinate, and oversee the strategies and tasks required to support the national cultural resource geospatial data theme and to coordinate these activities across Federal, State, Tribal, local, and private sector geospatial programs to that end. Because each State/Tribal historic preservation office, certified local government, and Federal agency operates independently to collect, maintain, and utilize their portion of the repository of over five million cultural resources nationwide, coordination in data standards is a key aspect for the utility of the data, required for Federal regulatory needs, disaster response, and preparedness, as well as for climate change studies. The subcommittee provides the framework for developing cultural resource data standards to facilitate data sharing, in addition to fostering coordination of data collection efforts among stakeholders. Subcommittee members include 20 Federal agencies, as well as 10 State and 10 Tribal participants. The subcommittee's accomplishments for 2016 include the following:

- Continued development of an initial working draft of the proposed cultural resource data transfer standard throughout 2016, making significant progress. The subcommittee members have agreed on a data structure for the standard, as well as feature level metadata fields and domain values for those fields. This feature level documentation will help facilitate the exchange of data between Federal, State, Tribal, and local governments. The model is currently being tested by subcommittee participants with their own cultural resource spatial data.
- Completed the NGDA Theme Strategic Plans in June 2016, based on input from the Dataset Managers and the subcommittee participants. Reviewed the NGDA Implementation Plan for the strategic plan and will complete the Implementation Plan in 2017.
- Reviewed and updated all of the cultural resource datasets within the theme on geoplatform.gov to add references to Web services and to be in compliance with the FGDC NGDA dataset-level metadata needs.
- Developed a data-sharing agreement with FEMA to share resources with the goal of improving the National Register



of Historic Places NGDA dataset, resulting in dramatically improved historic district boundaries in several States.

3D Nation Elevation Subcommittee

The 3D Nation Elevation Subcommittee, established in 2016, unites terrestrial and coastal/ocean mapping agencies for the coordination and integration of terrestrial and bathymetric elevation mapping. The focus is on improving the national mapping foundation by Federal agencies in the 3DEP, the Interagency Working Group on Ocean and Coastal Mapping (IWG–OCM), and partners of other Federal, State, academic, and private sector groups. The subcommittee seeks to ensure access to an accurate, updated, continuous elevation surface from the land to the coasts to the depths of our oceans. The concept of a 3D Nation serves as a unifying goal for these efforts, providing a consistent set of standards and objectives for an authoritative National geospatial foundation.

The subcommittee’s 2016 accomplishments include the following:

- The IWG–OCM developed the National Coastal Mapping Strategy (NCMS), which presents a strategic approach to acquiring high-accuracy, high-resolution topographic and bathymetric lidar along the coasts. Released for public comment through a Federal Register announcement in

June 2016, the NCMS assesses the next steps needed to achieve the 3D Nation vision with comprehensive lidar elevation coverage in a manner that is comprehensive, cost-effective, and recurring. The NCMS describes strategies to enhance existing coordination on coastal lidar acquisition, defines bathymetric lidar quality levels that will foster the collection of interoperable datasets across agencies, encourages interagency cooperation on data management, and lays out an approach for interagency collaboration on methods, research, and technology development. In support of the NCMS and to enhance coordination, IWG members have engaged regionally with Federal, State and local partners throughout the year, including participation in a Coastal Mapping Summit in Alaska, and interactions in Washington, the Southeast region, and the Northeast. The IWG’s U.S. Federal Mapping Coordination Site also continues to be a strong vehicle for collaboration (fedmap.seasketch.org).

- 3DEP is managed by the USGS on behalf of Federal, State, and other partners to acquire nationwide high-resolution three dimensional (3D) elevation data. The goal of the cooperative program is to complete national coverage of lidar, with ifsar, in Alaska in 8 years. These data support critical applications, including flood hazard mapping, infrastructure planning, and development, natural resource management, and more. Accomplishments include:

- Preliminary results from the United States Interagency Elevation Inventory, coled by the USGS and NOAA, showed that publicly available lidar coverage increased from about 14% in FY 2015 to 19% in FY 2016.
- Preliminary FY 2016 analysis shows an increase in both data acquisition investments and number of square miles acquired compared to FY 2015. Results will be published in the FY 2016 Annual 3DEP report.
- FY 2016 was the first full year of data production and resulted in about 177,000 square miles of data made available free of charge from The National Map viewer.nationalmap.gov/basic/.
- Working with partners, the USGS conducted an assessment of emerging lidar technologies for their potential use in 3DEP acquisition. Results are published in the journal Remote Sensing. Pilot projects were initiated to further identify the full lifecycle costs of integrating these technologies into 3DEP.
- The 3DEP Executive Forum and WG initiated the development of a multiyear data acquisition plan that will establish a more systematic plan for the completion of national coverage to better leverage State, local, and other partnerships.
- In collaboration with the NOAA National Centers for Environmental Information and in coordination with the IWG–OCM, the USGS Coastal National Elevation Database (CoNED) Applications Project is constructing integrated high-resolution topobathymetric elevation models (TBDEMs) for U.S. coastal regions to support coastal and marine spatial planning investigations and applications. In FY 2016, a TBDEM model for the New Jersey and Delaware region, severely altered by Hurricane Sandy, was publicly released at (topotools.cr.usgs.gov/topobathy_viewer/).

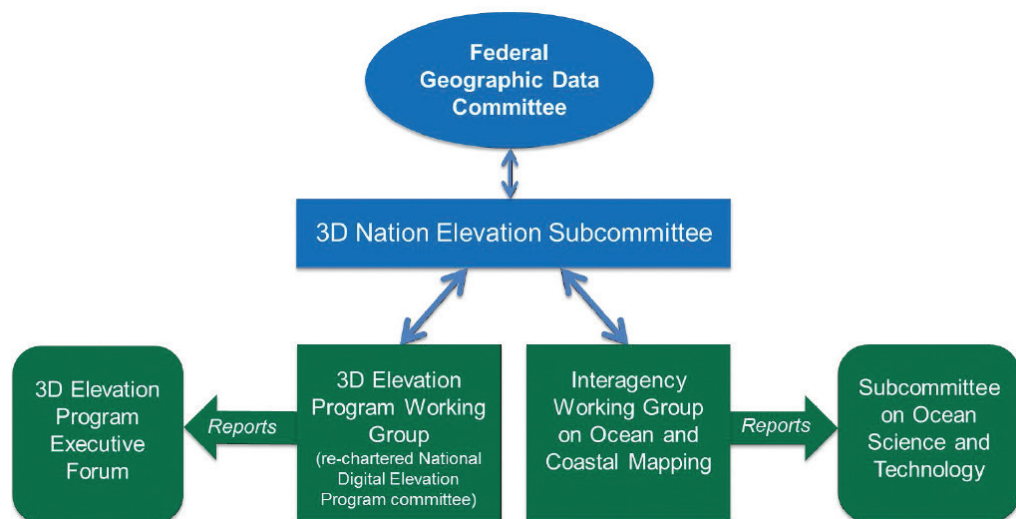
Geodetic Control Subcommittee

The Federal Geodetic Control Subcommittee helps coordinate the planning and execution of geodetic surveys, developing standards and specifications for these surveys, and exchanging geodetic survey data and technical information among Federal agencies. To provide effective leadership in these activities, NOAA's National Geodetic Survey (NGS) participates in international meetings to collaborate on international reference frames, national meetings to educate the public on U.S. national reference frames, and smaller regional meetings to discuss the particular dynamics of local

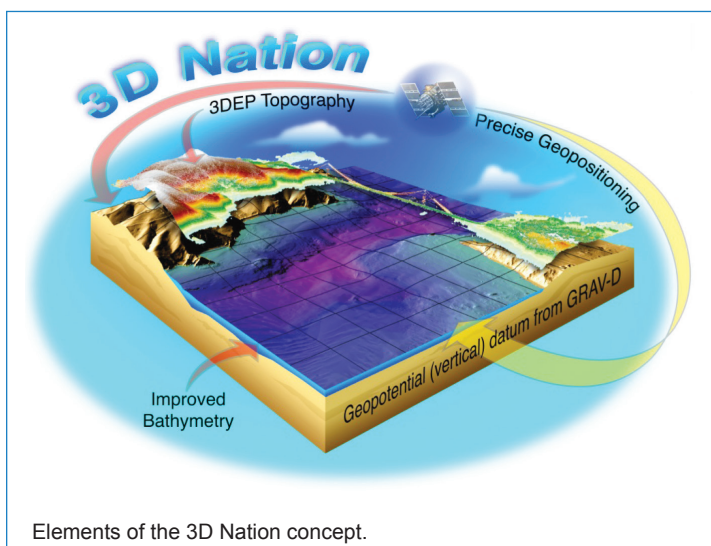
geographies.

Some of the international collaboration meetings included:

- International Federation of Surveyors (FIG) helped organize and present for a "Reference Frames in Practice Workshop," providing outreach and communication to international surveyors.
- UN–GGIM international governance, oversight, and collaboration meetings, primarily with the subcommission Global Geodetic Reference Frame (UN–GGRF), which is responsible for adopting and adapting the International Terrestrial Reference Frame (ITRF).
- Gravity Geoid and Height System meeting supporting the furtherance of the International Height Reference Frame (IHRF) and ITRF.



The 3D Nation Elevation Subcommittee governance structure.

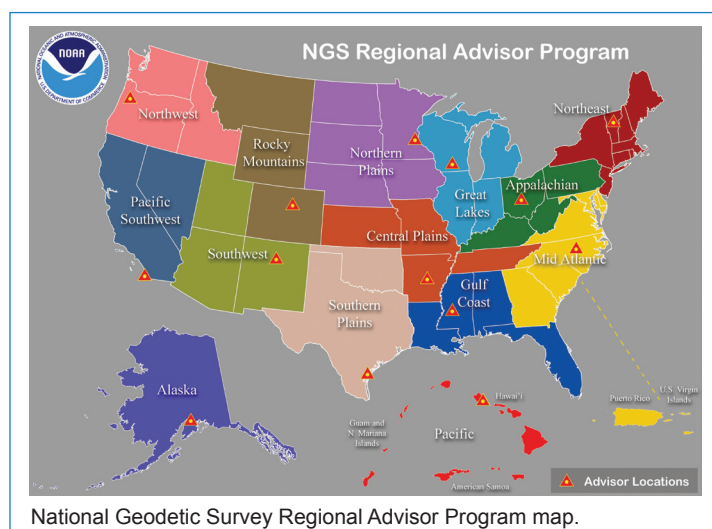
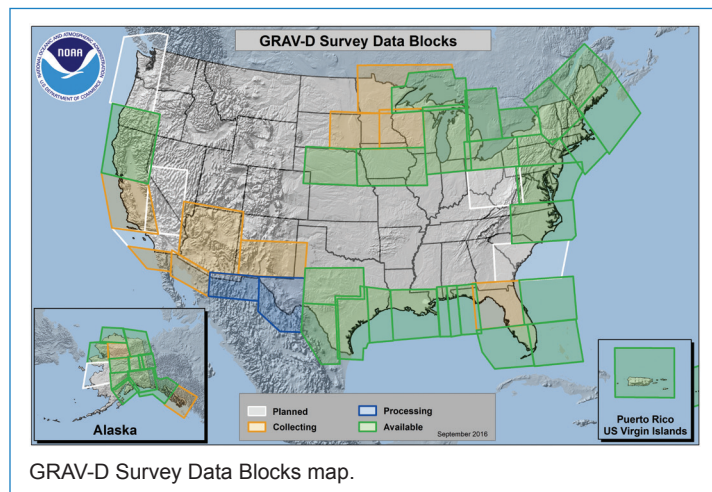


Elements of the 3D Nation concept.

- Cuba: Directors and subject matter experts from the NOAA navigation services offices met with their counterparts in Cuba to identify specific priority activities for cooperation in hydrography and geodesy.
- ISO TC 211 Control Board: working to update the ISO 19111 standard for input of reference frames into GIS applications.

Some of the subcommittee's accomplishments for 2016 are:

- *The Gravity for the Redefinition of the American Vertical Datum* (GRAV-D) reached a major milestone, collecting over 50% of the aerial gravity data collection throughout the United States and its territories. GRAV-D is on track to complete data collection 100% by the end of 2022. Each percentage of the project area equates to approximately 100 flight hours and over three million square miles of data collection has been completed. (See map.)
- The NGS released the *Experimental Geoid* for 2016 (xGEOID16) incorporating over 40% coverage for aerial gravity across the United States and its territories. These experimental geoids will help the NGS to develop a new North American Vertical Datum replacing NAVD 88.
- The NGS hosted a 5-day *Airborne Gravimetry for Geodesy Summer School* in May 2016. The school brought together experts from around the world to share their knowledge pertaining to airborne gravity data collection and processing techniques and its application to geodesy and geophysics. Sixty-five participants from 12 different countries, including Germany, Spain, and Saudi Arabia (to name a few) took part in the training.
- The NGS has expanded the *Geodetic Advisor Program* to encompass the entire United States and its territories by transitioning from a State advisor program to a regional advisor program. Regional geodetic advisors serve as liaisons between the NGS and our public, academic, and private sector constituents within their assigned regions, to ensure all States and territories are covered. (See map.)
- The NGS developed *Geodesy and Mapping educational videos* and online lessons to highlight basic principles of Geodesy, the importance of the science within mapping applications, and how changes will impact their work. This year's new videos included educational topics on the importance of Accurate Coastal Elevations and Shoreline Data and on VDATUM—a tool designed to vertically transform geospatial data among a variety of tidal, orthometric, and ellipsoidal vertical datums.
- In September 2016, NGS began Global Navigation Satellite System (GNSS) field observations for the 2016 Southern Louisiana Survey Control Update project. The project will reobserve a similar network of control marks that were occupied in 2010 and a subset of the marks that were updated in 2006. Louisiana has been



experiencing significant subsidence and is a low-elevation State where heights are very important to understand where water will flow during major events.

Geologic Subcommittee

The Geologic Data Subcommittee coordinates Federal and non-Federal interests in geologic data, including the facilitation of exchange of information and transfer of data; the establishment and implementation of standards for quality, content, and transferability; and the coordination of the identification of requirements and the collection of spatial data to minimize duplication of effort where practicable and economical.

Homeland Infrastructure Foundation-Level Data Subcommittee

The Homeland Infrastructure Foundation-Level Data (HIFLD) Subcommittee develops, promotes, and executes a coordinated strategy for acquisition or development of

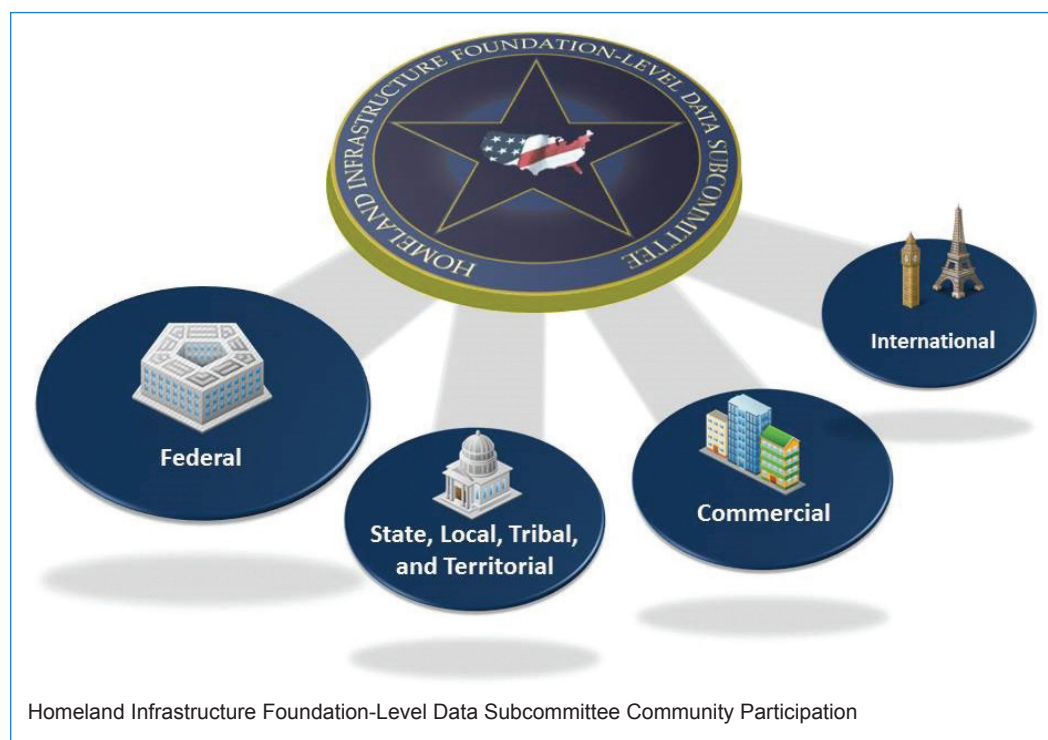
a coordinated strategy for acquisition or development of homeland infrastructure geospatial information for Federal agencies while creating and utilizing partnerships with State, Tribal, territorial, local, and private organizations. The subcommittee serves as a focal point to coordinate homeland infrastructure geospatial information requirements among Federal, State, Tribal, territorial, local, and private organizations, and to ensure coverage of homeland infrastructure geospatial information for all States, territories, and possessions. It consists of Federal agencies that, as part of their mission, collect or finance the collection of infrastructure geospatial information.

The subcommittee is supported by a HIFLD Program Management Group, which is composed of the following organizations: DHS Geospatial Management Office (GMO), National Protection and Programs Directorate (NPPD), FEMA, Department of Defense (DOD) Office of the Assistant Secretary of Defense for Homeland Defense and America's Security Affairs (OASD-HD&ASA); DOI Office of the Geospatial Information Officer; and the NGA.

The fiscal year 2016 accomplishments of the subcommittee include:

- The subcommittee coordinated the instantiation of HIFLD Open, an online portal infrastructure enabling the dissemination of 275 publically accessible Homeland Security Infrastructure Program (HSIP) data products and Web services. Since its inception in February, this HIFLD Open site has been used by over 12,900 users.
- The subcommittee extended new memberships to the Urban and Regional Information Systems Association (URISA) and the National Alliance for Public Safety Geographic Information System (GIS) Foundation (NAPSG) to provide input on the strategic direction of HIFLD and ensure their feedback is incorporated in the Common Operating Data (COD) requirements management process.
- The Common Operational Data Management Plan was established to formalize the adjudication process for new datasets based on the A-16 lifecycle data framework designated by the FGDC. The subcommittee applied intake criteria from the Plan to assess multiple layers and services available from a wide variety of data providers (both within the Federal Government and from the private sector vendor community).
- Subcommittee representatives participated in outreach events, such as the States Geospatial Intelligence Foundation (USGIF) conference and the NAPSG Homeland Security Summit to address data needs and access challenges facing users from diverse stakeholder groups. The subcommittee briefed the HIFLD community regarding the HIFLD Open Data portal at the Esri Federal Users Conference and participated in a series of meetings with fusion center representatives at the Esri National Security Summit and Users Conference. The subcommittee regularly performed HSIP demonstrations to working groups and stakeholders at multiple levels of government, including the Tennessee Geospatial Information Council (TNGIC).
- Lastly, the HIFLD Subcommittee convened a National Parcel Data Summit

120 participants convened from across 22 Federal Agencies, 20 State/local government representatives, 18 private sector organizations, and four trade associations around the critical importance of coordinating National leadership and resources towards the aggregation of a National Parcel data layer. The Summit and subsequent followup Federal Parcel Requirements workshop were all aimed at exploring ways to take a “whole-of-the-Nation” approach to satisfying a demonstrated need for national-level parcel data and its possible linkages to other ongoing FGDC initiatives (such as the National Address Database).



Marine and Coastal Spatial Data Subcommittee

The primary mission of the Marine and Coastal Spatial Data (MCSD) Subcommittee is to develop and promote the Marine and Coastal NSDI. The vision of the Marine and Coastal NSDI is that current and accurate geospatial coastal and ocean data will be readily available to contribute locally, nationally, and globally to economic growth, environmental quality and stability, and social progress. The primary focus of the subcommittee during fiscal year 2016 was complying with the A-16 requirements for the W-O&C. The subcommittee is chaired by the NOAA Geospatial Information Officer.

For the past 5 years, the subcommittee has worked in an integrated manner, seeking critical partnerships with other Federal, State, and local governments, as well as interagency and multisector activities in the marine and coastal environment focusing on spatial data. These activities include the National Ocean Council and the ocean.data.gov data portal, the Integrated Working Group on Ocean and Coastal Mapping in their development of a National Coastal Mapping Strategy, and the Integrated Ocean Observing System, to name a few key initiatives. For the year 2016, accomplishments of the subcommittee include the following:

- Led activities to complete all requirements of the NGDA Management Plan for the Water – Oceans and Coasts Theme. This included the following: created metadata for all 16 NGDAs and posted them to GeoPlatform; completed lifecycle assessment for all W-O&C NGDAs; updated the W-O&C Theme community page on GeoPlatform; and completed the initial W-O&C Theme Strategic Plan. Ongoing activities include the development of a W-O&C Theme Implementation Plan and ensuring all NGDAs have mapping services and that they are registered on GeoPlatform.
- Supported the IWG-OCM in the development of the first National Coastal Mapping Strategy. The focus of the initial Coastal Mapping Strategy is on elevation data, which includes the critical need for high-resolution coastal and bathymetric to support a variety of applications.
- Expanded the use of the Coastal and Marine Ecological Classification Standard (CMECS) for coastal mapping across the United States. The CMECS provides a national framework for organizing information about coasts and oceans and their living systems. It provides a structure for developing and synthesizing data so that ecosystems can be identified, characterized, and mapped in a standard way across regional and national boundaries. The CMECS also supports status and trend-monitoring activities, policy development, restoration planning, and fisheries management.

- Continued to support a number of high-profile coastal and marine GIS projects. A short list includes the Digital Coast, Marine Cadastre, and nowCOAST applications. Each of these projects provides access to critical data, analysis tools, and online training resources to support a range of decision-making functions—from off-shore energy development to situational awareness for coastal storms. Ensured the mapping services supporting these applications are registered and available through the National GeoPlatform.
- Worked to expand the subcommittee's outreach to the coastal and marine geospatial community. In one activity this past year, members of the subcommittee participated in the UN-GGIM and are now proposing the creation of a marine and coastal working group under the GGIM.

National Digital Orthoimagery Program Subcommittee

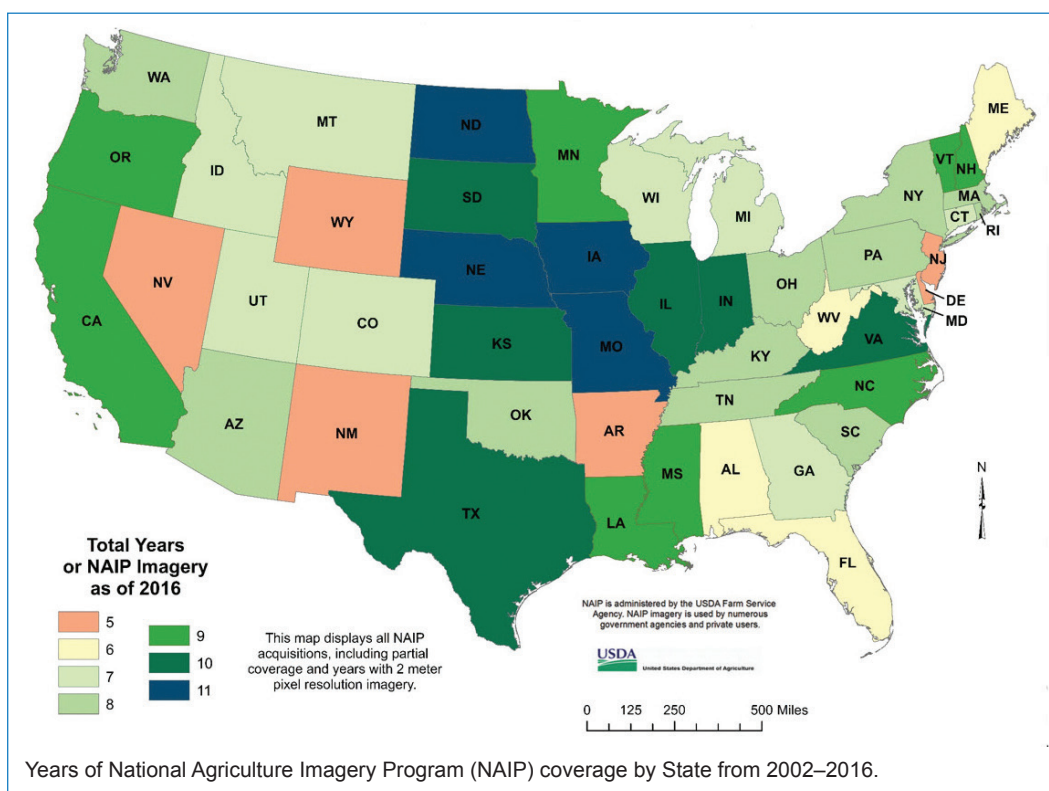
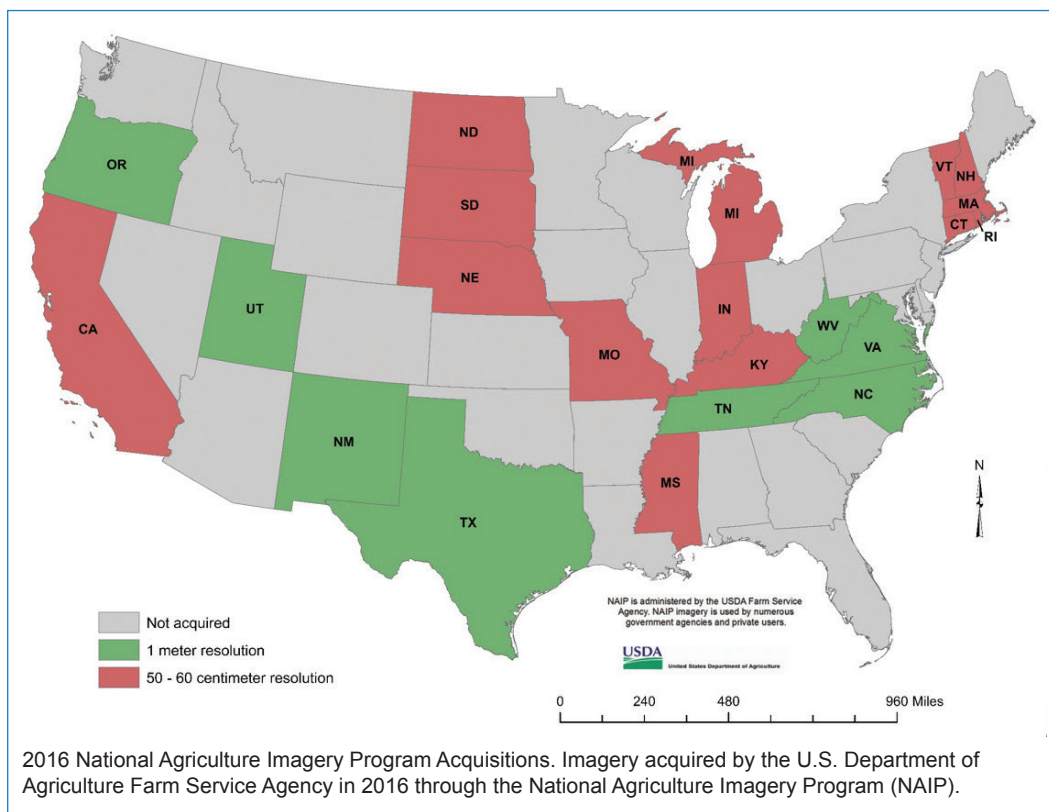
The National Digital Orthoimagery Program (NDOP) Subcommittee is responsible for developing, promoting, and executing a national strategy for acquisition or development of orthoimagery data for Federal agencies while creating and utilizing partnerships with State, local, Tribal, and private organizations and supports NSDI Strategic Plan Objective 2.2. The NDOP Subcommittee is accountable to the FGDC Steering Committee and provides recommendations to the FGDC Coordination Group. These are the policy and operational authorities, respectively, responsible for providing leadership and direction in the use and development of geospatial data and information across Federal geospatial programs and in conjunction with public, academic, and private sector partners/stakeholders. The subcommittee accomplished the following in 2016:

- As the primary source of aerial imagery for the USDA, the FSA administers the National Agriculture Imagery Program (NAIP), leveraging partnership funds from other Federal, State, and local entities to acquire imagery during the growing season over the Continental United States. In 2016, FSA acquired nearly 1.7 million square miles of 4-band (natural color and near color infrared) imagery in 22 States. Fourteen States were collected at .6-meter resolution through a partnership “buy-up” option and all the remaining States are at 1-meter resolution. An innovative addition to NAIP called the Early Access Web Services (EAWS) provides minimally processed NAIP imagery via Web-service protocols on average between 2 and 7 business days after acquisition. This allows the FSA and partner agencies to perform time-sensitive work with the most current imagery available months in advance of receiving production-level NAIP imagery. This year was the end of the current NAIP infinite delivery indefinite quantity (contract).

- (IDIQ). The FSA worked diligently in 2015 and 2016 to revalidate FSA and partner-agency user requirements for imagery, and carried that information forward in planning for what imagery acquisition and delivery may look like in 2017 and beyond. A robust Analysis of Alternatives (AOA) and Recommended Alternative were provided for the FSA Executive Leadership review and a course of action has since been approved. The FSA will extend current contracts to cover 2017 imagery needs and work throughout 2017 in an Integrated Project Team (IPT) environment to build a new IDIQ for 2018 and beyond. The new IDIQ will align with USDA Procurement Advisory No. 101B, Shared First Policy in USDA Contracts.

Government that coordinated acquisition to eliminate duplicate efforts by various government programs. Started in 1978 by various Federal Government agencies,

- NDOP has been evaluating the new High Resolution NAIP Imagery (1-foot resolution) offered from Hexagon Corporation called Valtus. This service contains NAIP imagery at 1-foot resolution and four band with FGDC-compliant metadata. Valtus is offered by Hexagon as a Web Map Service compatible with ESRI ArcMap and AutoCAD. Valtus content is supported by acquisitions from the main contractors to the NAIP program. Valtus expects most of the United States, including Hawaii, Puerto Rico and sections of Alaska, to be completed by the end of 2017.
- The NDOP has been coordinating the high-resolution scanning of historic aerial photography with an emphasis on National High Altitude Program (NHAP). The NHAP was one of the first interagency geospatial programs in the Federal



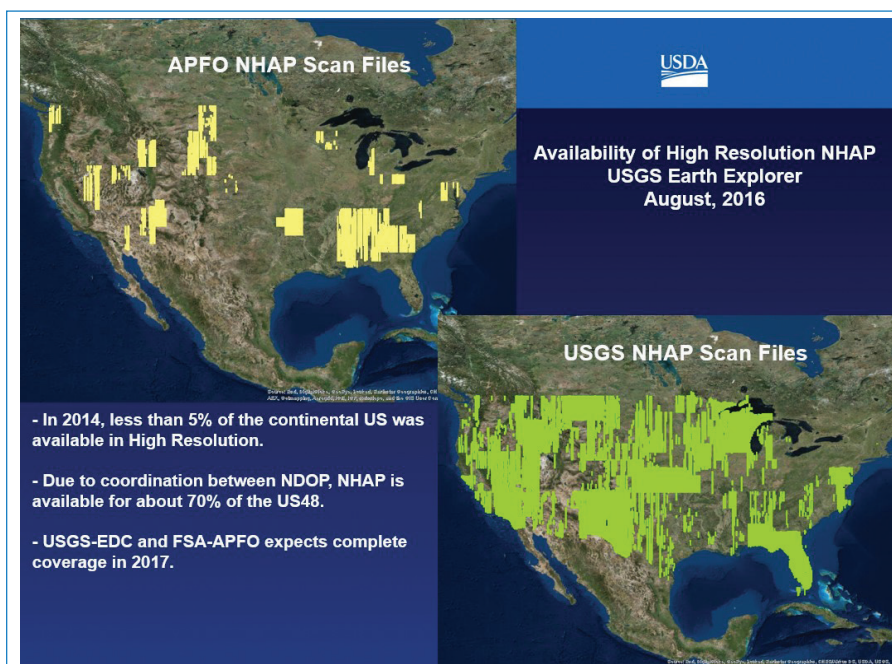
including DOI-USGS, USDA–Natural Resources Conservation Service (NRCS), USDA–FSA, USFS, and many others. Imagery for the NHAP was collected from 1980–1989 in panchromatic and color infrared. NHAP imagery is important to many Federal/State/local agencies. In FY 2015, USDA–FSA–Aerial Photography Field Office (APFO) and the USGS–Eros Data Center, along with funding support from USDA–NRCS, have coordinated the scanning of the NHAP. Scanned high-resolution NHAP is made available to the Federal, State, local government, and private citizens from the USGS–Earth Explorer (EE) site. In FY 2014, less than 5% of the continental United States was available with high-resolution NHAP. At the end of FY 2016, approximately 70% is available via USGS–EE. The NHAP is a critical historic geospatial Imagery layer used in many agency programs such as USDA Wetlands Reserve Program and Highly Erodible Program.

- In 2016, the Land Remote Sensing (LRS) Program assumed USGS colead responsibility for the Imagery Theme alongside the USDA. The LRS manages a number of Federal capabilities related to imagery collection and management, among them the Landsat Satellite System, the National Satellite Land Remote Sensing Data Archive (NSLRSDA), and the Civil Applications Committee, which manages civil government access to National Technical Means and Commercial Remote Sensing Data provided by the Intelligence Community. The LRS and USDA, and other NDOP-participating agencies, have engaged in a number
- of discussions regarding alignment of U.S. civil and commercial remote-sensing resources, both aerial- and space-based. Future Imagery Theme Implementation Planning will address how this broad spectrum of capabilities can be used to advance NDOP and FGDC needs and interests.
- The NOAA collected 96 tide controlled coastal imagery datasets to support shoreline mapping efforts. In addition, NOAA collected oblique imagery along the West coast and Mid-Atlantic coast for coastal-zone management applications.
- The NDOP members have been providing user requirements to the Requirements, Capabilities and Analysis for Earth Observations (RCA–EO) study by DOI–USGS. The RCA–EO provides data and analyses to help optimize investments in Earth observing technology and products to better meet user needs. The RCA–EO is collecting information from NDOP members, including Imagery/Elevation data types, resolution, sensors, and products.
- The NDOP members (USDA–NRCS, USDA–FSA, NOAA, and DOD–NGA) have worked together to acquire new orthoimagery in FY 2016 for the following areas in Hawaii and the U.S. Pacific Basin: Hawaii, Guam, Commonwealth of the Northern Mariana Islands, and the Marshall Islands.
- The NDOP Technical Subcommittee held meetings during the year to discuss technical issues that affect our member agencies, with the principal goal to share information and save time and costs. In 2016, some key topics of discussion included determining requirements

for Earth observation systems, aircraft and unmanned aerial systems sensor technology, new commercial satellite capabilities, and the scanning of historical film collected by traditional film cameras.

Spatial Water Data Subcommittee

The Advisory Committee on Water Information (ACWI) and the FGDC created the Subcommittee on Spatial Water Data (SSWD) to assist coordination of Federal and non-Federal interests in spatial water data, including (1) facilitating the exchange of information and transfer of data; (2) establishing and implementing standards for quality, content, and transferability; and (3) coordinating the identification of requirements and the collection of spatial data to minimize the duplication of effort where practicable and economical.



National Digital Orthoimagery Program (NDOP) coordination of high-resolution scanning of historic aerial photography with an emphasis on the National High Altitude Program (NHAP).

The SSWD has been leading efforts to engage the community and to design and scope the Open Water Data Initiative (OWDI). The OWDI was launched by the FGDC and the ACWI in the summer of 2014. The goal of the OWDI is to bring currently fragmented water information into a connected, national water data framework by leveraging existing systems, infrastructure, and tools to underpin innovation, modeling, data sharing, and solution development.

Since 2014, progress has been made through the OWDI by applying a common geospatial framework of rivers, watersheds, and other geographic features to water observations made by various Federal, State, and local agencies. This approach is beginning to take form into an infrastructure that leverages existing systems using a modern cloud-based big-data approach, to provide interoperable Web data and map services. An API for water information (api.nasa.gov/ for an analogous example) is being unleashed for innovators and solution developers.

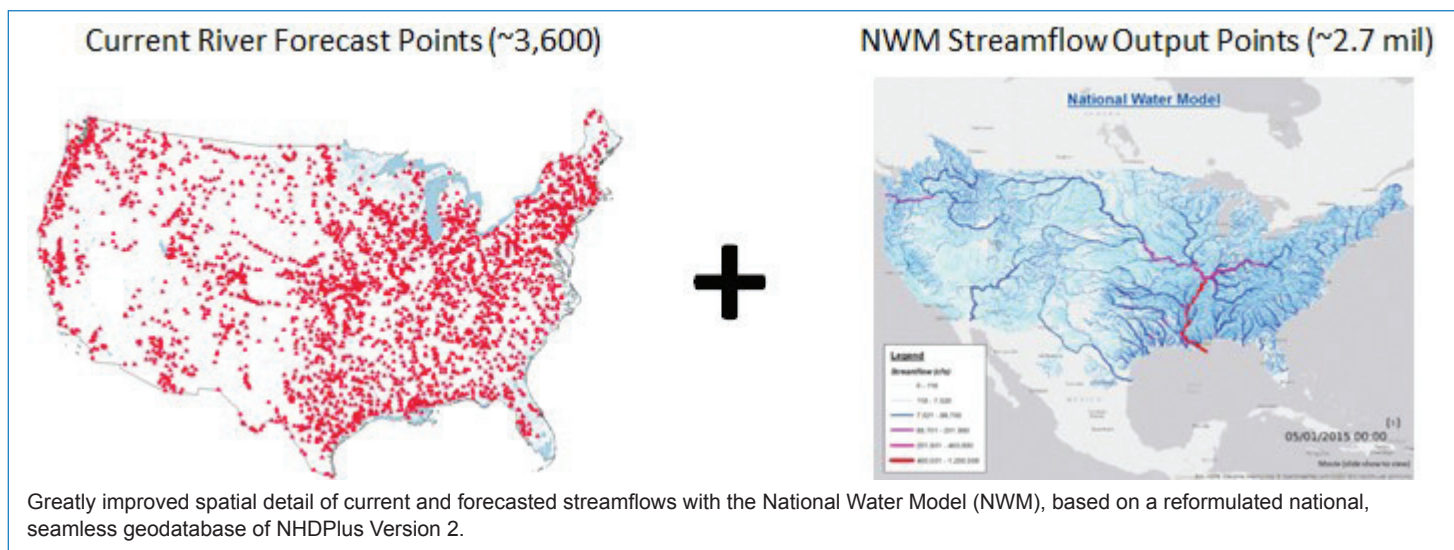
The following two functional examples illustrate the power of the geospatial hydrographic data framework being enabled through OWDI:

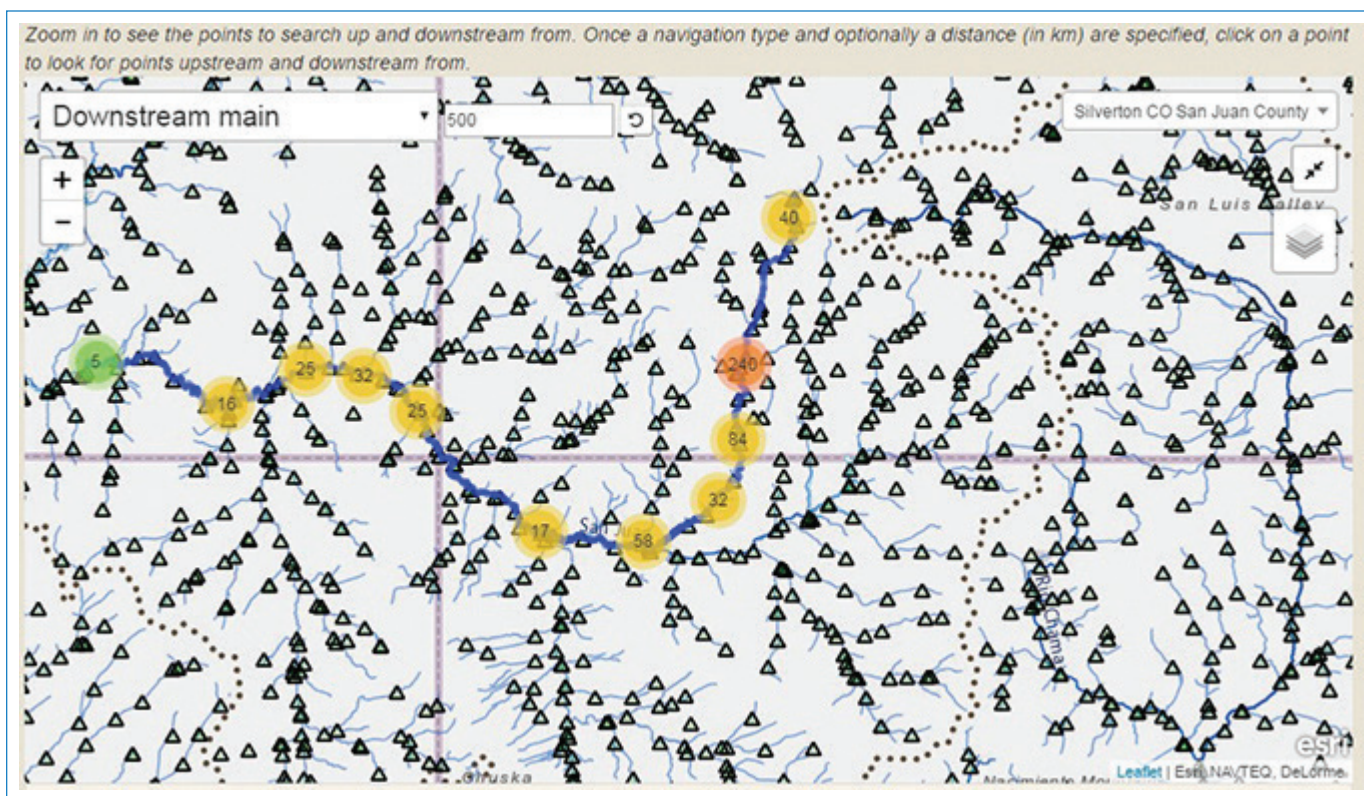
1. The NOAA's National Water Model (NWM) was implemented on the National Weather Service (NWS) super computer in August 2016. The NWM is based on the geospatial hydrographic data framework of a reformulated national seamless geodatabase of NHDPlus Version 2, developed by SSWD WGs and based on community feedback during 2015. Using this data framework, the NWM increases the spatial detail of modeling from about 3,600 forecast points to about 2.7 million stream segments, as shown below:

Results of the NWM are now available in the form of Web services giving continuously updated current and forecast streamflow estimates for each of 2.7 million stream segments nationwide. The greatly improved spatial detail of forecasts will provide better information to emergency responders, enabling them to improve their response and save lives.

2. The infrastructure of geospatial services and API has been incorporated into the Water Quality Portal (WQP), a system sponsored by the USGS, EPA, and the National Water Quality Monitoring Council that serves more than 200 million data records collected by over 400 State, Federal, Tribal, and local agencies. In the same way that smartphones can route drivers efficiently to their destination based on GPS and the U.S. road network, the WQP now supports queries that navigate the Nation's river network using the OWDI Web services. Users can access water-quality data using upstream/downstream queries based on 2.7 million stream segments represented in the National Hydrography Dataset Plus (NHDPlus) through an API and associated Web services. As a specific example, in August, 2015, a spill of mine waste from the Gold King Mine in Colorado contaminated the Animas River with toxic heavy metals. In response, it took multiple experts several days to retrieve previously collected water-quality records for the river downstream of the spill from USGS databases. That same action (and more) can now be achieved in less than 2 minutes with the WQP, and can be replicated with this single link. A map showing the sites selected within the WQP interface is shown on the next page.

Similar queries could be made for any of 2.7 million stream segments in the conterminous United States.





using this system, which is now operational. The system effectively is a search engine for water-quality data, much like the Google search engine, but is even more powerful because the system understands the underlying structure of the stream network, which is provided by the NHDPlus. The source code for this system, called the Network-Linked Data Index is being shared in an open-source GitHub repository that has been established for the SSWD. See <https://github.com/ACWI-SSWD>.

This system can be extended and generalized so that other types of data (beyond water-quality data) can be added, and the system can easily be modified to use the much more detailed geospatial framework of the NHD+HR as it becomes available during the next 2 years.

Other highlights from FY 2016 include:

- **Drought Data Catalog:** Work has been focused on making the U.S. Bureau of Reclamation water datasets open and accessible, and on considering several options for hosting data and a hackathon timed with the catalog release.
- **Spanish-language version of the Colorado River Basin Drought Visualization:** Translation of record completed by International Boundary and Water Commission (IBWC), approved by U.S. and Mexico sections. On target to release concurrent with finalization of Minute 32X (likely late CY2016).

- **Water use data catalog:** Complete. *Application.* ScienceBase.
- National Seamless NHDPlus V2 geodatabase and documentation are available from <https://www.epa.gov/waterdata/nhdplus-national-data>.

Transportation Subcommittee

The Transportation Subcommittee is responsible for the coordination of transportation data-related activities among agencies and establishes a mechanism for the coordinated development, use, sharing, and dissemination of best practices, standards, and data for transportation.

The Transportation Subcommittee reached consensus on its working agenda early in 2016. Since then, the committee has been producing a minimum content standard for the All Roads Network of Linear Referenced Data (ARNOLD), reviewing and updating its charter, establishing teams to identify and monitor transportation data assets, standards, and activities. The committee is also committed to building its membership.

The committee started using a collaboration Web site to document, organize, and prioritize its work (trello.com/transsubcom). Each of the committee's efforts has a Web page where tasks are defined, organized, and traced.

The committee is defining a minimum content standard for ARNOLD. In August, the subcommittee collected suggested attributes. In the coming months, the committee will organize and summarize those attributes and then grade them. The grades will be used to determine if an attribute is included in the standard.

The committee is reviewing and updating its charter. A review team has been established and collecting comments; they will be making suggested edits soon. The edits will be presented to the subcommittee for review in 2017.

Vegetation Subcommittee

The Vegetation Subcommittee was established to coordinate terrestrial vegetative data-related activities that include promoting accurate and current standards, financed in whole or in part by Federal funds; exchanging information on technological improvements; encouraging the Federal and non-Federal communities to identify and adopt the standards and specifications; and collecting and processing the requirements of Federal and non-Federal organizations. Federal participants in the subcommittee provide leadership to facilitate: (1) the revision and implementation of the FGDC Vegetation standard and the revision of the classification hierarchy according to the FGDC Vegetation standard, which are used in vegetation classification, mapping, and inventory; (2) the development of partnership programs with Federal agencies, States, Tribes, localities, academia, and the private sector; (3) addressing user and natural resource needs, (4) identifying needs for standards and metadata to support the NGDA Land Cover and Land Use and Biota Themes; and (5) the adoption of goals to support the NSDI strategy, A-16 portfolio management, Data.gov, and GeoPlatform.gov. The subcommittee meets monthly to facilitate partner communication and planning. In fiscal year 2016, the subcommittee completed the following activities:

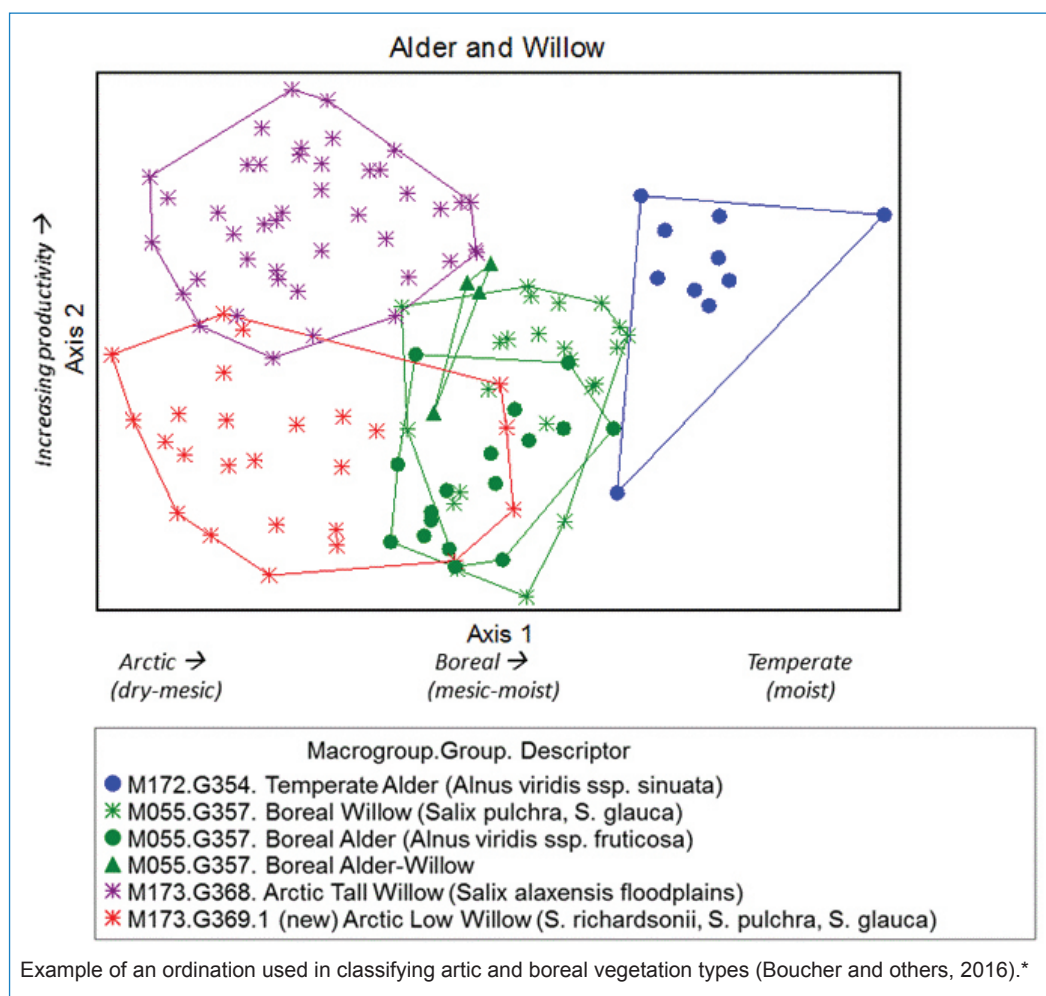
- In February 2016, the U.S. National Vegetation Classification (USNVC) Hierarchy was formally released in a form accessible to the public at www.usnvc.org. This represents the formal release of the classification based on FGDC 2008 Dynamic Content Standard (www.fgdc.gov/standards/projects/vegetation/NVCS_V2_FINAL_2008-02.pdf), which was a revision of the original standard adopted in 1997. The classification represents the end result of applying the standard—the fully listed vegetation hierarchy. The 2016 National Vegetation Classification is the most up-to-date classification now available. One of the key new features is that it contains more detailed, lower level classifications that include the alliance and association levels. This hierarchy of vegetation classification is the result of grouping stands of vegetation together based on shared characteristics. As with any taxonomy, vegetation classification is used to simplify the complex patterns in order to communicate and share information.
- The USNVC Web site went live online in 2016, with the content of the Web site fully revised, and the Hierarchy Explorer was updated and made accessible to the public. Much publicity was given to the rollout of the revised vegetation classification hierarchy, in a news release put out by the Ecological Society of America (www.esa.org/esa/national-vegetation-classification-press-release/) and by NatureServe (www.natureserve.org/news-events/news/natureserve-and-partners-unveil-adaptable-ecology-based-us-national-vegetation).
- Now that the initial vegetation hierarchy content is formally adopted, the process for managing the USNVC as a dynamic standard includes a peer-review process and open access for anyone interested to submit a proposal for revision. A formal review for any proposed changes to the hierarchy descriptions or names will be managed by the Ecological Society of America's (ESA's) Vegetation Panel through the Peer Review Board. Peer Review Board members, including the Editor-in-Chief and Regional Editors, were formally accepted by ESA's Panel; Associate Editors are in the process of being formalized. A scientific peer review will be used to evaluate whether the proposals justify changes in the description or name of a classification. The submitted proposals and decision by the review panel will be published online as the USNVC Proceedings.
- The first article of the USNVC Proceedings was made available through the ESA Web site (50.87.248.75/~usnvcorg/proceedings/index.php). That article represents not only a comprehensive scientific review of USNVC content, but also serves as the centerpiece in testing the formal peer-review process for the dynamic standard.
- The U.S. Forest Service (FS) continues to work toward implementing the USNVC in research and development, as well as in the National Forest System. The Plan is for FS Regions to develop dichotomous keys for each region to conduct the crosswalk of vegetation to the USNVC with the Vegetation Subcommittee's help. The subcommittee has been working closely with the National Forest System on their planning to crosswalk existing vegetation classification systems to the USNVC hierarchy. After a number of planning meetings with Regional ecologists, botanists, and foresters and agency Washington D.C. leadership, it was decided that the FS would crosswalk and that the Vegetation Subcommittee would offer assistance to the Regions as they developed the keys needed for the crosswalk.
- A yearlong effort by the Vegetation Subcommittee's Data Management working group resulted in a determination of what is needed to keep the USNVC sustainable, easily accessible, and used by partners. Preferred and alternative options were costed out and

detailed in a proposal for use in subsequent strategic and implementation plans. The Data Management WG has drafted recommendations for housing the cyber-infrastructure components of the USNVC and is exploring potential sources of funding.

- The ESA Vegetation Panel submitted a proposal for a poster session on the USNVC at the ESA meeting in Portland in August 2017. The proposed title of this poster session on the USNVC includes U.S. National Vegetation Classification and is titled, “Advancing the Description & Management of the Nation’s Ecosystems.” This session will provide clear examples of the direct application of the classification; demonstrate tools that have been developed to increase access to the standard; and highlight the network of ecologists who are helping develop the classification. This will help Federal agencies and programs who want their ecologists to use this Federal standard in their planning and management activities.
- The FS and NatureServe are planning to present their work “Assigning U.S. National Vegetation Classification Macrogroups to Forest Inventory and Analysis Plots” at the Society of American Foresters meeting in November 2016. The USNVC macrogroups were assigned to Forest Inventory and Analysis plots across 37 States of the eastern United States by iteratively refining a computer algorithm based on FIA and ancillary geospatial data. Results provide new opportunities for relating FIA with other products that utilize the USNVC Federal standard.
- There were two documents on the USNVC published in 2016. The first—“How a national vegetation classification can help ecological research and management”—was published in the Journal “Frontiers in Ecology and the Environment” (www.treesearch.fs.fed.us/pubs/48698). The second—“Classification and description of world formation types”—was the result of work by the Hierarchy Revisions WG, who published the revised USNVC

of the World Formation Types. It was published by the FS in General Technical Report 346 (www.fs.fed.us/rm/pubs/rmrs_gtr346.html).

- The results of two National Vegetation Classification analyses were finalized in two reports to the USGS. These reports summarized analyses of Vegetation Plot Data Harvests in Pennsylvania and a Boreal and Arctic Regional Analysis in Alaska.
- The FS and USGS continued to fund the ESA to help manage the infrastructure of the USNVC, to develop the classification revision process, and other USNVC activities.
- Much of subcommittee attended the ESA Vegetation Classification Panel meeting in Ft. Lauderdale, Florida, in August. That annual meeting is a full day in which the panel focuses on status updates and setting direction for the coming year. Topics covered this year include the USNVC Booth, Publications, the Peer Review Process, and Keys to the USNVC. The Panel focused specifically on identifying next steps to expand the panel’s involvement in international as well as State partnership



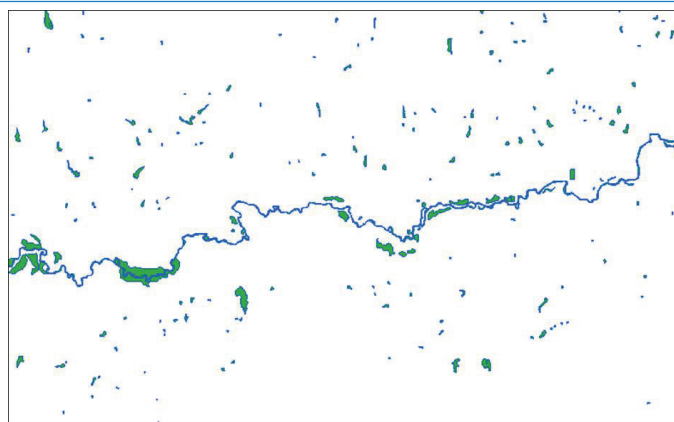
*Boucher, T.V., Flagstad, L.A., and Bernard, B.L., 2016, National Vegetation Classification: Boreal and Arctic Alaska Regional Analysis, Alaska Natural Heritage Program, 81 p.

efforts. The minutes from that meeting can be found on the ESA Vegetation Panel's Web site (esa.org/vegpanel/wp-content/uploads/2016/09/ESA-Veg-Panel-Meeting-Notes-FINAL-Ft-Lauderdale-2016.pdf).

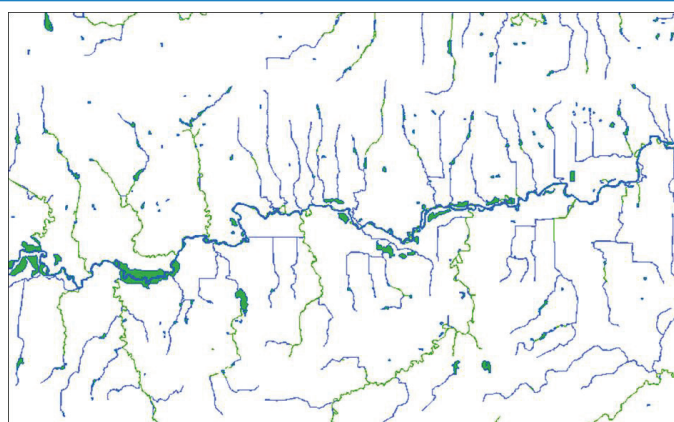
Wetlands Subcommittee

The Wetlands Subcommittee promotes standards of accuracy and consistency in Federal geospatial wetlands data, exchanges information on technological improvements for collecting spatial wetlands data, encourages Federal and non-Federal communities to identify and adopt standards and specifications for spatial wetlands data, and collects and processes the requirements of Federal and non-Federal organizations for spatial wetlands data. This year, the subcommittee worked on the following:

- Wetlands data for over 107 million acres of the United States were contributed from 11 Federal, State, and local agencies in fiscal year 2016. All data submitted to the NSDI wetlands layer must comply with the National Wetlands Classification Standard and the FGDC Wetlands Mapping Standard. Rigorous quality-control and quality-assurance processes and tools are implemented at all points within the data creation and submission process.
- The National Wetlands Inventory Version 2, which includes never-before-served legacy NWI linear data augmented with NHD to produce a comprehensive wetlands and surface waters dataset, was made available to the public via an improved, mobile-enabled Web-based mapper. This comprehensive dataset allows the accurate, consistent calculation of area and ecological classification to best support geospatial summaries and ecological modeling. (See figure NWI Version 2.0)
- To better facilitate the transfer of wetland mapping technology and related datasets, the Interagency Wetland Mapping WG was formed with members from the U.S. Fish and Wildlife Service (FWS), the USGS, and NOAA.
- Inventories of change and of multitemporal wetland geospatial datasets were produced for areas of elevated management concern to directly support the development of wetland policies and management actions, as well as to guide the use of moderate spatial-resolution satellite-based land cover maps to support the continued development of the NSDI wetlands layer. Inclusion of the full suite of water regime modifiers, which are not available as part of the NWI Wetlands Status and Trends dataset, further enabled the targeting of management actions. An improved understanding of the relationship between the NSDI wetlands layer and coarser spatial-resolution satellite-based land cover maps will help in using those products to target NSDI wetlands layer updates.
- To ensure that wetlands data are made available to a diverse set of end users, secure Web services were developed and released. Before implementation of secure Web services, some Federal and State users were restricted from using NSDI wetlands layer Web services.



Original National Wetlands Inventory polygons.



Original National Wetland Inventory (NWI) polygons with added orphaned NWI linear data (green lines) and introduced National Hydrography Dataset (blue lines) to produce a comprehensive wetlands and surface-waters dataset.

Architecture and Technology Working Group

The Architecture & Technology Working Group (ATWG) provides cross-agency representation and expertise to address geospatial architecture and technology issues for the FGDC as a whole and for the GeoPlatform as a primary focus in direct support of Objective 1.2 of the NSDI Strategic Plan. The ATWG serves as the focal point for integrating interagency, intergovernmental, and academic community input on requirements for the GeoPlatform to the Geospatial Platform Managing Partner (DOI) for the five workflow areas of the GeoPlatform:

1. Content Exploration Services
2. Customer Services
3. Information Exchange Services
4. Content Management Services
5. Infrastructure Services

In addition, the ATWG may also provide recommendations and solutions to architecture and technology issues to the Coordination Group and Steering Committee, as appropriate. The goal of the ATWG is facilitate better means of integration, analysis, and display of data in support of the varied national geospatial community, while providing content that is easily accessible and usable for senior policy and decision makers.

Notable fiscal year 2016 accomplishments of the ATWG include the following:

- Reestablished the ATWG with an updated charter, new leadership, and more clearly defined objectives. Identified a diverse set of eight Federal representatives to form the foundation of the reinvigorated group, while providing opportunities for non-Federal participation and consideration of those perspectives.
- Established a Web-based collaboration environment and ATWG Request Tracker to solicit input, foster discussion, and build consensus around requests elevated to the ATWG.
- Evaluated the GeoPlatform approach to update the content management system (CMS) from a rigid Drupal structure to a more flexible system. The shift will decrease operations and maintenance (O&M) cost and time and improve community experience.
- Provided a formal recommendation to the Geospatial Platform Managing Partner advocating for the consideration of keyword, community (for example, A-16 Theme Communities and FGDC WGs), and location-based data-availability and update notification mechanisms.
- Provided a formal recommendation to the Geospatial Platform Managing Partner advocating for further research into a Web service utilization tracking system for the Geospatial Platform, to include gathering and analysis of utilization and sentiment metrics.

Metadata Working Group

The Metadata WG promotes awareness and best practices among FGDC member agencies and NSDI stakeholders about the metadata component of geospatial data; facilitates the coordination, development, use, sharing, and dissemination of geospatial metadata; supports the implementation of geospatial metadata and other related semantic and structural (that is, nongeospatial) metadata standards established by Federal, national, and

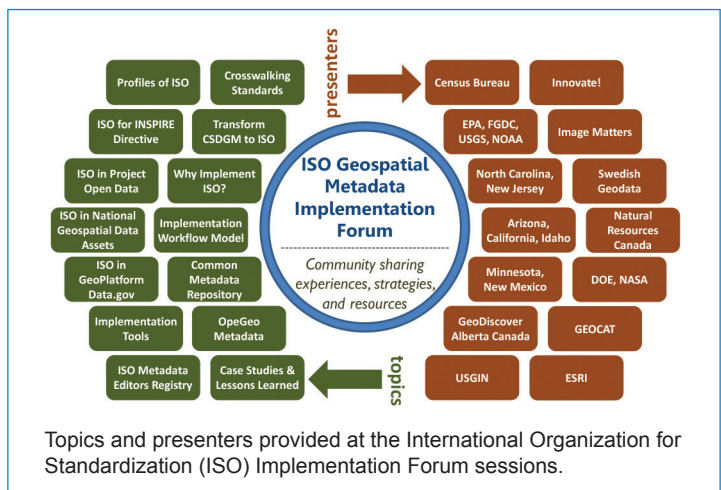
international standards organizations, such as the FGDC, OGC, American National Standards Institute, ISO, Dublin Core Metadata Initiative (DCMI), Open Source Metadata Framework (OMF), Ecological Metadata Language (EML), and the World Wide Web Consortium (W3C).

In fiscal year 2016, the Metadata WG (MWG) provided direct support to the FGDC Metadata Program and actively engaged in a range of NSDI initiatives, including the following:

- Proposed endorsement for two ISO geospatial metadata standards for INCITS/ISO 19115-1:2014, Geographic information—Metadata—Part 1: Fundamentals and INCITS/ISO 19157:2013[2014] Geographic information—Data quality standard (June 2016).
- Participation and presentations within the MWG quarterly teleconferences, FGDC Standards WG, ISO Implementation Forum sessions, and the Esri Metadata Special Interest Group meeting (June 2016).
- Participation in metadata activities supporting the NGDA Management Plan, A-16 NGDA Portfolio management, Project Open Data, Data.Data.gov, and Geoplatform.gov.
- Assessment of the NSDI Strategic Plan and the role of metadata to support specific tasks.
- Published and provided user reviews to the FGDC ISO Geospatial Metadata Editors Registry.
- Served as the primary conduit for the communication about geospatial metadata and other related semantic and structural (nongeospatial) metadata standards, tools, training, and implementation.
- Coordinated with the INCITS-L1 group who provided regular ISO geospatial metadata updates for the MWG.

National Boundaries Group Working Group

The National Boundaries Group (NBG) is an interagency



WG coordinated by the FGDC and contributes to the FGDC mission of fostering collaboration and developing partnerships for the advancement of the NSDI. The purpose of this group is to develop nationally consistent and integrated boundaries that are current, accessible, and accurate in establishing the geographic base.

National Boundaries Group Organization and Operations

The NBG continued their quarterly meetings working in collaboration with the FGDC Cadastral Subcommittee to identify boundaries coincident with cadastral features such as parcels and the public land survey system. The Census Bureau has operationalized the results of this activity into the BQARP during FY 2016 and planned for FY 2017. The NBG and the Census Bureau also reviewed public land types to determine which categories should be included in the Bureau's MAF/TIGER (MTDb) system.

Federal Lands Working Group

The FLWG is a subgroup of the NBG. The goal of the FLWG is to develop a data standard and the organizational strategies for federally owned lands by publishing an aggregated Federal lands geodatabase to meet common agency needs. Furthermore, the FLWG seeks to provide a platform for Federal agencies to identify and review boundary gaps and overlaps. The group is working to automate the translation of land data from Federal agencies into the format of the USGS Protected Areas Database of the United States (PAD-US). The USGS Gap Analysis Program (GAP) released a PAD-US update (version 1.4) in May 2016, including a complete replacement of Federal lands developed through FLWG collaboration. The FS, FWS, and the National Park Service (NPS) have submitted data for the PAD-US for review by the USGS.

The FLWG facilitated cross-agency cooperation to create these automated tools, making it easier for Federal agencies to crosswalk their data into PAD-US 2.0. Along with the improvement of the PAD-US, the FLWG developed a tool to harness review comments regarding Federal lands data, documented source data translation into the PAD-US schema, worked to increase efficiency, and significantly reduced boundary overlap errors between agency datasets. The team presented to the DOI Geospatial Advisory Committee (GAC) on February 23, 2016, which resulted in the DOI GAC acknowledging PAD-US as the official inventory of public lands and other protected areas, and named it an A-16 layer in the Cadastre Theme. The team lead then met with the Governmental Units Theme lead about making PAD-US a standard at the FGDC. The FLWG posts meeting notes, updates, and events to the

GeoPlatform Web site. The group maintains monthly calls and primary contacts from each Federal land management agency. The FLWG recently updated the group's fact sheet to summarize current objectives, recent accomplishments, and primary contacts.

Tribal Boundaries Subgroup

The Tribal Boundaries subgroup formed early in FY 2016 and is cochaired by members from the Census Bureau and the EPA. The subgroup membership consists of Federal agencies, private industry, one Tribal organization, and federally recognized Tribes. The Tribal Boundaries subgroup formed when members of the NBG expressed significant interest in sharing information about Tribal boundaries. The subgroup has hosted presentations from the Census Bureau, EPA, BIA, Department of Energy, FEMA, and the NPS. The purpose of the subgroup is to identify data, establish definitions, reduce duplication through collaboration, and create a shared public resource for Tribal boundaries.

International Boundaries

The International Boundary Commission (IBC) updated the NBG on their work improving the international boundaries with Canada and Mexico. The NBG continued its collaboration with the Census Bureau, IBC, and IBWC to update the international boundaries in the MTDb system.

Standards Working Group

The FGDC Standards WG (SWG) promotes development and implementation of standards for the NSDI and supports Objective 3.1 of the NSDI Strategic Plan and the NGDA Management Plan. Its charter has been updated for the NSDI Strategic Plan, the NGDA Management Plan, and the GeoPlatform. The updated charter has been submitted to the FGDC Steering Committee to recommend for FGDC endorsement. The SWG achieved the following accomplishments in fiscal year 2016:

Standards advanced for FGDC endorsement

Part 2, Digital orthoimagery (revised), of the Geographic Information Framework Data Standard.

The FGDC announced endorsement of Part 2, Digital orthoimagery (revised) of the Geographic Information Framework Data Standard in early FY 2016. This revision replaces analog camera references with digital sensors and recognizes satellite technology for digital orthoimagery production. Part 2 supports the Imagery NGDA Framework theme, and the theme lead agencies (USDA-FSA and DOI-USGS) participated in development of the standard.

United States Thoroughfare, Landmark, and Postal Address Data Standard

Public review of the revised draft United States Thoroughfare, Landmark, and Postal Address Data Standard (Address Data Standard) closed on April 25, 2016. The Address Data Standard enables data sharing across jurisdictions and upward to State and national repositories. Data integrators can use it as a common format for disparate address data.

INCITS/ISO 19115-1:2014 Geographic information—Metadata— Part 1: Fundamentals

Metadata is the foundation for data discovery and use. INCITS/ISO 19115-1:2014 provides information about identification, extent, quality, spatial and temporal aspects, content, spatial reference, portrayal, distribution, and other properties of digital geographic data and services. It improves the FGDC CSDGM and ISO 19115:2003 Geographic information—Metadata through new elements for services and feature catalog, consistent management of identifiers, update to responsible party, update of related attributes, among others. INCITS/ISO 19115-1:2014 is pending FGDC Coordination Group (CG) approval for FGDC endorsement.

INCITS/ISO 19157:2013[2014] Geographic information—Data quality standard

INCITS/ISO 19157:2013[2014] facilitates description of geospatial data quality, an important component of data management practices, and defines standardized components and structures of data-quality measures. It improves data-quality reporting in metadata standards through added elements of value, such as principles for describing quality of geographic data; components for describing data quality; components and content structure of a register for data-quality measures; general procedures for evaluating quality of geographic data; principles for reporting data quality; and measures for evaluating and reporting data quality. INCITS/ISO 19157:2013[2014] is pending CG approval for FGDC endorsement.

Building relationships

Action 3.1.1 of the NSDI Strategic Plan calls for consulting and collaborating with both existing and emerging geospatial communities to advance common standards and approaches. The FGDC continued its leadership and participation in INCITS Technical Committee L1, Geographic Information Systems; ISO Technical Committee 211, Geographic information/Geomatics; the Geospatial-Intelligence Standards WG (GWG); and the OGC. In 2016, the FGDC standards program initiated engagement with the USGEO and the FGDC Architecture & Technology WG through presentations to the FGDC Standards WG.

Appendix A

FGDC Leadership Profiles



Camille Touton
Deputy Assistant Secretary for Water & Science
Chair, FGDC Steering Committee

Camille Calimlim Touton serves as Deputy Assistant Secretary for Water and Science at the United States Department of the Interior (DOI), where she provides leadership and oversight on various policy issues relating to the Bureau of Reclamation and the U.S. Geological Survey (USGS). This includes spearheading the Open Water Data Initiative, which is part of the Administration's larger Climate Data Initiative and Open Data efforts, as well as work on the Colorado River, including the Glen Canyon Dam Adaptive Management Program.

Prior to joining DOI, Camille worked as Senior Policy Advisor to the United States House Natural Resources Committee, Subcommittee on Water and Power. The Natural Resources Committee is the authorizing committee for DOI. Prior to joining the committee, Camille worked as an aide to Senate Majority Leader Harry Reid on public lands and water issues.

Camille holds a bachelor of science degree in Engineering (Civil) and a bachelor of arts degree in Communication Studies from the University of Nevada, Las Vegas, and a master of arts degree in Public Policy from George Mason University. She calls Nevada home, but currently resides in Arlington, Virginia, with her husband, Matthew, her daughter, Ella, and their dogs, Gibbs and Ducky.



Jamie Huang
Office of Management and Budget
Vice Chair, FGDC Steering Committee

Ms. Huang joined the Office of Management and Budget (OMB) in 2014 as a policy analyst from the private sector. She possesses management, monitoring, and evaluation skills with training in qualitative and quantitative analysis (database operation: STATA, ArcGIS). She received her bachelor of science degree in Journalism from the University of Wisconsin-Madison. She completed her master of science degree in public policy and master of arts degree in Middle Eastern Studies—a dual degree from the University of Chicago.



Ivan DeLoatch
Executive Director
Federal Geographic Data Committee

Mr. Ivan DeLoatch has served as the Executive Director of the FGDC for the past 13 years. Previously, he served as Chief of the Data Acquisition Branch in the U.S. Environmental Protection Agency's (EPA) Office of Environmental Information. He earned a bachelor of science degree in biology from Bowie State University.

FGDC Executive Committee



David Alexander
Director, Geospatial Management Office
U.S. Department of Homeland Security

Mr. Alexander's career in the geospatial information field spans more than three decades. He assumed responsibility for the U.S. Department of Homeland Security (DHS) Geospatial Management Office in 2012 after having spent 4 years in senior leadership roles with the DHS Office of the Chief Information Officer. Mr. Alexander has led several national initiatives, including the Homeland Security Geospatial Concept of Operations (GeoCONOPS), the DHS Geospatial Information Infrastructure, the Homeland Infrastructure Foundation-Level Data (HIFLD) Working Group, and technical lead for response coordination in the Department of Health and Human Services, the Secretary's Operations Center. Mr. Alexander holds several advanced degrees encompassing history, geography, and business management.



Jerry Johnston
Geographic Information Officer
U.S. Department of the Interior

Dr. Jerry Johnson has been with DOI for the past 5 years. Prior to this, he served as the Geographic Information Officer for the EPA for several years. Before his time with the EPA, Dr. Johnston conducted research on complex environmental systems modeling and served as the project manager for numerous geospatial projects in the private sector. He holds a master of science degree and doctorate in environmental science from Indiana University, Bloomington, as well as a bachelor of science degree in environmental science from Michigan State University. Dr. Johnston currently serves as Vice Chair for the National Geospatial Advisory Committee.



Ted Payne
Geographic Information Officer (Acting)
U.S. Department of Agriculture, Office of the Chief Information Officer

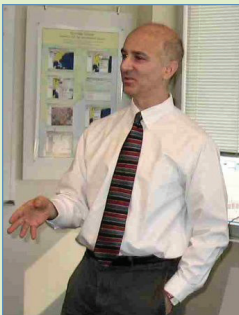
Mr. Payne has been with the Department of Agriculture (USDA) since 2003 in three different roles: the Farm Service Agency's (FSA) Geospatial Chief, the USDA's Geospatial Program Manager and the Acting Geographical Information Officer for the USDA. While with FSA, he led multimillion dollar geospatial integration projects while building geospatial governance standards that helped bridge mapping capabilities with Federal program implementations. Prior to his experience in the Federal government, he was the lead geospatial technician for two municipal governments, as well as practiced in the private sector that now spans three decades of experience. Mr. Payne holds graduate degrees in Communications and Geography from Kansas State University.).

FGDC Executive Committee (continued)



Kevin Murphy
Program Executive for Earth Science Data Systems
Earth Science Division
Science Mission Directorate, NASA HQ

Kevin Murphy is Program Executive for Earth Science Data Systems at NASA Headquarters. Mr. Murphy manages a portfolio of programs encompassing the Distributed Active Archive Centers, Science Investigator-led Processing Systems, and a number of competitively funded programs. Prior to assuming his current role, Mr. Murphy served as System Architect for the Earth Observing System Data and Information System, where he conceived, developed, and managed major system development projects, including near real-time systems, search engines, large-scale visualization systems, and <https://Earthdata.nasa.gov>.



Harvey Simon
Acting Geospatial Information Officer, Office of Environmental Information
Immediate Office
U.S. Environmental Protection Agency

Mr. Harvey Simon has been EPA's Geospatial Information Officer since July 2012 and is responsible for coordinating EPA's geospatial program. Prior to that, he was Chief of the Information Services Branch in the Office of Information Analysis and Access, which is responsible for the Envirofacts database, a number of national geospatial applications and services, and operational management of the EPA GeoPlatform. Previously, Mr. Simon held the role of Geographic Information System (GIS) Coordinator for Region 2 and Chair of the EPA GIS Workgroup, including its Emergency Response GIS subgroup. Mr. Simon brings 29 years of GIS and risk analysis experience to his current position. He has an undergraduate and a master's degree from the State University of New York.



Timothy Trainor
Chief, Geography Division, U.S. Census Bureau
U.S. Department of Commerce

Mr. Timothy Trainor is Chief of the Geography Division at the Census Bureau and is responsible for managing the MAF/TIGER System, a national resource of addresses and geospatial information to support data collection, tabulation, and dissemination for censuses and surveys. As a Rotary Fellow, he holds a postgraduate diploma in cartography from Glasgow University, Scotland. He has a master's certificate in project management from George Washington University School of Business and Public Management and a bachelor of arts degree in history from Rutgers University. He leads the U.S. Delegation to the UN-Global Geospatial Information Management Committee. He serves as a vice president to the International Cartographic Association.

Appendix B

FGDC Structure and Membership

The Federal Geographic Data Committee (FGDC) operates under Office of Management and Budget (OMB) Circular A–16 (revised August 2002). The circular incorporates Executive Order 12906 and reaffirms the FGDC’s role to provide leadership for the National Spatial Data Infrastructure (NSDI) and to coordinate the development, use, sharing, and dissemination of the Nation’s geospatial data. Close coordination among the many agencies involved in Federal geospatial activities helps ensure the efficient and effective investment and use of geospatial resources.

The FGDC is an organized structure of Federal geospatial professionals and constituents that provide executive, managerial, and advisory direction and oversight for geospatial decisions and initiatives across the Federal Government. In accordance with OMB Circular A–16, the FGDC is chaired by the Secretary of the Interior or his/her designee, and the OMB Deputy Director for Management or his/ her designee serves as Vice Chair.

FGDC Structure

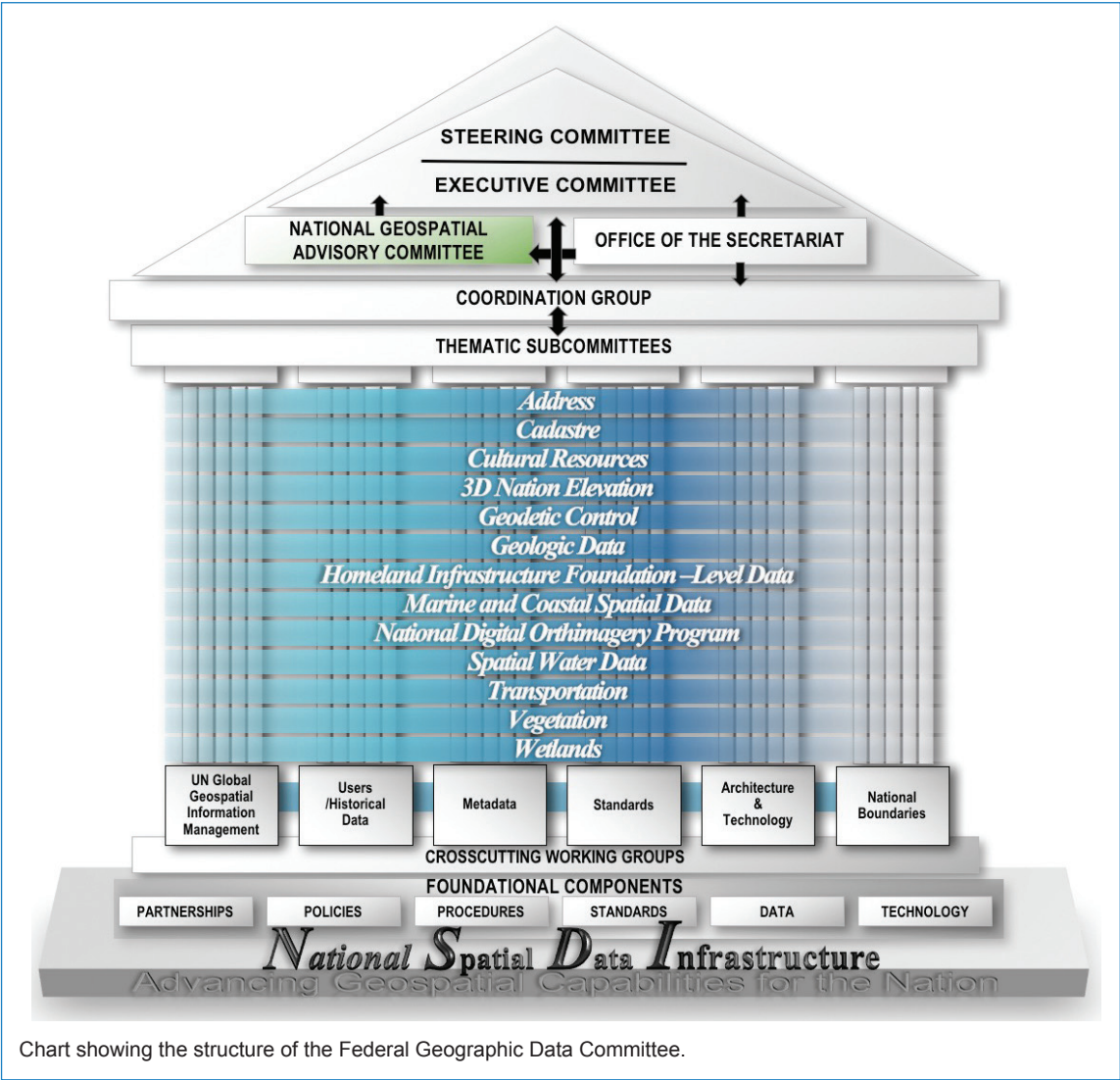
The FGDC is governed by a Steering Committee that sets the FGDC’s high-level strategic direction and is the Federal decision-making

body. The Executive Committee, which is a subset of the Steering Committee, provides advice and guidance to the Chair and the Vice Chair.

The National Geospatial Advisory Committee (NGAC) is a Federal advisory committee that provides advice and recommendations on Federal and national geospatial programs. The FGDC Coordination Group consists primarily of geospatial program leads and technical experts

and conducts the FGDC’s day-to-day business. The FGDC Office of the Secretariat, which is located at the U.S. Geological Survey headquarters in Reston, Virginia, provides strategic support and management for FGDC committees, components, and initiatives.

The FGDC infrastructure also includes agency-led subcommittees and working groups, and collaborating partners that represent State, Tribal,



and local governments, as well as industry and academic and professional organizations. All participants initiate and (or) support the following activities that are crucial to expanding the NSDI and addressing national priorities:

- Providing advice and leadership in applying geospatial capabilities to address national priorities and Presidential initiatives.
- Developing and establishing the National Geospatial Data Clearinghouse on the Internet.
- Developing and implementing standards.
- Creating a national digital geospatial data framework.
- Promoting collaborative relationships for sharing geospatial data among and between Federal and non-Federal partners.
- Developing policies and processes to better harmonize collective action.

In addition, the Global Geospatial Management Working Group serves as the lead to develop and provide the United States' position on topics addressed by the United Nations Committee on Global Geospatial Information Management (GGIM). More information about the FGDC structure and specific membership can be found at <https://www.fgdc.gov/organization>.

Steering Committee

The FGDC is governed by the Steering Committee, which is the policy-level interagency group whose central focus is to provide executive leadership for the coordination of Federal geospatial activities between, among, and within agencies. The committee does this by establishing policy and providing guidance and direction to the member agencies, based on business best practices. The Steering Committee is responsible for overseeing activities related to OMB Circular A-16 and for the implementation of the National Spatial Data Infrastructure. The FGDC Chair and Vice Chair lead the committee, which is made up of senior agency officials for geospatial information (SAOGIs) and includes representatives from Federal organizations, including the Executive Office of the President, Federal Executive Departments, and independent Federal agencies.

A subset of the Steering Committee, the Executive Committee, provides advice and guidance to the FGDC Chair and the Vice Chair on major Federal geospatial priorities and initiatives. The FGDC Chair and Vice Chair lead this committee, which includes representatives from the OMB and the

2016 Steering Committee Agencies

Federal Communications Commission (nonvoting member)
General Services Administration
Library of Congress
National Aeronautics and Space Administration
National Archives and Records Administration
National Capital Planning Commission (nonvoting member)
National Science Foundation
Office of Management and Budget (tie-breaking vote only)
Office of Personnel Management
Small Business Administration
Smithsonian Institution
Social Security Administration
Tennessee Valley Authority
U.S. Agency for International Development
U.S. Army Corps of Engineers (nonvoting member)
U.S. Department of Agriculture
U.S. Department of Commerce
U.S. Department of Defense
U.S. Department of Education
U.S. Department of Energy
U.S. Department of Health and Human Services
U.S. Department of Homeland Security
U.S. Department of Housing and Urban Development
U.S. Department of the Interior
U.S. Department of Justice
U.S. Department of Labor
U.S. Department of State
U.S. Department of Transportation
U.S. Department of the Treasury
U.S. Department of Veterans Affairs
U.S. Environmental Protection Agency
U.S. Nuclear Regulatory Commission

seven Federal agencies that have the largest investments in geospatial technologies. The Executive Committee makes recommendations to the Steering Committee and provides a focal point for coordination with the NGAC.

Appendix C

National Geospatial Data Asset Themes

Geospatial data is described in the Office of Management and Budget (OMB) Circular A–16 “Supplemental Guidance,” released November 10, 2010, as a capital asset, and its importance to the success of Federal Government and partner programs is emphasized. This focus provides the foundation for a portfolio management approach for Federal geospatial datasets of National Significance—a National Geospatial Data Asset (NGDA) Portfolio called for by OMB in fiscal year 2011 budget guidance. All NGDA Datasets are associated with a National Geospatial Data Asset Theme. These Themes serve as the management units for collections of related NGDA Datasets that would benefit from coordinated development and management. In August 2016, the FGDC Steering Committee endorsed the revised version of the A–16 NGDA Themes and Theme Lead Agencies list. This endorsement revises the earlier list that was approved by the Steering Committee in 2013. The list of the NGDA Themes and Datasets and further information is available on the FGDC Web site (https://www.fgdc.gov/what-we-do/manage-federal-geospatial-resources/a-16-portfolio-management/index_html).

Framework Themes are noted with an asterisk (*) and provide the core, most commonly used set of base data. All Themes are identified in OMB Circular A–16 Appendix E and maintained by the FGDC (<https://www.fgdc.gov/policyandplanning>).

NGDA Themes	Number of NGDA Datasets	Theme Lead Agency
Address	To be determined	Coleads: U.S. Department of Commerce, Census Bureau, and U.S. Department of Transportation
Biota	7	U.S. Department of the Interior, U.S. Geological Survey
*Cadastre	19	U.S. Department of the Interior, Bureau of Land Management
Climate and Weather	5	U.S. Department of Commerce, National Oceanic and Atmospheric Administration
Cultural Resources	2	U.S. Department of the Interior, National Park Service
*Elevation	12	Co-Leads: U.S. Department of the Interior, U.S. Geological Survey and U.S. Department of Commerce, National Oceanic and Atmospheric Administration
*Geodetic Control	4	U.S. Department of Commerce, National Oceanic and Atmospheric Administration
Geology	6	Co-Leads: U.S. Department of the Interior, U.S. Geological Survey and U.S. Department of the Interior, Bureau of Ocean Energy Management
*Governmental Units, and Administrative and Statistical Boundaries	41	U.S. Department of Commerce, U.S. Census Bureau
*Imagery	9	Co-Leads: U.S. Department of Agriculture, Farm Service Agency and U.S. Department of the Interior, U.S. Geological Survey
Land Use—Land Cover	14	Co-Leads: U.S. Department of Agriculture, U.S. Forest Service and U.S. Department of the Interior, U.S. Geological Survey
Real Property	14	General Services Administration
Soils	5	U.S. Department of Agriculture, Natural Resources Conservation Service
*Transportation	16	U.S. Department of Transportation
Utilities	2	Offshore Utilities: U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement Terrestrial Utilities: Lead to be determined
*Water — Inland	5	Co-Leads: U.S. Department of the Interior, U.S. Fish and Wildlife Service and U.S. Department of the Interior, U.S. Geological Survey
*Water — Oceans and Coasts	16	U.S. Department of the Commerce, National Oceanic and Atmospheric Administration

Appendix D

Fiscal Year 2016 FGDC Office of the Secretariat Financial Summary

The Federal Geographic Data Committee (FGDC) is a 32-member interagency committee that promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis. The FGDC Office of the Secretariat (FGDC OS), administered in the U.S. Geological Survey (USGS) in the Department of Interior (DOI), provides program, management, coordination, administrative, and technical support for FGDC initiatives, activities, and priorities. The following table illustrates a summary of actual expenditures of appropriated funds for fiscal year 2016.

FGDC Office of the Secretariat Fiscal Year 2015 Expenditures

Activity	Function	Expenditure
Staff Operations and Projects	<ul style="list-style-type: none"> - Committee management/support - Contract execution/reporting - National Spatial Data Infrastructure (NSDI) training and Web services - Special projects - Position, Navigation, and Timing - Conferences - NSDI Strategic Plan, National Geospatial Data Asset Management Plan 	\$2,156,690
Geospatial Platform Shared Service/Line of Business*	<ul style="list-style-type: none"> - DOI/USGS contribution - GeoCloud - Services registry 	\$1,048,000
National Geospatial Advisory Committee (NGAC)	<ul style="list-style-type: none"> - Committee management - Meetings and facilitation - Subcommittee activities 	\$147,000
International Activities	<ul style="list-style-type: none"> - Group on Earth Observations (GEO), GEOSS - Global Spatial Data Infrastructure - Arctic Spatial Data Infrastructure - United Nations Global Geospatial Information Management 	\$127,100
Geospatial Standards	<ul style="list-style-type: none"> - Interoperability - FGDC and Geospatial Standards Working Group standards - Open Geospatial Consortium 	\$212,500
Bureau Shared Costs		\$142,710
Total Expenditures		\$3,834,000

*Contributions from other agencies are not included.

Appendix E

NSDI Strategic Plan—Fiscal Year 2016

Performance Summary

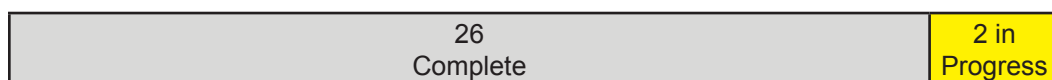
NSDI Plan Implementation Approach

The FGDC community is working collaboratively to implement the NSDI Strategic Plan. The FGDC Executive Committee has the lead responsibility for overseeing and monitoring the implementation of the plan. Designated Federal officials, appointed from the FGDC Executive Committee, are serving as executive champions for each of the objectives in the plan. Implementation plans have been developed for each of the objectives in the strategic plan, describing how the actions will be implemented and measured. This summary describes the FY 2015 implementation status of all of the actions and tasks included in the NSDI Strategic Plan and implementation plans.

Performance Summary

This summary describes the FY 2016 implementation status of all of the actions and tasks included in the 2014–2016 NSDI strategic plan. The plan includes 3 strategic goals, 9 objectives, and 29 actions. The NSDI implementation plans included more detailed tasks and performance metrics for each of the actions in the strategic plan. The following is a summary of the implementation status:

- **FY 2014.** The status report includes 28 tasks for FY 2014. Of these tasks, 26 are reported as complete (shown in gray) and 2 are reported as not complete but in progress (shown in yellow).



- **FY 2015.** The status report includes 36 tasks for FY 2015. Of these tasks, 32 are reported as complete (shown in gray) and 4 are reported as not complete but in progress (shown in yellow).



- **FY 2016.** The status report includes 24 tasks for FY 2016. Of these tasks, 11 are reported as complete (shown in gray), and 13 are reported as not complete but in progress (shown in yellow).



Next Steps

The FGDC Executive Committee will continue to monitor the implementation of the goals and objectives in the 2014–2016 NSDI strategic plan. As described in the “NSDI Strategic Planning” section of this report, the FGDC is engaged in developing the next version of the strategic plan for the NSDI. This new plan will be developed in two phases. First, a high-level strategic plan framework will be developed by December 2016, describing priorities and opportunities for the next Administration. Second, following engagement and coordination with the new Administration in 2017, a final version of the next NSDI strategic plan will be developed by the end of 2017.

The Executive Committee and FGDC Secretariat will continue to keep the FGDC community and key partners, such as the National Geospatial Advisory Committee, apprised of the status of the development of this new plan.

Additional information on the NSDI strategic plan, including the complete version of the FY 2016 Status Report, is available at <https://www.fgdc.gov/nsdi-plan>.

STRATEGIC GOAL 1 – DEVELOP CAPABILITIES FOR NATIONAL SHARED SERVICES

Objective 1.1: Develop geospatial interoperability reference architecture

Action 1.1.1. Establish reference architecture to assure interoperability utilizing published open-service standards to share data among unclassified, controlled unclassified information (CUI), and classified domains and missions.

Task	Performance Indicator	Task Status
1.1.1.1. Develop draft Geospatial Information Reference Architecture (GIRA)	Metric: Completion of draft GIRA FY14 Target: Draft completed and prepared for distribution for comments	Complete
1.1.1.2. Review by participating agencies	Metric: Review of comments received from DHS, DOI, & NGA FY14 Target: 100% comments adjudicated	Complete
1.1.1.3. Review by FGDC agencies	Metric: Review of comments received FY14 Target: 100% of comments received adjudicated	Complete
1.1.1.4. Final approval of GIRA by FGDC and transmittal to the Federal Chief Information Officer (CIO) Council for inclusion as a Federal Enterprise Architecture reference document	Metric: Transmittal of GIRA to Federal CIO Council FY15 Target: 100% complete	Complete

Action 1.1.2. Define the role of the Geospatial Platform as a technology and collaboration environment for unclassified geospatial information sharing.

Task	Performance Indicator	Task Status
1.1.2.1. Develop components of GIRA that describe the role of the Geospatial Platform for information sharing	Metric: Draft completed and prepared for distribution for comments FY14 Target: 100% complete	Complete
1.1.2.2. Develop and present outreach and training materials to educate the community on the role of the Geospatial Platform for supporting information sharing	Metric: Presentation on Geospatial Platform role for information sharing environment at one national geospatial meeting FY15 Target: 100% complete	Complete

Action 1.1.3. Identify Federal CIO Council requirements, shared services, and other infrastructure that can be reused and leveraged by the NSDI, including access control, search, and discovery.

Task	Performance Indicator	Task Status
1.1.3.1. Develop and deliver briefing to CIO Council/Shared Services Executive Steering Committee on Geospatial Platform and NSDI	Metric: Delivery of briefing FY15 Target: 100% complete	Complete
1.1.3.2. Work with the Office of Management and Budget (OMB) Financial Management LoB (OMB MAX team) to identify collaboration and technology reuse opportunities	Metric: Completion of outline/brief white paper on opportunities for sharing between MAX and Platform FY15 Target: 100% complete	Complete
1.1.3.3. Develop white paper on use/sharing of technology components existing within Departments and among the OMB shared services for the benefit of the NSDI	Metric: Completion of white paper FY15 Target: 100% complete	In Progress

Objective 1.2: Establish the Geospatial Platform as the Federal geospatial data, services, and applications Web-based service environment		
Action 1.2.1. Establish Service Level or Interagency Agreements between and among government agencies and the Geospatial Platform Managing Partner.		
Task	Performance Indicator	Task Status
1.2.1.1. Complete FY 14 Funding Agreements	Metric: Completion of FY 14 Funding Agreements FY14 Target: 100% of Agreements completed	Complete
1.2.1.2. Develop model Service Level Agreement (SLA) for customers hosting data on Platform	Metric: Completion of model SLA FY14 Target: 100% complete	Complete
Action 1.2.2. Establish the Geospatial Platform Oversight Body and develop its operating procedures, scope, and roles for Federal and non-Federal members.		
Task	Performance Indicator	Task Status
1.2.2.1. Establish Charter for Geospatial Platform Oversight Body	Metric: Completion of Charter FY15 Target: 100% complete	Complete
1.2.2.2. Establish Geospatial Platform Oversight Body	Metric: Establishment of Oversight Body FY15 Target: 100% complete	Complete
Action 1.2.3. Implement the primary contracting mechanism to continue Geospatial Platform development and operations and maintenance for FY 2014 and beyond..		
Task	Performance Indicator	Task Status
1.2.3.1. Award contract for Geospatial Platform support	Metric: Award of contract FY14 Target: 100% complete	Complete
Action 1.2.4. Implement communities of interest on the Geospatial Platform for collaboration, including a shared investment planning “Marketplace” and data theme communities, as outlined in OMB Circular A–16.		
Task	Performance Indicator	Task Status
1.2.4.1. Establish Geospatial Platform Marketplace as operational capability	Metric: Establishment of Marketplace capability FY14 Target: 100% complete	Complete
1.2.4.2. Establish initial capabilities for A–16 Theme communities on Geospatial Platform	Metric: Establishment of initial capabilities for A–16 communities FY14 Target: 100% complete	Complete
1.2.4.3. Define workflow for creating new communities on Geospatial Platform	Metric: Completion of workflow document FY15 Target: 100% complete	Complete
Action 1.2.5. Develop guidance for Federal agencies and their partners that describes how to use the Geospatial Platform to store and publish data and metadata and how to use services in the Platform’s common hosting infrastructure.		
Task	Performance Indicator	Task Status
1.2.5.1. Develop draft guidance for use of the Geospatial Platform	Metric: Completion of draft guidance FY14 Target: 100% complete	Complete
1.2.5.2. Finalize metadata publication guidance for use of the Geospatial Platform	Metric: Completion of final guidance FY15 Target: 100% complete	Complete
Action 1.2.6. Solicit advice and recommendations from the National Geospatial Advisory Committee (NGAC) and community partners on ways to expand and enhance the Geospatial Platform for broader use and value by the non-Federal community.		
Task	Performance Indicator	Task Status
1.2.6.1. Include section on Geospatial Platform in 2014 FGDC Guidance to NGAC	Metric: Inclusion of Platform language in 2014 NGAC Guidance FY14 Target: 100% complete	Complete
1.2.6.2. Provide briefings and seek feedback from NGAC on Geospatial Platform developments	Metric: Completion of NGAC briefings/ feedback FY15 Target: 100% complete	Complete

Action 1.2.7. Define the concept and develop an implementation plan for a “Data as a Service” (DAAS) offering within the Geospatial Platform Marketplace.		
Task	Performance Indicator	Task Status
1.2.7.1. Develop concept paper for Platform Marketplace DAAS offering	Metric: Completion of concept paper FY16 Target: 100% complete	Complete
1.2.7.2. Complete implementation plan for Platform Marketplace DAAS offering	Metric: Completion of implementation plan FY16 Target: 100% complete	Complete

Objective 1.3: Expand the use of cloud computing

Action 1.3.1. Define the Department of the Interior (DOI) Foundation Cloud Services consumer requirements, scope of service levels, and repeatable workflows for Geospatial Platform users.

Task	Performance Indicator	Task Status
1.3.1.1. (1) Draft acquisition Task Order and government cost estimate for Cloud-IaaS using a DOI-sanctioned vehicle, and complete review by FGDC Executive Committee; (2) Develop draft performance work statement measures/metrics	Metric: Completion of draft Task Order FY14 Target: 100% complete	Complete
1.3.1.2. Execute Cloud IaaS Task Order to initiate Geospatial Platform server hosting	Metric: Completion of final Task Order FY15 Target: 100% complete	Complete
1.3.1.3. Complete memorandum announcing Shared Cloud hosting and managed services bundles	Metric: Completion and distribution of memorandum and guide FY15 Target: 100% complete	Complete

Action 1.3.2. Provide guidance, best practices, and case studies for agencies considering migration of agency stored content and services to commodity cloud providers.

Task	Performance Indicator	Task Status
1.3.2.1. PDevelop tools, resources, and informational materials to communicate with agencies and to assist with learning about geospatial cloud service options	Metric: Completion of resource materials FY15 Target: 100% complete	Complete
1.3.2.2. Provide briefing to FGDC Steering Committee to introduce Geospatial Platform cloud offerings before FY 2016 expenditures and FY 2017 planning take place	Metric: Completion of FGDC briefing FY15 Target: 100% complete	Complete

Action 1.3.3. Develop an options paper for expanding the currently defined common hosting environment with capabilities available in the commercial market.

Task	Performance Indicator	Task Status
1.3.3.1. Perform and document market review of existing geospatial service hosting options that support endorsed standards to enable Platform community publishers to host compatible data and services	Metric: Completion of market review FY16 Target: 100% complete	Complete

Objective 1.4: Promote the use of geospatial multiagency acquisition vehicles for interagency and intergovernmental purchases

Action 1.4.1. Inventory available and planned geospatial acquisition vehicles open to Federal agencies and non-Federal partners.

Task	Performance Indicator	Task Status
1.4.1.1. Complete implementation Action Plan for Objective 1.4	Metric: Completion of Action Plan FY15 Target: 100% complete	Complete

1.4.1.2. Create survey to be completed by FGDC Steering Committee members to identify inventory of geospatial acquisition solutions, to include cataloging any vehicles available for government-wide use	Metric: Development of survey FY16 Target: 100% complete	In Progress
1.4.1.3. Steering Committee members complete and return the survey	Metric: Completion of survey FY16 Target: 100% complete	In Progress
1.4.1.4. Contact GSA Federal Acquisition Service, NASA, DOI, HHS, others with known Government-wide Acquisition Contracts (GWACs) to generate list of additional acquisition solutions	Metric: Completion of list of GWACs FY16 Target: 100% complete	In Progress
1.4.1.5. Collect surveys and analyze results, to include determining and validating geospatial acquisition vehicles available for government-wide use	Metric: Completion of analysis FY16 Target: 100% complete	In Progress
Action 1.4.2. Create a mechanism for sharing information on the availability and use of consolidated acquisition vehicles.		
Task	Performance Indicator	Task Status
1.4.2.1. Complete implementation Action Plan for Objective 1.4	Metric: Completion of Action Plan FY16 Target: 100% complete	Completed
1.4.2.1. Identify point of contact with contact and online “link information” for each GWAC	Metric: Identification of GWAC contact information FY16 Target: 100% complete	In Progress
1.4.2.3. Provide links on GeoPlatform to these solutions and post list of common acquisition vehicles to include acquisition type, period of performance, Ceiling, terms and conditions of use to GeoPlatform	Metric: Posting of links on GeoPlatform Web site FY16 Target: 100% complete	In Progress
1.4.2.4. Review FGDC Steering Committee member responses to include their Statement of Work submissions, standardize as needed, and post to the GeoPlatform under a controlled access area of the Geoplatform	Metric: Posting of links on GeoPlatform Web site FY16 Target: 100% complete	In Progress

STRATEGIC GOAL 2 – ENSURE ACCOUNTABILITY AND EFFECTIVE DEVELOPMENT AND MANAGEMENT OF FEDERAL GEOSPATIAL RESOURCES

Objective 2.1: Advance the portfolio management process for National Geospatial Data Assets (NGDA)

Action 2.1.1. Identify foundational NGDAs and high-priority data themes and datasets to be included in NSDI portfolio management.

Task	Performance Indicator	Task Status
2.1.1.1. Identify initial baseline of NGDA Datasets (NGDA Management Plan: Action 1B.1)	Metric: Initial NGDA Datasets identified FY14 Target: FY14 Q3, 100%	Complete
2.1.1.2. Complete and submit NGDA Dataset Maturity Baseline Assessment (NGDA Management Plan: Action 2A.1)	Metric: NGDA Dataset Maturity Assessment complete FY15 Target: FY15 Q3, 30%; FY15 Q4, 100%	Complete
2.1.1.3. Complete and submit NGDA Theme Administrative Maturity Baseline Assessment (NGDA Management Plan: Action 2A.2)	Metric: NGDA Theme Administrative Maturity complete FY16 Target: FY16 Q2, 100%	In Progress

Action 2.1.2. Define Federal roles and responsibilities in national data management, including metadata and data delivery, taking into account OMB Circular A–16 Supplemental Guidance portfolio management requirements, the Open Data Policy, Geospatial Platform, Data.gov, and other relevant requirements.		
Task	Performance Indicator	Task Status
2.1.2.1. Develop a process for selecting and maintaining Executive NGDA Theme Champions, NGDA Theme Leads, and NGDA Dataset Managers (NGDA Management Plan: Action 1A.1)	Metric: Process developed and roles filled FY14 Target: FY14 Q4, 100%	Complete
Action 2.1.3. Finalize and implement the Circular A–16 Portfolio Implementation Plan to include reporting investments and defining investment requirements.		
Task	Performance Indicator	Task Status
2.1.3.1. Review/revise the definition of geospatial investment and budget reporting codes (NGDA Management Plan: Action 1E.1)	Metric: Geospatial Investment and Budget Reporting Codes defined FY15 Target: FY15 Q4, 100%	In Progress
2.1.3.2. Apply the Geospatial Investment definition and budget reporting codes (NGDA Management Plan: Action 1E.2)	Metric: Agencies have instituted revised definition and coding FY16 Target: FY16 Q4, 30%; FY17 and beyond, Ongoing	In Progress
2.1.3.3. Develop the A–16 NGDA portfolio-level processes, reporting requirements, and roles and responsibility requirements for Federal geospatial portfolio management (NGDA Management Plan: Action 2E.1)	Metric: Developed the A–16 processes, reporting requirements, and roles and responsibility requirements FY15 Target: FY15 Q4, 100%	In Progress
2.1.3.4. Develop a process for Federal agencies to identify resources required for managing geospatial data beyond their agency's mission (NGDA Management Plan: Action 2E.2)	Metric: Process developed FY16 Target: FY16 Q4, 100%	In Progress
Action 2.1.4. Develop a process for monitoring and reporting on the progress of Circular A–16 Data Theme and Geospatial Platform Community management responsibilities, including the use and proliferation of content and technology standards.		
Task	Performance Indicator	Task Status
2.1.4.1. Develop NGDA Dataset Maturity Baseline Assessment survey and tool (NGDA Management Plan: Action 1D.1)	Metric: Survey and tool complete FY14 Target: FY14 Q4, 100%	Complete
2.1.4.2. Develop NGDA Dataset report template and tool (NGDA Management Plan: Action 1D.2)	Metric: Template and tool complete FY15 Target: FY15 Q3, 100%	Complete
2.1.4.3. Develop NGDA Theme Administrative Maturity Baseline Assessment survey and tool (NGDA Management Plan: Action 1D.3)	Metric: Survey and tool complete FY14 Target: FY14 Q4, 100%	In Progress
2.1.4.4. Develop NGDA Strategic Theme Plan template and tool (NGDA Management Plan: Action 1D.4)	Metric: Template and tool complete FY15 Target: FY15 Q2, 100%	Complete
2.1.4.5. Develop NGDA Theme Report template and tool (NGDA Management Plan: Action 1D.5)	Metric: Template and tool complete FY15 Target: FY15 Q3, 100%	Complete
2.1.4.6. Develop NGDA Services and (or) Applications Investment Report template, tool, and report (NGDA Management Plan: Action 1D.6)	Metric: NGDA Services and Applications Investment Report template complete; CPIC harvesting algorithms complete; NGDA Services and Applications Investment Report complete FY16 Target: FY16 Q1, NGDA Services and Applications Investment Report template complete; CPIC harvesting algorithms complete; FY16 Q2, NGDA Services and (or) Applications Investment Report complete	In Progress

2.1.4.7. Develop NGDA portfolio summary report template and tool (NGDA Management Plan: Action 1D.7)	Metric: Template and tool complete FY16 Target: FY16 Q3, NGDA NGDA portfolio summary report template and tool complete	In Progress
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Objective 2.2: Identify potentially duplicative investments and opportunities for collaborative investments		
Action 2.2.1. Provide guidance and instructions to Federal agencies on use of the Geospatial Platform Marketplace.		
Task	Performance Indicator	Task Status
2.2.1.1. Provide FGDC guidance for use of the Marketplace to FGDC member agencies	Metric: Submittal of guidance to FGDC agencies FY14 Target: 100% complete	Complete
2.2.1.2. Provide draft guidance on use of the Marketplace that each FGDC member can customize for issuance of their own internal policies	Metric: Submittal of draft guidance for customization to FGDC agencies FY14 Target: 100% complete	Complete
Action 2.2.2. Develop process and technology implementation to track use of the Geospatial Platform Marketplace and cost savings/avoidance through its application.		
Task	Performance Indicator	Task Status
2.2.2.1. Prototype and (or) mockup of cost savings/avoidance report with ties to data sources and collection methodology	Metric: Prototype submitted to FGDC Coordination Group for review and feedback FY15 Target: 100% complete	In Progress
2.2.2.2. Implementation of Marketplace performance metrics dashboard on geoplatform.gov	Metric: Dashboard available on geoplatform.gov Draft FY16 Target: 100% complete	Complete
Action 2.2.3. Solicit feedback from the Geospatial Platform user community on future requirements for Marketplace functionality.		
Task	Performance Indicator	Task Status
2.2.3.1. Solicit feedback on Marketplace from attendees at national geospatial meetings	Metric: National conference presentations on Geospatial Platform given with feedback sessions FY14 Target: Presentations at two (2) national conferences	Complete

STRATEGIC GOAL 3 – CONVENE LEADERSHIP OF THE NATIONAL GEOSPATIAL COMMUNITY

Objective 3.1: Lead and participate in the development and coordination of national and international standards applicable to the geospatial community		
Action 3.1.1. Consult and collaborate with both existing and emerging geospatial communities to advance common standards and approaches.		
Task	Performance Indicator	Task Status
3.1.1.1. Identify, monitor, and participate in existing and emerging external geospatial communities (for example, volunteered geographic information, indoor navigation, mobile applications)	Metric: Periodic distribution of information about existing and potential opportunities for consultation and collaboration online FY14 Target: At least one information outreach cycle	Complete
Action 3.1.2. Develop strategic partnerships with existing standards development organizations.		
Task	Performance Indicator	Task Status
3.1.2.1. Identify gaps and opportunities for partnerships with existing standards development organizations	Metric: Register of FGDC participation in existing standards development organizations FY14 Target: 50% complete	Complete

3.1.2.2. Encourage and maintain FGDC membership in existing standards organizations	Metric: Periodic synopsis of participation in existing standards organizations published online FY14 Target: At least one publication cycle	Complete
Action 3.1.3. Provide technical and educational support to agencies implementing NSDI standards and engage the standards community through workshops or online information-sharing tools such as Web meetings or social media.		
Task	Performance Indicator	Task Status
3.1.3.1. Identify means to provide wanted/needed technical and educational support to agencies implementing NSDI standards	Metric: Register training opportunities FY14 Target: Needs assessment; 40% complete	In Progress
3.1.3.2. Develop repeatable (yearly) process to provide information on technical and educational training opportunities	Metric: Development of updated register of existing and planned standards training opportunities FY16 Target: 100% complete	In Progress
3.1.3.3. Continually update content on standards on <i>www.fgdc.gov</i> , including dynamic information	Metric: Information content about standards is continually maintained and updated on the FGDC website FY14 Target: Timely updates	Complete

Objective 3.2: Convene the leadership of the geospatial and nongeospatial communities to develop public/private partnerships and shared approaches for addressing critical national issues

Action 3.2.1. Engage with the NGAC, key geospatial organizations, and other stakeholders to inform policy decisions and collaboratively identify and address issues of common concern.

Task	Performance Indicator	Task Status
3.2.1.1. Complete 2014 FGDC Guidance to NGAC describing NGAC study topics and focus areas	Metric: Completion of guidance FY14 Target: 100% complete	Complete
3.2.1.2. Hold three in-person meetings with NGAC in FY 2014	Metric: Completion of in-person meetings FY14 Target: Three in-person NGAC meetings	Complete
3.2.1.3. Hold NSDI Leaders Forum meetings to seek input and dialogue on key NSDI issues	Metric: Completion of Leaders Forum meetings FY14 Target: One Leaders Forum meeting (Q4 FY 14)	Complete
3.2.1.4. Collaborate with NGAC subcommittees to develop products addressing 2014 NGAC guidance	Metric: Completion of NGAC products/papers addressing 2014 NGAC guidance FY15 Target: Adoption of all 2014 NGAC products/papers by December 2014	Complete
3.2.1.5. Complete 2015 FGDC Guidance to NGAC, describing NGAC study topics and focus areas	Metric: Completion of guidance FY15 Target: 100% complete	Complete
3.2.1.6. Hold three in-person meetings with NGAC in FY 2015	Metric: Completion of in-person meetings FY15 Target: Three in-person NGAC meetings	Complete
3.2.1.7. Collaborate with NGAC subcommittees to develop products addressing 2015 NGAC guidance	Metric: Completion of NGAC products/papers addressing 2015 NGAC guidance FY15 Target: Adoption of all 2014 NGAC products/papers by December 2015	Complete
3.2.1.8. Complete 2016 FGDC Guidance to NGAC, describing NGAC study topics and focus areas	Metric: Completion of guidance FY16 Target: 100% complete	Complete
3.2.1.9. Hold three in-person meetings with NGAC in FY 2015	Metric: Completion of in-person meetings FY16 Target: Three in-person NGAC meetings	Complete
3.2.1.10. Collaborate with NGAC subcommittees to develop products addressing 2015 NGAC guidance	Metric: Completion of draft NGAC products/papers addressing 2015 NGAC guidance FY16 Target: Development of draft 2015 NGAC products/papers by October 2016	Complete

Action 3.2.2. Collaborate with the NGAC and other partners to review and develop common approaches to the issue of geolocation privacy.		
Task	Performance Indicator	Task Status
3.2.2.1. Incorporate geolocation privacy into 2014 FGDC guidance to the NGAC	Metric: Inclusion of geolocation privacy into 2014 NGAC guidance FY14 Target: 100% complete	Complete
3.2.2.2. Collaborate with NGAC privacy subcommittee to address 2014 NGAC guidance	Metric: Completion of NGAC products/papers addressing 2014 NGAC guidance on geolocation privacy FY15 Target: Completion of 2014 NGAC products/papers by FY15 Q2	Complete
3.2.2.3. Hold joint FGDC–NGAC briefing for CIO Council Privacy Committee	Metric: Completion of joint FGDC–NGAC briefing for CIO Council Privacy Committee FY15 Target: 100% complete	Complete
3.2.2.4. Collaborate with NGAC Geospatial Privacy Subcommittee to define deliverables for 2015	Metric: Agreement on subcommittee deliverables for 2015 FY15 Target: 100% complete	Complete
3.2.2.5. Hold joint FGDC–NGAC panel presentation on geospatial privacy at CIO Council Privacy Summit	Metric: Completion of joint FGDC–NGAC panel presentation at CIO Council Privacy Summit FY16 Target: 100% complete	Complete

Objective 3.3: Raise awareness of the NSDI and its impact on critical national and international issues

Action 3.3.1. Develop and implement a communication strategy and outreach plan to promote the benefits of NSDI data and the goals of the NSDI Strategic Plan.

Task	Performance Indicator	Task Status
3.3.1.1. Award Task Order under GeoPlatform support contract for communications/outreach support	Metric: Award of Task Order FY15 Target: 100% complete	Complete
3.3.1.2. Complete draft outline of NSDI/GeoPlatform communications strategy/implementation plan	Metric: Completion of draft communications strategy/implementation plan outline FY15 Target: 100% complete	Complete
3.3.1.3. Input from FGDC/NGAC on draft communications strategy/implementation plan	Metric: Collection of input from FGDC/NGAC on draft communications strategy/implementation plan FY15 Target: 100% complete	Complete
3.3.1.4. Finalize NSDI/GeoPlatform communications strategy/implementation plan	Metric: Completion of NSDI/GeoPlatform communications strategy/implementation plan FY15 Target: 100% complete	Complete
3.3.1.5. Complete NSDI communications toolkit, including fact sheets, templates, Web content, key messages, and so forth	Metric: Completion of communications toolkit FY16 Target: 100% complete	Complete

Action 3.3.2. Promote the vision of NSDI globally through active participation and support for activities, such as the Global Spatial Data Infrastructure (GSDI), the United Nations Initiative on Global Geospatial Information Management (UN-GGIM), and the U.S. Group on Earth Observations (USGEO).

Task	Performance Indicator	Task Status
3.3.2.1. Provide technical support for GSDI Small Grants Program	Metric: Completion of four GSDI Small Grant projects FY15 Target: 100% complete	Complete
3.3.2.2. Organize and execute U.S. participation in 2015 Geospatial World Forum and the Infrastructure for Spatial Information in the European Community (INSPIRE) meeting	Metric: Completion of U.S. participation in Geospatial World Forum and INSPIRE meetings FY15 Target: 100% complete	Complete

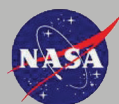
3.3.2.3. Complete NSDI/GeoPlatform communications strategy/implementation plan, including international activities	Metric: Completion of NSDI/GeoPlatform communications strategy/implementation plan FY15 Target: 100% complete	Complete
3.3.2.4. Organize and execute U.S. participation in 12th Plenary Session of the Group on Earth Observations (GEO-XII), and the GEO 2015 Ministerial Summit (November 2015)	Metric: Completion of U.S. participation in GEO-XII Plenary Session and GEO 2015 Ministerial Summit FY16 Target: 100% complete	Complete

Appendix F

Glossary of Abbreviations and Terms

3DEP	3D Elevation Program	FGDC	Federal Geographic Data Committee
ACWI	Advisory Committee on Water Information	FIG	Integrated Federation of Surveyors
AGOL	ArcGIS Online	FLWG	Federal Lands Working Group
AOA	Analysis of Alternatives	FS	U.S. Forest Service
APFO	USDA Aerial Photography Field Office	FSA	Farm Service Agency
API	Application Programming Interface	FWS	U.S. Fish and Wildlife Service
ARNOLD	All Roads Network of Linear Referenced Data	GAC	DOI Geospatial Advisory Committee
		GAO	U.S. Government Accountability Office
ATWG	Architecture and Technology Working Group	GDWG	GEOSS Development Working Group
		GEO	Group on Earth Observations
BAA	Broad Agency Announcement	GeoCloud	Geospatial Cloud
BAS	Boundary and Annexation Survey	GEOSS	Global Earth Observation System of Systems
BBSP	Block Boundary Suggestion Project		
BIA	Bureau of Indian Affairs	GGIM	Global Geospatial Information Management
BLM	Bureau of Land Management	GIRA	Geospatial Interoperability Reference Architecture
BQARP	Boundary Quality Assessment and Reconciliation Project	GIS	Geographic Information System
CAP	Cooperative Agreements Program	GMO	DHS Geospatial Management Office
CENRS	Committee of the Environment, Natural Resources and Sustainability	GNSS	Global Navigation Satellite System
Census Bureau	U.S. Census Bureau	GPS	Global Positioning System
CES	Conference of European Statisticians	GRAV-D	Gravity for the Redefinition of the American Vertical Datum
CFEOD	Common Framework for Earth Observation Data	GSA	U.S. General Services Administration
		GSDI	Global Spatial Data Infrastructure
CG	FGDC Coordination Group	GSF	GEOSS Service Framework
CIO	Chief Information Officer	GTFS	General Transit Feed Specification
CMECS	Coastal and Marine Ecological Classification Standard	GWG	Geospatial Intelligence Standards Working Group
CMS	Content Management System	HIFLD	Homeland Infrastructure Foundation-Level Data
CMTS	Committee on the Marine Transportation System	HSIP	Homeland Security Infrastructure Program
COGO	Coalition for Geospatial Organizations	IBC	International Boundary Commission
CONED	USGS Coastal National Elevation Database	IBWC	International Boundary and Water Commission
CONOPS	Concept of operations	IDIQ	Infinite delivery indefinite quantity (contract)
CORS	Continuously Operating Reference Station	IHRF	International Height Reference Frame
CSDGM	Content Standard for Digital Geospatial Metadata	INCITS	International Committee for Information Technology Standards
CSR	Component Systems Registry	INSPIRE	Infrastructure for Spatial Information in the European Community
DAB	Discovery and Access Broker		
DCMI	Dublin Core Metadata Framework	IPT	Integrated Project Team
DHS	Department of Homeland Security	ISO	International Organization for Standardization
DOD	U.S. Department of Defense		
DOI	U.S. Department of the Interior	IT	Information Technology
EAWS	Early Access Web Services	ITRF	International Terrestrial Reference Frame
EE	USGS Earth Explorer	IWG	Interagency Working Group
EML	Ecological Metadata Language	IWG-OCM	Interagency Working Group on Ocean and Coastal Mapping
EPA	U.S. Environmental Protection Agency		
ESA	Ecological Society of America	LMA	Lifecycle Maturity Assessment
FEMA	Federal Emergency Management Agency	LRS	Land Remote Sensing

MCA	Mission Critical Activity	OMF	Open Source Metadata Framework
MCSD	Marine and Coastal Spatial Data	OPUS	Online Positioning User Service
MLRA	Major Land Resource Areas	ORNL DAAC	Oak Ridge National Laboratory Distributed Active Archive Center
MODIS	Moderate Resolution Imaging Spectroradiometer	OWDI	Open Water Data Initiative
MRLC	Multi-Resolution Land Characteristics	PAD-US	USGS Protected Areas Database of the United States
MWG	Metadata Working Group	PLSS	Public Land Survey System
NAIP	National Agriculture Imagery Program	PM-ISE	Program Manager-Information Sharing Environment
NAPSG	National Alliance for Public Safety GIS Foundation	RCA-EO	Requirements Capabilities and Analysis for Earth Observations
NASA	National Aeronautics and Space Administration	SAOGI	Senior agency official for geospatial information
NAVD 88	North American Vertical Datum of 1988	SBIR	Small Business Innovative Research
NBG	National Boundaries Group	SCC	Service Status Checker
NCC	NGDA Collaboration Community	SDG	Sustainable Development Goal
NCMS	National Coastal Mapping Strategy	SDI	Spatial Data Infrastructure
NDOP	National Digital Orthoimagery Program	SMA	Surface Management Agency
NGA	National Geospatial-Intelligence Agency	SSURGO	Soil Survey Geographic Database
NGAC	National Geospatial Advisory Committee	SSWD	Subcommittee on Spatial Water Data
NGDA	National Geospatial Data Asset	SWG	Standards Working Group
NGS	National Geodetic Survey	TBDEM	Topobathymetric elevation model
NHAP	National High Altitude Program	TIGER	Topologically Integrated Geographic Encoding and Reference system
NHC	National Hurricane Center	TIP	Theme Implementation Plan
NHD	National Hydrography Dataset	TNGIC	Tennessee Geospatial Information Council
NHD+HR	High-Resolution National Hydrography Dataset Plus	UN-GGIM	United Nations Global Geospatial Information Management Working Group
NHDPlus	National Hydrography Dataset Plus	UN-GGRF	United Nations Global Geodetic Reference Frame
NID	National Inventory of Dams	URISA	Urban and Regional Information Systems Association
NLCD	National Land Cover Database	USACE	U.S. Army Corps of Engineers
NLD	National Levee Database	USDA	U.S. Department of Agriculture
NOAA	National Oceanic and Atmospheric Administration	USDOT	U.S. Department of Transportation
NPPD	National Protection and Programs Directorate	USGEO	U.S. Group on Earth Observations
NPS	National Park Service	USGIF	States Geospatial Intelligence Foundation
NRCS	USDA Natural Resources Conservation Service	USGS	U.S. Geological Survey
NSDI	National Spatial Data Infrastructure	USNVC	U.S. National Vegetation Classification
NSLRSDA	National Satellite Land Remote Sensing Data Archive	W3C	World Wide Web Consortium
NWI	National Wetlands Inventory	WBD	Watershed Boundary Dataset
NWM	NOAA National Water Model	WG	Working Group
NWS	National Weather Service	WMS	Web mapping services
OGC	Open Geospatial Consortium	W-O&C	Water-Oceans and Coasts
O&M	Operations and maintenance	WQP	Water Quality Portal
OMB	Office of Management and Budget		



FGDC.GOV
FEDERAL GEOGRAPHIC DATA COMMITTEE