WATER – OCEANS AND COASTS THEME
NATIONAL GEOSPATIAL DATA ASSET
STRATEGIC PLAN
2017 – 2021

THEME STRATEGIC PLAN FOR WATER – OCEANS AND COASTS

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Water – Oceans and Coasts Theme Definition

"Features and characteristics of salt water bodies (i.e. tides, tidal waves, coastal information, reefs) and features and characteristics that represent the intersection of the land with the water surface (i.e. shorelines), the lines from which the territorial sea and other maritime zones are measured (i.e. baseline maritime) and lands covered by water at any stage of the tide (i.e. Outer Continental Shelf), as distinguished from tidelands, which are attached to the mainland or an island and cover and uncover with the tide." [Source: National Geospatial Data Asset (NGDA) Theme Descriptions web page [http://www.fgdc.gov/ngda-reports/Theme_Descriptions.html]]

Water – Oceans and Coasts National Geospatial Data Assets [NGDA]

NGDA Datasets	Dataset Manager Agency
Coastal Mapping Shoreline Products	DOC-NOAA
NOAA Electronic Navigational Charts (ENC)	DOC-NOAA
NOAA Raster Navigational Charts (RNC)	DOC-NOAA
Maritime Limits and Boundaries of the United States of America	DOC-NOAA
ODIN: Observational Data Interactive Navigation, an interactive map of all CO-OPS active stations	DOC-NOAA
OCSLA Sec. 8(g) Revenue Zone Boundary - Alaska Region NAD83	DOI-BOEM
OCSLA Sec. 8(g) Revenue Zone Boundary - Atlantic Region NAD83	DOI-BOEM
OCSLA Sec. 8(g) Revenue Zone Boundary - Gulf of Mexico Region NAD27	DOI-BOEM
OCSLA Sec. 8(g) Revenue Zone Boundary - Pacific Region - West Coast NAD83	DOI-BOEM
Outer Continental Shelf 200 Nautical Mile Limit - Gulf Of Mexico Region NAD27	DOI-BOEM
Outer Continental Shelf Submerged Lands Act Boundary - Alaska Region NAD83	DOI-BOEM
Outer Continental Shelf Submerged Lands Act Boundary - Gulf of Mexico Region NAD27	DOI-BOEM
Outer Continental Shelf Submerged Lands Act Boundary - Pacific Region - West Coast NAD83	DOI-BOEM
Sea Levels Online: Sea Level Variations of the United States Derived from National Water Level Observation Network Stations	DOC-NOAA
U.S. Marine Protected Areas Boundaries: MPA Inventory	DOC-NOAA

Theme History

The recognition of coastal and ocean datasets as part of the National Spatial Data Infrastructure [NSDI] has been around for decades, although initially it was seen as somewhat less important than more traditional, terrestrial datasets. The original voice for the Marine NSDI was the FGDC Subcommittee on Bathymetric and Nautical Charting Data which was created in 1993. Later in the 1990's there was a desire to give more visibility to Marine NSDI activities and contributions. To this end the FGDC created the Marine and Coastal Spatial Data Subcommittee [MCSD Subcommittee] in 2000. This subcommittee, along with its Marine Boundaries Working Group, has been very productive since its inception. Selected accomplishments include: the publication of '*Marine Managed Areas: Best Practices for Boundary Making*'; the adoption of the '*Coastal and Marine Ecological Classification Standard [CMECS]*'; the creation of the authoritative online resource for offshore energy and marine planning communities [MarineCadastre.gov]; and assisting in the planning and hosting of the bi-annual Coastal GeoTools conference. In 2004 the National Academy of Sciences published their landmark study on coastal and ocean GIS, '*A Geospatial Framework for the Coastal Zone; National Needs for Coastal Mapping and Charting*' illustrating the importance of coastal and marine datasets and applications.

> *"More Americans live and work along our coasts than anywhere else in the nation. In 2012, over 162 million people – 52 percent of the nation's total population – resided within the coastal watershed counties of the United States, including the Great Lakes and territories. This same narrow zone generates about 56 percent of U.S. Gross Domestic Product (GDP) at $8.7 trillion, and supports 67 million jobs and $2.8 trillion in wages. The ocean economy's direct and indirect effects on GDP account for $633 billion, approximately 5.4 million jobs and over $266.7 billion in wages, and it too is tied to our coasts and the 360+ U.S. ports that welcome maritime commerce and other economic uses. Just as critical, we depend on our coasts for protection from storms, food, recreational enjoyment, their natural beauty, water purification and other essential goods and services."*
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> *NATIONAL COASTAL MAPPING STRATEGY 1.0: COASTAL LIDAR ELEVATION FOR A 3D NATION*
> *National Science and Technology Council, April 2016*

During the FGDC's process to update OMB Circular A-16 and create the National Geospatial Data Assets [NGDA] Supplemental Guidance documentation in 2010, a new FGDC Data Theme was created to capture the components of the Marine NSDI. This new theme, Water – Oceans and Coasts [W-O&C], is now the leading voice for coastal and marine data, applications, and partnerships within the FGDC A-16 portfolio data management process.

Theme Scope

Since the creation of the FGDC and the initial visioning of the NSDI, the focus has been principally on the terrestrial datasets. The initial seven NSDI Framework Themes had limited references to non-terrestrial data --- the Bathymetry component of the Elevation Theme and the Shoreline component of the Hydrography Theme being the two main coastal and marine datasets. Additionally it was not uncommon for members of the geospatial community to not think about the NSDI extending beyond "the water's edge", oftentimes discounting the importance of coastal and marine data and services in realizing the true vision of the NSDI.

The U.S. Exclusive Economic Zone (EEZ) extends 200 nautical miles offshore and encompasses diverse ecosystems and vast natural resources such as fisheries, energy and other mineral resources. The U.S. EEZ is the largest in the world, spanning over 13,000 miles of coastline and containing 3.4 million square nautical miles of ocean—larger than the combined land area of all fifty states.

Source: http://www.gc.noaa.gov/documents/2011/012711_gcil_maritime_eez_map.pdf

The development of the Marine NSDI also brings some unique challenges and risks. A short list includes the difficulties associated with mapping ambulatory boundaries, a proliferation of 3D/4D datasets and diverse data formats specific to the oceanographic community, the difficulty in 'seeing' what you are mapping – especially below the surface of the ocean through the water column to the ocean bottom and suboceanic areas, and costly data collection required for even the most fundamental base datasets.

The current emphasis of the W-O&C Theme is tightly focused on a few critical NGDA's – nautical charts, shoreline, water levels, and selected marine boundaries. It would be extremely difficult for the W-O&C Theme, or the MCSD Subcommittee, to fully represent all requirements, activities, and challenges of this diverse geospatial community. The Theme and Subcommittee need to be strategic in identifying priority activities, with special attention given to those efforts that will have the biggest impact on issues of critical societal benefits, like climate impact planning and coastal resilience, vibrant coastal economies and societies, and healthy coastal and ocean ecosystems. A priority activity for the W-O&C Theme moving forward is the identification of critical datasets to add to the theme.

Internal FGDC Coordination

The W-O&C Theme is somewhat unique among the NGDA Data Themes. While the MCSD Subcommittee is the W-O&C Theme's primary FGDC coordination body, the Theme also has direct connections and dependencies to other A-16 Themes to fully represent the Marine NSDI portfolio.

The primary mission of the MCSD Subcommittee is to develop and promote the Marine NSDI. The Marine NSDI vision 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. For the past decade, the MCSD Subcommittee has worked in an integrated manner, seeking critical partnerships with other Federal, State, and local governments, as well as interagency and multisector geospatial activities in the marine and coastal environment.

Since the marine and coastal geospatial community is so broad and diverse, the MCSD Subcommittee seeks to leverage ongoing activities with other A-16 Themes. This chart shows selected connections between NGDA's managed by other A-16 Themes that could be considered components of the larger Marine NSDI, as well as W-O&C Theme NGDA's that are also of potential interest to other A-16 Themes.

A-16 Theme	Marine NSDI Datasets from Other A-16 Themes	Water – Oceans and Coasts Datasets with Other A-16 Theme Connections
Biodiversity and Ecosystems	Environmental Sensitivity Index (ESI)	
Cadastre	Outer Continental Shelf Lease datasets	Shoreline Products Outer Continental Shelf Boundaries
Climate and Weather	GOES Imagery High-Resolution Sea Surface Temperature Analysis Products POES Radiometer Data	
Cultural Resources	National Register of Historic Places	
Elevation	Coastal Lidar Digital Elevation Models Multibeam Bathymetric Data Marine Trackline Geophysics Database National Flood Hazard Layer NOS Hydrographic Surveys Collection	
Geology	Federal Sand and Gravel Borrow Areas Outer Continental Shelf Sand and Gravel Outer Continental Shelf Wells Seismic Water Bottom Anomalies – Gulf of Mexico	
Governmental Units		Maritime Limits and Boundaries Marine Protected Areas Boundaries Lands Act Boundaries
Imagery	Coastal Mapping Remote Sensing Data	
Land Use – Land Cover	Coastal Change Analysis Program Data	
Transportation	Ports	Nautical Charts
Utilities	Outer Continental Shelf Pipelines Outer Continental Shelf Oil Platforms	
Water - Inland	National Wetlands Inventory	

External Drivers and Requirements

Similar to all of the other A-16 Data Themes, the W-O&C Theme has a number of requirements and external drivers that provide direction for its priorities and activities. Some of these requirements are similar across all of the A-16 Themes, for example OMB Circular A-16 Revised, US Open Data Policy (OMB Memorandum M-13-13), and OSTP Memorandum on Increasing Public Access to the Results of Federally-Funded Research. In addition to these, there are a number of other external requirements specific to the coastal and marine community. The following is a short-list of policies, legislation, and research studies that guide the work of the MCSD Subcommittee and the W_O&C Theme.

National Ocean Policy

The *National Ocean Policy Implementation Plan* defines actions for President Obama's *National Policy for the Stewardship of the Ocean, Our Coasts and the Great Lakes*. The plan calls for the creation of a National Information Management System (NIMS) dedicated to coastal and marine scientific data and information products. The portal, ocean.data.gov, was created to address this requirement for geospatial coordination.

Coast and Geodetic Survey Act

The *Coast and Geodetic Survey Act of 1947* calls for NOAA "To provide charts and related information for the safe navigation of marine and air commerce, and to provide basic data for engineering and scientific purposes and for other commercial and industrial needs."

Ocean and Coastal Mapping Integration Act

The *Ocean and Coastal Mapping Integration Act of 2009* was a bill to establish a "coordinated and comprehensive federal ocean and coastal mapping plan," which included a focus on "cost-effective, cooperative mapping efforts." The Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM) was tasked to: "…develop an annually updated National Ocean and Coastal Mapping Plan…"

Energy Policy Act of 2005

The *Energy Policy Act of 2005 Sec. 388 – Alternative Energy-Related Uses on the Outer Continental Shelf* directs the U.S. Department of the Interior, in cooperation with the U.S. Department of Commerce, U.S. Coast Guard, and U.S. Department of Defense to establish a mapping initiative for decision-making related to alternative energy uses on the Outer Continental Shelf (OCS). MarineCadastre.gov implements the mapping initiative requirement and includes data on jurisdictional boundaries, marine infrastructure and transportation, alternative energy, and physical and biological data to support planning, management, and conservation of submerged lands and marine spaces.

Integrated Coastal and Ocean Observation System Act of 2009

The *Integrated Coastal and Ocean Observation System Act of 2009* requires NOAA to "establish a national integrated System of ocean, coastal, and Great Lakes observing systems, comprised of Federal and non-Federal components coordinated at the national level by the National Ocean Research Leadership Council and at the regional level by a network of regional information coordination entities, and that includes in situ, remote, and other coastal and ocean observation, technologies, and data

management and communication systems, and is designed to address regional and national needs for ocean information, to gather specific data on key coastal, ocean, and Great Lakes variables, and to ensure timely and sustained dissemination and availability of these data."

National Academy of Sciences Reports

In 2004 the National Academies released ***A Geospatial Framework for the Coastal Zone: National Needs for Coastal Mapping and Charting***. This report proposes an integrated and coordinated coastal mapping strategy for the nation, based on a consistent geospatial framework that would be the foundation for all data collection, analyses, and products. It also suggests mechanisms for enhanced communication among the many agencies and entities with mapping and charting responsibilities in the coastal zone in order to minimize redundancy and maximize operational efficiencies.

The National Research Council report ***Sea Change: 2015-2025 Decadal Survey of Ocean Sciences*** identifies eight strategic research priorities for the next decade that will continue to advance scientific understanding of the ocean. It also assesses the infrastructure needed to support this research, and makes recommendations for aligning current and planned infrastructure and budgets with science priorities in order to reach research goals.

United Nations Sustainable Development Goals

In September 2015 the United Nations adopted 17 sustainable development goals as part of the "Transforming our World: the 2030 Agenda for Sustainable Development". Goal 14 is to "Conserve and sustainably use the oceans, seas and marine resources for sustainable development". A number of the targets for this goal require the use of geospatial data and technologies.

Critical Coastal and Ocean Geospatial Coordination Partnerships

In addition to the MCSD Subcommittee, there are numerous other long-standing coordination bodies working on similar issues. A primary focus of the MCSD Subcommittee is to work collaboratively with existing efforts at all levels of government and across all sectors. The following is a short list of existing committees, working groups, and project teams that are active in the coastal and marine geospatial community and were vital in the development of W-O&C Theme and this strategy.

Interagency Working Group on Ocean and Coastal Mapping [IWG-OCM]

The Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM) is a working group of the Subcommittee on Ocean Science and Technology (SOST). SOST serves as the Ocean Science and Technology Interagency Policy Committee under the National Ocean Council. The IWG-OCM was established in 2006 to "facilitate the coordination of ocean and coastal mapping activities and avoid duplicating mapping activities across the Federal sector as well as with State, industry, academic and non-governmental (NGO) mapping interests." (National Ocean and Coastal Mapping Strategic Action Plan 2009).

National Ocean Council / ocean.data.gov Data Portal

The ocean.data.gov portal allows users to discover and access data, information, and decision tools related to our ocean, coasts, and Great Lakes. In response to the *National Ocean Policy Implementation Plan of 2009*, the National Ocean Council provides this site to support regional marine planning efforts across the country and to create a convenient place for anyone to find out more about marine, coastal, and Great Lakes environments.

Integrated Ocean Observing System [IOOS]

The Integrated Ocean Observing System (IOOS®) is a national-regional partnership working to provide new tools and forecasts to improve safety, enhance the economy, and protect the environment. The system is building better access to real time and retrospective data which helps predicting and understanding coastal events such as storms, wave heights, and sea level change. Coastal events affect a broad spectrum of activities from retail to development planning.

International Hydrographic Organization [IHO] Marine Spatial Data Infrastructure Working Group [MSDIWG]

The International Hydrographic Organization (IHO) Hydrographic Services and Standards Committee (HSSC) established a Marine Spatial Data Infrastructure Working Group (MSDIWG) to provide input from the Hydrographic Community to the National Spatial Data Infrastructure (NSDI).

International Coastal Atlas Network

The International Coastal Atlas Network (ICAN) is a project of the International Oceanographic Data & Information Exchange (IODE) Programme of UNESCO's Intergovernmental Oceanographic Commission (IOC) The goal of the IODE/ICAN is to encourage and help facilitate the development of digital atlases for use in marine spatial planning, understanding coastal governance, conservation, hazards, disaster management and mitigation.

Water – Oceans and Coasts Goals and Objectives

The W-O&C Theme strategy is comprised of four main goals with associated objectives, outcomes, challenges, and opportunities. This initial strategy was developed in close coordination with members of the MCSD Subcommittee as well as with members of related marine geospatial coordination bodies. This strategy does not include specific actions as they will be captured in the annual W-O&C Theme Implementation Plan. The initial W-O&C Theme Implementation Plan will be completed by the end of calendar year 2016.

GOAL 1: PROMOTE THE COLLECTION AND DISTRIBUTION OF KEY COASTAL AND OCEAN DATASETS

Anticipated Outcomes

- Increased access to critical coastal and ocean datasets that will improve the health and use of the coastal and marine environments.
- Enhanced marine spatial data infrastructure to support diverse community of users and uses.

Objective 1.1 Ensure W-O&C NGDAs are compliant with all A-16 Portfolio Data Management requirements for metadata, data access, web services, archiving, and maturity assessments.

Objective 1.2 Review scope of existing NGDAs and explore adding new NGDAs to the W-O&C Theme that fulfill authoritative framework data requirements for a national Marine NSDI.

Objective 1.3 Coordinate with other A-16 Theme Leads on NGDAs that are applicable to the W-O&C Theme to enhance cross-theme efficiencies and benefits and improve data product design, management and utilization.

Objective 1.4 Increase the overall availability of coastal and ocean datasets by encouraging authoritative data stewardship agencies to provide metadata and standards-compliant mapping services, as well as register content in Geoplatform.gov.

Objective 1.5 Gather and evaluate requirements from a diverse community of end-users for critical coastal and ocean datasets that don't currently exist, or are unavailable, that could be future candidates for national data development initiatives [e.g, integrated habitat data, high-resolution coastal bathymetry].

Objective 1.6 Support the Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM) in the development and implementation of a National Coastal Mapping Strategy, as directed by Congress in the Coastal and Ocean Mapping Integration Act of 2009.

GOAL 2: PROMOTE TOOLS THAT INCREASE THE USEFULNESS OF COASTAL AND OCEAN GEOSPATIAL DATA TO ADDRESS CRITICAL SOCIETAL ISSUES

Anticipated Outcomes

- Access to analytical tools that support effective utilization of coastal and ocean data to enhance the data investment value.
- Proven examples and best practices in the use of decision support technologies for coastal and marine management.

Objective 2.1 Work in partnership with other groups, such as the regional ocean portal teams and Digital Coast, to identify inventories of existing tools and decision support systems for the coastal and marine environment.

Objective 2.2 Seek out opportunities to promote high-value tools through a variety of outreach existing mechanisms (e.g., webinars, list servers, newsletter stories, conference presentations).

Objective 2.3 Identify and promote examples where geospatial data and technologies are critical in addressing complex coastal issues [e.g, sea level rise simulations, off-shore alternative energy siting alternatives analysis, acidification, sustainable fisheries, safe navigation].

GOAL 3: INCREASE AWARENESS OF NEW GEOSPATIAL DATA, COLLECTION SYSTEMS, AND INNOVATIVE APPROACHES TO MANAGE AND SHARE THESE RESOURCES.

Anticipated Outcomes

- Potential to take full advantage of new technologies to lower the cost of collecting and disseminating data.
- Access to new methods for data management and provision of datasets, models, and analytical tools.

Objective 3.1 Provide leadership and participate in national-scale standards efforts in thematic areas relevant to the coastal and ocean geospatial community.

Objective 3.2 Support the NOAA IOOS Office in providing new tools and forecasts to improve safety, enhance the economy, and protect the environment through a national-regional partnership for ocean observing systems.

Objective 3.3 Participate with the NOAA IOOS office as they lead a nationwide program for modeling development, undersea glider operations, high-frequency radar, and animal telemetry to include providing resources to partner organizations through a competitive funding program.

Objective 3.4 Identify coastal and ocean use cases that could potentially benefit from advances being made in the high performance computing and Big Data fields.

Objective 3.5 Partner with the academic community, private sector, and government research agencies in the development and testing of new geospatial technologies and approaches [e.g., Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX), Center for Coastal and Ocean Mapping/Joint Hydrographic Center (CCOM/JHC)].

Objective 3.6 Explore opportunities for shared services, for example cloud hosting or enterprise contracting vehicles, to improve efficiencies and coordination.

GOAL 4: FOSTER THE GROWTH OF AN INFORMED AND PRODUCTIVE COASTAL AND OCEAN GEOSPATIAL COMMUNITY

Anticipated Outcomes

- Increased communication between all sectors (government, private, academia, and non-profit) involved in the use of geospatial data and technologies for coastal and ocean planning.
- Identification of best practices and common technology approaches and platforms for coastal and ocean data management.
- Potential development of common best practices, technical assistance, and training materials for geospatial practitioners.

Objective 4.1 Reconstitute the Marine and Coastal Spatial Data Subcommittee to provide a coordination focal point for communicating the diverse activities and developing shared requirements for the coastal and marine geospatial community [e.g, IWG-OCM, IOOS, MPPN, ICAN].

Objective 4.2 Ensure close coordination with the wide range of regional ocean planning data portals and coastal atlas teams with an emphasis on sharing requirements and lessons learned on data, technology, decision support tools, and use cases.

Objective 4.3 Leverage existing coordination opportunities such as the Coastal GeoTools Conference, Esri's Oceans Conference, and related events to promote the goals of and gather feedback on the W-O&C Theme and related activities.

Objective 4.4 Seek out all opportunities and venues to expand interactions and solicit feedback from all sectors on the current state of the national Marine NSDI.

Objective 4.5 Advertise and support peer-to-peer sharing of both information and opportunities, using the example of the NOAA Digital Coast's "Stories from the Field" and the "GeoZone Blog".

Objective 4.6 Participate actively in applicable international organizations dealing with Marine NSDI and related topical areas [e.g, International Hydrographic Office [IHO], United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM), Group on Earth Observations [GEO]].

External Factors, Challenges, and Opportunities

The W-O&C Theme has its own spatial data infrastructure and community of users and practitioners that is similar in its nature to the terrestrial themes. The W-O&C Theme includes datasets from multiple disciplines and thematic areas such as biological data, governmental boundaries, ocean and coastal imagery, coastal land cover and so on. It includes a wide variety of types of data that, for the terrestrial environment, are divided into multiple themes. The wide variety of data types will be a challenge for the W-O&C Theme as many of the datasets have little in common with the others but are part of the larger MSDI concept. There are also many existing research and development activities, especially in the data collection field, that show great promise but will take time before they move into operations.

Coordination and communication with the other FGDC A-16 themes will be very important and may present challenges. As shown in the table, there are a number of datasets in other themes that are seen as components of MSDI and thus within the purview of the W-O&C Theme. For example, because sea surface temperature affects the weather and climate it is part of the Climate and Weather theme. It is obviously an observation of the oceans and could just as easily have been assigned to the WO&C Theme.

There are numerous policies and acts that govern marine and coastal activities that the theme needs to consider. These policies are subject to change especially with the arrival of a new Presidential Administration in 2017. Priorities may likely change in the next several years and the theme will need to keep current on these, which can provide challenges.

Because the scope of the WO&C theme is so diverse, it is important that the theme capitalize on and coordinate with other groups. There are a number of groups described in this plan that work on marine and coastal issues, and these groups vary from regional to national to international in scope. A critical activity of the theme will be to work with the various groups to bring the geospatial components together for the NSDI. Although working with these disparate groups will be a challenge as it can be tough to keep track of all the players and priorities, it will also be an opportunity to build something bigger than the theme could do on its own through coordination with and capitalization of these various efforts. Although working with these groups presents a number of opportunities, there is also the risk in being dependent on others to complete some objectives. Incomplete objectives will affect the theme and may call for alternate methods for issues critical to the marine and coastal NSDI.