



Theme Implementation Plan for Water-Inland Theme

U.S. Geological Survey (USGS) and
U.S. Fish and Wildlife Service (USFWS)

Federal Geographic Data Committee (FGDC)

October 31, 2018



Water-Inland Theme FY18 Implementation Plan Report



Overview

As part of meeting the requirements under [OMB Circular A-16 Supplemental Guidance](#) and [OMB Circular A-16 Appendix E - NGDA Data Themes, Definitions, and Lead Agencies](#) for NGDA Portfolio Management and NGDA Theme Management, NGDA Themes Leads for a Theme, in coordination with associated NGDA Dataset Managers, have developed Theme Strategic Plans and corresponding implementation plans for each Theme in the NGDA Portfolio. This report provides information on implementing the goals, objectives, and actions outlined in the Theme’s Strategic Plan (link below). The report includes information on Theme Personnel (Table 1), National Geospatial Data Asset (NGDA) Datasets associated with the Theme (Table 2), and the human and financial resources needed to manage the Theme (Table 3). Table 4 provides a status update on progress made in in the current reporting period toward meeting Theme Strategic Plan goals and objectives. Table 5 provides details on the Theme Implementation Plan.

Theme Strategic Plan

https://communities.geoplatform.gov/ngda-waterinland/wp-content/uploads/2018/04/Water_Inland_Theme_Strategic_Plan_20160630.pdf

Theme Personnel

Theme personnel play a vital role in the operation and maintenance of a Theme. They are “individuals who provide interdepartmental leadership and coordination at the NGDA Theme level. They work with component NGDA Dataset Managers to develop standards and provide guidance. The NGDA Theme Lead, or designee, chairs the NGDA Theme’s Thematic Committee and manages the annual process of providing NGDA Dataset collaboration and funding recommendations to the FGDC Steering Committee for those NGDA Datasets within their NGDA Theme. Additionally, the NGDA Theme Lead reports to the Executive NGDA Theme Champion and the FGDC Coordination Group on the NGDA Theme’s activities and investments (both current and planned).” Table 1 provides a summary of current Theme Personnel followed by Table 2 that lists the NGDA Datasets that comprise the Theme.

Theme Personnel	
Theme Lead (Co-Leads):	Steve Aichele, Megan Lang
Theme Lead Agency(ies):	DOI-USGS, DOI-USFWS
Executive Theme Champion(s):	Thomas (Tod) Dabolt
Executive Champion Agency(ies):	DOI

Table 1. Personnel Involved in Theme Management.

Water-Inland Theme NGDA Datasets	NGDA Agency
National Hydrography Dataset (NHD)	DOI-USGS
National Inventory of Dams (NID)	DOD-USACE
National Levee Database (NLD)	DOD-USACE
National Wetlands Inventory (NWI)	DOI-USFWS
Watershed Boundary Dataset (WBD)	DOI-USGS

Table 2. NGDA Datasets within the Theme.

Human and Financial Resources Needed for Theme Management

The following table provides an estimate of resources needed for managing this Theme. It includes different activities, the roles that support them, as well as an estimated decimal Full Time Equivalent (FTE) and FTE grade. This estimate does not include the resources required for the agency to develop and maintain the NGDA Dataset(s) that make up the Theme to meet the agency’s core mission requirements.

Reporting Period for Human and Financial Resources¹: 10/2017 – 9/2018

Description of Theme Management Activities	Role <i>(Theme Lead, co-Theme Lead, NGDA Coordinator, other as specified)</i>	FTE ²	FTE Grade
NGDA Theme management (e.g., attend meetings, review NGDA documents, develop Theme Strategic Plans, etc.)	Theme Lead (USGS)	.20	14
NGDA Theme management (e.g., attend meetings, review NGDA documents, develop Theme Strategic Plans, etc.)	Theme Lead (USFWS)	.20	13

Table 3. Human and Financial Resources Needed for Theme Management.

Progress against Goals and Objectives

The following table shows the progress status made toward achieving the Theme’s Strategic Plan goals and objectives since the last reporting period. Status categories include 'Not Started' for those activities that have not gotten underway in the reporting period; 'In Progress' for those activities underway which will continue into the next year; 'Complete' for the activities finished, or 'Recurring (completed for the current reporting period).

¹ Reporting period should align with October 1 – September 30 and be submitted by October 31.

² A full-time employee was available a maximum of 1952 hours during the inclusive period of October 1 – September 30; assuming a Monday-Friday schedule with 8-hour workdays and not counting Federal holidays. The FTE was determined by taking actual number of hours worked in support of Theme Management divided by 1952 hours, rounded to the nearest 0.01.

Goals and Objectives undertaken during 2018	Status
Goal 1: Use results of the Hydrography Requirements and Benefits (HRBS) study to assess community needs and guide future programs to maximize the return on investment in meeting user needs (OWDI: Community for Water Data, Tools).	
Objective 1.1. Complete development of a cost-benefit analysis for hydrographic data.	In Progress
Goal 2: Improve and enrich capabilities/intelligence of the datasets (OWDI: Enriching Water Data).	
Objective 2.1. Using the NHD, WBD, and 10-meter seamless 3DEP elevation models as the source datasets, develop and implement the high-resolution (1:24,000 or better scale) NHDPlus as a foundational framework for georeferencing users' hydrologic and biologic observations for discovery and exploitation.	In Progress
Objective 2.2. Provide support for linking water-related data to the NHDPlusHR hydrography framework.	In Progress
Objective 2.3. Develop integrated elevation and hydrography datasets based on high-accuracy 3DEP elevation data.	In Progress
Objective 2.4. Improve NWI wetland code intelligence in the NWI data model.	In Progress
Objective 2.5. Refine methods for delineation of gaged drainage areas stored in the USGS National Water Information System (NWIS) from WBD.	Not Started
Goal 3: Continue building and strengthening the water data community with States, Tribes, academia, the private sector, other federal agencies, and localities that meet the needs of users (OWDI: Community for Water Data, Tools).	
Objective 3.1. Investigate coordination and mutually beneficial activities between data sets.	Recurring (completed for FY 2018)
Objective 3.2. Engage partners, stakeholders, and users by providing educational and discussion forums.	Recurring (completed for FY 2018)
Objective 3.3. Foster a culture of open-source development and code sharing.	In Progress
Objective 3.4. Provide a web-based forum and collaborative workspace for the Open Water Data Initiative.	Not Started
Objective 3.5. Continue stakeholder and partner coordination for acquisition of NWI data.	Recurring (completed for FY 2018)
Objective 3.6. Continue steward coordination for acquisition and improvement of NHD and WBD data.	Recurring (completed for FY 2018)
Objective 3.7. Engage international partners (Canada and Mexico).	In Progress
Goal 4: Provide discoverable, standardized and interoperable data to users (OWDI: Water data as a service and water data catalog).	
Objective 4.1. Provide datasets as open and interoperable web services in compliance with agency policies.	Recurring (completed for FY 2018)
Objective 4.2. Ensure all datasets in theme have current FGDC compliant metadata in the GeoPlatform and are identified as an NGDA.	Recurring (completed for FY 2018)

Objective 4.3. Maintain and update existing standards as needed to reflect best practices.	Not Started
Objective 4.4. Improve accessibility of dams and levee information.	Recurring (completed for FY 2018)
Objective 4.5. Develop toolsets and web services to deliver drainage area boundaries for gages stored in the USGS National Water Information System (NWIS).	Not Started
Objective 4.6. Provide network-based data discovery and analysis framework.	In Progress

Table 4. Theme Implementation Plan Progress Status.

Theme Implementation Plan

The following table provides details for achieving Theme Strategic Plan goals and objectives over the multi-year planning period. These include roles and responsibilities, specific actions, milestones, performance indicators and projected completion dates.

Goal 1: Use results of the Hydrography Requirements and Benefits (HRBS) study to assess community needs and guide future programs to maximize the return on investment in meeting user needs.				
Objective 1.1: Complete development of a cost-benefit analysis for hydrographic data				
Agency and/or Stakeholders Involved: USGS				
Anticipated Outcome: Development of a program recommendation for future development of hydrographic data that maximizes user needs met				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
1.1.1 Complete analysis of requirements and benefits data collected from the user community	1) Requirements and benefits data analysis completed	1) Percent of analyses completed	USGS National Geospatial Program (NGP)	FY17
1.1.2 Execute pilot projects to determine implementation costs to support cost-benefit comparison among multiple scenarios	1) Contracts for pilots executed	1) Percentage of pilot contracts executed	USGS NGP	FY17
1.1.3 Develop and document proposed program direction based on study results	1) Proposed program direction developed 2) Proposed program direction documented	1) Percentage of proposed program direction development completed 2) Percent of proposed program direction documentation completed	USGS NGP	FY17
1.1.4 Vet proposed program direction with users/stakeholders to fine tune the approach	1) Outreach to users/stakeholders to solicit interest 2) Completion of proposed program	1) Number of users/stakeholders contacted to solicit interest 2) Number and types of	USGS NGP, National Hydrography Dataset (NHD) Advisory Team, other users/stakeholders	FY18

	vetting with users/stakeholders	stakeholder groups approached to vet proposed program direction		
1.1.5 Publish action plan for new program direction	1) Action plan published	1) Percentage completion of action plan publishing process	USGS NGP	FY19
Agency and/or Stakeholder	Activity through FY 2018			
USGS	1.1.1: Study is complete, results are available at https://www.usgs.gov/core-science-systems/ngp/national-hydrography/hydrography-requirements-and-benefits-study .			
USGS	1.1.2: Pilot projects have been completed. Data are available to develop cost estimates for program scenarios.			
USGS	1.1.3.1&2: Program direction work has been rescoped and rescheduled for FY19 to accommodate program changes			
USGS	1.1.4.1&2: Program direction work has been rescoped and rescheduled for FY19 to accommodate program changes			
Goal 2: Improve and enrich capabilities/intelligence of the datasets.				
<p>Objective 2.1: Using the NHD, WBD, and 10-meter seamless 3DEP elevation models as the source datasets, develop and implement the high-resolution (1:24,000 or better scale) NHDPlus as a foundational framework for georeferencing users' hydrologic and biologic observations for discovery and exploitation.</p> <p>Agency and/or Stakeholders Involved: USGS, states, tribes, academia, the private sector, other federal agencies, and localities.</p> <p>Anticipated Outcome: The user community becomes unified on a single hydrography geospatial framework that is partially integrated with elevation, based on drainage enforcement; user observations become more interoperable.</p>				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
2.1.1 Produce beta NHDPlusHR for nation	1) Production of NHDPlusHR Beta version	1) Number of Hydrologic Regions or Subregions completed	USGS NGP	FY19
2.1.2 Conduct QC efforts to improve the beta version in partnership with the community, including states, tribes, academia, the	1) Engagement of QC Teams 2) NHDPlusHR Beta version QC completed	1) Number of QC Teams engaged 2) Number of Hydrologic Regions or Subregions completed	USGS NGP, states, tribes, academia, the private sector, other federal agencies, and localities	FY20

private sector, other federal agencies, and localities as possible				
2.1.3 Edit NHD and WBD source datasets to reflect QC findings	1) NHD and WBD source dataset QC edits applied	1) Number of Hydrologic Regions or Subregions completed	USGS NGP	FY20
2.1.4 Improve WBD and NHDPlusHR integration	1) WBD and NHDPlusHR vertically integrated	1) Number of Hydrologic Regions or Subregions completed	USGS NGP	FY21
2.1.5 Following QC and corrections of the beta version, quickly release Version 1.0 of NHDPlusHR	1) Release of NHDPlusHR Version 1.0 (or better)	1) Number of Hydrologic Regions or Subregions completed	USGS NGP	FY20
2.1.6 Maintain NHDPlusHR over the long term, incorporating edits and refreshing as needed, in partnership with states, tribes, academia, the private sector, other federal agencies, and localities through established stewardship programs	1) Markups of ingredient data used to refresh the NHDPlusHR 2.0 (based on change detection criteria)	1) Percentage of validated markups submitted by partners in stewardship programs that have been applied to NHDPlusHR	USGS NGP	FY21
2.1.7 Develop methods and tools to generalize the NHDPlusHR	1) Generalization tools and methods developed	1) Number of Hydrologic Regions or Subregions with VisibilityFilter populated	USGS NGP	FY19

flowline network and catchments to many different scales, while retaining feature identities, enabling linkages between scales.				
Agency and/or Stakeholder	Activity through FY 2018			
USGS	2.1.1: The National Hydrography Dataset Plus High Resolution (NHDPlusHR) Beta version is proceeding on schedule with 72.2% of the nation complete. Completed data are available via The National Map (http://nationalmap.gov/).			
USGS, states, tribes, academia, the private sector, other federal agencies, and localities	2.1.2: QC Teams of volunteers with hydrographic/hydrologic expertise and local knowledge completed reviewing Hydrologic Regions (06, 01, 2, 12, 14, 15, and 16). Regions 3, 7, 9, 10, 11, and 17 are currently in work.			
USGS, states, tribes, academia, the private sector, other federal agencies, and localities	2.1.2(2): The NHDPlus Beta QC is complete for seven Hydrologic Regions (06, 01, 2, 12, 14, 15, and 16).			
USGS	2.1.3: Region 02 was completed in FY18			
USGS	2.1.4 Catchment integration workgroup continued. 31% of 4-digit hydrologic units reviewed at the 8-digit level. Recommendations and areas of focus for FY19 work developed. Tools and methods to develop outlet points for 12-digit hydrologic units 70% complete. Tool to collect catchments to HU12 units based on pour points 10% complete. No Hydrologic Regions (0) vertically integrated.			
USGS	2.1.7: USGS improved tools and processes to generalize the NHDPlus HR flowline network (VisibilityFilter). The population of VisFilter attributes in the NHDPlus Beta dataset began for Regions 01, 02, 03, 04, 05, 06, 07,08,10,11,& 12 in FY18.			
Objective 2.2: Provide support for linking water-related data to the NHDPlusHR hydrography framework. Agency and/or Stakeholders Involved: USGS. Anticipated Outcome: Data become interoperable and can be used together seamlessly.				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
2.2.1 Support and promote desktop Hydro	1) Maintain functionality of HEM Desktop tool	1) HEM Desktop tool available and	USGS NGP	FY18

Event Management (HEM) tool for the short term.		functional for a majority of users		
2.2.2 Develop web-based HEM tools, transition from desktop HEM for the longer term.	1) Web-based HEM tool developed	1) Ability to create and maintain linked data (events) via web	USGS NGP	FY19
Agency and/or Stakeholder		Activity through FY 2018		
USGS	2.2.1 HEM Desktop tool is available and functional for all users in for Arc 5 and 5.1 in Windows 7 and soon in Windows 10			
USGS	2.2.2: USGS is developing (in FY18) a web-based toolbox and implementation with partial hydro addressing functionality (Hydro Addressing Tool), while continuing to support point event creation with existing HEM tool. ◆ Continuing work in FY19			
<p>Objective 2.3: Develop integrated elevation and hydrography datasets based on high-accuracy 3DEP elevation data.</p> <p>Agency and/or Stakeholders Involved: USGS.</p> <p>Anticipated Outcome: Improved accuracy and interoperability of hydrography data; hydrography and elevation data are integrated and consistent and can be used together seamlessly in a multitude of applications that will improve our understanding of hydrologic processes.</p>				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
2.3.1 Research integrated data model for NHD, WBD, and 3DEP	1) Integrated NHD, WBD, 3DEP data model concept formulated	1) Percentage of model research completed	USGS NGP	FY19
2.3.2 Research methods to evaluate, delineate, and store non-contributing areas in WBD or NHDPlus	1) Methods for non-contributing areas concept formulated	1) Percentage of non-contributing area methods research completed	USGS NGP	FY19
2.3.3 Research methods to extract hydrography from 3DEP data	1) Methods for 3DEP hydrography extraction concepts formulated	1) Percentage completion for 3DEP hydrography extraction researched	USGS NGP	FY18

2.3.4 Research methods to automate or semi-automate WBD delineations from elevation so that WBD is composed of a collection of elevation-based catchments	1) Methods for WBD automation from elevation concepts formulated	1) Percentage completion for WBD automation from elevation researched	USGS NGP	FY18
2.3.5 Implement methods based on research results	1) Researched methods demonstrated in an operational environment	1) Percentage of accepted methods implemented	USGS NGP	FY19
Agency and/or Stakeholder	Activity through FY 2018			
USGS	2.3.3: Methods research is approximately 50% complete.			
USGS	2.3.4: Activity is complete. Tools and methods are in use to develop additional hydrologic units in Alaska.			
Objective 2.4: Improve NWI wetland code intelligence in the NWI data model. Agency and/or Stakeholders Involved: USFWS. Anticipated Outcome: Analytical capability is improved through NWI wetland codes linked to FGDC wetland definition and descriptions.				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
2.4.1 Develop parsed NWI wetland code tables	1) Parsed NWI wetland code tables developed	1) Percentage of identified wetland code tables revised	USFWS NWI, National Standards and Support Team	FY17
2.4.2 Develop NWI code interpreter	1) NWI code interpreter improved	1) Percentage of identified wetland code interpreter improvements made	USFWS NWI, National Standards and Support Team	FY17
2.4.3 Integrate parsed NWI code tables into data model	1) Parsed NWI code tables integrated into the data model	1) Percentage of revised code tables integrated within the database	USFWS NWI, National Standards and Support Team	FY19

2.4.4 Research integration of USACE wetland plant list to NWI wetland codes	1) Feasibility of integrating the USACE wetland plant list into NWI wetland codes determined	1) Feasibility of integration measured	USFWS NWI, National Standards and Support Team	FY19
Agency and/or Stakeholder		Activity through FY 2018		
USFWS		2.4.3: The parsed NWI code tables have been integrated into a beta data model. Testing and implementation of the data model are ongoing.		
<p>Objective 2.5: Refine methods for delineation of gaged drainage areas stored in the USGS National Water Information System (NWIS) from WBD. Agency and/or Stakeholders Involved: USGS. Anticipated Outcome: Improved integration of spatial hydrography data with drainage areas stored in NWIS thus tying NWIS to the spatial component of the national water data framework.</p>				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
2.5.1 Develop improved toolsets for drainage area delineation	1) Gaged drainage area delineation toolsets formulated	1) Percentage of gaged drainage area delineation toolset development completed	USGS NGP	FY20
Agency and/or Stakeholder		Activity through FY 2018		
		Activities for this Objective scheduled in future fiscal years. No current activity to report.		
<p>Goal 3: Continue building and strengthening the water data community with states, tribes, academia, the private sector, other federal agencies, and localities that meet the needs of users</p>				
<p>Objective 3.1: Investigate coordination and mutually beneficial activities between data sets. Agency and/or Stakeholders Involved: USGS, USFWS, USACE. Anticipated Outcome: Identify opportunities to leverage dataset resources and enhance dataset quality.</p>				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
3.1.1 Continue meetings between theme dataset development teams	1) Theme dataset development teams meet quarterly, virtually or in person	1) Number of meetings held per year	USGS, USFWS, USACE	FY21

Agency and/or Stakeholder	Activity through FY 2018			
USGS, USFWS	3.1.1: Meetings between theme dataset development teams are ongoing, including four meetings in FY18 between USGS and USFWS regarding NWI and NHD collaborations and two meetings of all Water-Inland Theme Dataset Managers.			
<p>Objective 3.2: Engage partners, stakeholders, and users by providing educational and discussion forums.</p> <p>Agency and/or Stakeholders Involved: USGS NGP, USFWS.</p> <p>Anticipated Outcome: Community members have opportunities to engage, learn, and share information, and to provide input to the ongoing improvement of the Theme.</p>				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
3.2.1 Continue education and collaboration activities including NHD Advisory team, WBD State Stewardship workgroup, Hydrography Technical Exchange Meetings, Hydrography Seminar Series, and Wetlands Mapping Consortium	1) Coordinated groups, meetings, workshops, presentations, and related educational and collaborative events held on their respective, regular schedules	1) Number of meetings, workshops, presentations, and related events held	USGS NGP, USFWS	FY21
3.2.2 Continue and expand, if possible, participation of staff in scientific Conferences	1) Staff participate (in-person, remotely, or by other means) in scientific conferences that disseminate theme-related information	1) Number of scientific conferences with theme-related participation	USGS NGP, USFWS	FY21

Agency and/or Stakeholder	Activity through FY 2018
USGS, USFWS	<p>3.2.1: The following educational and collaborative activities were held in this reporting period:</p> <ul style="list-style-type: none"> • 6 WBD State Stewardship workgroup meetings. Meeting minutes are posted on the Hydrographic Data Community website under WBD Program Management (login required – contact Lily Niknami, lniknami@usgs.gov) • 24 Hydrography Technical Exchange Meetings covering both the NHD, WBD, Conflation, and HEM tool. Meetings are held regularly and posted to the Hydrographic Data Community website calendar (login required – contact Lily Niknami, lniknami@usgs.gov) • 9 NHD/WBD Advisory meetings. Meetings are generally once monthly - calendar available on the hydrographic data community website (login required – contact Lily Niknami, lniknami@usgs.gov) • No Hydrography Seminars were held in FY18 due to limited resources. • USFWS NWI helped to organize and participate in an Association of State Wetland Managers (ASWM) workshop in Silver Spring, Maryland focused on wetland and floodplain mapping. Multiple members of the NWI team are members of the ASWM Wetland Mapping Consortium Coordination Committee and participated in three planning meetings during FY18 Q1/2/3.
USGS, USFWS	<p>3.2.2: Theme members participated in the following scientific conferences during this reporting period:</p> <ul style="list-style-type: none"> • USGS staff attended and presented at 4 larger conferences, and many smaller conferences. The large conferences included: 1) American Water Resources Association Annual Meeting in Portland, OR, 5-9 Nov 2017; 2) American Water Resources Association GIS and Water Resources Spring Specialty Conference, April 22-25, 2018; 3) Esri User Conference, San Diego, CA, July 9-13, 2018; 4) American Fisheries Society, August 19-23, 2018; • NWI staff led a session on coastal watershed wetland mapping and monitoring at the 6th Interagency Conference on Research in the Watersheds in July 2018.

Objective 3.3: Foster a culture of open-source development and code sharing. Agency and/or Stakeholders Involved: USGS, USFWS, SSWD. Anticipated Outcome: Tools developed to support theme datasets are shared in public open-source repositories and are building a community of users around them, development investments are leveraged across the community.				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
3.3.1 Release NHD and WBD toolsets in open source formats	1) NHD and WBD toolset software code released	1) Number of NHD and WBD toolset software code released	USGS	FY19
3.3.2 Encourage others in community to contribute tools and best practices	1) Outreach to community to encourage contributions in meetings, presentations, newsletter, coordinated groups, etc., accomplished	1) Listing of outreach communications	USGS, USFWS, Subcommittee on Spatial Water Data (SSWD)	FY21
3.3.3 Explore the use of challenge grants and other community events like mapathons to engage and expand the field of users and developers	1) Research and inquiries into methods to engage and expand the field of users and developers undertaken	1) Number of research endeavors and/or inquiries undertaken	USGS NGP	FY18
Agency and/or Stakeholder	Activity through FY 2018			
USGS, SSWD	3.3.2: Outreach communications have been held regularly. <ul style="list-style-type: none"> • The Subcommittee on Spatial Water Data (SSWD), co-chaired by USGS, holds monthly meetings and is encouraging these activities (meeting notes are available at http://acwi.gov/spatial/minutes/index.html). • Community-supported open-source tool development resources may be found at https://github.com/ACWI-SSWD. • Program and general hydrography information is communicated monthly 			

<p>through the USGS NHD Newsletter (http://usgs.gov/NatHydroNews), which is sent to a mailing list of over 650 subscribers.</p> <ul style="list-style-type: none"> • Program and general hydrography information is presented monthly on USGS NHD/WBD Advisory calls, which are attended by a broad swath of users and partners. • The USGS Hydrography website (https://usgs.gov/NatHydro) is updated continuously and contains information on USGS products and services. The USGS also uses social media such as Twitter (@USGSNHD) and Facebook (https://www.facebook.com/USGeologicalSurvey/) to communicate with broad audiences. 				
<p>Objective 3.4: Provide a web-based forum and collaborative workspace for the Open Water Data Initiative.</p> <p>Agency and/or Stakeholders Involved: USGS.</p> <p>Anticipated Outcome: Improved collaboration and coordination within the spatial water data community.</p>				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
3.4.1 Establish OWDI wiki and collaborative space within the GeoPlatform Water-Inland Theme Community space	1) OWDI wiki and collaborative space within the GeoPlatform Water-Inland Theme Community space established	1) Wiki and collaborative space within the GeoPlatform Water-Inland Theme Community space operational	USGS	FY18
Agency and/or Stakeholder	Activity through FY 2018			
N/A (TBD)	Activities for this Objective scheduled in future fiscal years. No current activity to report.			

Objective 3.5: Continue stakeholder and partner coordination for acquisition of NWI data. Agency and/or Stakeholders Involved: USFWS. Anticipated Outcome: Integrate wetlands data created by stakeholders and partners into the NWI dataset.				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
3.5.1 Provide updated Wetlands Data Verification tools	1) Updated wetlands data verification tools provided as needed	1) Percentage of new standards, procedures and software versions represented within NWI data verification tools	USFWS NWI, National Standards and Support Team	FY19
3.5.2 Provide wetland mapping training webinars and documentation	1) Wetland mapping training webinars and documentation provided as needed	1) Percentage of new standards and procedures documented	USFWS NWI, National Standards and Support Team and HQ	FY19
3.5.3 Continue outreach activities with the Association of State Wetland Managers (ASWM)	1) ASWM outreach activities continued	1) Number of meetings with ASWM and resultant products	USFWS NWI, National Standards and Support Team and HQ	FY17
Agency and/or Stakeholder	Activity through FY 2018			
USFWS	3.5.1: All (100%) of necessary verification tool updates identified at the beginning of FY18 have been implemented to date. This activity is ongoing.			
USFWS	3.5.2: All (100%) new standards and procedures identified at the beginning of FY18 have been documented. This activity is ongoing.			

Objective 3.6: Continue steward coordination for acquisition and improvement of NHD and WBD data.

Agency and/or Stakeholders Involved: USGS.

Anticipated Outcome: A well-functioning stewardship process that ensures timely update and improvement of the NHD and WBD datasets.

Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
3.6.1 Maintain NHD and WBD edit toolsets and steward websites	1) NHD and WBD edit toolsets up-to-date and functioning 2) NHD and WBD stewardship websites accurate and functioning	1) Percentage of NHD and WBD edit toolsets up-to-date and functioning 2) Percentage of NHD and WBD stewardship websites accurate and functioning	USGS NGP	FY21
3.6.2 Provide NHD and WBD tool and edit training	1) NHD and WBD tool and edit training provided quarterly	1) Number of NHD and WBD tool and edit trainings provided	USGS NGP	FY21
3.6.3 Develop web-edit capability to simplify and streamline edit process	1) Web-edit capability developed	1) Percentage of web-edit capability development completed	USGS NGP	FY21
3.6.4 Continue to engage with stewardship partners, and to develop partnership agreements with new partners to the extent possible	1) Stewardship relationships are established and maintained	1) Number of active stewardship relationships	USGS NGP	FY21
Agency and/or Stakeholder	Activity through FY 2017			
USGS	3.6.1: 100% of NHD and WBD edit toolsets are up-to-date and functioning.			
USGS	3.6.2: 100% of NHD and WBD stewardship websites accurate and functioning (http://usgs-mrs.cr.usgs.gov/usgssteward/).			

USGS	3.6.2: 51 hydrography-related trainings on various topics including NHD Basics, NHD Update Tools, NHD GeoConflation, WBD Editor Tools, Markup App, and NHD HEM were held.
USGS	3.6.3 WBD planned web-edit capability development complete.
USGS	3.6.4: 48 State stewardship agreements are established / maintained (40 NHD & 19 WBD signed MOU agreements). NRCS continues to act as WBD national steward where state partners are unavailable. Three agreements (New Mexico, North Carolina, California) are in work.

Objective 3.7: Engage international partners (Canada and Mexico).
Agency and/or Stakeholders Involved: USGS.
Anticipated Outcome: Seamless continental hydrography data that support cross-border applications.

Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
3.7.1 Continue to complete cross-border data harmonization with WBD and NHD	1) NHD and WBD cross-border data harmonization completed	1) Percentage of areas with NHD and WBD cross-border harmonization completed	USGS NGP, USGS OWI	FY21
3.7.2 Evaluate the feasibility of developing an international integrated elevation and hydrography data model that leverages domestic plans and directions outlined in this strategy	1) Meetings to discuss an international elevation and hydrography model held 2) Meeting overview summary produced	1) Listing of meetings held 2) Percentage of meeting overview summary completed	USGS NGP	FY18
3.7.3 Conduct one or more pilot studies developing NHDPlusHR datasets for river basins spanning the U.S.-Canada border	1) US-Canada pilot studies completed	1) Percentage of total planned US-Canada pilot studies completed	USGS NGP	FY18

3.7.4 Initiate discussions with Mexico regarding possible partnership on NHDPlusHR datasets for river basins spanning the U.S.-Mexico border	1) Discussions with Mexican contacts to discuss potential NHDPlusHR partnerships held	1) Number of discussions held and general outcomes	USGS NGP	FY18
3.7.5 Conduct one or more pilot studies developing NHDPlusHR datasets for river basins spanning the U.S.-Mexico border	1) US-Mexico pilot studies completed	1) Percentage of total planned US-Mexico pilot studies completed	USGS NGP	FY19
Agency and/or Stakeholder	Activity through FY 2018			
USGS NGP	3.7.1 100% harmonization completed for the NHD for all 8-digit hydrologic units along the US-Canada border. 100% completion for all 8-digit WBD units on the US-Canada border. 64% of 8-digit units completed to the 12-digit WBD along the US-Canada border. No additional 12-digit WBD hydrologic units were fully harmonized in FY18 due to lack of capacity.			
USGS NGP	3.7.2 (1): A US-Canada common hydrology features and linked open data information exchange was held March 12-16 in Portsmouth, New Hampshire. Agreement was reached to hold an annual information exchange meeting in a city to be determined. 3.7.2 (2): A meeting summaries have been completed. Documentation of the draft model and software is available at https://github.com/cmhodgson/chyf-pilot/wiki . A demonstration page for the model pilot and navigation capability is available at http://chyf.ca/chyf/			
USGS NGP	3.7.3: Three pilot studies developing NHDPlusHR datasets for river basins spanning the U.S.-Canada border are completed (Region 1, which includes the St John and St Croix River Basins along the Canadian border; The Rainy River and Lake of the Woods Basin along the Canadian border, and the Lake Champlain and Richelieu River Basin)			

USGS NGP	3.7.4: Two conference calls and one in-person meeting were held to discuss with Mexico collaboration on NHDPlus HR as well as on the Integrated Map of the Americas. Data exchange was arranged, and discussions are ongoing regarding future collaboration.
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Goal 4: Provide discoverable, standardized and interoperable data to users.

Objective 4.1: Provide datasets as open and interoperable web services in compliance with agency policies.

Agency and/or Stakeholders Involved: USFWS, USACE, USGS.

Anticipated Outcome: Datasets are openly available and interoperable via web services.

Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
4.1.1 Continue to leverage current technologies and formats to provide open dataset access via interoperable web services	1) Interoperable web services available	1) Number of interoperable web services available by theme dataset	USFWS, USACE, USGS	FY21

Agency and/or Stakeholder	Activity through FY 2018
USGS, USFWS, USACE	4.1.1: Number of interoperable web services available by Theme dataset: <ul style="list-style-type: none"> • National Hydrography Dataset: 3 (available as KML, WMS, REST) • Watershed Boundary Dataset: 1 (available as KML, WMS, REST) • National Wetlands Inventory: 1 (available as KML, WMS, REST) • National Levee Database: 1 (available as WMS, REST)

Objective 4.2: Ensure all datasets in theme have current FGDC compliant metadata in the GeoPlatform and are identified as an NGDA.
Agency and/or Stakeholders Involved: USFWS, USACE, USGS.
Anticipated Outcome: All theme datasets are readily discoverable through the GeoPlatform and clearly identified as NGDA.

Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
4.2.1 Ensure all theme datasets have current FGDC compliant metadata including the NGDA theme keyword	1) Current FGDC compliant metadata including the NGDA theme keyword completed for each theme dataset	1) Listing of theme datasets with FGDC compliant metadata including the NGDA theme keyword	USFWS, USACE, USGS	FY21
4.2.2 Ensure all data are distributed with FGDC compliant metadata	1) All theme datasets distributed with FGDC compliant metadata	1) Listing of theme datasets with and without FGDC compliant metadata	USFWS, USACE, USGS	FY21
4.2.3 Publish metadata records on data clearinghouse applications including Data.gov and GeoPlatform.gov	1) All theme dataset metadata records published on Data.gov and GeoPlatform.gov	1) Listing of theme datasets with and without FGDC compliant metadata published on Data.gov and GeoPlatform.gov	USFWS, USACE, USGS	FY21
Agency and/or Stakeholder	Activity through FY 2018			
USGS, USFWS, USACE	4.2.1: Theme datasets with current FGDC compliant metadata including the NGDA theme keyword completed include: <ul style="list-style-type: none"> National Hydrography Dataset: https://cms.geoplatform.gov/node/243/e6482162-4491-482b-b9dd-adb0b0a1141f (also available through The National Map with FGDC compliant metadata) 			

	<ul style="list-style-type: none"> • Watershed Boundary Dataset: https://cms.geoplatform.gov/node/243/4fce9f0d-3355-42c3-ab0a-a9d76f674927 (also available through The National Map with FGDC compliant metadata) • National Wetlands Inventory: https://www.fws.gov/wetlands/Data/Metadata.html • National Levee Database: https://oe.geoplatform.gov/view/9c30226b3afb8667cab114ad182d82ed • National Inventory of Dams: https://oe.geoplatform.gov/view/702947f7c37c3bccf1e277a487a8f2ce
USGS, USFWS, USACE	<p>4.2.2: Theme datasets distributed with current FGDC compliant metadata including the NGDA theme keyword include:</p> <ul style="list-style-type: none"> • National Hydrography Dataset: https://catalog.data.gov/dataset/usgs-national-hydrography-dataset-nhd-downloadable-data-collection-national-geospatial-data-as (also available through The National Map with FGDC compliant metadata) • Watershed Boundary Dataset: https://catalog.data.gov/dataset/usgs-national-watershed-boundary-dataset-wbd-downloadable-data-collection-national-geospatial- (also available through The National Map with FGDC compliant metadata) • National Wetlands Inventory: https://www.fws.gov/wetlands/Data/Metadata.html and https://catalog.data.gov/dataset/national-wetlands-inventory-wetlands • National Levee Database: https://oe.geoplatform.gov/view/9c30226b3afb8667cab114ad182d82ed • National Inventory of Dams: https://oe.geoplatform.gov/view/702947f7c37c3bccf1e277a487a8f2ce

<p>USGS, USFWS, USACE</p>	<p>4.2.3: Theme datasets with metadata records published on data clearinghouse applications including Data.gov and GeoPlatform.gov include:</p> <ul style="list-style-type: none"> • National Hydrography Dataset: https://cms.geoplatform.gov/node/243/e6482162-4491-482b-b9dd-adb0b0a1141f (also available through The National Map with FGDC compliant metadata) • Watershed Boundary Dataset: https://cms.geoplatform.gov/node/243/4fce9f0d-3355-42c3-ab0a-a9d76f674927 (also available through The National Map with FGDC compliant metadata) • National Wetlands Inventory: https://catalog.data.gov/dataset/national-wetlands-inventory-wetlands • National Levee Database: https://oe.geoplatform.gov/view/9c30226b3afb8667cab114ad182d82ed • National Inventory of Dams: https://oe.geoplatform.gov/view/702947f7c37c3bccf1e277a487a8f2ce
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Objective 4.3: Maintain and update existing standards as needed to reflect best practices.				
Agency and/or Stakeholders Involved: USGS.				
Anticipated Outcome: Well documented and easily accessible standards allow both dataset managers and user community to understand and implement best practices for using and maintaining data.				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
4.3.1 Update WBD standards (http://pubs.usgs.gov/tm/11/a3/ , 4th edition) in FY2018 to meet current best practice guidelines.	1) WBD standards updated	1) Percentage of total WBD standards updated	USGS NGP, USGS WMA	FY18
4.3.2 Revise NHD and WBD standards to reflect updated delineation practices developed during research into NHDPlus catchment integration and automated delineation efforts (Objective 2.3)	1) Review of NHD and WBD standards to determine which need alignment with Obj 2.3 outcomes 2) NHD and WBD standards revised in alignment with Obj 2.3 outcomes	1) Number of NHD and WBD standards needing revision due to Obj 2.3 outcomes 2) Percentage NHD and WBD standards revised due to Obj 2.3 outcomes completed	USGS NGP, USGS WMA	FY21
4.3.3 Investigate use of Specifications Explorer as a standards delivery mechanism for NHD and WBD.	1) Investigate alternative standards delivery mechanisms as necessary	1) Percentage of necessary investigation completed	USGS NGP	FY21
Agency and/or Stakeholder	Activity through FY 2018			
N/A (TBD)	Activities for this Objective scheduled in future fiscal years. No current activity to report.			

Objective 4.4: Improve accessibility of dams and levee information.				
Agency and/or Stakeholders Involved: USACE.				
Anticipated Outcome: Dams and levee information are more discoverable and accessible to users.				
Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
4.4.1 Start annual publication of the National Inventory of Dams in early 2017 with updated dam information from states	1) Publication of National Inventory of Dams in 2017 2) Publication of National Inventory of Dams in 2019 3) Publication of National Inventory of Dams in 2021	1) Publication Complete 1) Publication Complete 1) Publication Complete	USACE	FY21
4.4.2 Improve publish mapping and data access capabilities for the National Levee Database in early 2017	1) Publish mapping and data access capabilities for the National Levee Database improved in 2017	1) Publication Complete	USACE	FY17
4.4.3 Start publication of the National Levee Database with updated levee information from states and other federal agencies in mid-2017	1) Publication of National Levee Database in 2019 2) Publication of National Levee Database in 2021	1) Publication Complete 1) Publication Complete	USACE	FY21
Agency and/or Stakeholder	Activity through FY 2018			
USACE	4.4.1: National Inventory of Dams will be published on the GeoPlatform in January 2019 rather than December 2017 because the National Inventory of Dams data submittal process took longer than expected.			
USACE	4.4.2: National Levee Database was published to the GeoPlatform in June 2018.			

Objective 4.5: Develop toolsets and web services to deliver drainage area boundaries for gages stored in the USGS National Water Information System (NWIS).

Agency and/or Stakeholders Involved: USGS.

Anticipated Outcome: Improved accessibility of gaged drainage areas.

Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
4.5.1 Leverage current technologies to develop open dataset access via web services	1) Public dataset access via web services developed	1) Total number of web services available	USGS NGP, USGS OWI	FY18
Agency and/or Stakeholder	Activity through FY 2018			
USGS	Activities for this Objective scheduled in future fiscal years. No current activity to report.			

Objective 4.6: Provide network-based data discovery and analysis framework.

Agency and/or Stakeholders Involved: USGS.

Anticipated Outcome: Data linked to the hydrography framework can be easily discovered and shared for multiple uses.

Actions	Milestones	Performance Indicators	Action Responsibility	Projected Completion Date
4.6.1 Continue development of a network-linked data index	1) Network-linked data index development	1) Listing of network-linked data index improvements	USGS NGP, USGS OWI	FY19
4.6.2 Develop network-linked data index services based on NHDPlusHR	1) NHDPlusHR network-linked data index service(s) development	1) Percentage completion of NHDPlusHR network-linked data index service(s) developed	USGS NGP	FY19
4.6.3 Promote listing of datasets in network-linked data index	1) Outreach to promote network-linked data index listings	1) Total number of outreach communications	USGS NGP, USGS OWI	FY21

Agency and/or Stakeholder	Activity through FY 2018
USGS	<p>4.6.1: Collaborative development of a network-linked data index is ongoing and managed through the open-source repository at https://github.com/ACWI-SSWD. An initial prototype is implemented and active within the Water Quality Portal (http://www.waterqualitydata.us/). Enhancements to the basic functionality are ongoing and planned.</p> <p>USGS began an assessment for migrating the NLDI to the NHDPlus HR, work will continue in FY19.</p>

Table 5. Theme Implementation Plan.