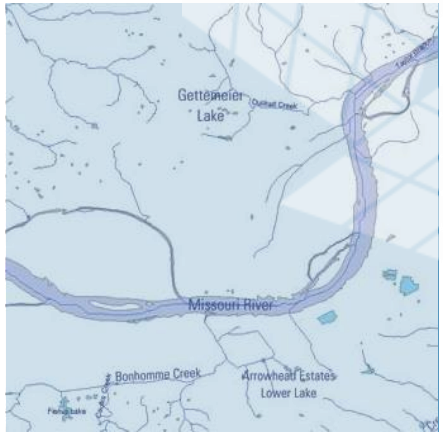
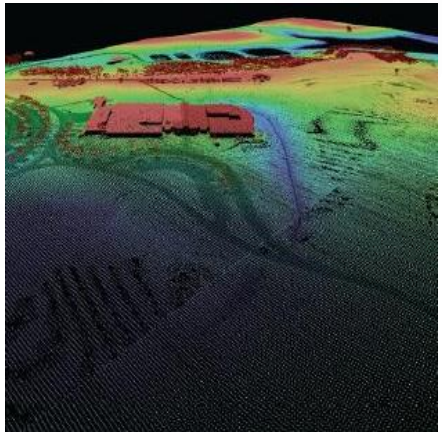
Inland Waters Theme – Status Report to FGDC





Vicki Lukas, USGS
Bill Wilen, USFWS
Nancy Blyler, USACE
June 11, 2015

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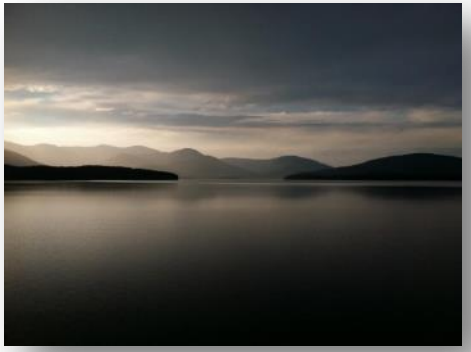
Inland Waters Theme

Definition

Interior hydrologic features and characteristics, including classification, measurements, location, and extent. Includes aquifers, watersheds, wetlands, navigation, water quality, water quantity, and groundwater information

Theme Leads – Al Rea, U.S. Geological Survey and Bill Wilen, U.S. Fish and Wildlife Service

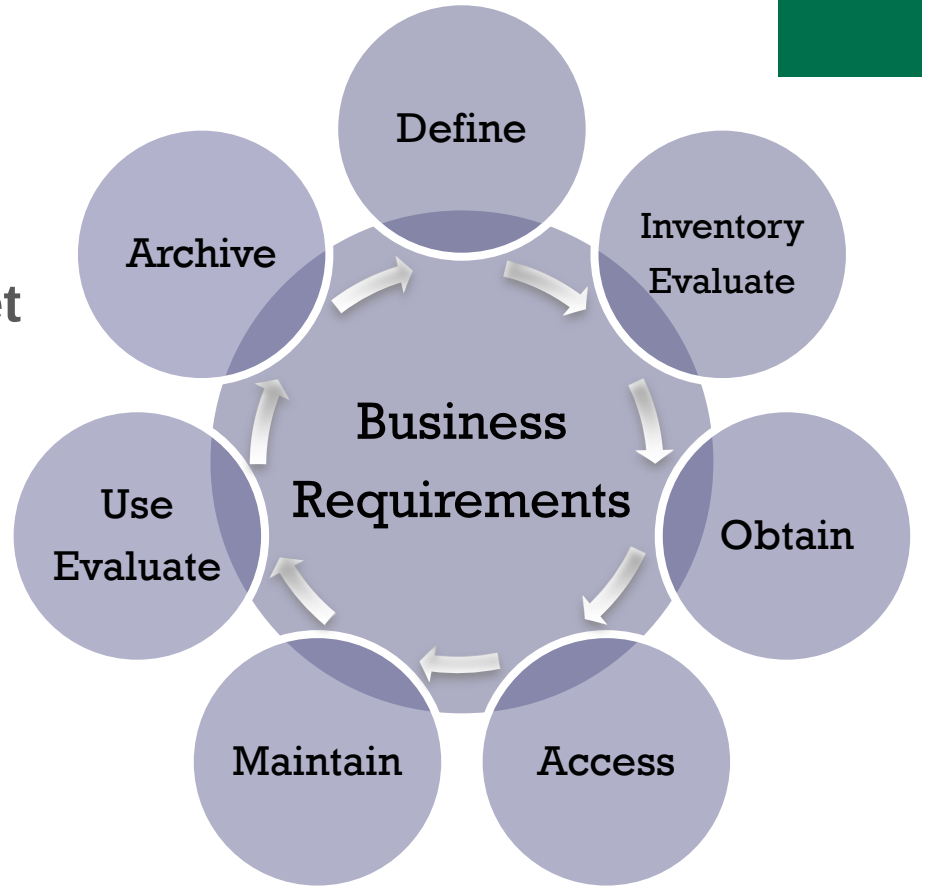
Executive NGDA Theme Champion – Jerry Johnston, DOI SAOGI



Inland Waters

NGDA Dataset Managers

- **National Hydrography Dataset**
  Jeff Simley, USGS
- **Watershed Boundaries Dataset**
  Karen Hanson, USGS
- **National Wetlands Inventory**
  Mitch Bergeson, USF&WS
- **National Inventory of Dams**
  Becky Ragon, USACE
- **National Levee Database**
  Joel Schlagel, USACE

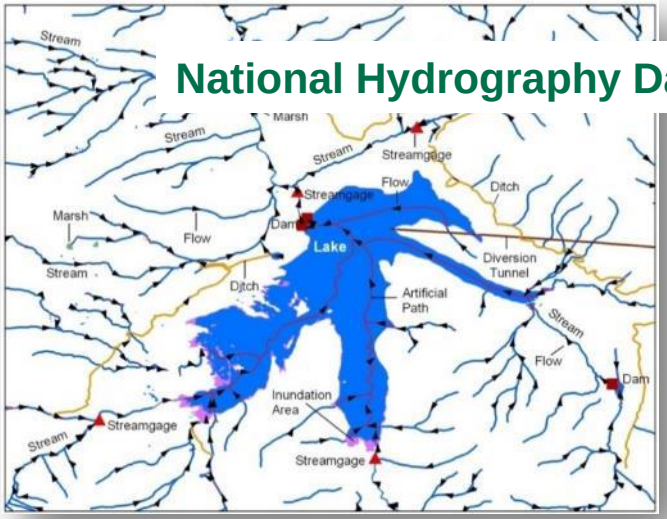


A-16 Geospatial Data Lifecycle

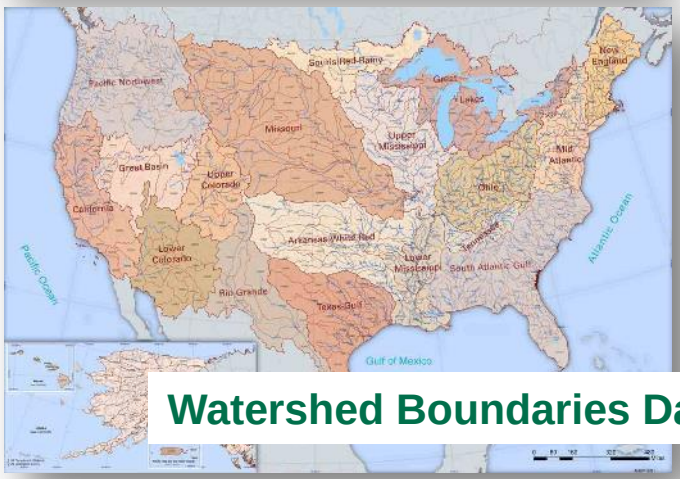
National Hydrography and Watershed Boundaries Datasets (NHD and WBD)

Surface water layers of *The National Map*

- The **NHD** represents the drainage network with features such as rivers, streams, canals, lakes, ponds, coastline, dams, and stream gages
- The **WBD** represents drainage basins at 8 scales of a nested hierarchy and defines the areal extent of surface water drainage to a point, accounting for all land and surface areas
- Together, a powerful database
  - Contains a flow network that allows for modeling and tracing water downstream or upstream
  - Uses an addressing system based on reach codes and linear referencing to link information such as water discharge rates, water quality, and fish population



National Hydrography Dataset



Watershed Boundaries Dataset

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National Hydrography and Watershed Boundaries Datasets (NHD and WBD)

Datasets and A Community 20 Years In The Making

1993 – USGS and EPA collaboration begins

2000 – Initial release of 100K NHD

2006 – 100K NHDPlus completed

2006 – 24K NHD Stewardship program started

2007 – 24K NHD completed

2010 – Completion of 12-digit WBD and integration of WBD in NHD

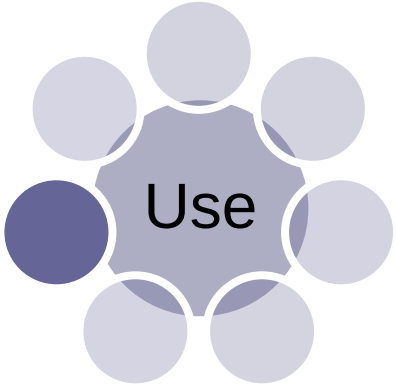
2012 – NHDPlusV2 completed

2015 – NHDPlus High Resolution began

National Hydrography and Watershed Boundaries Datasets (NHD and WBD)

Cited in over 300 articles in reviewed literature

49: Journal of the American Water Resources Association
38: Environmental Management
28: Proceedings of the Water Environment Federation
26: Water Resources Research
19: Journal of Fisheries
18: Journal of Hydrology
18: Wetlands
12: Journal of Hydrologic Engineering
12: Landscape Ecology
12: Landscape and Urban Planning
11: North American Journal of Fisheries
8: Environmental Modelling and Software
7: Hydrology and Earth Systems Science
5: Limnology and Oceanography



National Hydrography and Watershed Boundaries Datasets (NHD and WBD)

Coordination and Community Engagement

- **Strategic Direction –** Interagency Teams
  - **NHD/WBD Management Team –** meets monthly
  - **WBD Steering Committee -** meets quarterly
- **Operational Coordination**
  - **NHD/WBD Advisory Team** – meets weekly
  - **WBD State Stewardship Work Group** - meets twice a month
- **NHD/WBD International Harmonization** – Canada and Mexico
- **FGDC/ACWI Subcommittee on Spatial Water Data - Open Water Data Initiative** – Focused on making hydrography data and services accessible
- **Other outreach**
  - **NHD Newsletter by Jeff Simley** – Monthly newsletter – with quiz - is 14 years and going strong
  - **USGS Hydrography Webinar Series** – Bi-monthly virtual meetings to share user applications and experiences
- **Current Memoranda of Understanding (MOUs) –** NRCS, EPA and FWS in progress, stewardship MOUs

The water flows from east to west and involves ten states. Where is it? Send your guess to jdsimley@usgs.gov

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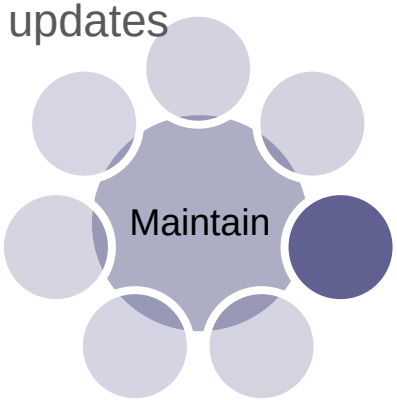
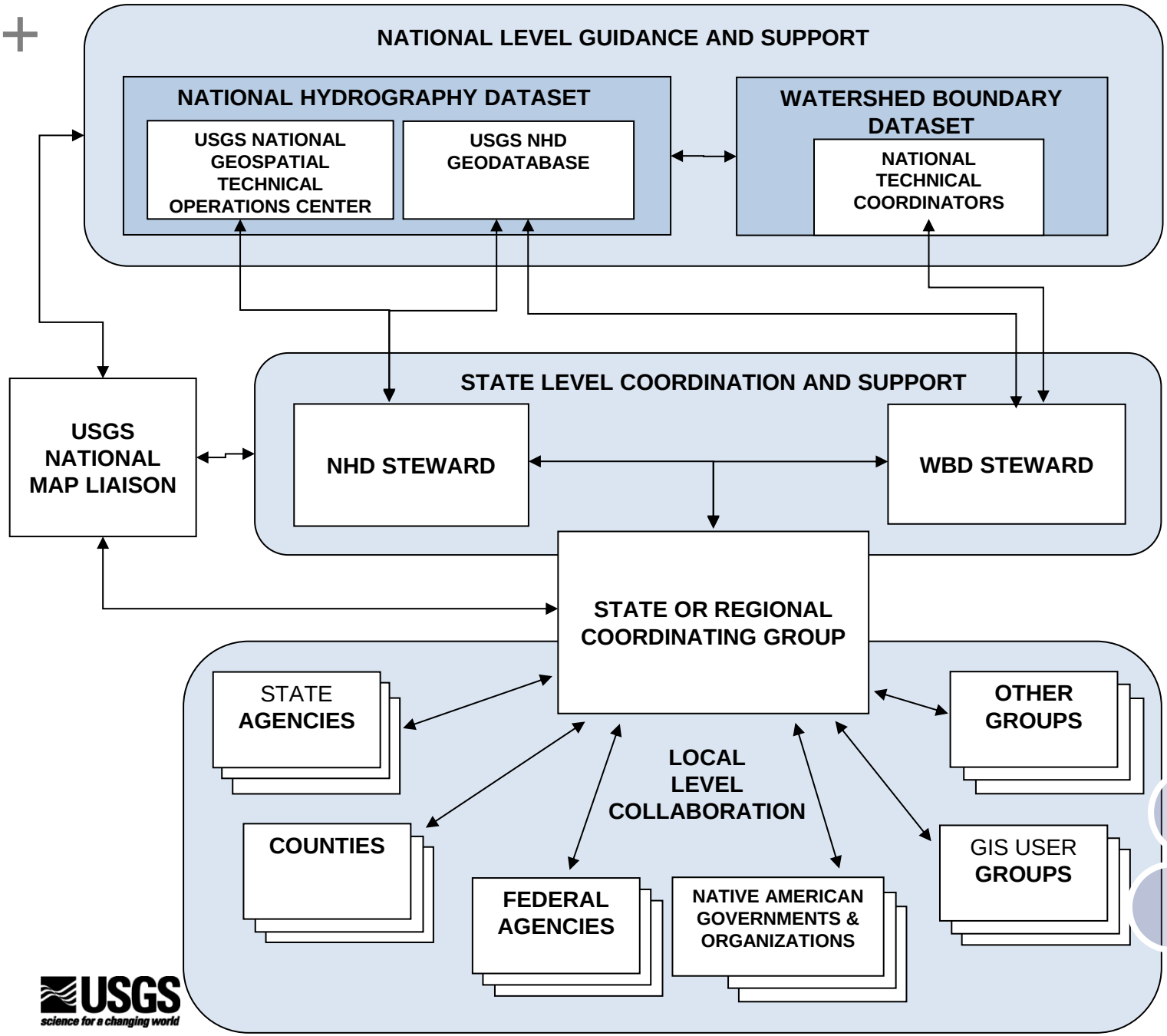
nhd.usgs.gov

National Hydrography and Watershed Boundaries Datasets (NHD and WBD)

Stewardship for Data Maintenance and Improvement

- There are 26 million features in the NHD representing a 7.5 million mile stream network with over 6.5 million waterbodies; the six-level WBD is based on 1:24,000 scale data and contains over 23,000 watershed polygons
- The best source of information about changes in local hydrography are users closest to the data, such as State and local governments, Federal land management agencies, and other users of the data
- A formal Memorandum of Understanding (MOU) between the USGS as the national data coordinator, and a principal steward for a State, which in many cases is a state government agency with a leadership role in water issues
- There may be one or more sub-stewards that provide hydrography updates under the principal steward
- NHD has stewardship agreements with 43 states plus Washington DC, WBD has active stewards in every state





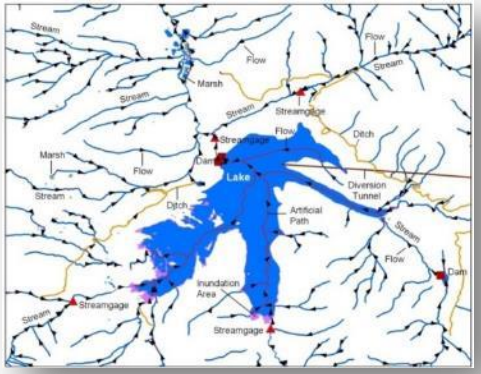
Maintain

USGS
science for a changing world

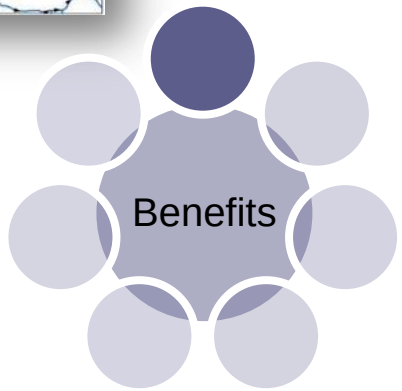
National Hydrography Data Requirements and Benefits Study

Results of First Data Collection Phase

- **Purpose** – Replicate the National Enhanced Elevation Assessment to document uses and benefits of hydrography data and use the results to define the next generation program
- **Initial data collection phase complete**: 532 individual responses received, with 595 mission critical activities identified
  - 222 from 23 Federal Agencies
  - 202 from all 50 States
  - 53 from regional/local governments
  - 10 from Tribal governments
  - 26 from not-for-profit (including academia)
  - 19 from private sector



- **Next steps**
  - Conduct follow-on workshops and interviews to refine and consolidate responses
  - Draft report this fall



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National Hydrography Data Requirements and Benefits Study

PRELIMINARY Results - Federal responses by agency

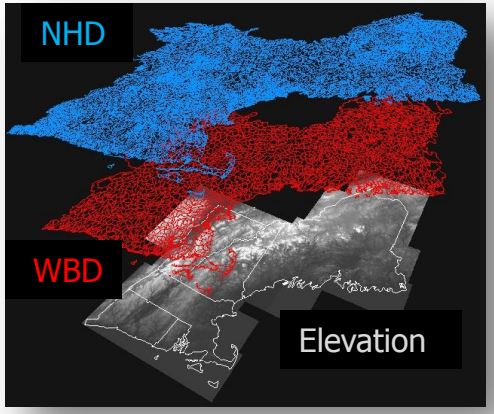
Organization Name	Total Annual Budget	Annual Benefits (current)	Annual Benefits (future)
Bureau of Land Management (BLM)	$123,050,000	$21,530,000	$4,800,000
Farm Service Agency (FSA)	$1,527,300,000	$132,775,000	$134,145,000
United States Geological Survey (USGS)	$353,970,000	$26,867,000	$30,158,000
National Park Service (NPS)	$2,325,540,000	$1,200,000	$2,200,000
U.S. Forest Service (USFS)	$18,800,000	$2,760,000	$4,060,000
U.S. Fish and Wildlife Service (USFWS)	$140,004,000	$6,250,000	$31,555,000
Animal and Plant Health Inspection Service	$50,500,000	$500,000	$500,000
Bureau of Reclamation	$23,500,000	$1,000,000	$2,000,000
Environmental Protection Agency (EPA)	$83,800,000	$6,785,000	$7,130,000
U.S. Army Corps of Engineers (USACE)	$17,820,000	$815,000	$762,000
Agricultural Research Service	$3,650,000	$0	$100,000
National Oceanic and Atmospheric Administration (NOAA)	$144,520,000	$60,000	$3,000,000
Western Area Power Administration (WAPA)	$300,600,000	$500,125,000	$75,000
Federal Energy Regulatory Commission (FERC)	$78,010,000	$1,210,000	$1,075,000
Bonneville Power Administration (BPA)			
Bureau of Ocean Energy Management (BOEM)			
Defense Installations Spatial Data Infrastructure (DISDI)	$300,000	$100,000	$200,000
Federal Emergency Management Agency (FEMA)			
International Joint Commission (IJC)	$2,000,000		$1,000,000
Natural Resources Conservation Service (NRCS)	$25,000,000	$1,000,000	
Nuclear Regulatory Commission (NRC)			
Office of Surface Mining Reclamation and Enforcement (OSMRE)		$2,000,000	$1,000,000
Southeastern Power Administration (SEPA)			$0
U.S. Census Bureau (USCB)	$55,613,000	$0	$0
Total		**$704,977,000**	**$223,760,000**

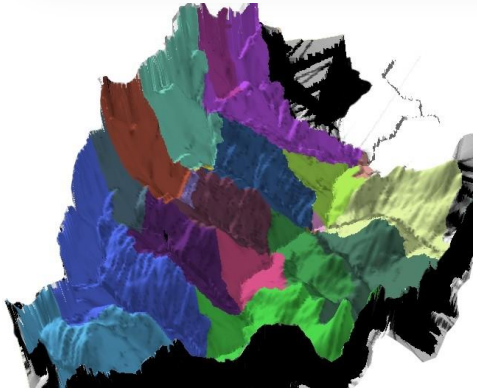
PRELIMINARY Results - Benefits by Business Use

Business Use	Total Annual Budget	Annual Benefits (current)	Annual Benefits (future)
River and Stream Flow Management	$260,145,000	$151,110,000	$148,077,000
Natural Resources Conservation	$1,242,150,000	$4,620,000	$32,035,000
River and Stream Ecosystem Management	$90,140,000	$24,495,000	$7,080,000
Water Quality	$237,920,000	$9,085,000	$15,155,000
Water Resource Planning and Development	$2,339,730,000	$2,208,000	$5,818,000
Flood Risk Management	$135,480,000	$4,320,000	$6,800,000
Renewable Energy Resources	$369,110,000	$500,210,000	$100,000
Wildlife and Habitat Management	$239,214,000	$1,302,000	$1,715,000
Agriculture and Precision Farming	$100,025,000	$1,502,000	$580,000
Forest Resources Management	$71,000,000	$2,200,000	$5,000,000
Resource Mining	$500,000,000	$2,000,000	$1,000,000
Health and Human Services	$11,700,000	$250,000	$500,000
Rangeland Management	$1,050,000	$500,000	$600,000
Homeland Security, Law Enforcement, and Disaster Response	$60,000,000	$1,000,000	$1,000,000
Sea Level Rise and Subsidence	$0	$0	$0
Infrastructure and Construction Management	$7,500,000	$25,000	$50,000
Real Estate, Banking, Mortgage, and Insurance	$2,200,000	$50,000	$100,000
Coastal Zone Management	$250,000	$100,000	$150,000
Wildfire Management, Planning, and Response	$3,500,000	$0	$0
Recreation	$250,000	$0	$0
Urban and Regional Planning	$55,613,000	$0	$0
Marine and Riverine Navigation Safety	$43,000,000	$0	$0

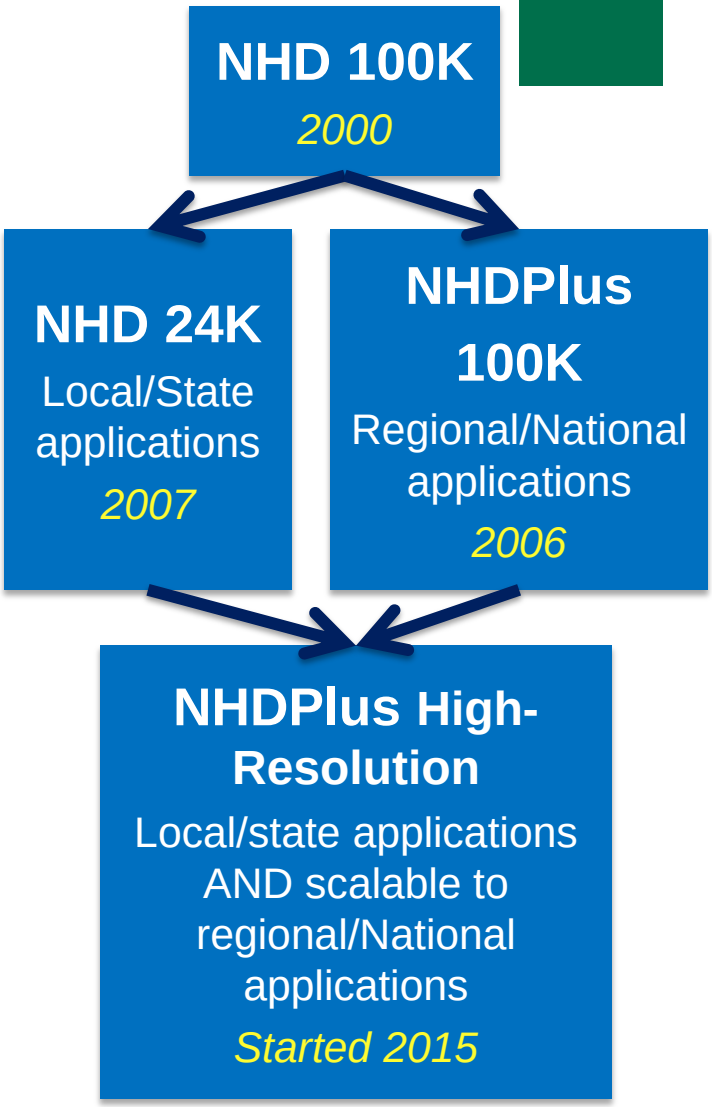
NHDPlus High Resolution

Integrating the Landscape with the Stream Network at 24K





- Addresses the need for a single hydrographic frame of reference by
  - Building on NHDPlus 100K integration of NHD, WBD and elevation data
  - Building on higher resolution framework of 24K NHD
  - Providing ability to generalize to many different scales so that all users can link their data to the same core network
- Initial Steps
  - Tools and procedures in FY15
  - Production will proceed by sub-region



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Open Water Data Initiative (OWDI)

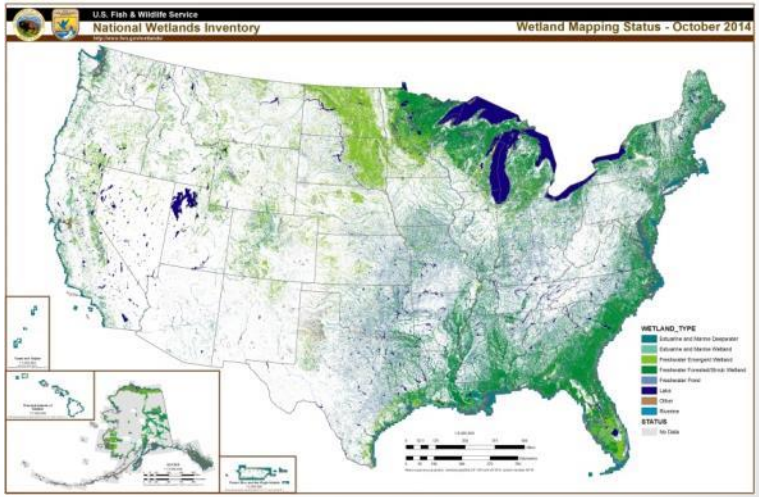
Ensure Access and Interoperability to Water Data

- FGDC Steering Committee (6/14) and Advisory Committee on Water Information (8/14) voted unanimously to charge the Subcommittee on Spatial Water Data (SSWD) to scope and design a national Open Water Data Infrastructure (Chair, USGS and Co-Chair, NWS)
- Focus on development of data standards, services, and accessibility
- SSWD has defined use cases to identify and prioritize efforts
  - The National Flood Interoperability Experiment (NFIE)
  - A regional water supply decision support system to support longer-term water management decisions in a major river basin
  - An emergency spill response use case
- Subcommittee on Spatial Water Data (SSWD) addressing use cases
  - Monthly meetings since 8/14
  - 40+ regular attendees, mailing list of 80+
  - > 30 organizations represented
  - Applying “Lean Startup” principles
  - 4 data work groups
  - Technology/standards work group

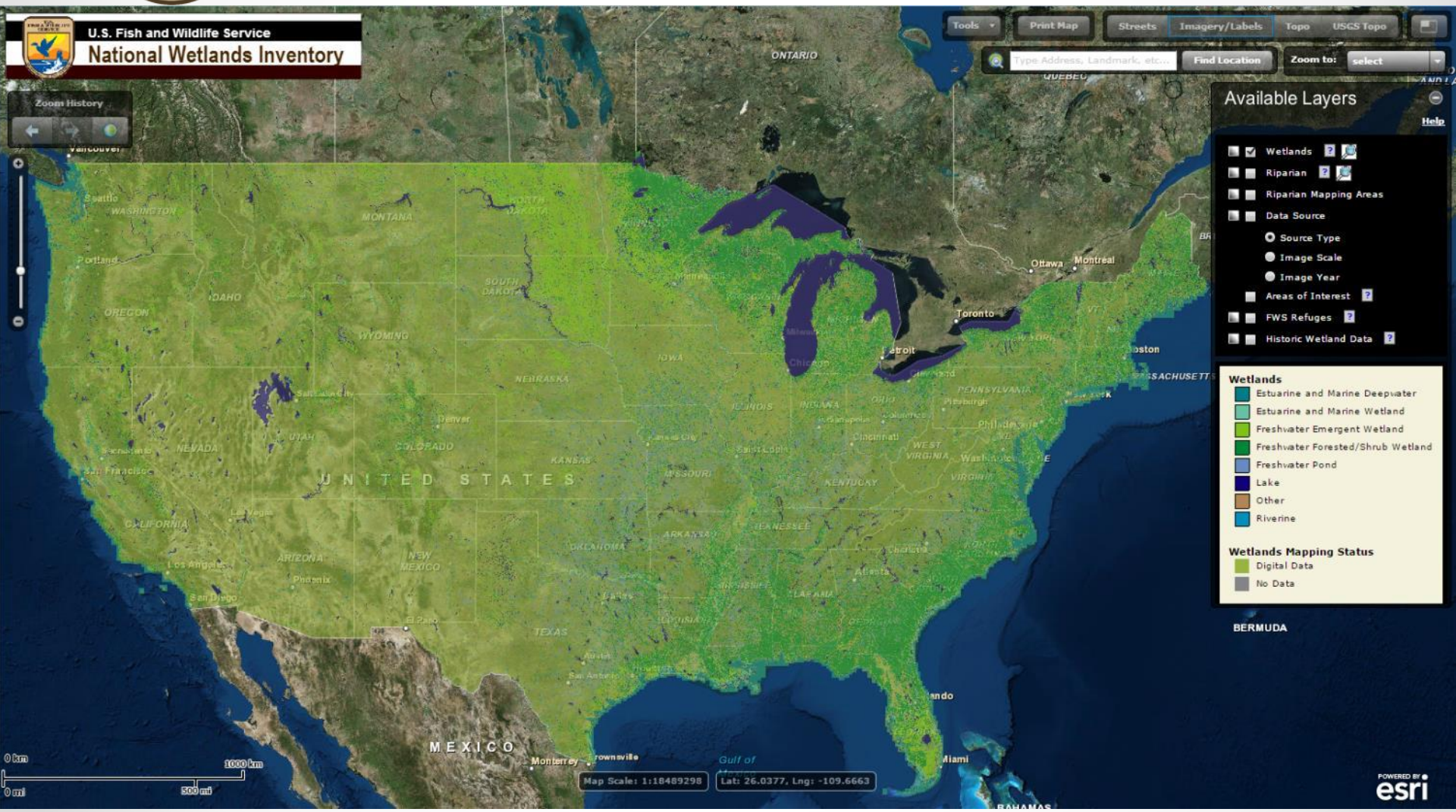
National Wetlands Inventory

- Emergency Wetland Resource Act of 1986
  - Map wetlands of the U.S. - **National Wetlands Inventory**
  - Provide 10 year Reports **– Wetlands Status and Trends Reports**
- National Geospatial Data Asset (NGDA)
  - Supports mission goals of multiple federal agencies
  - Statutorily mandated
  - Supports Presidential priorities as expressed by OMB
    - OMB Circular A-16 identifies the Wetlands Layer as a National Spatial Data Infrastructure (NSDI) layer
    - Stewards of National Wetland Classification Standard
    - Stewards of the FGDC Wetland Mapping Standard

- ➢ Over 20 million polygons
- ➢ 40 years and $220+ million
- ➢ Over 165 contributors
- ➢ Nearly 1 million website views annually
- ➢ 335,000+ Mapper unique users annually
- ➢ First DOI application hosted in the Cloud

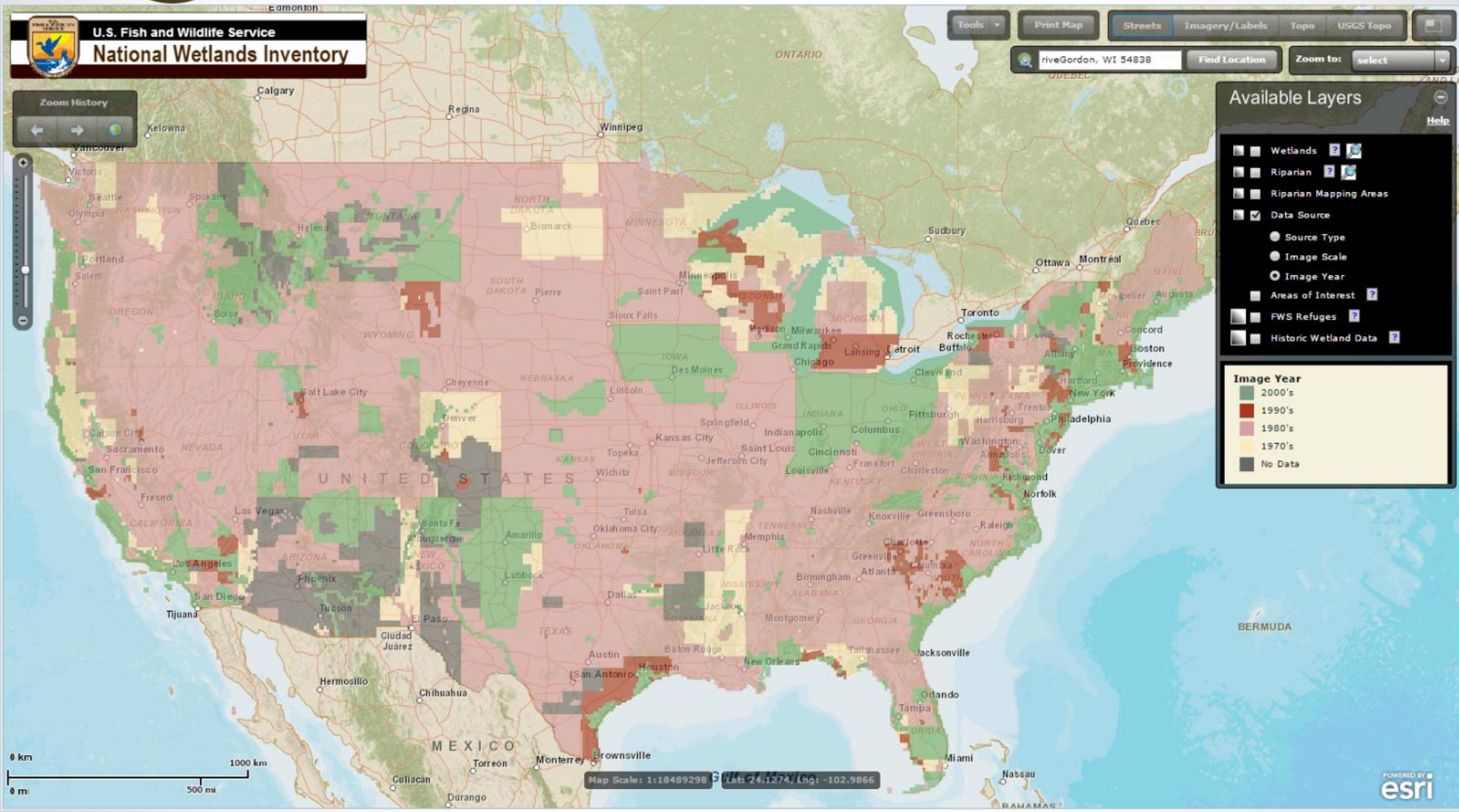


Wetlands Mapper - Layers



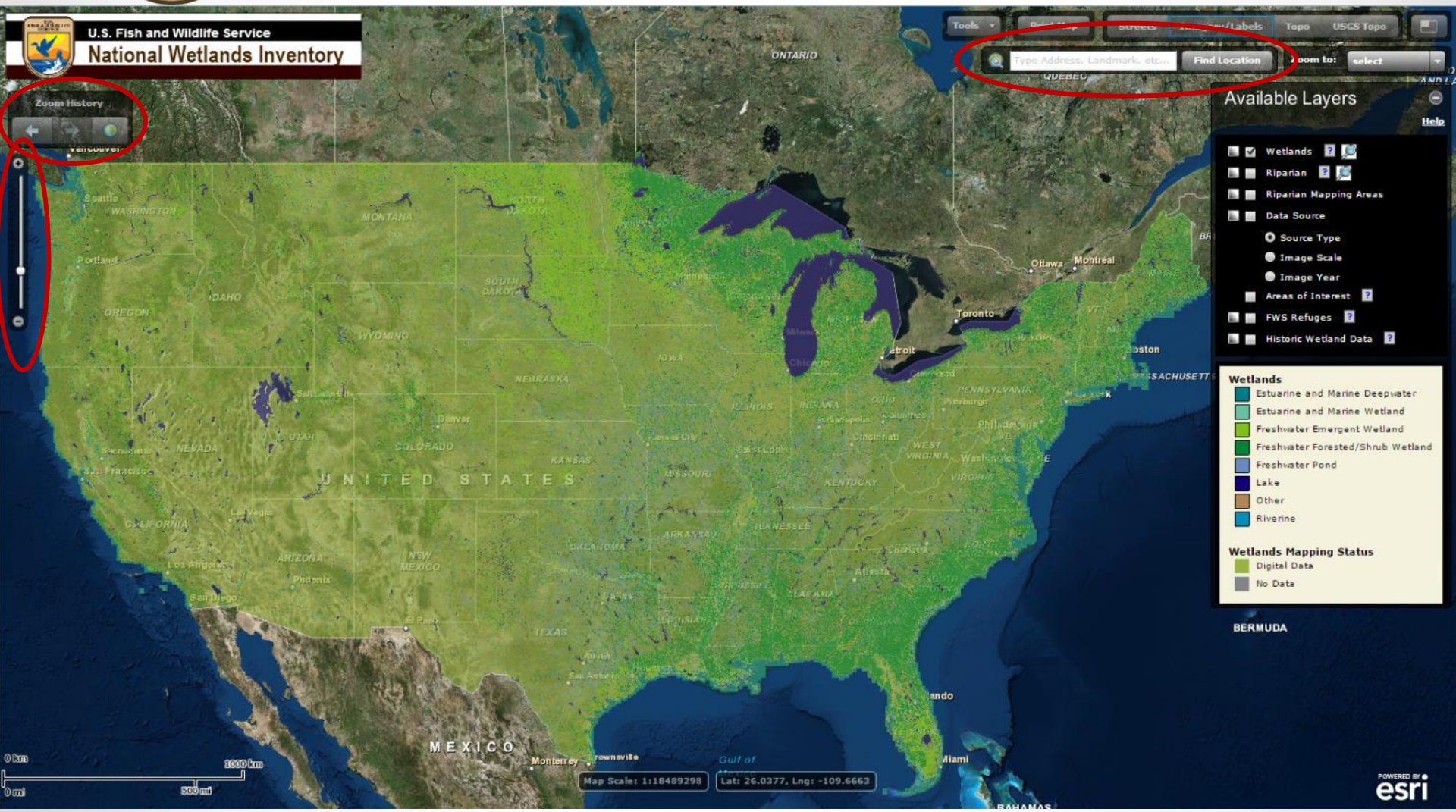
www.fws.gov/wetlands/Data/Mapper.html

Wetlands Mapper - Layers



www.fws.gov/wetlands/Data/Mapper.html

Wetlands Mapper - Navigation

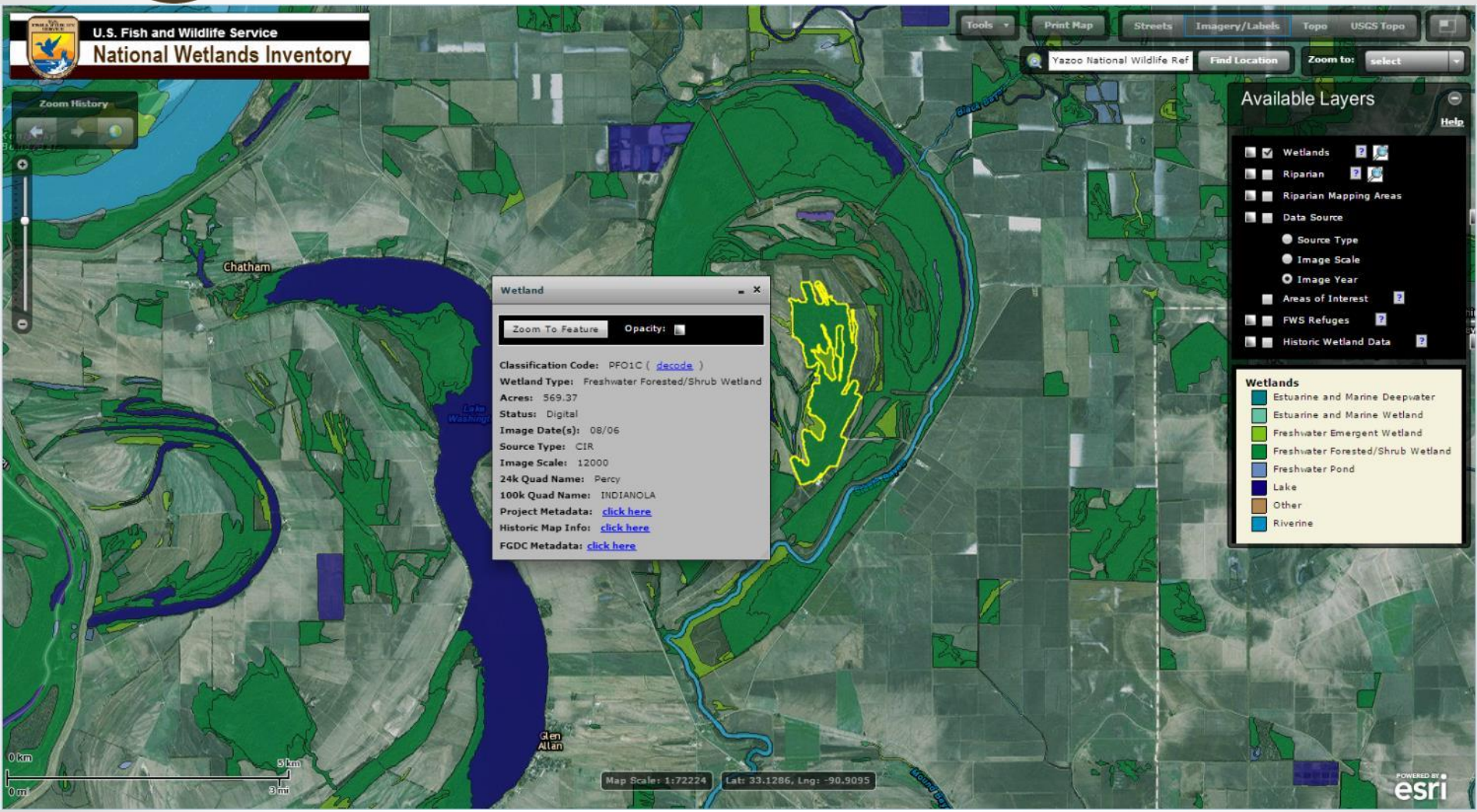


www.fws.gov/wetlands/Data/Mapper.html

Wetlands Mapper - Navigation

www.fws.gov/wetlands/Data/Mapper.html

Wetlands Mapper - Navigation



www.fws.gov/wetlands/Data/Mapper.html

Wetlands Mapper - Navigation

U.S. Fish & Wildlife Service

National Wetlands Inventory

Ecological Services

Enter Classification code: PFO1C (Example: **L1UB1Hx**)

For geographically specific information* (optional), please enter a State code: (Example: **TX** for Texas)

DECODE

Description for code **PFO1C** :

P System **PALUSTRINE**: The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. Wetlands lacking such vegetation are also included if they exhibit all of the following characteristics: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline feature; 3. have at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt.

Subsystem :

FO Class **FORESTED**: Characterized by woody vegetation that is 6 m tall or taller.

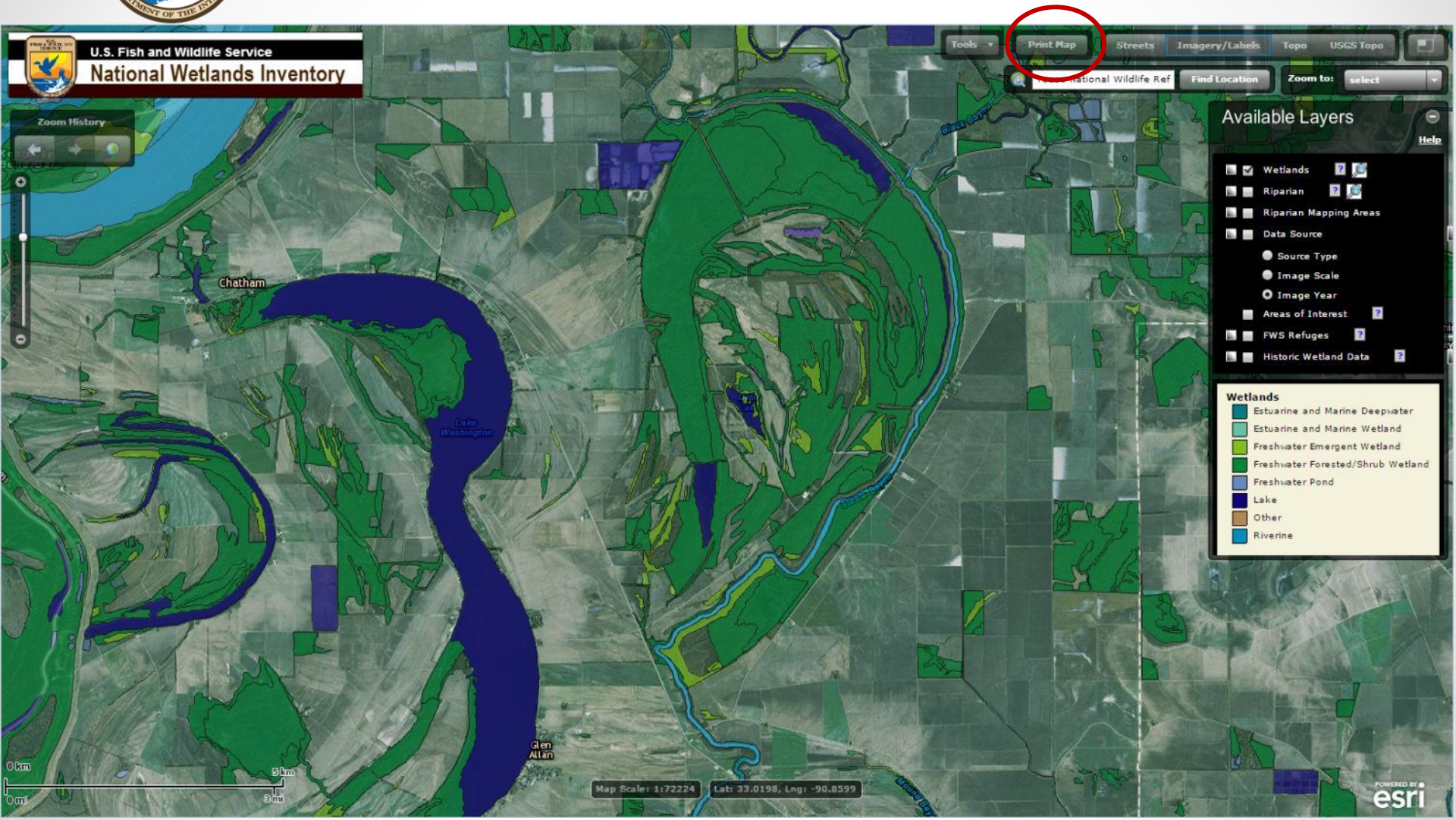
1 Subclass **Broad-Leaved Deciduous**: Woody angiosperms (trees or shrubs) with relatively wide, flat leaves that are shed during the cold or dry season; e.g., black ash (Fraxinus nigra).

Modifier(s):

C WATER REGIME **Seasonally Flooded**: Surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding

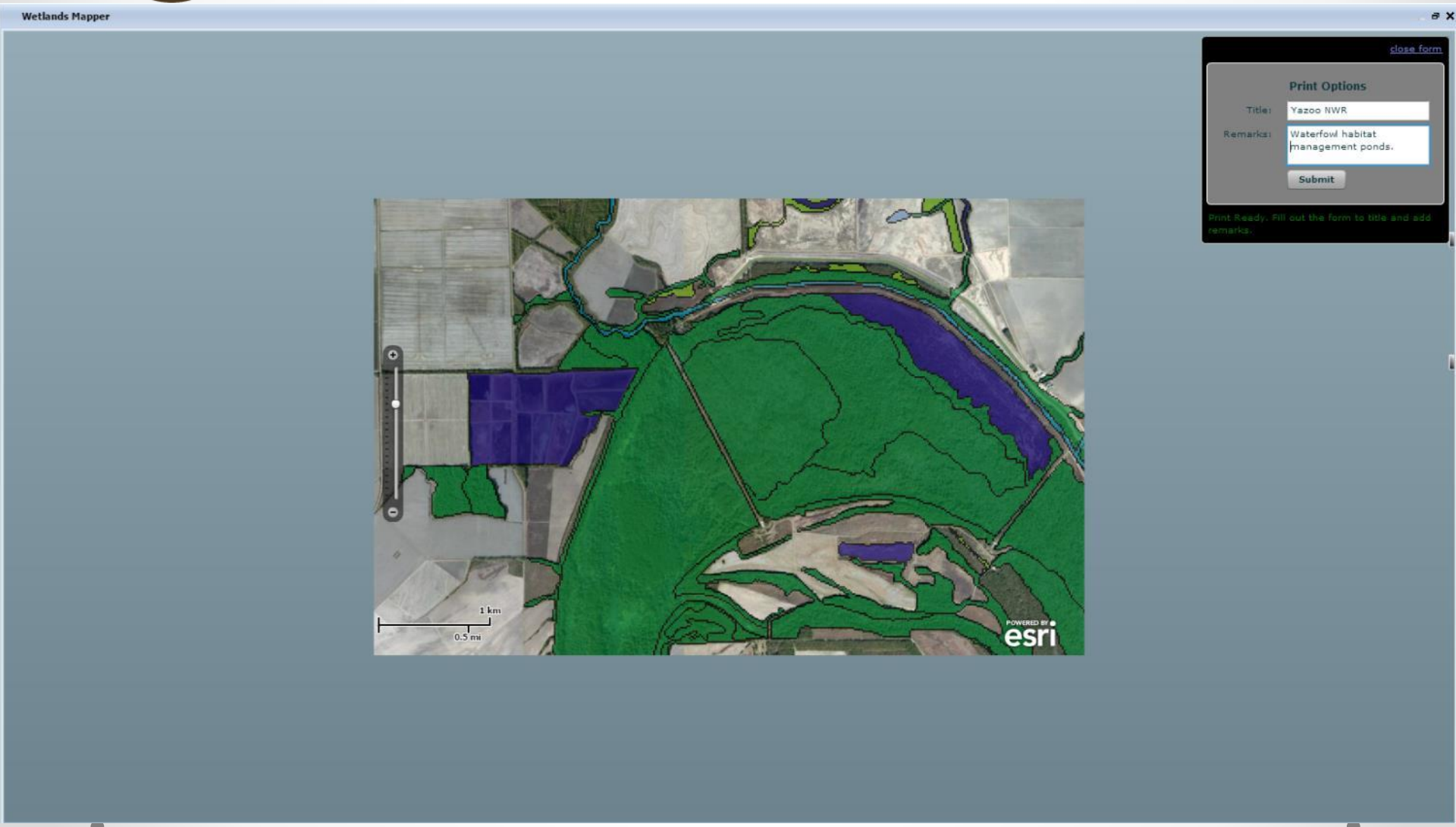
www.fws.gov/wetlands/Data/Wetland-Codes.html

Wetlands Mapper - Print



www.fws.gov/wetlands/Data/Mapper.html

Wetlands Mapper - Print



www.fws.gov/wetlands/Data/Mapper.html

Wetlands Mapper - Print

Wetlands Mapper

U.S. Fish and Wildlife Service

National Wetlands Inventory

Yazoo NWR

Mar 4, 2015

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

Waterfowl habitat management ponds.

close form

Options

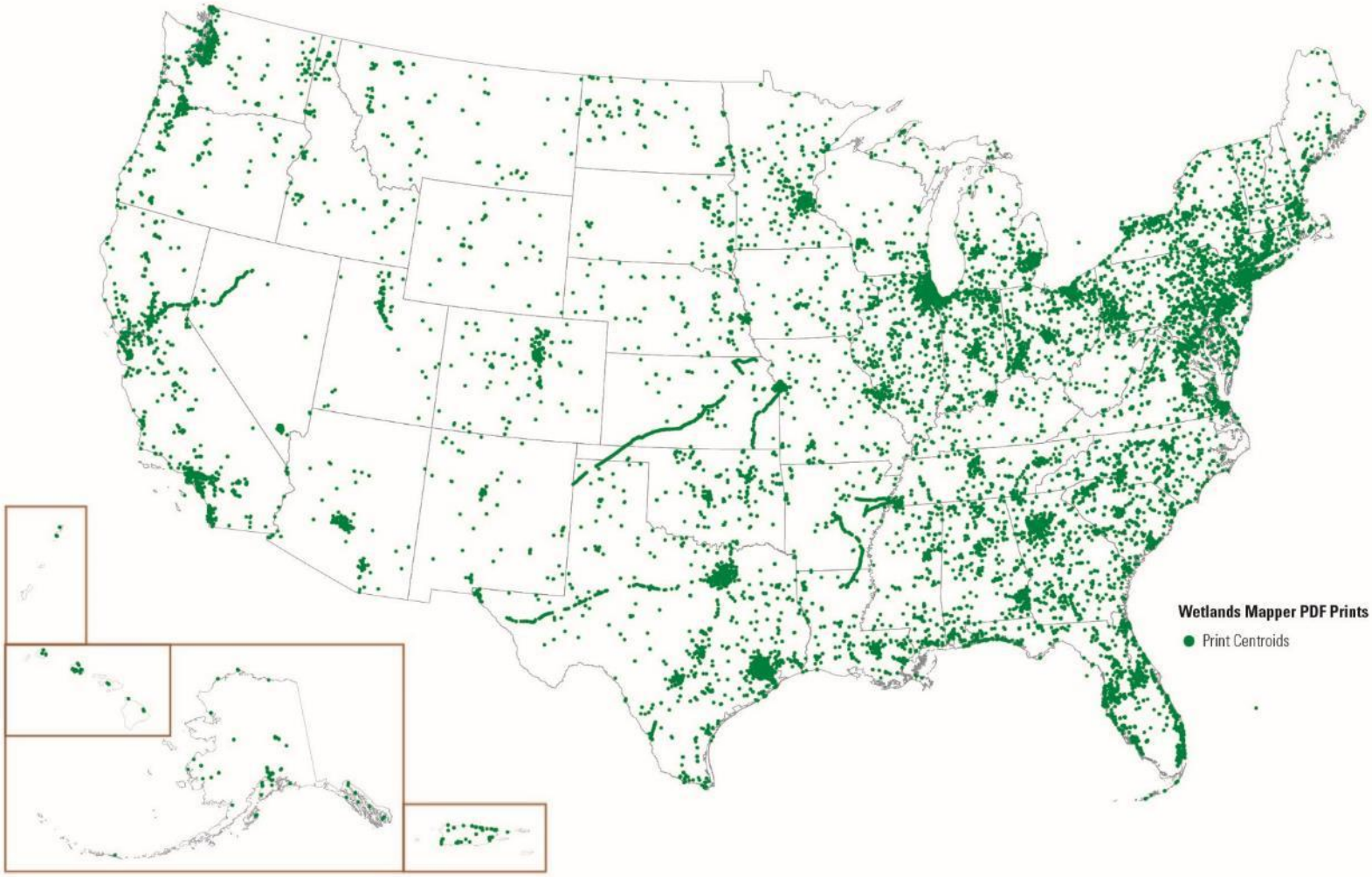
NWR

owl habitat
gement ponds.

nit

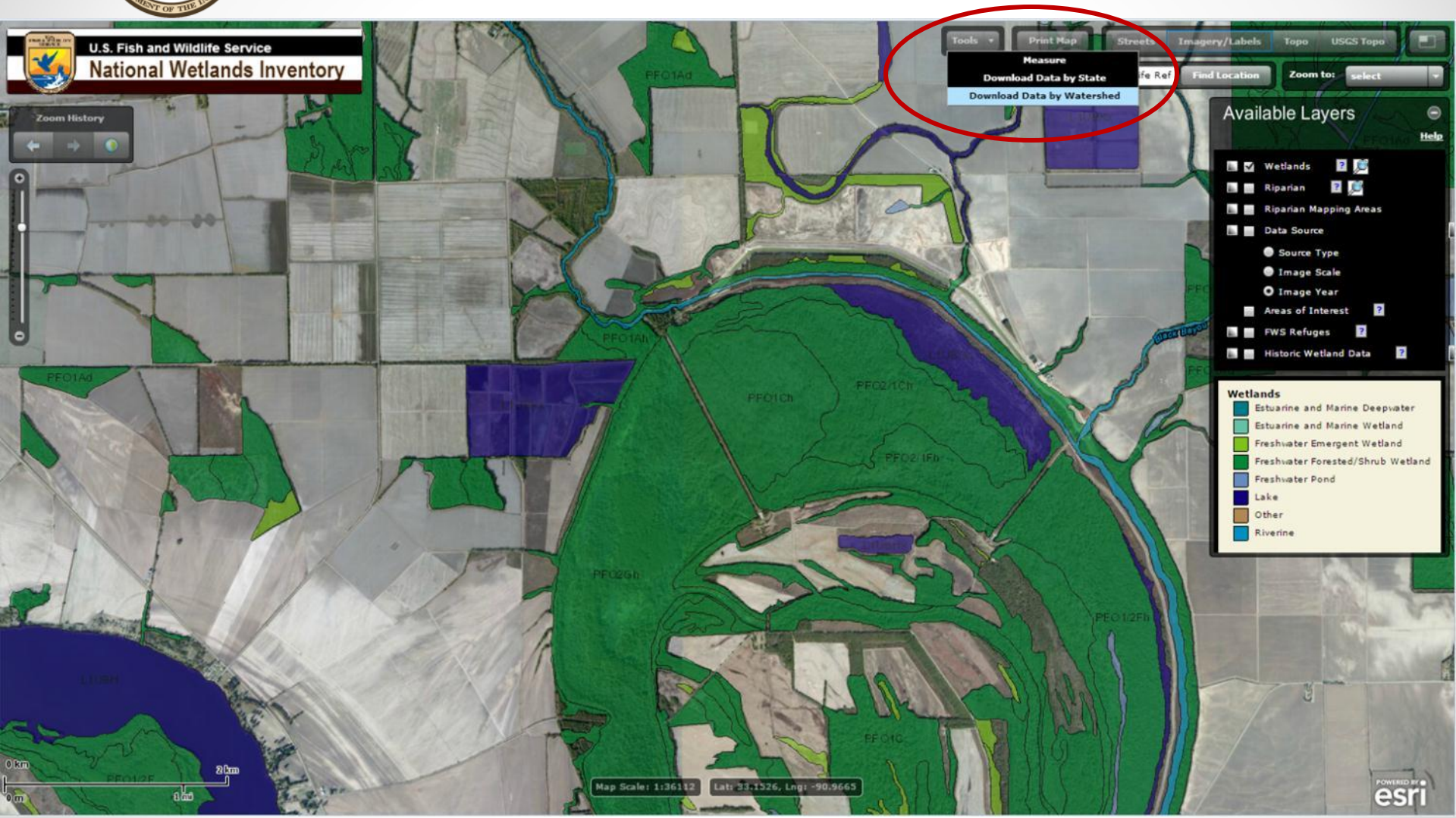
form to title and add

Wetlands Mapper – Print
13,947 Maps Printed – Feb 2015



www.fws.gov/wetlands/Data/Mapper.html

Wetlands Mapper - Data

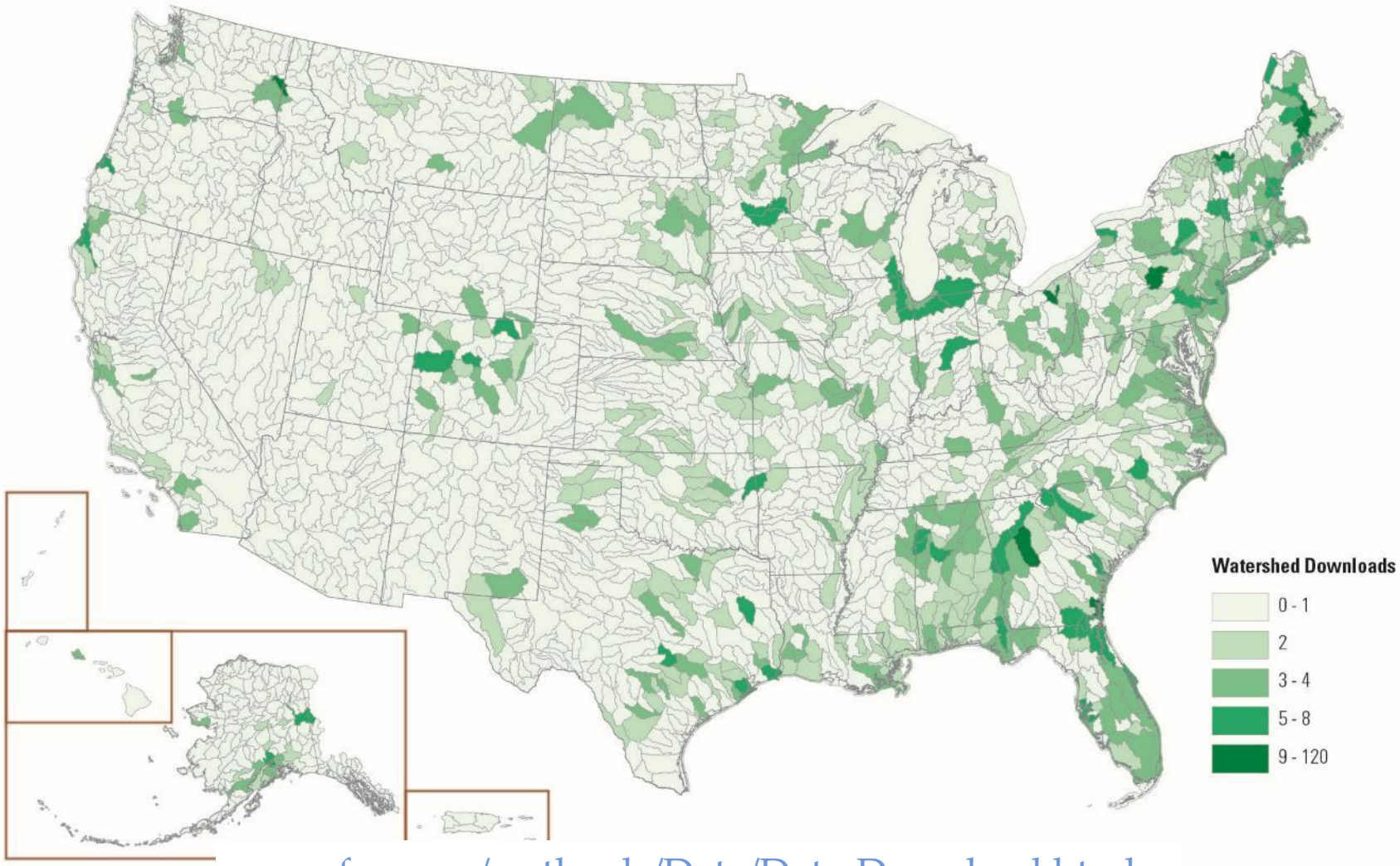


www.fws.gov/wetlands/Data/Mapper.html

Wetlands Mapper - Data

www.fws.gov/wetlands/Data/Mapper.html

Wetlands Mapper – Data
952 Watershed Downloads – Feb 2015



www.fws.gov/wetlands/Data/Data-Download.html

Wetlands Mapper - Data

U.S. Fish & Wildlife Service

National Wetlands Inventory

Ecological Services

Search NWI Site

Home | Wetlands Data ↓ | Status and Trends ↓ | Wetlands Layer ↓ | Other Topics ↓ | National Wetlands Inventory | Contact Information ↓

Download Seamless Wetlands Data by State

Before You Begin

- Each State data download is available as either a compressed file Geodatabase or a Shapefile. Both files are compressed by using the .zip format and contain the following layers:
  - Wetlands polygon data
  - Wetlands Project Metadata (includes image dates and project information)
  - Wetlands Historic Map Information*
  - Riparian polygon data*
  - Riparian Project Metadata (includes image dates and project information)*
  - Historic Wetlands*
  - Historic Wetlands Project Metadata (includes image dates and project information)*

  * If available at the requested location Information about each of these layers can be found on our Metadata page.
- Not all of Alaska has been digitally mapped by the U.S. Fish and Wildlife Service. Please refer to the Wetlands Mapper Wetlands Mapping Status layer to view where wetlands have been mapped in Alaska. The state downloads include a Wetlands Project Metadata layer that identifies where and when wetlands were mapped within the state.
- **NOTE:** Due to the variation in use and analysis of this data by the end user, each of states wetlands data extends beyond the state boundary. Each state includes wetlands data that intersect the 1:24,000 quadrangles that contain part of that state (1:2,000,000 source data). This allows the user to clip the data to their specific analysis datasets. Beware that two adjacent states will contain some of the same data along their borders.

Downloading Tips

- **If an error occurs during your download, or if your downloaded file(s) is corrupted, we strongly recommend the use of a download manager. Please visit the Frequently Asked Questions page for more information on this topic. For security reasons, we are not allowed to served data via FTP.**
- Due to the amount of data being downloaded, the resulting time to download each file may take up to 60 minutes or more, and each file can range in sizes from 1MB to approximately 1GB.

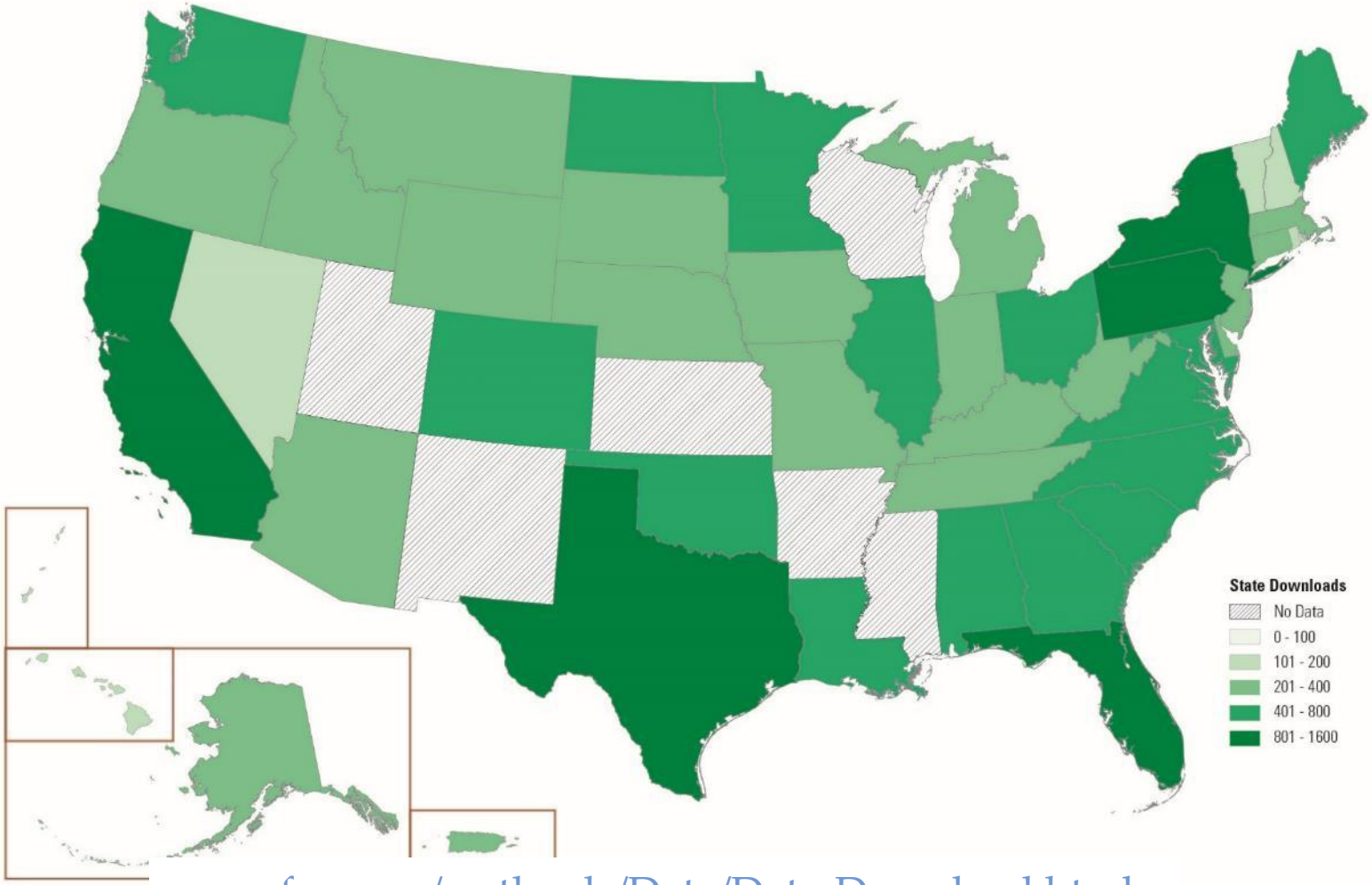
State Downloads (file downloads last updated October 6, 2014)

State	Download Type	
Alabama	Geodatabase	Shapefile
Alaska	Geodatabase	Shapefile
Arizona	Geodatabase	Shapefile
Arkansas	Geodatabase	Shapefile
California	Geodatabase	Shapefile
Colorado	Geodatabase	Shapefile

State	Download Type	
Nebraska	Geodatabase	Shapefile
Nevada	Geodatabase	Shapefile
New Hampshire	Geodatabase	Shapefile
New Jersey	Geodatabase	Shapefile
New Mexico	Geodatabase	Shapefile
New York	Geodatabase	Shapefile

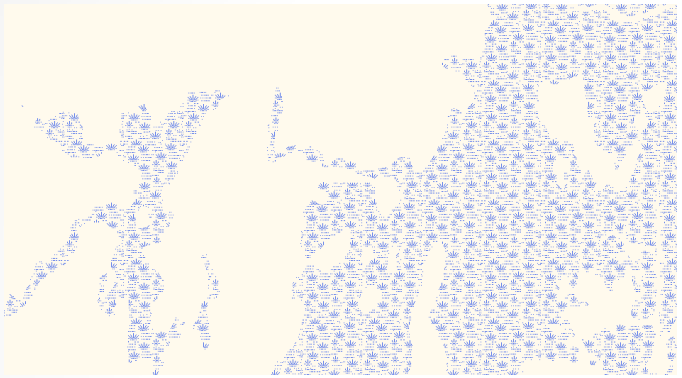
www.fws.gov/wetlands/Data/Data-Download.html

Wetlands Mapper – Data
20,850 State Downloads - 2014

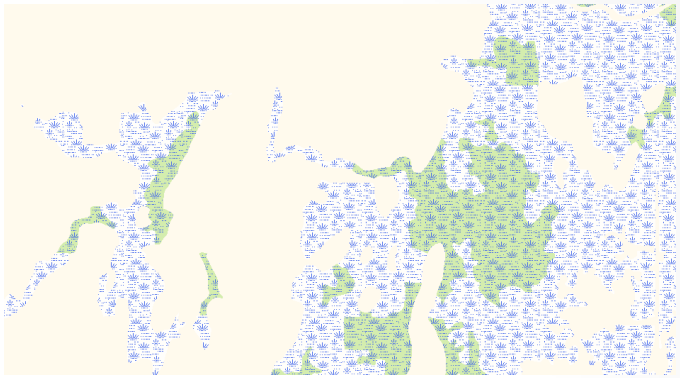


www.fws.gov/wetlands/Data/Data-Download.html

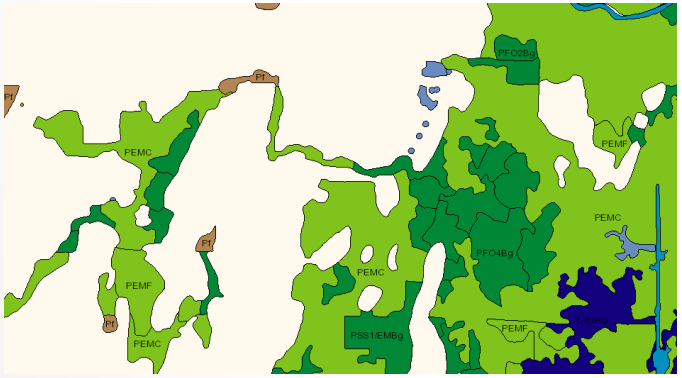
Wetlands Services



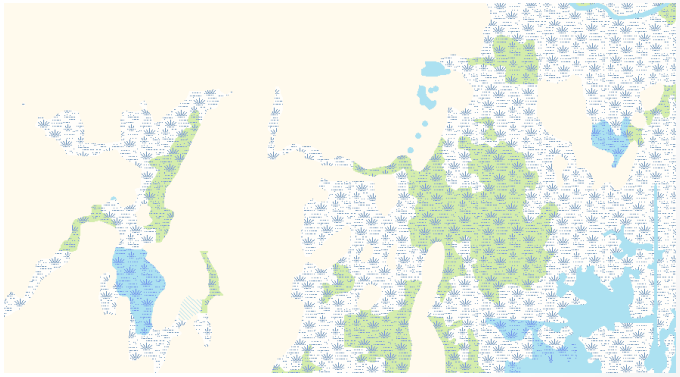
Symbol Service



Topo Service



Mapper Service



Complete Topo Service

http://107.20.228.18/ArcGIS/rest/services

Contribute Wetlands Data

U.S. Fish & Wildlife Service

National Wetlands Inventory

Ecological Services

Search NWI Site

Home | Wetlands Data ↓ | Status and Trends ↓ | Wetlands Layer ↓ | Other Topics ↓ | National Wetlands Inventory | Contact Information ↓

Contributed Data: Contribute your Data to the Wetlands Master Geodatabase

Introduction

Organizations or individuals have the opportunity to contribute wetlands data to the wetlands geospatial data layer maintained by the U.S. Fish and Wildlife Service. The wetlands data layer is the featured layer on the Wetlands Mapper, is a National Geospatial Data Asset (NGDA) dataset designated by OMB Circular A-16 and the Federal Geographic Data Committee (FGDC) and is registered through Geoplatform.gov and Data.gov.

The Service will provide proper acknowledgement of all data contributors and maintain data integrity consistent with DOI policy.

New: The Wetland Mapping Consortium (WMC) Webinar:

"Mapping Standards and Procedures – The NWI and You"

Part 1; Part 2; Part 3

Data Submission

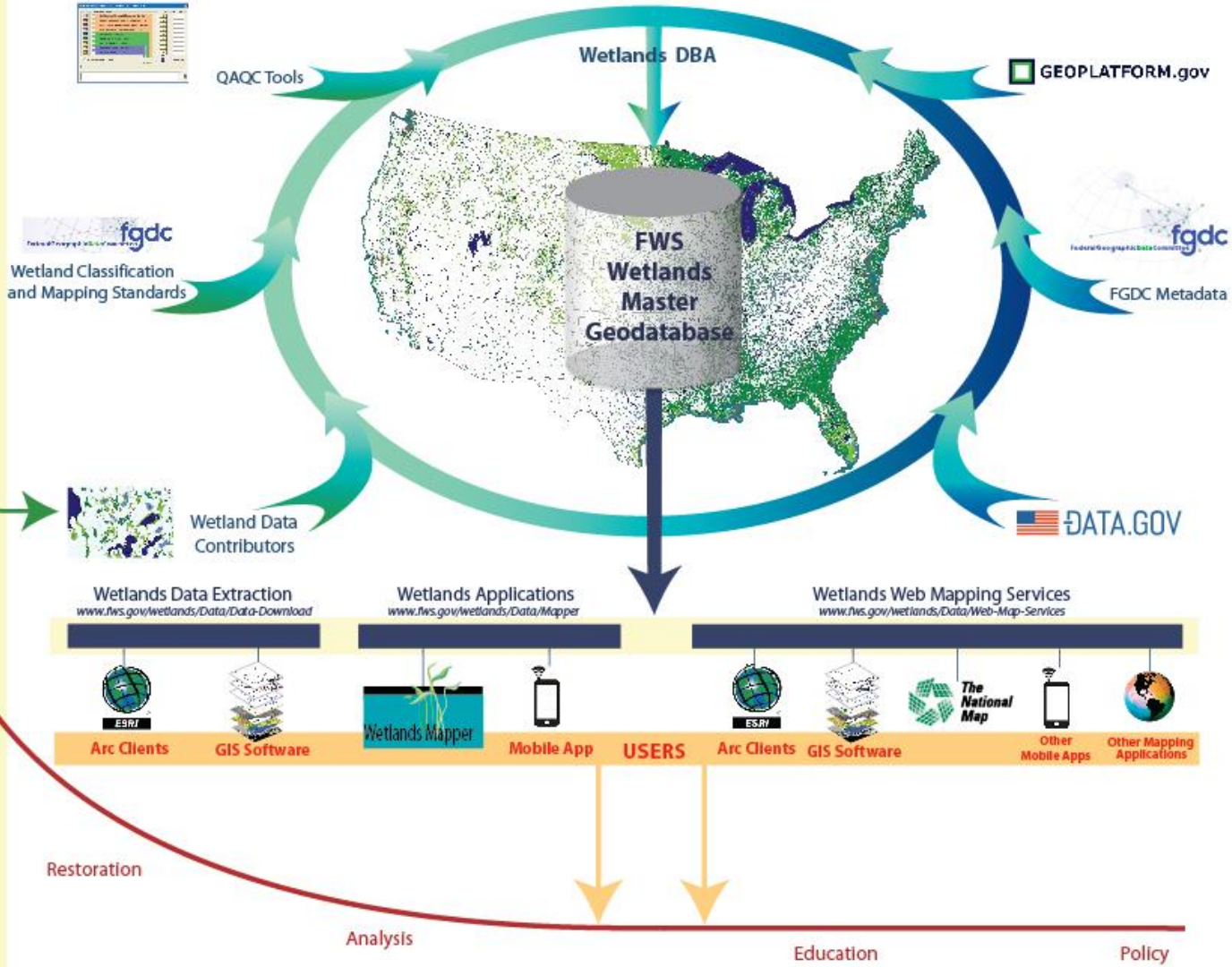
Because the Wetlands Master Geodatabase is a national data set, certain standards must be met before the data can be added. However, if you do not have the ability or resources to make your data meet these standards the Service may be able to assist in data conversions or modification.

The Wetlands data standards for acceptance into the Wetlands Master Geodatabase (MGD) are as follows:

- The data should comply with the Wetlands Mapping Standards.
- Properly project all data. The projection for wetlands is the Albers Equal Area Conic Projection and the North American Datum of 1983. Click here for additional projection information.
- ESRI shapefiles and Personal Geodatabases, or File Geodatabases, are the preferred spatial data formats for submission.
- Users are encouraged to verify their wetlands data by downloading and using the Wetlands Data Verification Toolset
- The Wetlands Master (... and added to the polygon feature class.

www.fws.gov/wetlands/Data/Contributed-Data.html

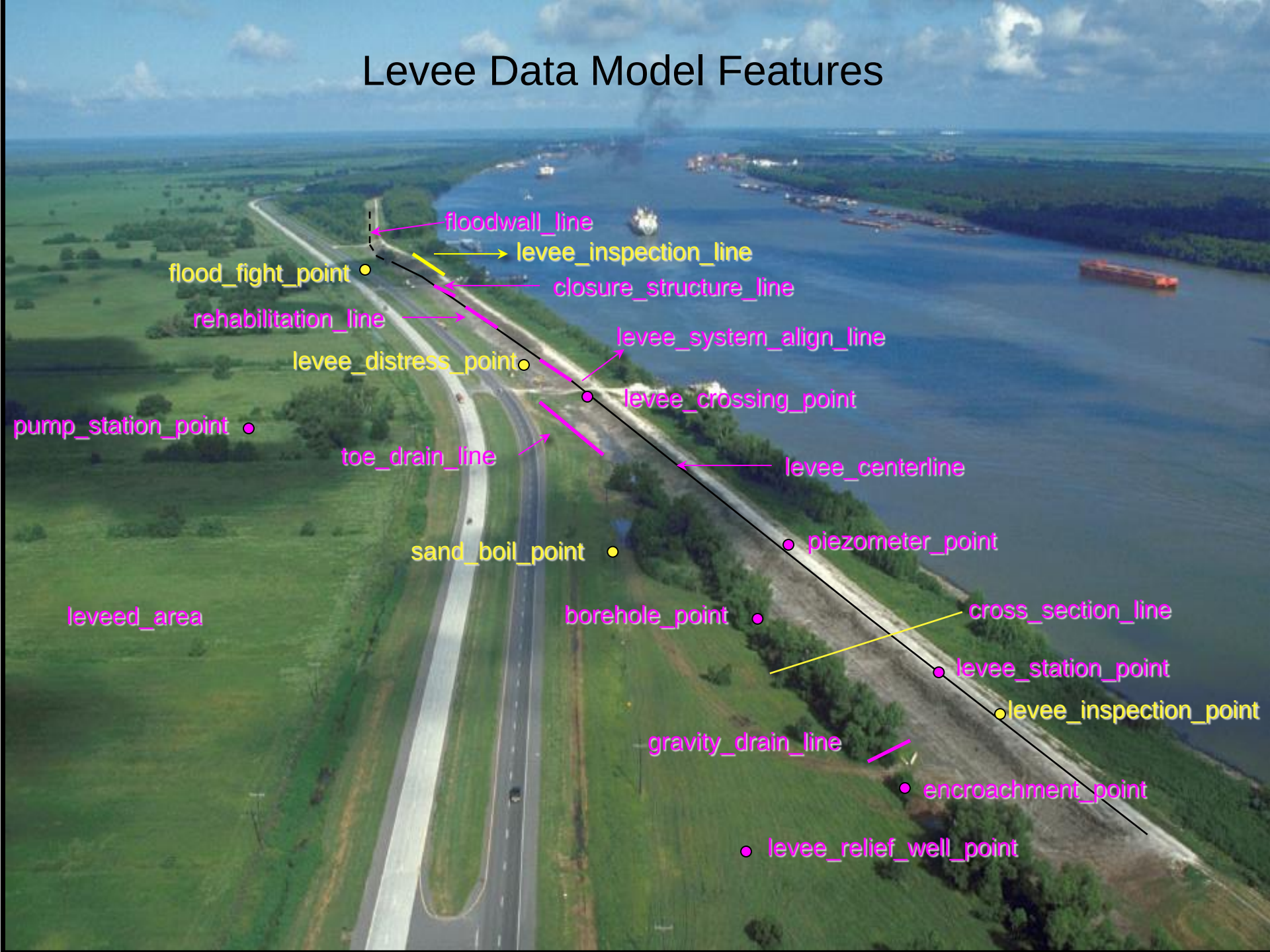
Wetlands Layer of the National Spatial Data Infrastructure (NSDI) a National Geospatial Data Assest (NGDA)



National Levee Database

- Initially developed for USACE to manage/maintain USACE levees
- Water Resource Development Act 2014 authorizes USACE to include other federal levees and state levees
- Supports the National Levee Safety Program

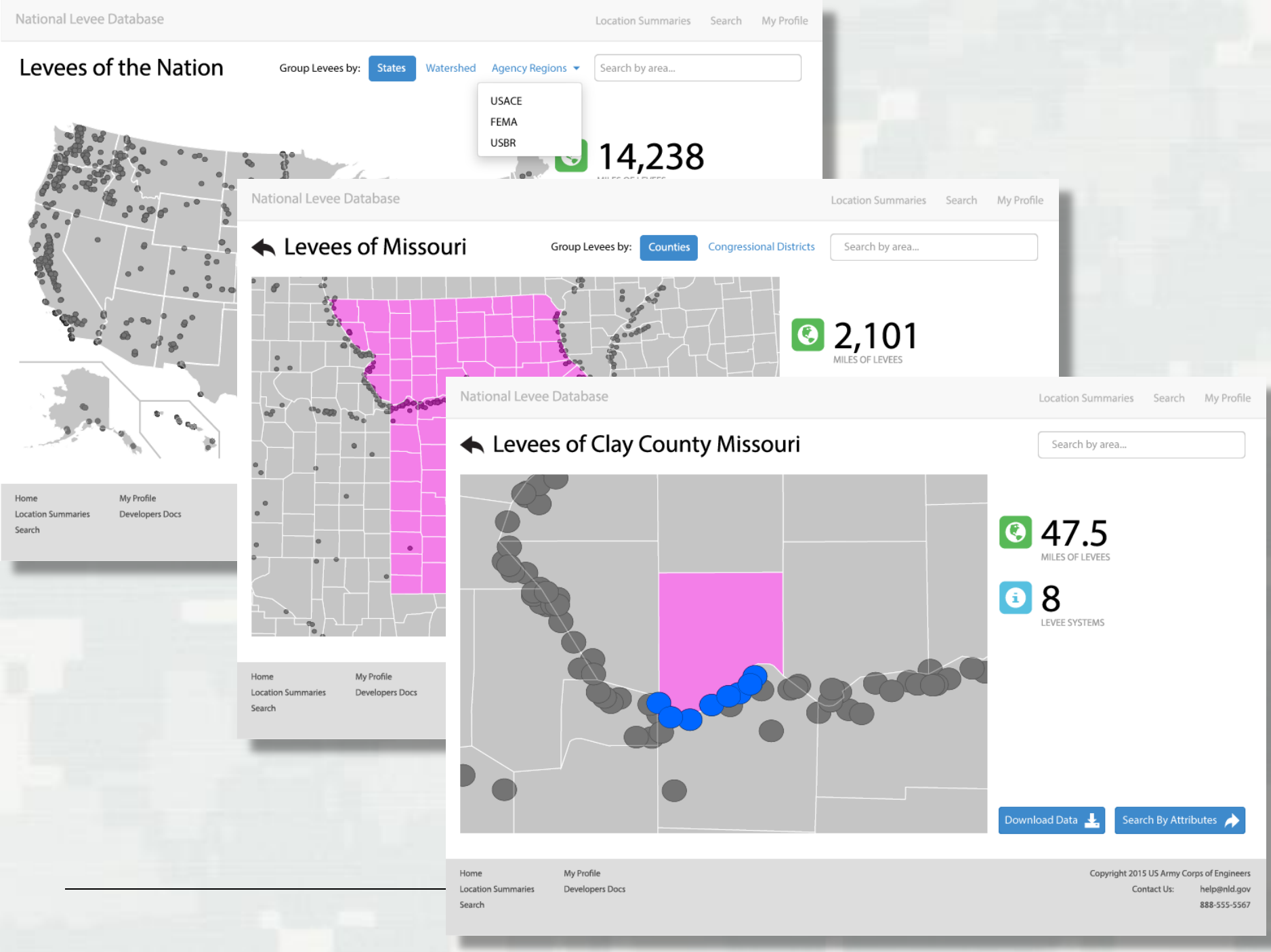
Levee Data Model Features



NLD Data Accessibility
Data Export

Proposed two-tier approach for data access

- Public Data: Need to share principles
  - Full range of web services and download opportunities built throughout the website for the public data
- Protected NLD data (FOUO): Need to know principles
  - Requirement for authenticated access, full suite of data download and service opportunities for these user groups


National Levee Database
Location Summaries
Search
My Profile
Levees of the Nation
Group Levees by:
States
Watershed
Agency Regions
Search by area...
USACE
FEMA
USBR
14,238
Home
Location Summaries
Search
My Profile
Developers Docs
National Levee Database
Location Summaries
Search
My Profile
Levees of Missouri
Group Levees by:
Counties
Congressional Districts
Search by area...
2,101
MILES OF LEVEES
Home
Location Summaries
Search
My Profile
Developers Docs
National Levee Database
Location Summaries
Search
My Profile
Levees of Clay County Missouri
Search by area...
47.5
MILES OF LEVEES
8
LEVEE SYSTEMS
Download Data
Search By Attributes
Home
Location Summaries
Search
My Profile
Developers Docs
Copyright 2015 US Army Corps of Engineers
Contact Us:
help@nld.gov
888-555-5567

Current NLD Data Partners

- USACE
  - 14,800 miles
- FEMA
  - 15,050 Miles
- Bureau of Reclamation (pilots)
  - 143 miles
- Miami Ohio(pilots)
  - 3 Miles
- State of California
  - ~4,000 miles pending, majority are NLD or MLI

BUILDING STRONG®

National Inventory of Dams (NID) Update

- USACE will be collecting dam information from states and federal agencies during 2015
- 2015 NID will be published on web site by 30 Dec 2015
- Updated 2015 NID will release two previously-restricted data fields
  - Nearest Downstream City and Distance to Nearest Downstream City will be available in the public version

NID Web Site Restrictions

- National Dam Safety Review Board recommended USACE restrict information in the NID
  - Six data fields available to government users only: downstream hazard potential, nearest city, distance to nearest city, condition assessment, condition assessment detail and condition assessment date
  - Public (non-government) users may not download any data or be given any aggregated dam information
  - **NEW:** No account is required to query the database or use the interactive map

NID Web Site Restrictions

- **NEW: To access restricted information, government users must re-apply for account; as of 17 Mar 15, all government accounts were deleted**
  - New procedure for approving government accounts
  - NID Web Site Administrator will seek approval from designated agency Point of Contact
  - Process may take up to 5-7 days to approve these accounts
- Government users must accept the non-disclosure agreement
  - May not provide the actual NID data (in electronic format) to anyone outside of their agency
  - May not provide the government-restricted information to anyone outside of their agency

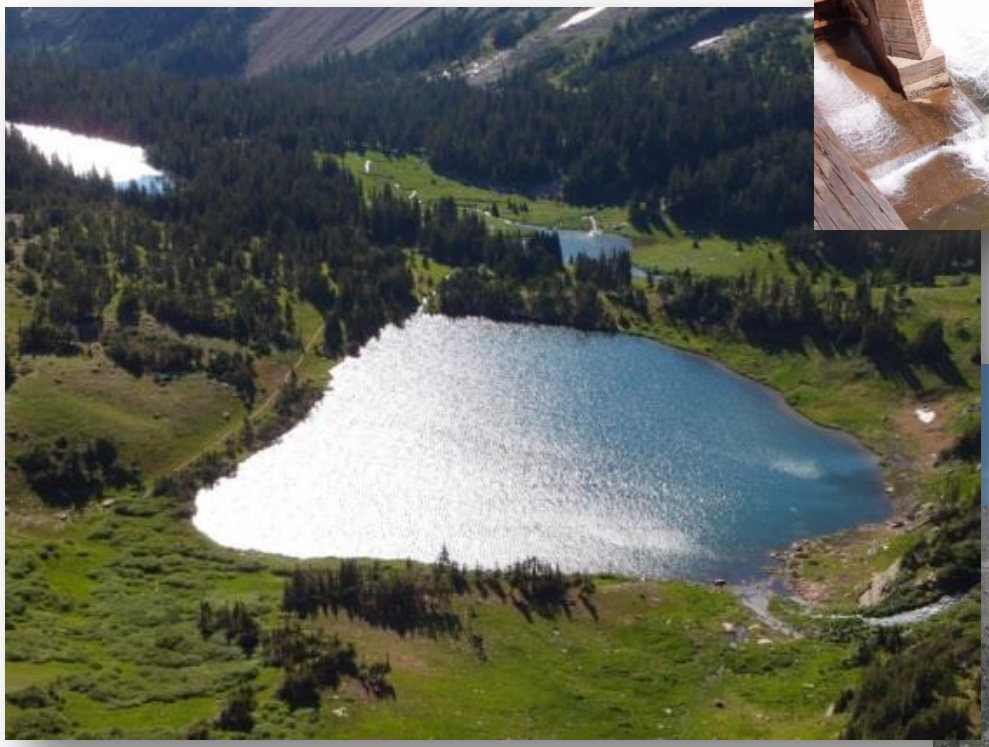
Inland Waters Theme

Opportunities and Challenges

- All datasets are important for addressing specific mission needs
- A lot of effort is put into coordination, but the datasets are not integrated
  - different mission needs
  - no well defined requirements to bring them together
  - integration would take a lot of effort and resources to accomplish
- Resources – Due to low investment in maintaining the datasets directly, all datasets are put together from many sources, which affects consistency and maintenance cycles
  - Implementing the framework will…Help NGDA Theme Leads and NGDA Dataset Managers "identify, develop, quantify, allocate, and sustain the resources necessary to develop the NGDA Themes and NGDA Datasets for which they are responsible" page 20
- Ongoing theme improvements– coordination between NID and NHD (meeting in July) within the constraints we have related to the NID distribution restrictions

THANK YOU

The Shoshone Dam, CO
Photo by Jeffrey Simley



Roger's Lake, CO
Photo by Jeffrey Simley

Island Lake, Wind River Wilderness Area, WY

USGS science for a changing world

The National Map
Your Source for Topographic Information