



What's New at the USFWS National Wetlands Inventory

Presentation to the National Association of Wetland Managers

by: Herb Bergquist and Jane Harner

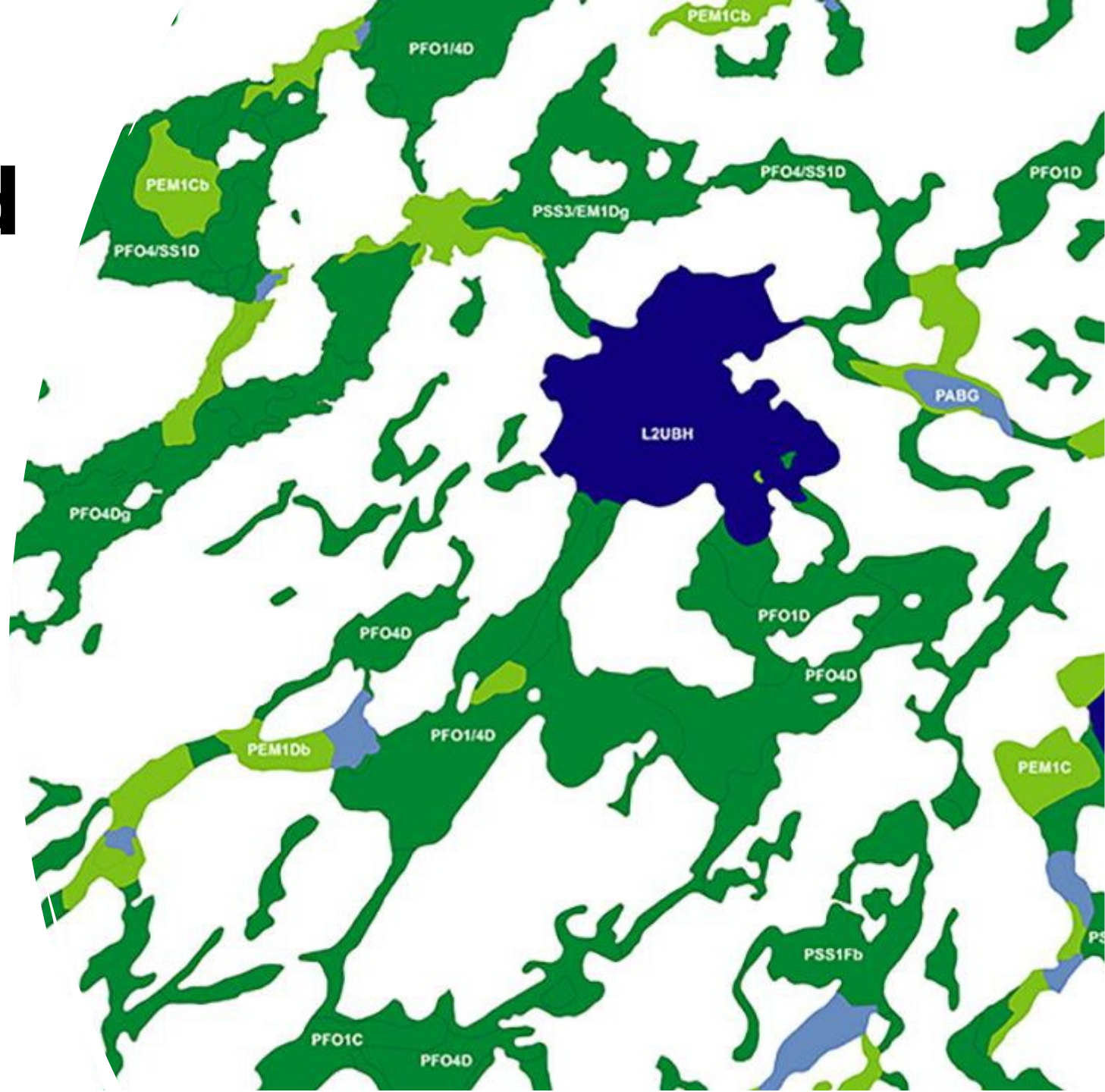
November 1, 2022

Presentation Overview

- ❖ Wetland Mapping Status for the Nation
- ❖ NWI's Strengthened Partnership with USGS National Geospatial Program
- ❖ Additional Guidance on Mapping Wetlands to the Federal Standard
- ❖ New Line Data Feature Class and Requirements Document
- ❖ New and Improved Verification Toolset
- ❖ NWI Staff Updates and Contact Info
- ❖ Questions

Status of Wetland Mapping

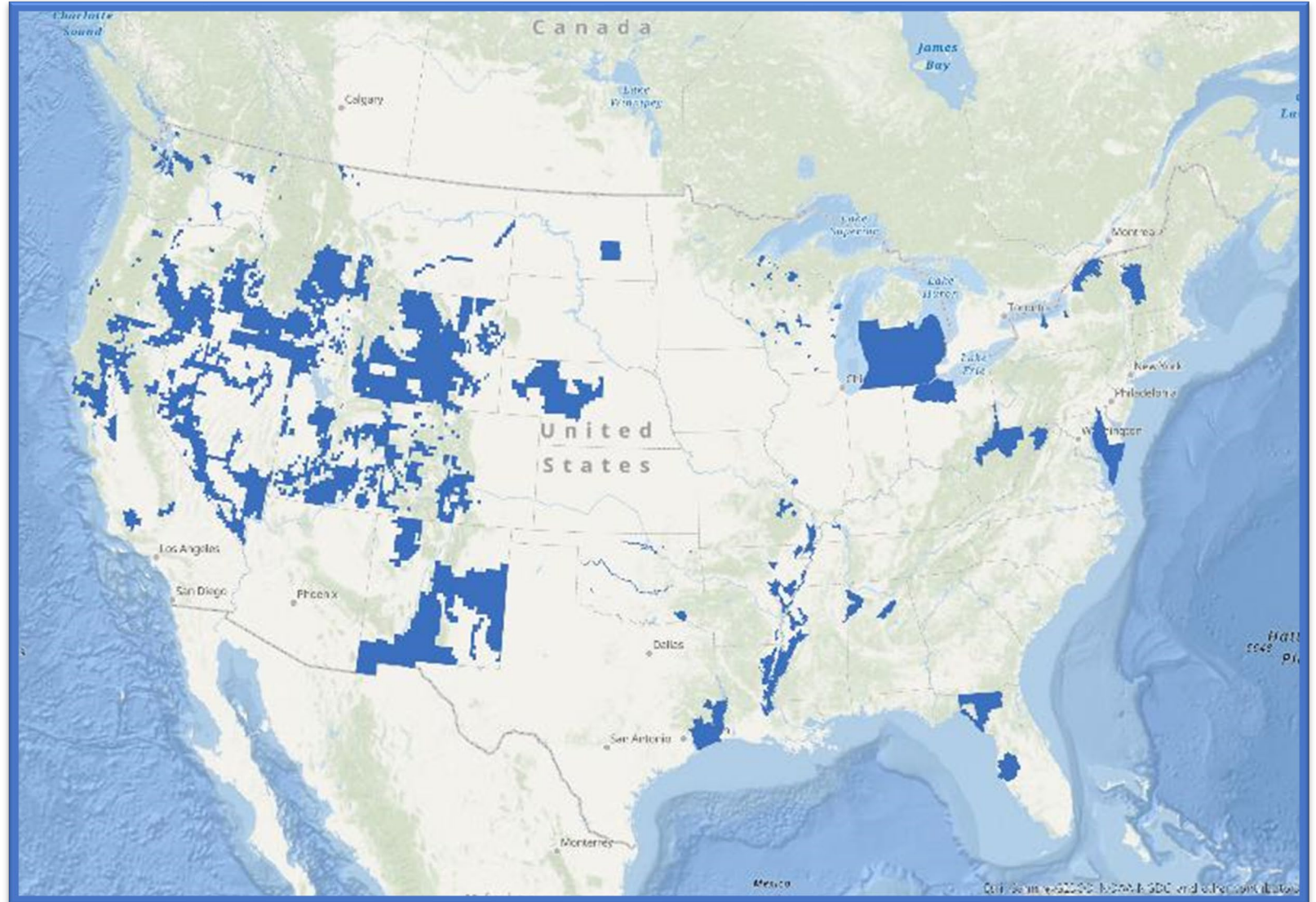
- The NWI Program is committed to providing most up to date, accessible wetland information.
- Partnerships are the key to achieving and maintaining a contemporary dataset.



CONUS

Over 90 Active Projects

- 240 Million Acres
- 37 States
- 11 Data Producers



Alaska and PRVI

Alaska

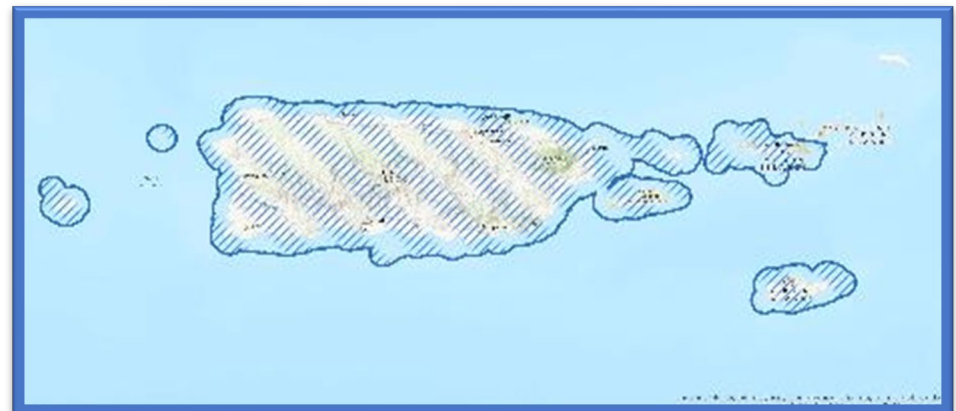
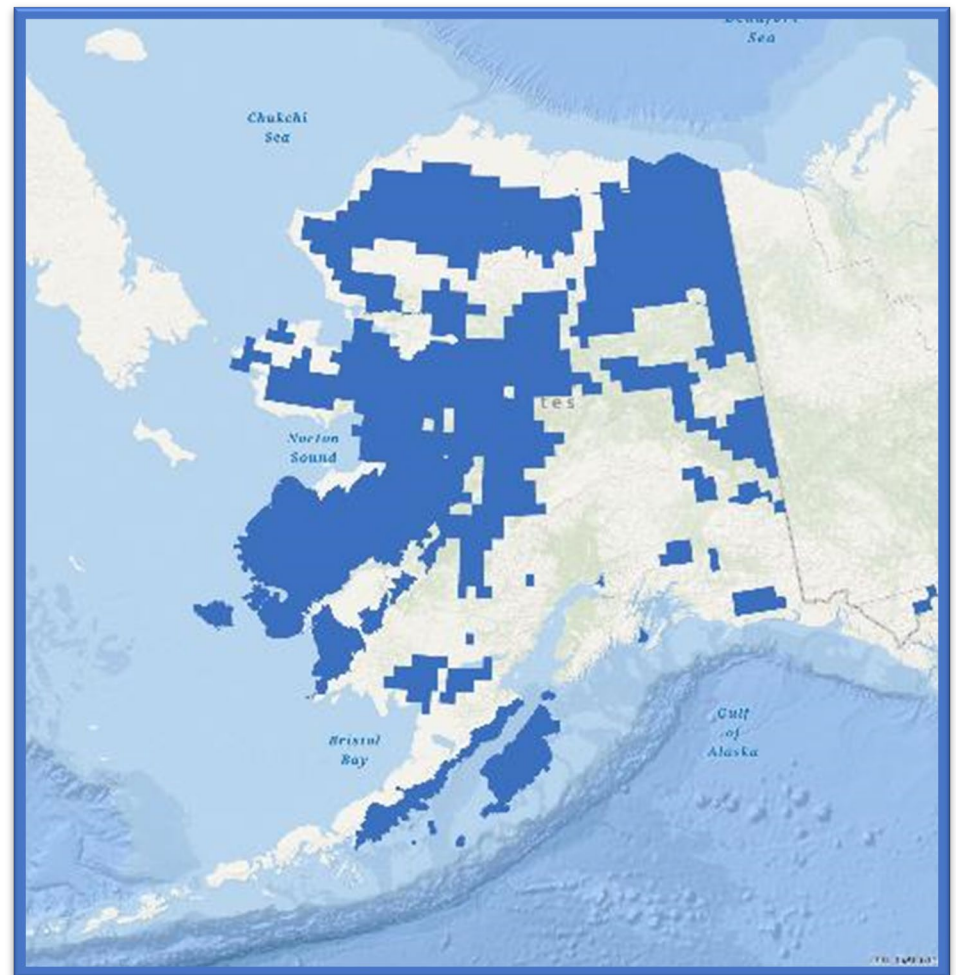
36 Active Projects

- 187 Million Acres

Puerto Rico and U.S. Virgin Islands

2 Active Projects

- 4 Million Acres



America's Foundational Geospatial Data Layers

The NWI Data Layer forms the Wetlands Layer of the NSDI

- **The National Spatial Data Infrastructure (NSDI)** is defined as the technologies, policies and standards necessary to acquire, process, store and distribute geospatial data.
 - Ensures that Geospatial data is current, accurate, open, interoperable and easy to access.

Shared governance and coordination of NHD and NWI through OMB-A16 FGDC Water-Inland Theme

- **USFWS** National Wetlands Inventory, NSDI Wetlands Layer
- **USGS** National Hydrography Dataset, NSDI Hydrography Layer

Interoperability is an NSDI guiding principle

NWI Partnership with USGS National Geospatial Program

Recognizing a common mission:

The U.S. Fish and Wildlife Service (FWS) National Wetlands Inventory (NWI) Program and the U.S. Geological Survey (USGS) National Geospatial Program provide the foundational geospatial data for Decision Support Systems supporting the management of aquatic resources.





Accelerating collaborative effort through the FGDC Water Inland Team

A springboard for NWI and USGS to work together collaboratively focusing on:

- Identifying common goals and objectives, then working on ways to address them
- Finding long-term solutions to operational and logistical challenges when updating datasets for better interoperability
- Defining success based on making steps toward a unified vision

Importance of Aligning Water Data

Geospatial water data are the foundation of critical decisions being made every day by governments, the private-sector and individuals

- Climate change resilience to infrastructure development to clean drinking water and food security
- Enable next-generation techniques including landscape scale wetland functional assessment

Currently available water data do not fully meet today's critical decision support needs

- FWS and USGS water data have been developed separately over decades to meet divergent mandates
- May not be complete or contemporary
- Cannot be effectively leveraged within one system
- Lacking sufficient detail to support critical decisions



Water Data Alignment - Charting a Path Forward

Based on lessons learned in CONUS and Alaska

Emerging environmental challenges require high-quality, interoperable data that can be applied rapidly and efficiently to meet the needs of decision-makers

Goal of Alignment: Modernize NWI and USGS National Geospatial Program **in tandem** to improve effectiveness and gain cost/time efficiencies.

- **Leveraging** investments in elevation/imagery, such as the 3D Elevation Program (3DEP)
- **Modernizing** and aligning all aspects of data management - from planning and outreach to data standards and distribution
 - Initiated long-term program coordination
 - Implementing pilot projects to develop new specifications and workflows - AK and CONUS
 - Participating together in technical and program development
- **Aligning** the expertise and purview of multiple Federal agencies and partners to build the future of water data
 - Water Subcabinet
 - Interagency Initiatives
 - 3D National Topography Model Call for Action Part 1: 3D Hydrography Program



CHALLENGES TO DATA SYNERGY

- Features that currently *exist in both datasets* are produced independently
- Duplication of effort in creating features is common practice
- Attempts to work with both datasets in their current state, in either analysis or visualization, can be difficult
- Federal funding to meet independent program goals and objectives are a constant struggle
- Standards and requirements used for producing datasets are based on entirely different foundations (elevation derived vs image based)
- Minimum mapping units and horizontal accuracy vary. Size and width requirements for transitioning between linear and polygonal features differ greatly

NWI and NHD/3 DEP Workgroup

Goal: To identify interoperability and dataset alignment opportunities

Focal Areas:

1. **Uniqueness**: Feature duplication is minimized between the datasets when appropriate and where possible
2. **Connectivity**: Spatially continuous features are mapped when there is evidence that connections are present on the ground, including across the datasets
3. **Consistency**: Spatially (e.g., density, detail, scale) and categorically (e.g., classes or codes) consistent dataset specifications are followed across the Nation
4. **Interoperability**: Datasets (schemas, resolution, distribution formats, services) are produced, maintained, and distributed in interoperable formats
5. **Accuracy**: Current dataset accuracy and scale is clearly documented

New Processes and Workflows to Improve Alignment

Steps Taken By The NWI Program:

- 1. Clarify Existing FGDC Wetlands Standard**
 - Some current NWI data go beyond required FGDC standard which can make it difficult to understand mapping requirements to meet the standard.
 - Addendum on mapping standard compliant data (10/04/2022)
- 2. NLH features that fall beyond the standard added to a separate linear dataset.**
 - Memo 9/21/2021
 - Narrow Linear Habitats (NLH's) document (10/04/2022)
 - New Line feature class added to the NWI Data Schema
- 3. Pilot projects initiated to assist in developing new workflows**

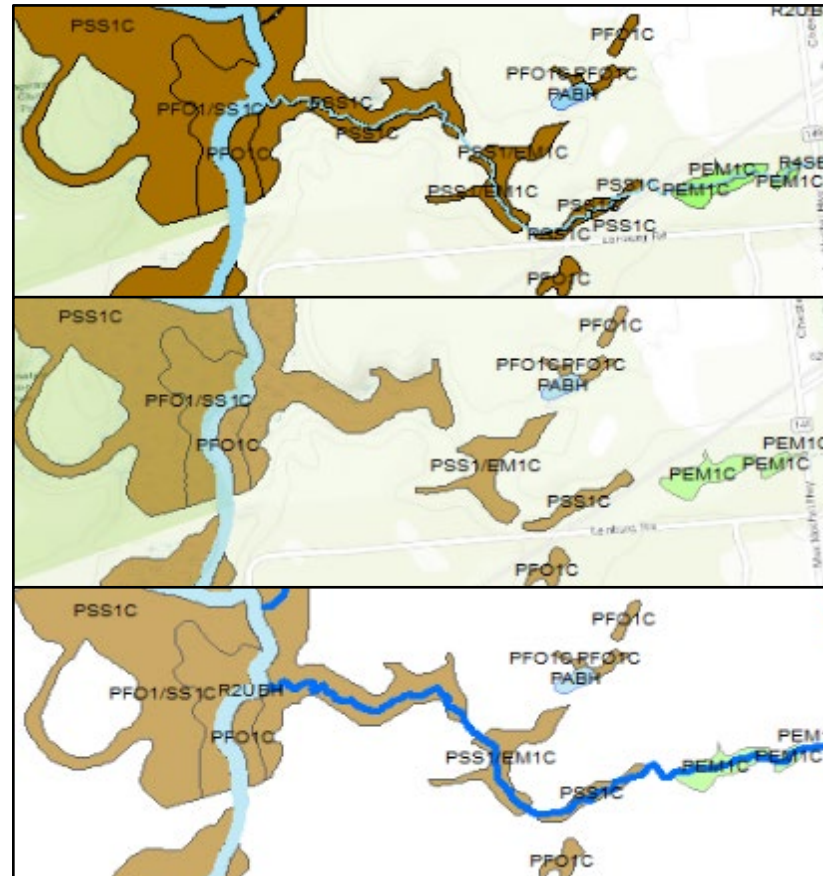
Mapping Narrow Linear Habitats (NLH's)

(10/04/2022)

Narrow Linear Habitats Definition:

Narrow linear habitats (NLH) are non-vegetated Cowardin-defined features (Federal Geographic Data Committee, 2013) that are less than 15 ft. (4.5m) wide in the U.S. and territories outside of Alaska.

Implementation



Current Polygonal Data

All features mapped as polygons

Future Polygonal Data

Only features >15 ft mapped as polygons

Future Polygonal and Linear Data *where lines are mapped

Features > 15 ft mapped as polygons separate linear layer (displayed in blue; enlarged for visibility)

Implementation- AK and CONUS Pilot Projects

Goal: Develop, produce and document new NWI workflows and specifications. 3DHP pilot data used to ensure interoperability with future 3DHP products.

Alaska

- ~10 M acres contracted to map NHD and NWI concurrently
- ~ 8 M acres completed NHD and NWI concurrently

Southeastern Coastal Texas

- ~1.5M acres contracted

Indiana

- ~.5M acres contracted
- *High density elevation derived NHD used as linear layer

Pennsylvania

- ~1.5M acres contracted but on hold until 3DHP pilot data are available

Request for Partner Engagement

Identify comprehensive water data information needs

Resolution or scale

- NHD/EDH and NWI are national datasets and as such must meet national standards
- Identify broader(e.g., statewide) planning and informational needs vs. project level needs

Attribution information

- NHD and NWI are non-regulatory **but** are often used for scoping, general planning and initial assessments

Temporal and data input considerations

- Identify lidar and imagery for your area of interest

Partner involvement is key to long term success

- Articulate application needs early and often
- Consider incremental engagement at a watershed level



Moving Forward Together

- The U.S. FWS and USGS are working together to better address today's emerging aquatic information needs by modernizing NWI data and initiating the 3D Hydrography Program.
- Success will depend on strong communication and partnerships
- The USGS Geospatial Program and USFWS NWI are committed to the success of this important partnership.

We welcome your participation!



New Tools and Resources

<https://www.fws.gov/program/national-wetlands-inventory>



What's NOT New

- **The NWI Program has NOT changed its data standards.**
 - Our goal is to provide additional clarity on how to meet the existing standard.
- **Discussions around changes to how NLH's are mapped are outside of the standard.**
 - Therefore, NLH feature creation is optional.



1. New Document

Mapping Standard Compliant Data (Supplement)

Additional information on mapping wetlands to the federal standard

- Clarifications on TMU and feature inclusion (5 acres for Alaska and .5 acres in the rest of the U.S.)
- Decision Support
- Staff Support

<https://www.fws.gov/media/mapping-standard-compliant-data-supplement>

Mapping Standard Compliant Wetland Data-Supplement

U.S. Fish and Wildlife Service National Wetlands Inventory (NWI)

Introduction

This document is being provided by the NWI Program to clarify Federal Geographic Data Committee (FGDC) Wetland Mapping Standard requirements regarding the target mapping unit (TMU), and to aid in wetland feature interpretation and standard related expectations. For project success, coordination with NWI early in the project initiation process is essential. Data producers (e.g., contractor or cooperator) are encouraged to bring their funders and NWI program staff together to clarify any project specific needs. If potential mapping issues or questions arise, it is the responsibility of the data producer and/or the project funder to work with NWI staff to determine the best path forward.

Background

The U.S. FWS National Wetlands Inventory (NWI) Program continues to update the National Wetlands Data Layer to enhance its applicability. The initial updates have advanced NWI data from a collection of analog maps to a highly detailed geospatial dataset of all wetlands and deepwater habitats within CONUS and guide data creation in Alaska. In 2009, the FGDC in partnership with the USFWS, adopted the Wetlands Mapping Standard (FGDC Document Number FGDC-STD-015-2009). In 2015, the Program updated the national wetlands data layer to include linear features not previously incorporated into the polygonal dataset. Many of these linear features had been created as part of the earlier analog NWI mapping process, but also included features from the U.S. Geological Survey National Hydrography Dataset (NHD) (NWI version 2). These features have always been required by the Wetland Mapping and Classification Standards but were previously not included in the polygonal dataset due to cartographic conventions and limitations.

Mapping Standard Compliant Wetlands Data

The NWI Program strives for data consistency, based on a solid technical rationale that can be defended, recognizing that "one size does not fit all." NWI Coordinators are available to assist in ensuring that only the data necessary to meet the standard are produced.

The FGDC wetland mapping standard requires features that are 0.5 acres in size and 15 feet (4.5 m) in width be included in the polygon data layer (except in Alaska.) Linear habitats that meet the TMU requirement, will remain in the polygonal data layer. However, non-vegetated linear habitats that are beyond the wetland standard (less than 15' or 0.5 acres), i.e., Narrow Linear Habitats (NLH), will be excluded from the polygonal dataset.

Beginning on October 1, 2022, the NWI data schema will include a linear feature class that can be used to represent NLH features mapped beyond the Wetland Mapping Standard (Figure 1). The NWI Program will provide requirements, oversight, and QC tools to maintain a level of consistency for this mapping effort. A separate NWI linear feature class document (NLH Guidance Document) provides additional information on how to map these features. These data will represent non-vegetated features that may be desired for specific projects but are smaller than the target mapping unit of the National dataset. For contracts originated after October 1, 2022 NWI will not accept NLH features within the polygonal dataset.

Steps to Success

Define Your Target Mapping Unit (TMU)

The FGDC Wetland Mapping Standard sets a TMU of 5 acres in Alaska and 0.5 acre within the rest of the United States and its territories. Any feature with an area greater than the TMU that meets the wetlands classification standard (FGDC 2012) should be included (Figure 1). This includes rivers, streams, and adjacent vegetated wetland buffers (Figures 2 and 3). Narrow features with little or no discernable interior area at a scale of 1:12,000 are excluded from the TMU requirements.

2. New NWI Lines Data Layer *OPTIONAL

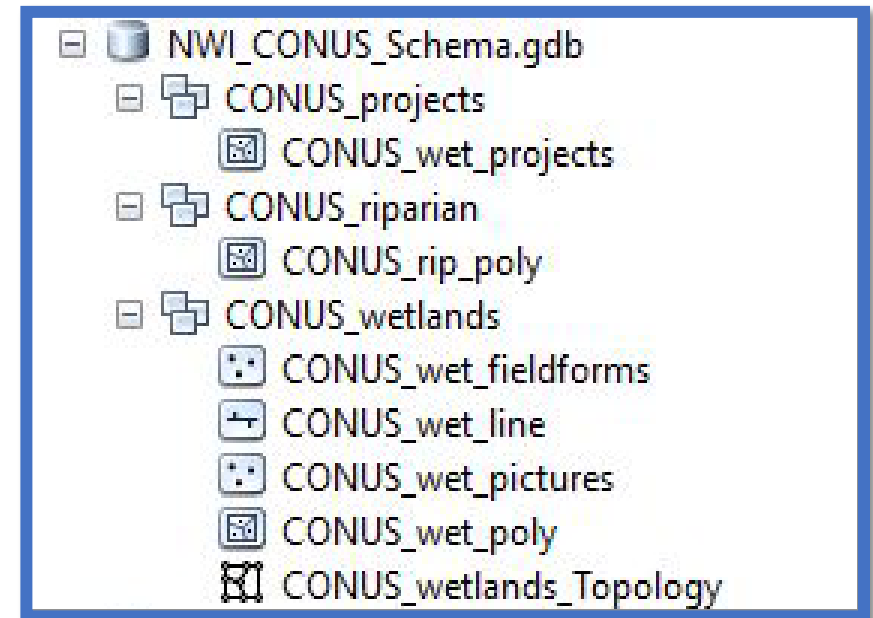
NWI Lines consist of a specific subset of data:

- Narrow linear features
- Non-vegetated
- **and** fall below the federal standard (<15 feet, visible at 1:12,000).

All vegetated wetland features, regardless of size, will remain in the polygonal dataset.

TMU for NWI Lines is 7 feet or what is visible as 1:6,000

- Lines must be mapped at this scale across the entire project area.
- Line specific mapping conventions to be outlined in metadata.



3. New Document

Mapping Narrow Linear Habitats as Line Features

Provides requirements for submitting line data to the national dataset

- Target Mapping Unit for Lines
- Topology Rules
- Classification Limitations
- Quality Control and Imagery Requirements

Mapping Narrow Linear Habitats as Line Features

U.S. Fish and Wildlife Service National Wetlands Inventory (NWI)

Preface

This document is intended to serve as a resource to assist in mapping wetland habitats beyond the Federal Geographic Data Committee (FGDC) Wetland Mapping Standard (FGDC 2009). The general guidelines included in this document should not be substituted for direct communication with the NWI Program. Partners funding projects for inclusion into the national wetlands data layer must contact NWI staff early in the development of a project to ensure its success.

Introduction

The purpose of this document is to outline requirements for submitting features that lie beyond the FGDC Wetland Mapping Standard that will no longer be accepted as polygons within projects initiated (i.e., contracts signed) after September 30, 2022. These features, also known as Narrow linear habitats (NLH) are non-vegetated Cowardin-defined features (Federal Geographic Data Committee, 2013) that are less than 15 ft. (4.5m) wide in the U.S. and territories outside of Alaska. If project goals require the inclusion of NLH features beyond the Wetland Mapping Standard, these features can be submitted to NWI in a separate linear data layer. The submission of a linear data layer is NOT required by NWI to meet the Wetland Mapping Standard.

NWI Line Feature Class Requirements

Classification

The classification system used to map NLH is described in the FGDC endorsed standard, Wetlands and Deepwater Habitats of the United States (FGDC 2013). Only non-vegetated habitat areas beyond the standard can be represented as a line. These non-vegetated areas include: Riverine (R) or Estuarine (E) Systems, with Subsystem 1, 2, 3 or 4, and Class RB, UB, or SB (Figure 1).

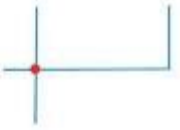
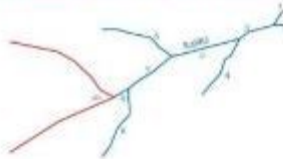

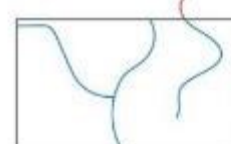


Target Mapping Unit (TMU)

The Target Mapping Unit is an estimate of the size class of the smallest wetland that can be consistently mapped and classified at a particular scale of imagery. The TMU allows for mapping below a specified threshold but does not require it.

TMU for NWI Lines: The minimum TMU for mapping NWI linear features is 7 (2.1 m) feet wide or visible at 1:6,000 or approximately half of the existing wetland mapping standard. NWI requires that lines be mapped at that minimum TMU across the entire project area to be accepted into the national dataset. The TMU for each project area must be declared in the metadata, along with an associated justification and description of the quality assurance process used.

Wetland data that meet or exceed the TMU along with the producer's accuracy (PA) requirements will be accepted by NWI. For the lower 48 states, Hawaii and the Trust Territories, features that are at least 7 (2.1 m) feet wide shall be mapped with a PA of 98% for feature accuracy and 85% for attribute accuracy, or higher. Habitat changes that have occurred between the date of the base imagery and the date of field observation are not considered errors because the wetland was correctly classified on the base imagery.

Mapping NWI Lines

Topology Rules	QA/QC Checks
<p>Must not self-intersect</p> <p>Line features may not intersect themselves. Self-intersects will be resolved by running the QA/QC Data Prep Tool.</p> 	<p>Must be multi-part</p> <p>Individual line segments must be single part making each stream network one large multipart feature. Merged features must be exploded before submission.</p> 
<p>Must not overlap</p> <p>Coincident line segments are not allowed. Overlaps will result in QA/QC tool error 'O'.</p> 	<p>Must be inside</p> <p>Line features may not extend beyond the project boundary. Line features must be clipped to the project boundary.</p> 
<p>Must not self-overlap</p> <p>Features may not overlap themselves. Self-overlaps will result in QA/QC tool error 'O'.</p> 	<p>Must not be a dangle</p> <p>Lines should be snapped to coincident features and not extend beyond. QA/QC should visually check for these anomalies.</p> 

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION FOR NWI LINES

R - Riverine

System: R - Riverine

Subsystem: 1 - Tidal, 2 - Lower Perennial, 3 - Upper Perennial, 4* - Intermittent

Class: RB*** - Rock Bottom, UB - Unconsolidated Bottom, SB**** - Streambed

Subclass:

1 Bedrock	1 Cobble-Gravel	1 Bedrock
2 Rubble	2 Sand	2 Rubble
3 Mud	3 Cobble-Gravel	3 Cobble-Gravel
4 Organic	4 Sand	4 Sand
	5 Mud	5 Organic
	6 Organic	7 Vegetated

* Intermittent is limited to the Streambed Class.
 ** Unconsolidated Bottom is limited to Unconsolidated Bottom Class code RBUB only.
 *** Rock Bottom is not permitted for the Lower Perennial Subsystem.
 **** Streambed is limited to Tidal and Intermittent Subsystems.

E - Estuarine

System: E - Estuarine

Subsystem: 2 - Intertidal

Class: SB - Streambed, UB - Unconsolidated Bottom

Subclass:

1 Bedrock	1 Cobble-Gravel
2 Rubble	2 Sand
3 Cobble-Gravel	3 Mud
4 Sand	4 Organic
5 Mud	
6 Organic	

MODIFIERS

In order to more adequately describe the wetlands and deepwater habitats, one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The format modifier may also be applied to the ecological system.

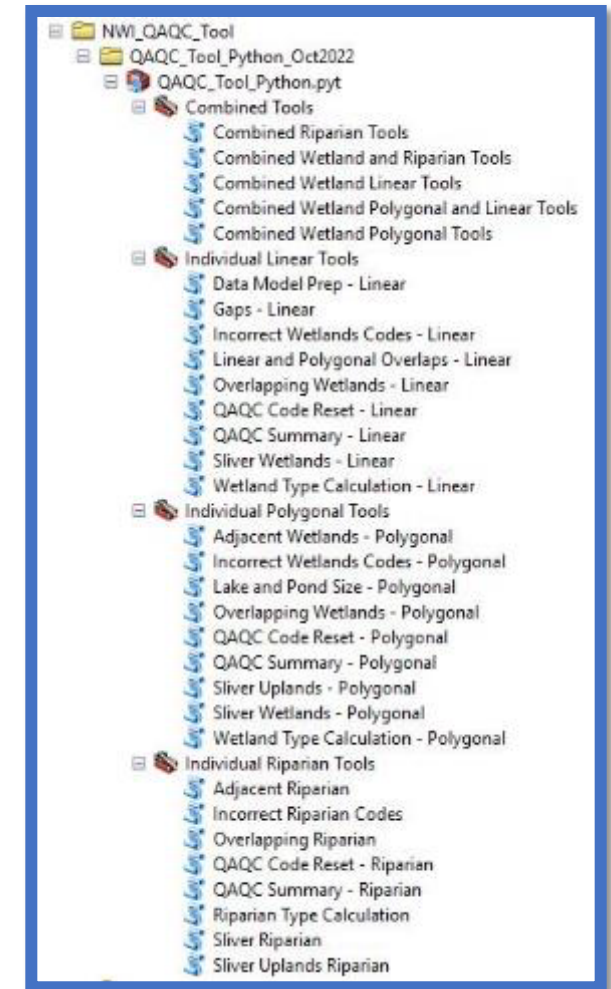
Water Regime		Special Modifiers	Water Chemistry	Soil
Nontidal	Saltwater Tidal	Freshwater Tidal	Salinity/Salinity	pH Modifiers for all Fresh Water
A Temporally Flooded	N Regularly Flooded	O Regularly Flooded-Fresh Tidal	1 Hypersaline / Hypersaline	a Acid
C Seasonally Flooded	P Irregularly Flooded	T Semi-permanently Flooded-Fresh Tidal	2 Eusaline / Eusaline	1 Circumneutral
F Semi-permanently Flooded		V Permanently Flooded-Fresh Tidal	3 Mesohaline / Mesohaline (Shackin)	1 Alkaline
G Intermittently Flooded			4 Polyhaline	
H Permanently Flooded			5 Microhaline	
J Intermittently Flooded			6 Oligohaline	
			0 Fresh	
		8 Beaver		g Organic
		d Partly Drained/Ditched		m Mineral
		f Farmed		
		m Managed		
		h Diked/Impounded		
		r Artificial Substrate		
		s Spoil		
		x Disturbed		

Classification of Wetlands and Deepwater Habitats of the United States, Cowardin et al. 1979

4. New Data Verification Toolset

New Tool Highlights:

- Built in Python for improved performance
- User-Friendly Interface
- New tools and data types added
- Streamlined – Wetland Polygons, Wetland Lines, and Riparian
- New Combined tool combinations
- ArcPro and ArcDesktop Versions Available
- New NWI schema and instruction manual included



NWI Staff Contacts

wetlands_team@fws.gov

Field Operations Group: *Data Quality Control, Field Operation Support, Funding, Coordination*

Herb Bergquist, *Field Operations Team Lead* h_bergquist@fws.gov

Gary Hunt, *Wetlands Coordinator* gary_hunt@fws.gov

Sara Owen, *Wetlands Coordinator* sara_owen@fws.gov

Amanda Pachomski, *Wetlands Assistant Coordinator* amanda_pachomski@fws.gov

Sydney Thielke, *Wetlands Coordinator (Alaska)* sydney_thielke@fws.gov

Madison Data Group: *Data QA, Integration, Analysis and Dissemination*

Rusty Griffin, *Quality Assurance Coordinator* rusty_griffin@fws.gov

Jane Harner, *Database Administrator* jane_harner@fws.gov

Jeff Ingebritsen, *GIS Specialist* jeff_ingegritsen@fws.gov

Headquarters: *Leadership, Administration, Scientific Integrity and Innovation*

Jonathan Phinney, *Branch Chief* jonathan_phinney@fws.gov

Megan Lang, *Chief Scientist* megan_lang@fws.gov





Questions