



**Office of Information
Technology Services**

Incorporating 3DEP Data into National Hydrography Dataset (NHD) Updates & Elevation Derived Hydrography (EDH)

Jeff Langella – NYS GIS Program Office

October 21, 2021

Topics

- How New York State Information Technology Services (NYSITS) became involved with USGS NHD/WBD
- NHD update process
- Current status of NHD
- Future of NYS involvement with NHD/EDH
 - Open discussion

New York State Information Technology Services (NYSITS) GIS Program Office (GPO)

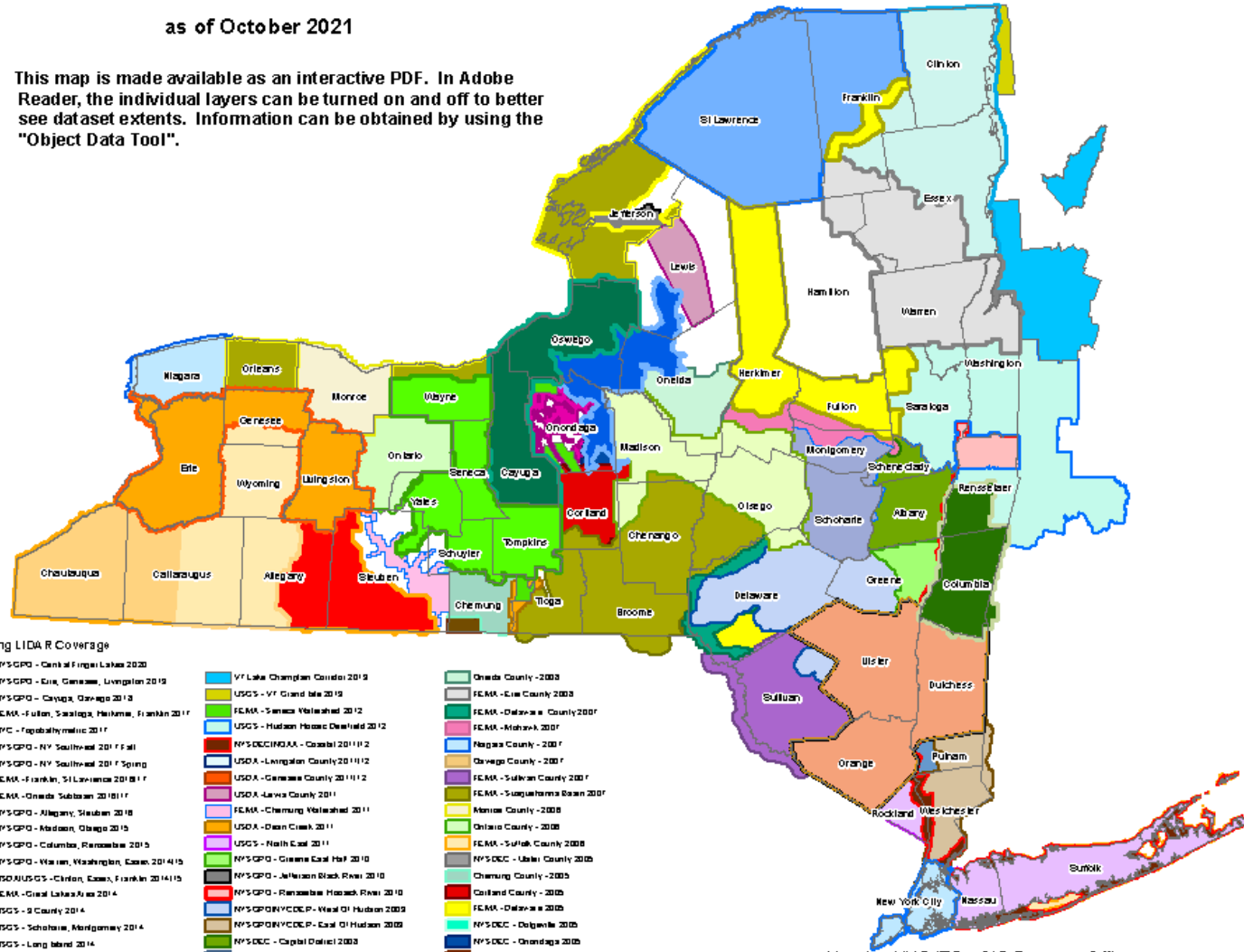
Programs related to NHD

- New York State Digital Orthophoto Program (NYSDOP)
- GIS Data Improvement
- Emergency Response
- LIDAR

Existing LIDAR Collections in NYS

as of October 2021

This map is made available as an interactive PDF. In Adobe Reader, the individual layers can be turned on and off to better see dataset extents. Information can be obtained by using the "Object Data Tool".

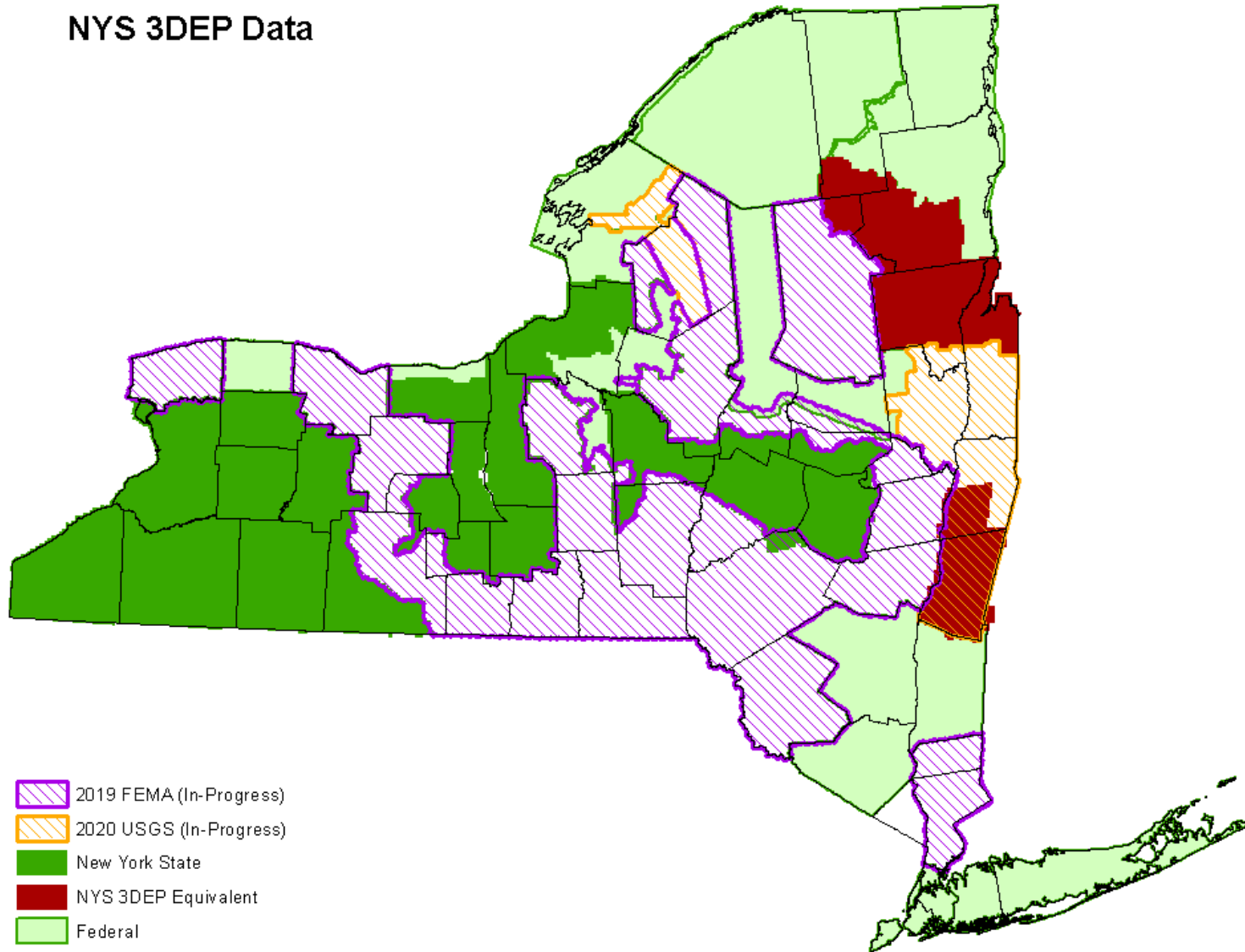







Existing LIDAR Coverage

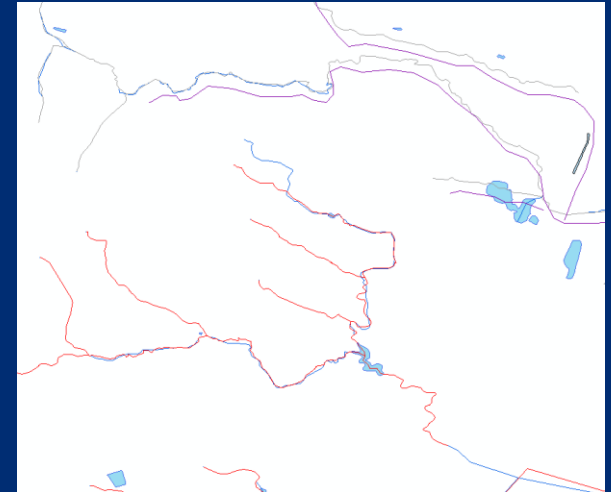
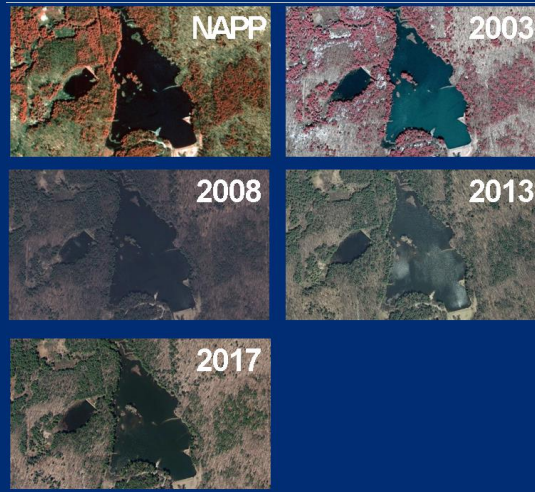
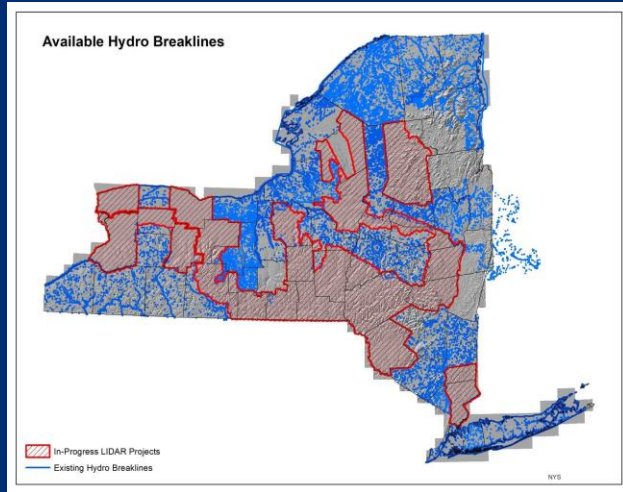
- | | | |
|--|--|------------------------------|
| NYS QPO - Catskill/Adirondack Lakes 2020 | NY Lake Champlain Corridor 2019 | Oneida County - 2008 |
| NYS QPO - Erie, Genesee, Livingston 2019 | USGS - NY Grand Isle 2019 | FEMA - Erie County 2008 |
| NYS QPO - Cayuga, Oswego 2013 | USGS - NY Grand Isle 2019 | FEMA - Delaware County 2007 |
| FEMA - Fulton, Saratoga, Herkimer, Franklin 2017 | USGS - Hudson Hoopoe Deerfield 2012 | FEMA - Madison County 2007 |
| NYC - Topographical 2017 | NYS DEC/NOAA - Coastal 2011/12 | FEMA - Madison County 2007 |
| NYS QPO - NY Southeast 2017 Fall | USDA - Livingston County 2011/12 | Naples County - 2007 |
| NYS QPO - NY Southeast 2017 Spring | USDA - Livingston County 2011/12 | Cayuga County - 2007 |
| FEMA - Franklin, St. Lawrence 2018/17 | USDA - Lewis County 2011 | FEMA - Sullivan County 2007 |
| FEMA - Oneida Subarea 2018/17 | FEMA - Chemung Watershed 2011 | FEMA - Schoharie Basin 2007 |
| NYS QPO - Allegany, Steuben 2018 | USDA - Chemung Watershed 2011 | Montezuma County - 2008 |
| NYS QPO - Madison, Otsego 2015 | USDA - Dean Creek 2011 | Ontario County - 2008 |
| NYS QPO - Columbia, Rensselaer 2015 | USGS - North East 2011 | FEMA - Sullivan County 2008 |
| NYS QPO - Warren, Washington, Essex 2014/15 | NYS QPO - Greene East Half 2010 | NYS DEC - Ulster County 2008 |
| USDA/USGS - Clinton, Cass, Franklin 2014/15 | NYS QPO - Jefferson Black River 2010 | Chemung County - 2005 |
| FEMA - Great Lakes Area 2014 | NYS QPO - Rensselaer Hoopoe River 2010 | Colford County - 2005 |
| USGS - 3 County 2014 | NYS QPO/NYCEEP - West Of Hudson 2009 | FEMA - Delaware 2005 |
| USGS - Schoharie, Montgomery 2014 | NYS QPO/NYCEEP - East Of Hudson 2009 | FEMA - Delaware 2005 |
| USGS - Long Island 2014 | NYS DEC - Capital District 2003 | NYS DEC - Otsego 2005 |
| USGS - NYC 2014 | NYS DEC - Putnam 2003 | Chemung County - 2002 |
| NYS QPO - Great Gully 2014 | NYS DEC - Ramapo County - 2003 | NYS DEC - Oneida County 2002 |

Map by: NYS ITS - GIS Program Office
 Information from: NYS DEC, USGS, FEMA, USDA, Counties

NYS 3DEP Data



-  2019 FEMA (In-Progress)
-  2020 USGS (In-Progress)
-  New York State
-  NYS 3DEP Equivalent
-  Federal



NHD

NHD/WBD Stewardship

- ITS signed Memorandum of Understanding (MOU) with USGS in July of 2019 becoming the state stewards of both NHD and WBD datasets
- 4 state employees are trained in NHD editing



NHD Improvement Goals

- Improve upon the existing NHD Dataset
 - Delete features that are no longer relevant
 - Check classification of existing features
 - Improve geometry of existing features
 - Add missing features
 - Add missing names
- One hydro dataset for State of New York
 - Consolidate all hydro datasets into one
 - Fold in missing waterbodies/streams
 - Improve on naming
- Produce a statewide web service

NHD Waterbody Improvements

HUC 02050102 - Chenango

NHD polygons review

- Marked for deletion (276 records)



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- Minor improvement (438 records)
 - No change in reachcode



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NHD polygons review

- Marked for deletion (276 records)
- Attribute change (95+ records)
- Minor improvement (438 records)
 - No change in reachcode
- Replace geometry (68 records)
 - LiDAR breaklines
 - Ponds greater than 2 acres
 - Existing datasets

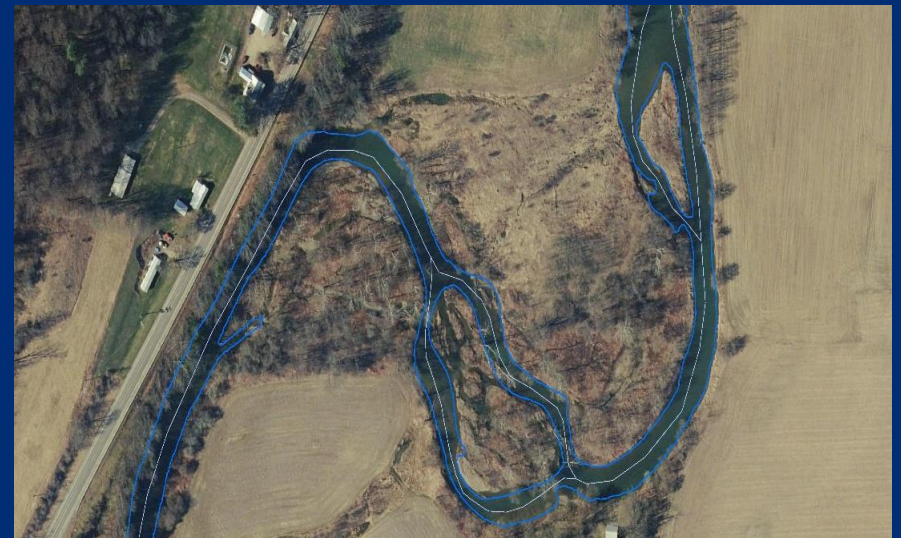


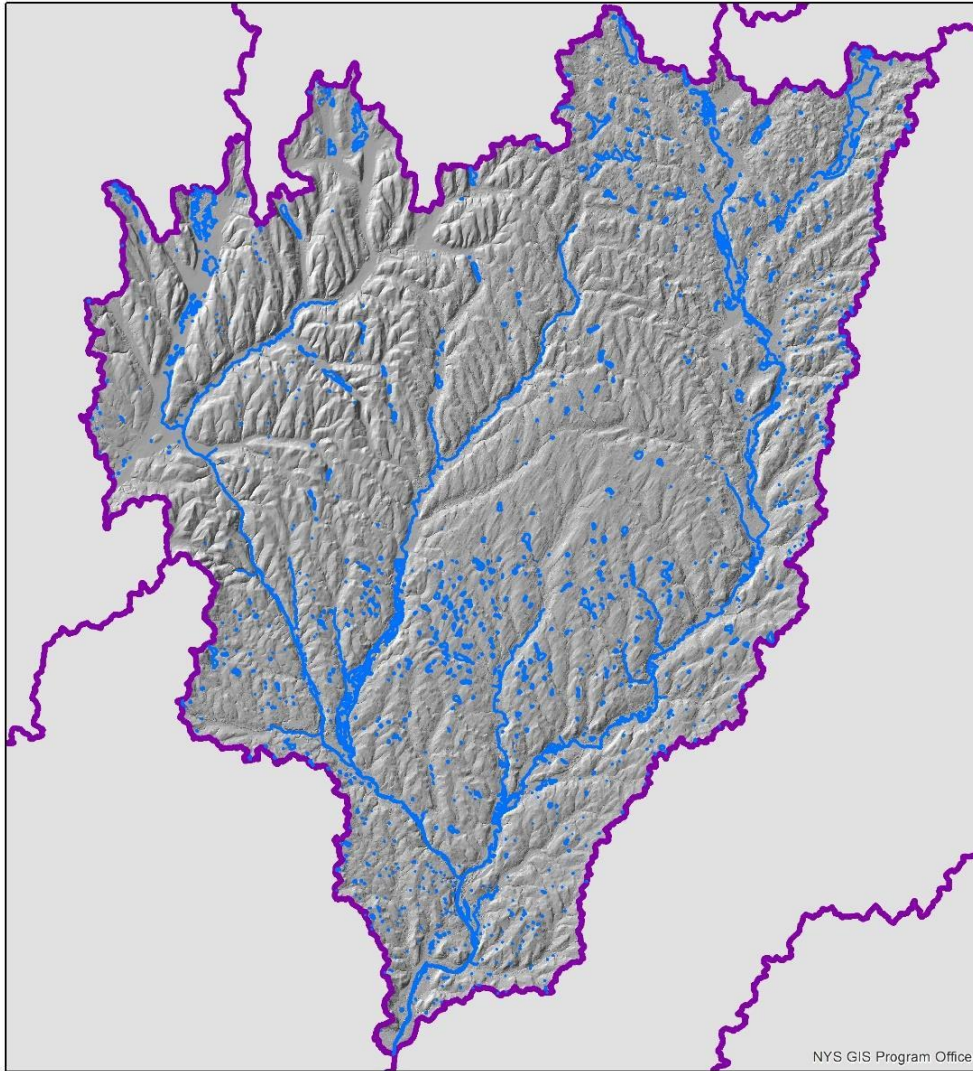
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 - Ponds greater than 2 acres
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- NHD Area/Flowline improvements
 - Improved where breaklines available

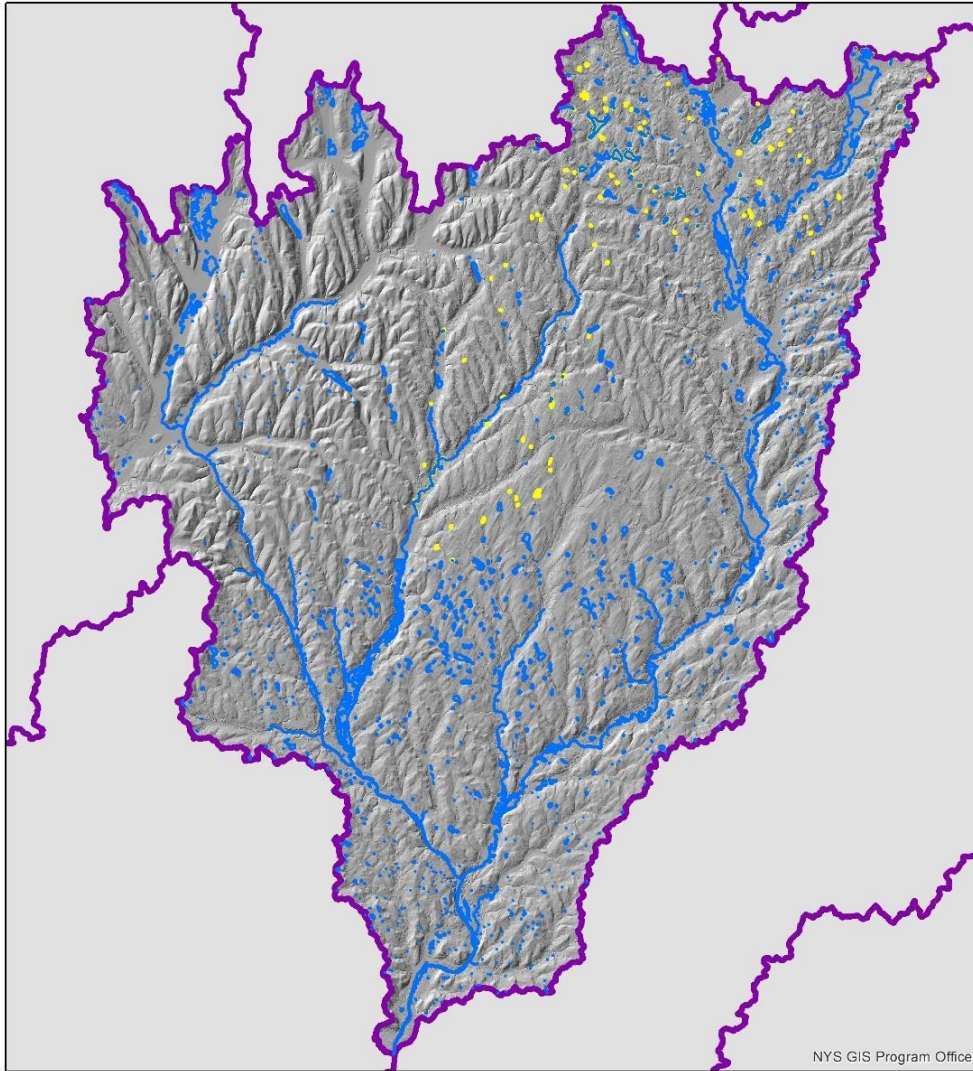






NYS GIS Program Office

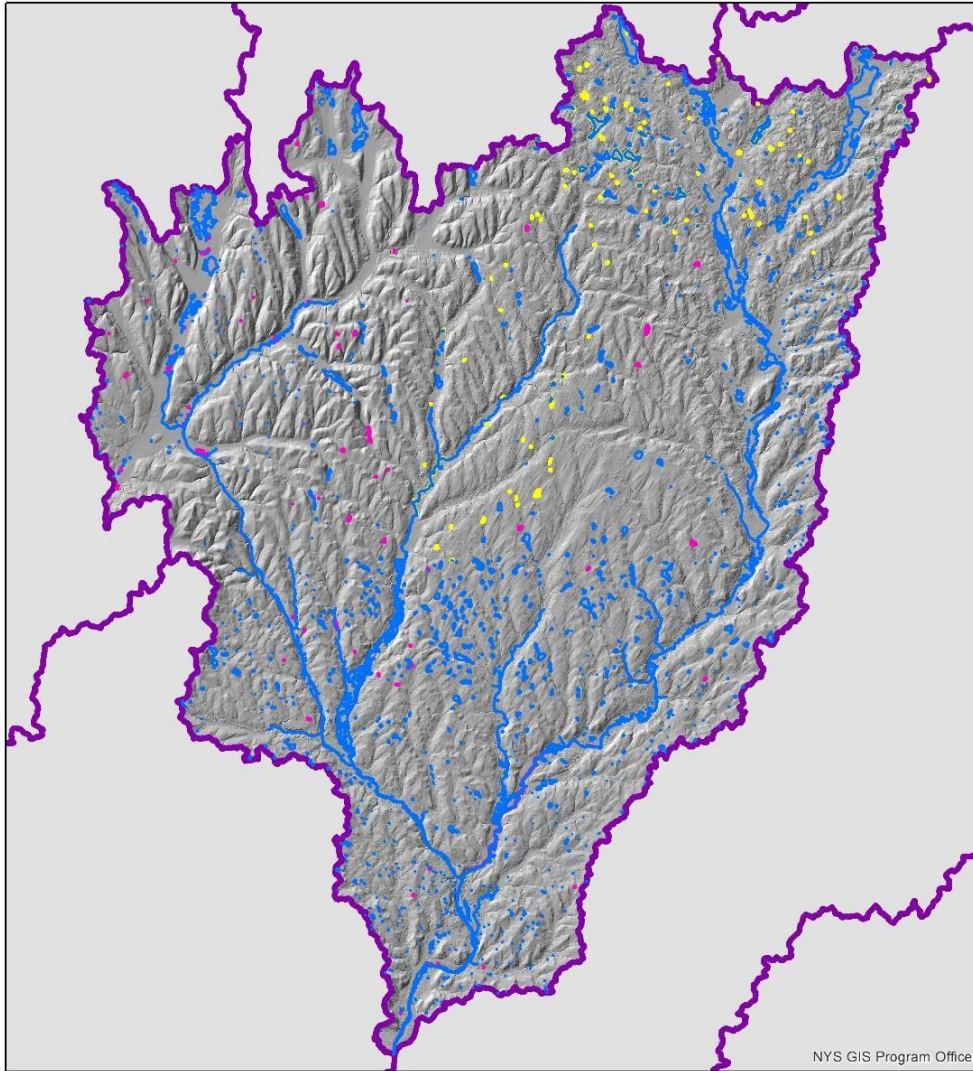
HUC 02050102 Chenango

 NHD Waterbody (1540 Records)






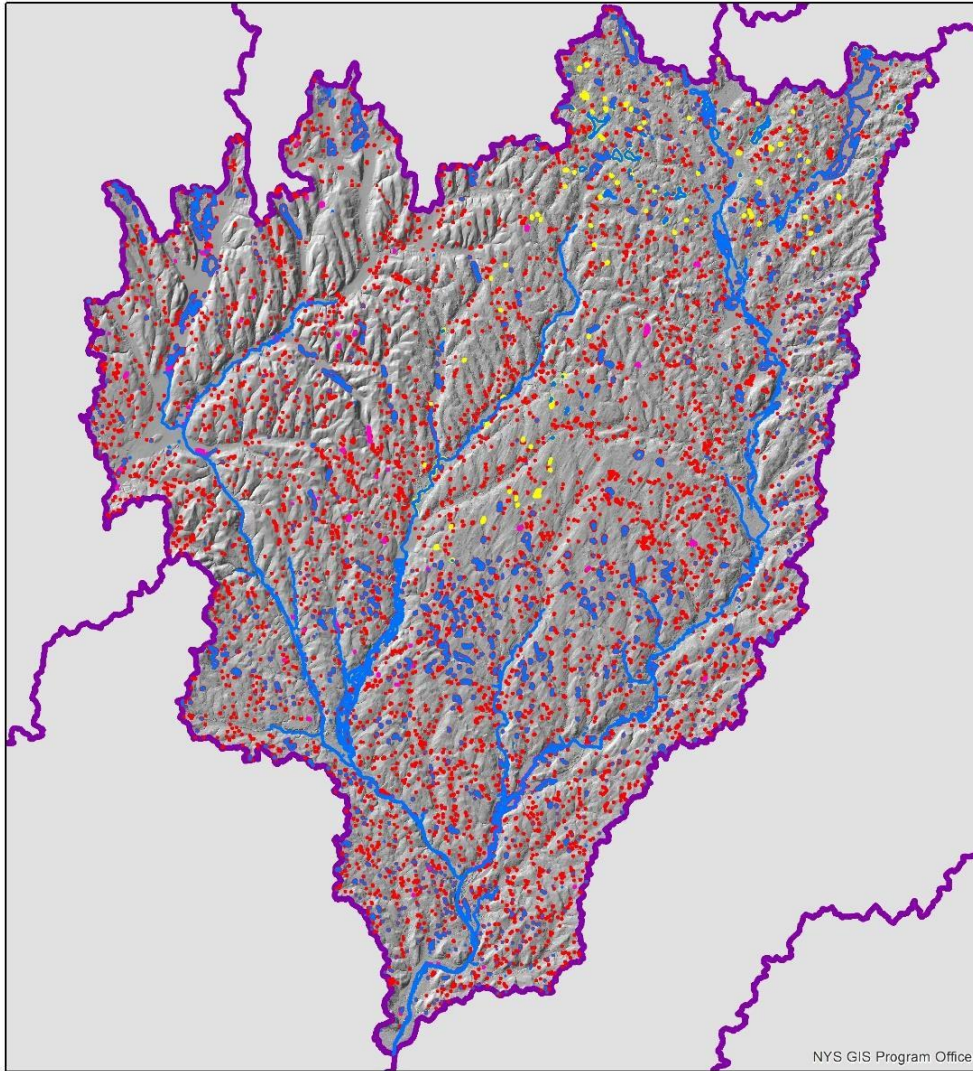
HUC 02050102 Chenango

-  NHD Waterbody (1540 Records)
-  LiDAR Breaklines (74 Records)



HUC 02050102 Chenango

-  NHD Waterbody (1540 Records)
-  LiDAR Breaklines (74 Records)
-  Area Hydrography (77 Records)



HUC 02050102 Chenango

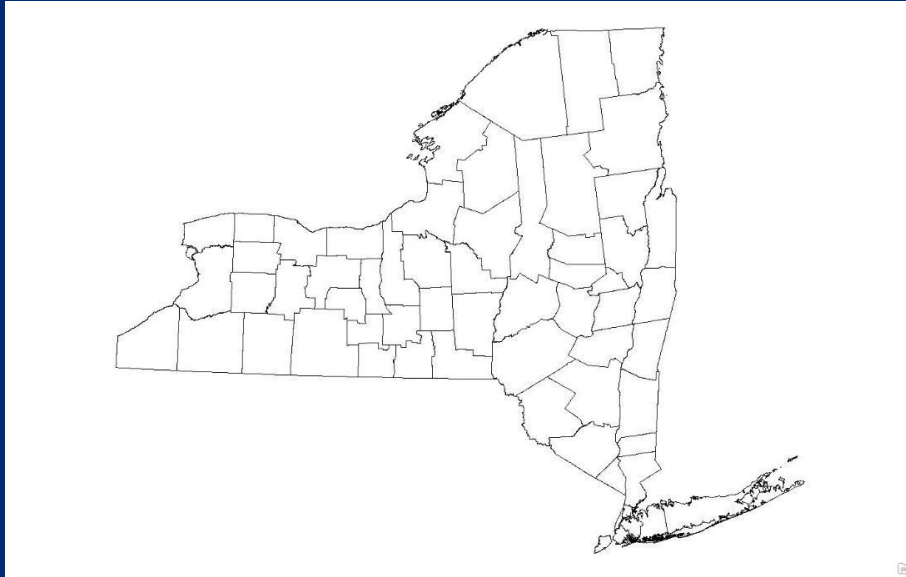
-  NHD Waterbody (1540 Records)
-  LiDAR Breaklines (74 Records)
-  Area Hydrography (77 Records)
-  Digitized (4856 Records)

Original NHD		
FCODE	Description	Count
39000	Lake/Pond	39
39001	Lake/Pond - Intermittent	4
39004	Lake/Pond - Perennial	811
39009	Lake/Pond - Perennial (Average Water Elevation)	79
43601	Reservoir - Aquaculture	25
43613	Reservoir - Water Storage	7
46600	Swamp/Marsh	575
		1540
Updated to USGS/NHD		
FCODE	Description	Count
39000	Lake/Pond	37
39001	Lake/Pond - Intermittent	176
39004	Lake/Pond - Perennial	636
39006	Lake/Pond - Intermittent (Date of Photography)	2
39009	Lake/Pond - Perennial (Average Water Elevation)	69
39011	Lake/Pond - Perennial (Date of Photography)	4834
43601	Reservoir - Aquaculture	11
43608	Reservoir - Swimming Pool	1
43612	Reservoir - Sewage Treatment	1
43613	Reservoir - Water Storage	2
46600	Swamp/Marsh	482
		6251

Add Digitize	4856
Add Breaklines	74
Add Other Datasets	77
Delete	276
Attribute Changes	95
Replace with Existing Datasets	68
Edited Geometry	438

Web Services

USGS Web Service

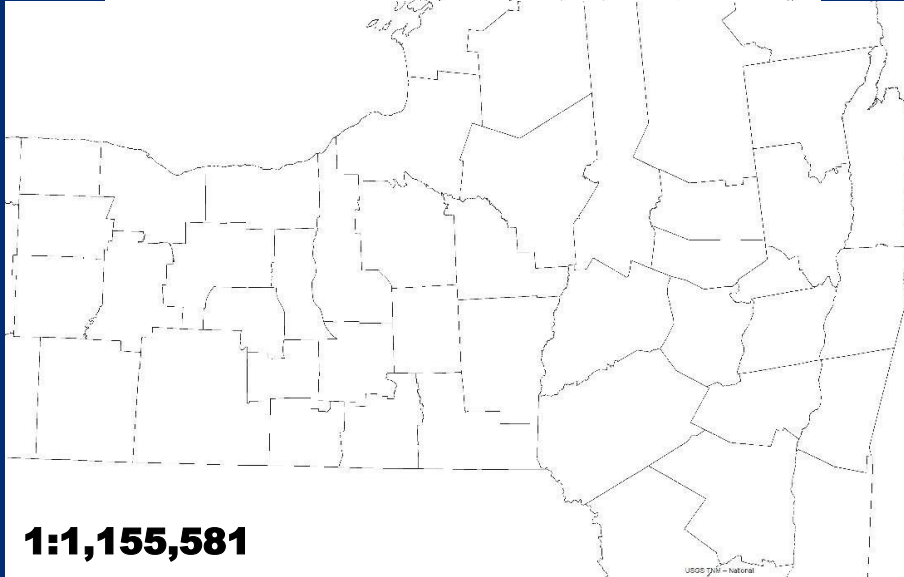


NYSGPO Web Service



- Hydrography Data viewable at a statewide scale
- Display waterbodies larger than 10 SQKM and NHD Area larger than 25 SQKM
- Labeling only waterbodies > 1000 SQKM

USGS Web Service

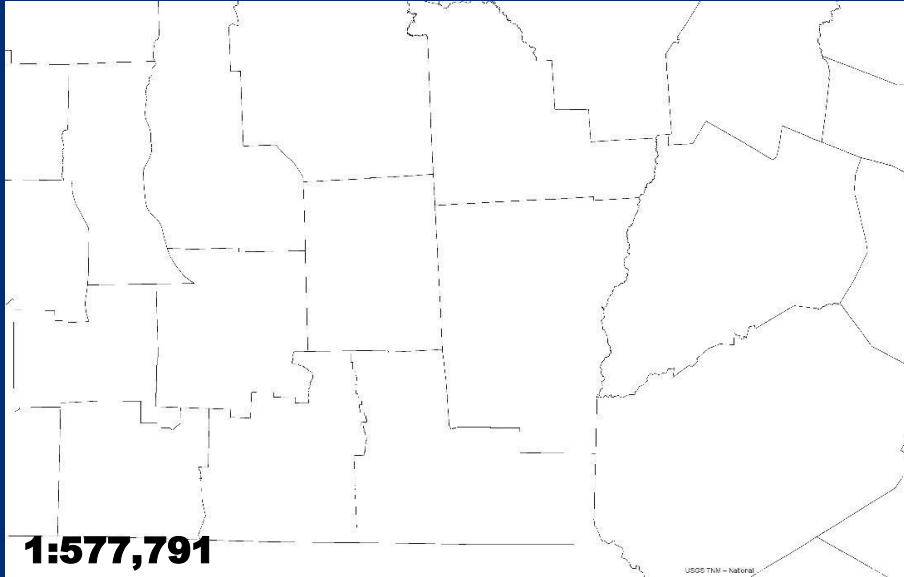


NYSGPO Web Service

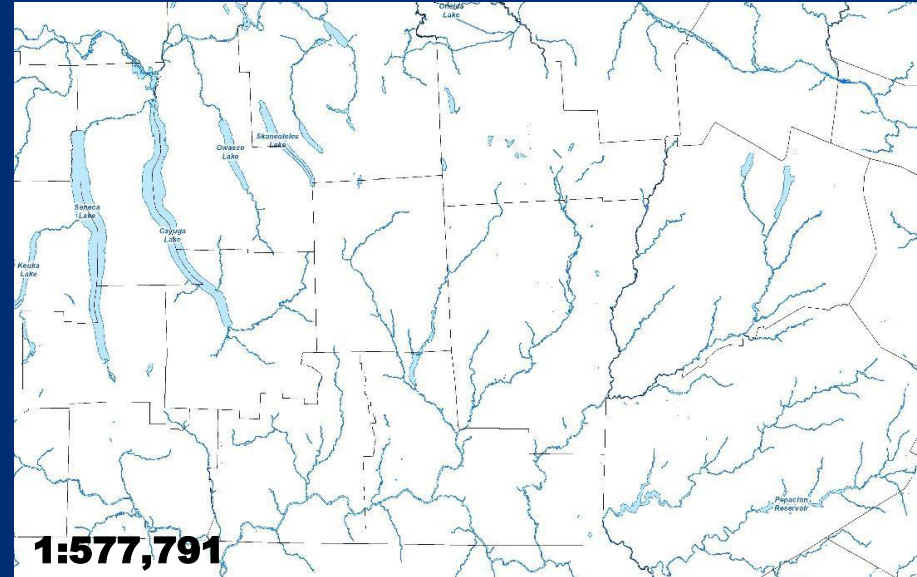


- Waterbodies larger than .5 SQKM
 - Label waterbodies > 20 SQKM
- NHD Area larger than 10 SQKM

USGS Web Service



NYSGPO Web Service



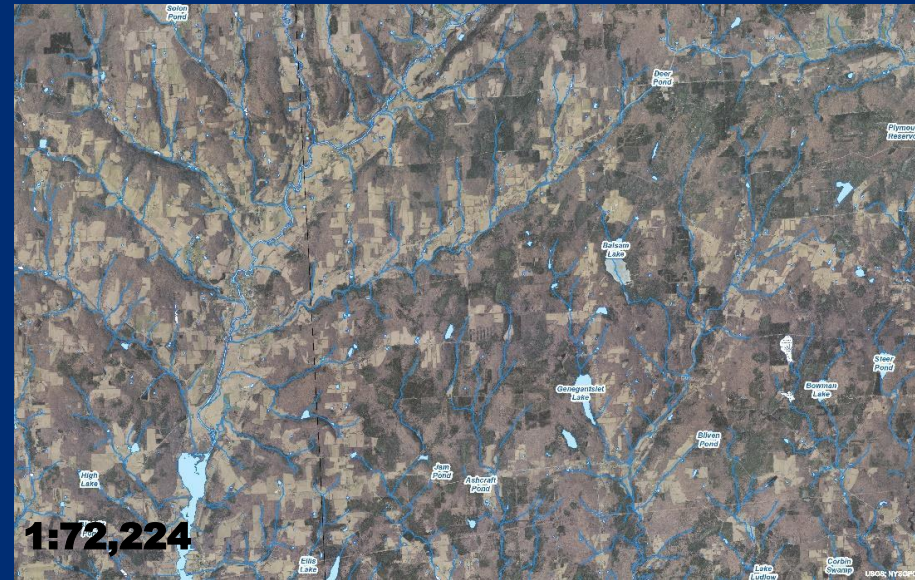
- Waterbodies larger than .25 SQKM
 - Label waterbodies > 10 SQKM
- NHD Area all displayed

USGS Web Service



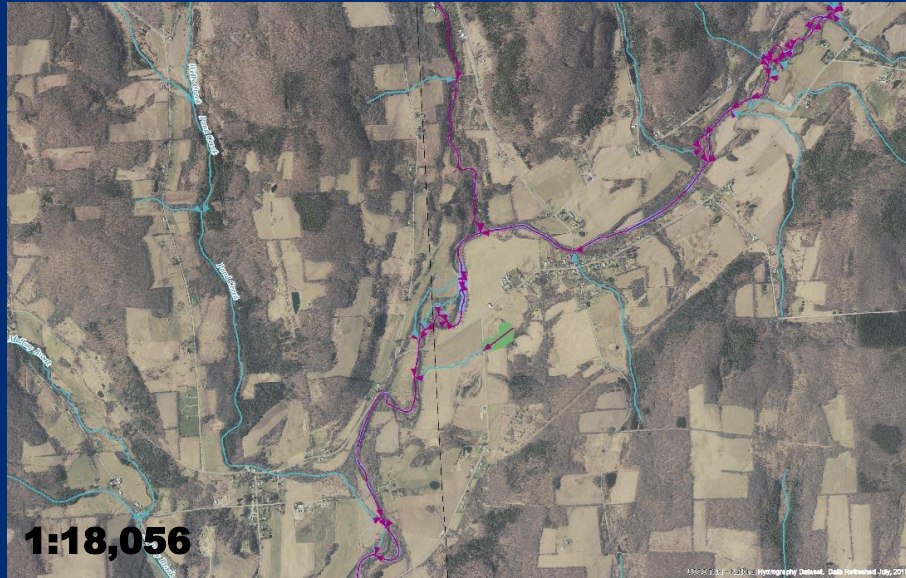
- All data turns on

NYSGPO Web Service

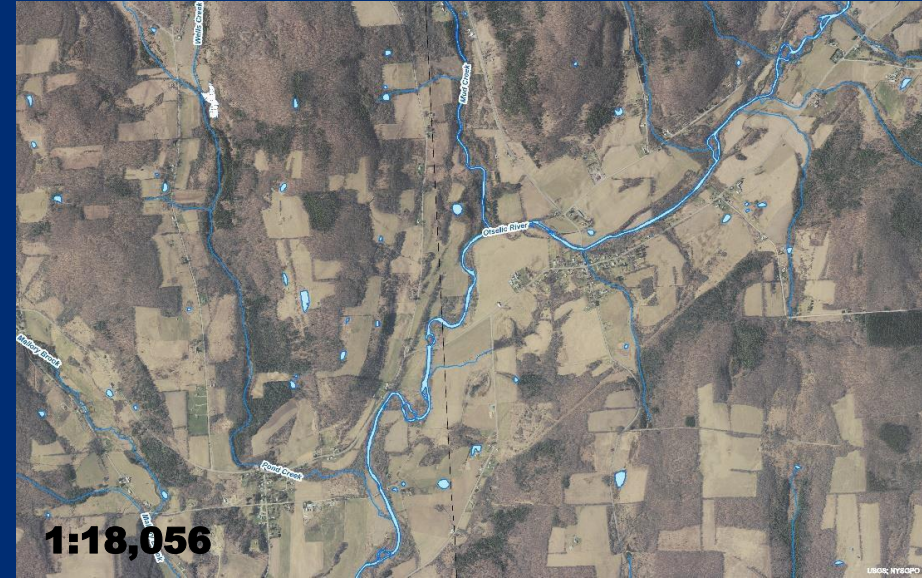


- Waterbodies displayed
 - Waterbodies labeled
 - Filter off some waterbodies (ex: sewage treatment)
- All NHD Area displayed
- NHD Flowline turns on
- Do not display "Artificial Path"

USGS Web Service

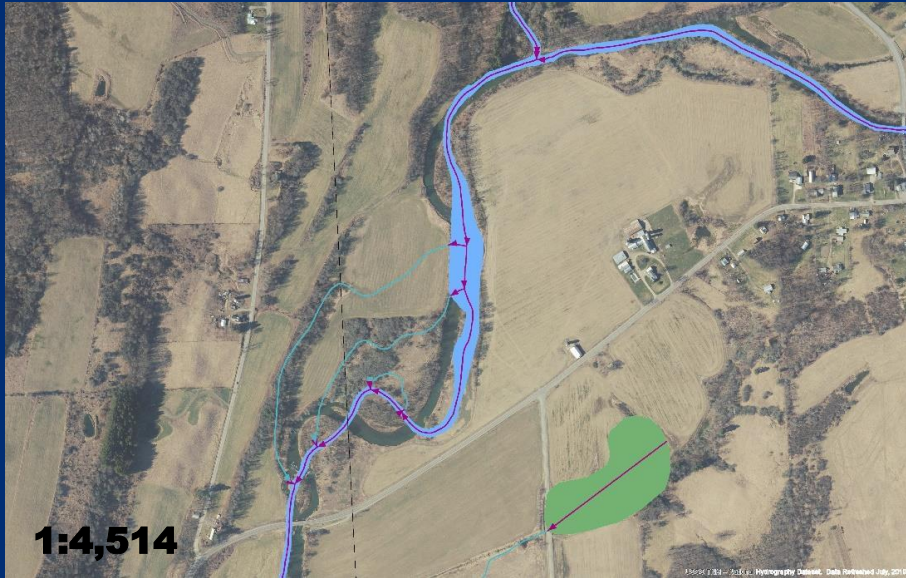


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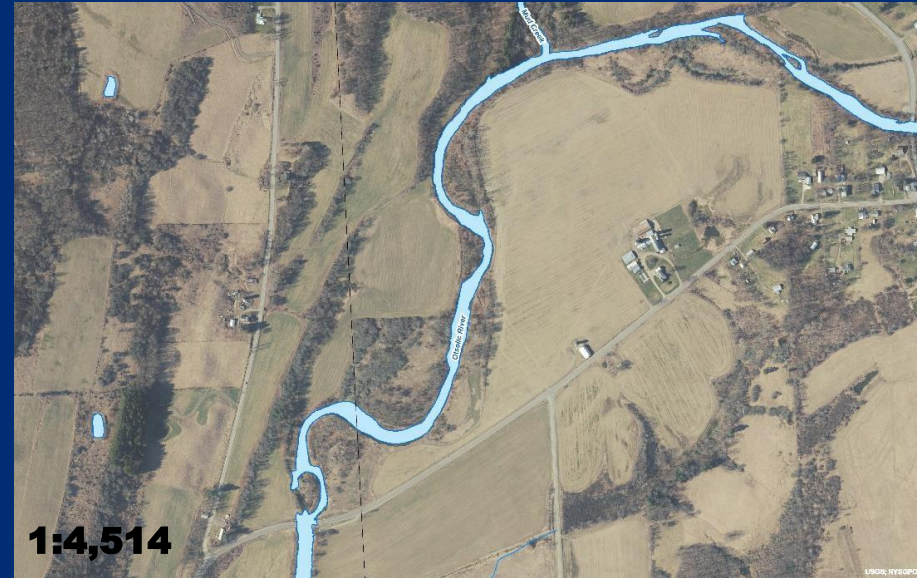


- NHD Area Labels using “Artificial Path” from flowline

USGS Web Service



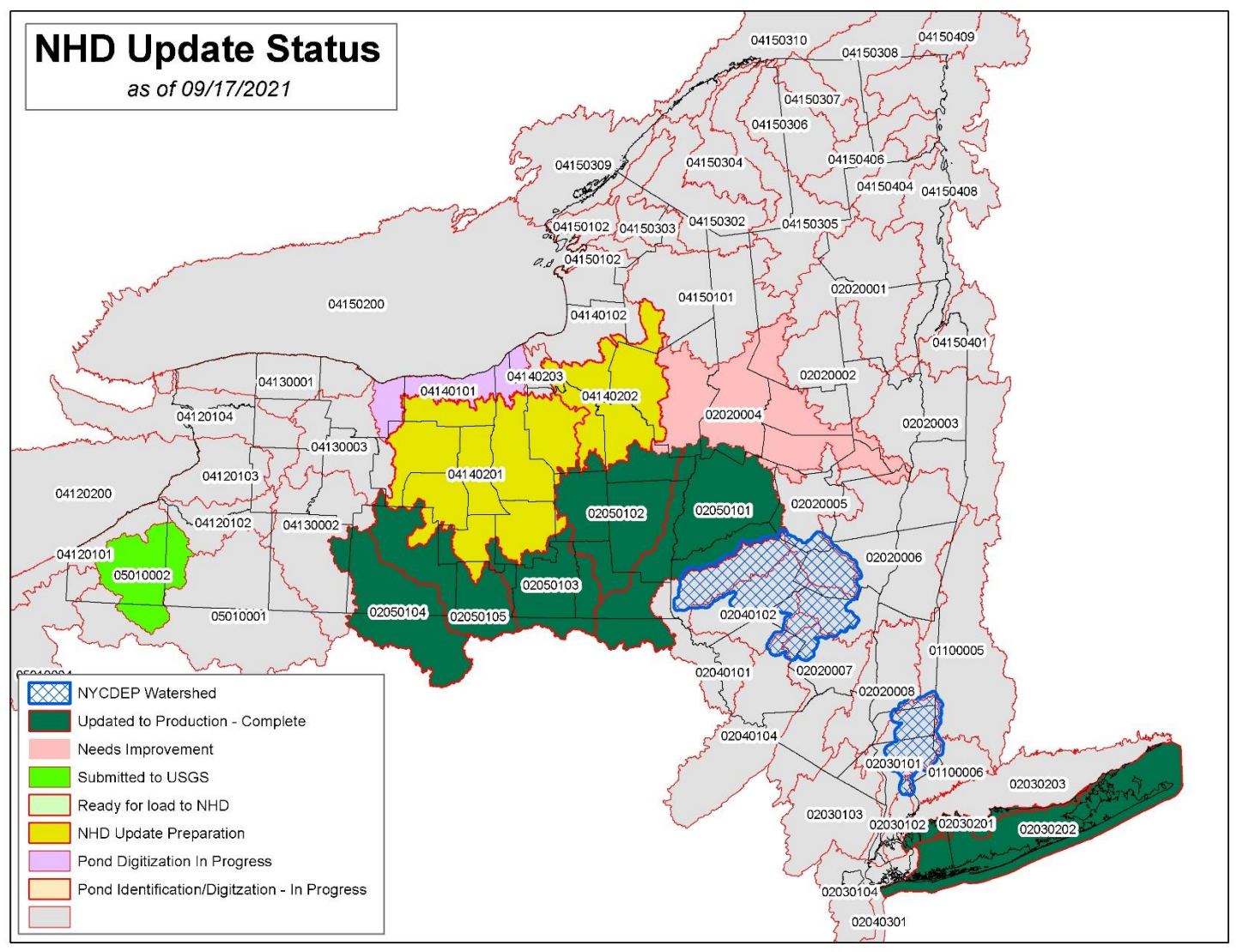
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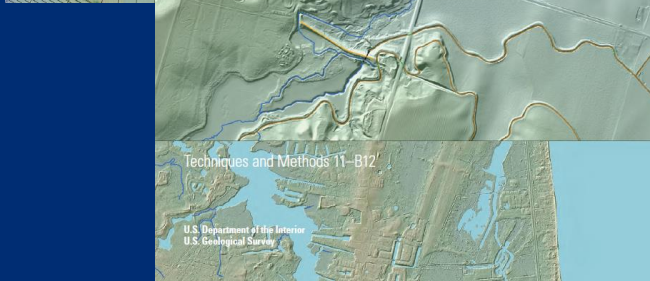
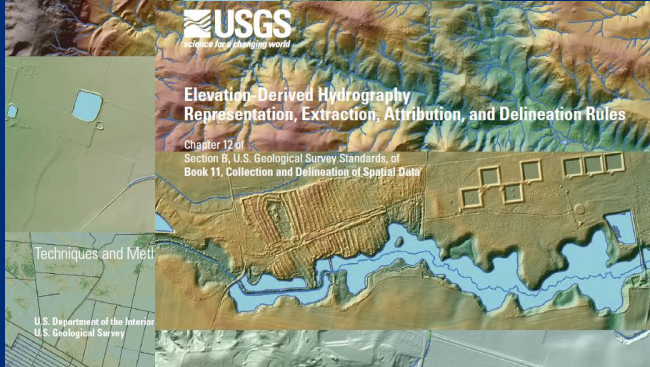
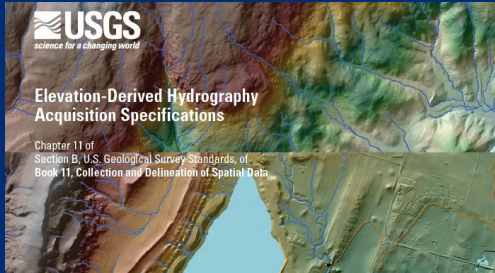
- Web Service may lag from what is downloadable

Naming Improvements

- NHD only names features that have a Geographic Names Information System (GNIS) Name - 3757 named waterbodies
- GPO adds a field for the Web Service that is a combination of GNIS Name and additional names we fold in from other datasets.
- GPO named waterbodies - 5103 named waterbodies (includes GNIS and other names we folded in)
- Additional 650+ names to be folded in once we work on additional HUCs.
- GPO labels do not go back into NHD, only available from NYS GPO Web Service
 - Goal is to add these named features into the GNIS



NHD & Elevation Derived Hydrography (EDH)?



Elevation Derived Hydrography (EDH)

- Acquisition Specifications
- Representation, Extraction, Attribution and Delineation Rules (READ)

<https://www.usgs.gov/core-science-systems/ngp/ss/elevation-derived-hydrography-specifications>

Benefits of EDH

- Align 3DEP Data with the NHD

Benefits of EDH

- Align 3DEP Data with the NHD
- Nationwide coverage

Benefits of EDH

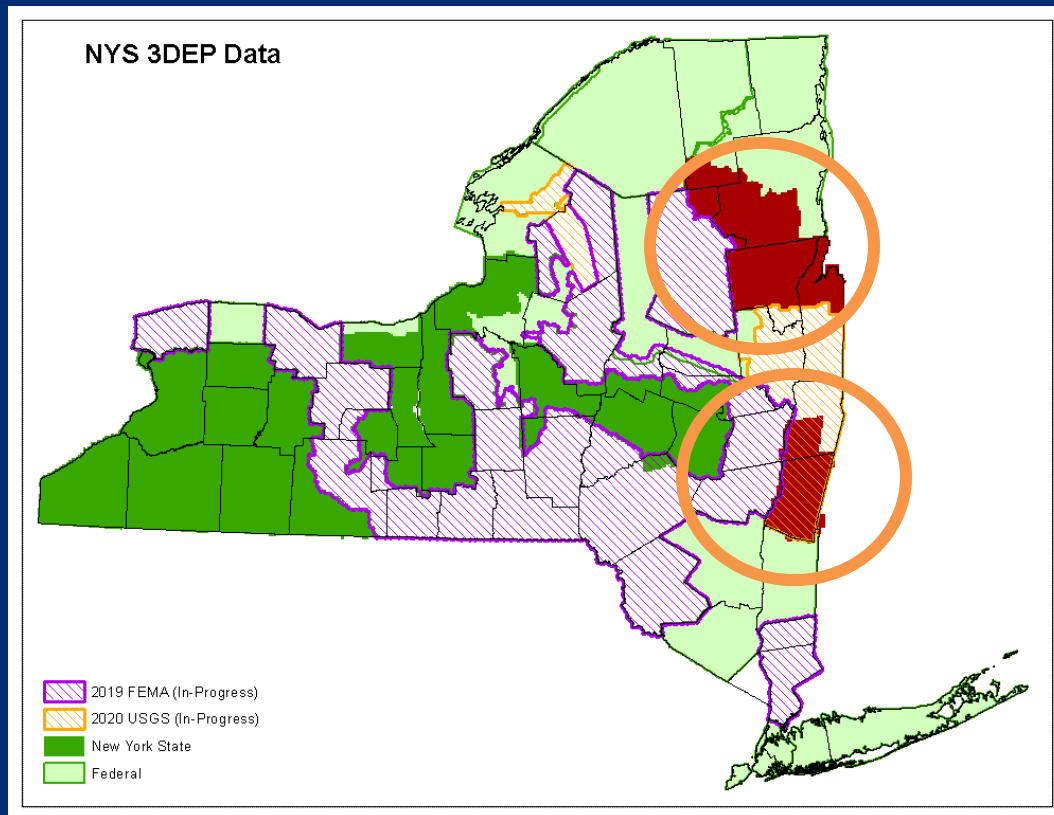
- Align 3DEP Data with the NHD
- Nationwide coverage
- Consistency/Guidance

Concerns with EDH

- Will EDH replace NHD?

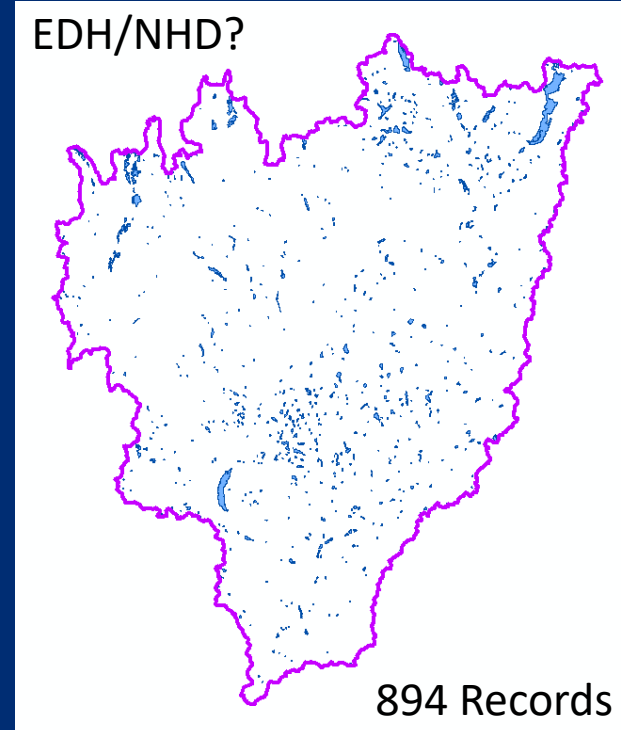
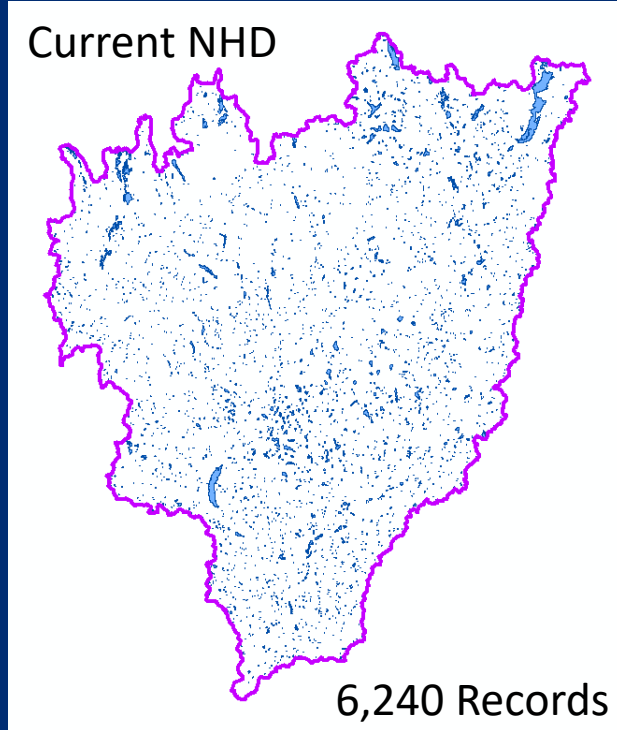
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- **Do incorporated breaklines need to be 3DEP breaklines?**



Concerns with EDH

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- **What happens to waterbodies that don't have breaklines?**



Concerns with EDH

- Will EDH replace NHD?
- Do incorporated breaklines need to be 3DEP breaklines?
- What happens to waterbodies that don't have breaklines?
- **NHD Stewardship Role?**

Hydrography Derived from Elevation Offers a Solution! Introducing the 3D Hydrography Program

- 3DHP will provide national consistency while meeting local needs
- Goal to standardize hydrography to align vertically, horizontally, and temporally with 3DEP data
 - Supports national and regional-level issues like flooding, contaminant spills, water quality and quantity, drought, climate change, etc.
 - Supports more accurate, updated modeling and analysis capabilities
- Hydrography Requirements and Benefits Study documented widespread need for integration of hydrography and elevation
- Stewards continue to provide local knowledge on attributes and flagging issues on the geometry and attributes with the Markup App
- In the future, change detection based on the elevation or hydrography may trigger updates to 3DHP data



Concerns with EDH

- Will EDH replace NHD?
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Building the 3D Hydrography Program (3DHP)

3DHP will follow 3DEP

- Establish 3DHP governance aligned with 3DEP governance to develop and coordinate partnerships and acquisition plans
- Add 3DHP to the 3DEP Broad Agency Announcement to solicit partnerships in the broad community
- Contract acquisition of 3DHP data primarily through the USGS Geospatial Products and Services Contracts (GPSC)
- Allow for cooperative data acquisition and contributed data
- Provide specifications

USGS

Concerns with EDH

- Will EDH replace NHD?
- Do incorporated breaklines need to be 3DEP breaklines?
- What happens to waterbodies that don't have breaklines?
- NHD Stewardship Role?
- **Cost/Need?**

3D Hydrography Program Comparison of Scenarios - Data Approach			
FEATURES	1 Status Quo	2 Derive from QL2 Elevation	3 Derive from QL1 Elevation
Completion of National Coverage	Ongoing updates vary by steward	Derive new data from elevation nationally in 9 years	Derive new data from elevation nationally in 9 years
Source Data	Varies by steward	1m DEMs	0.5m DEMs
Accuracy	Varies by steward; +/- 40 feet (~12m) (90% CE)	+/- 2m (90% CE)	+/- 1m (90% CE)
Improved Data Model	✘	✔	✔
Major Advantage(s)	Lowest cost	Meets most needs	Meets nearly all needs
Major Challenge(s)	Major needs unmet; growing inconsistency	Requires significant increased investment	Highest cost; source data not widely available
Annual BENEFITS	\$658M	\$1.047B	\$1.126B

Open Discussion

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