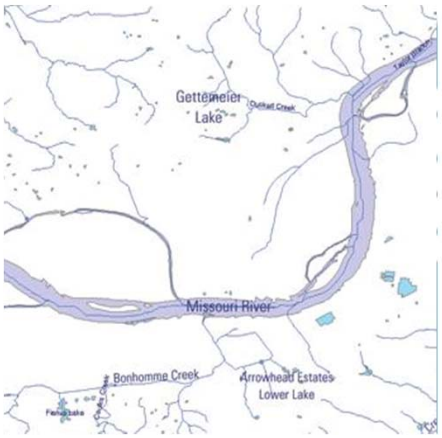
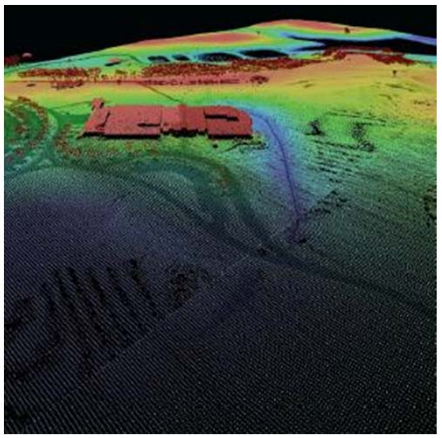
3D Elevation Program- Status and Updates





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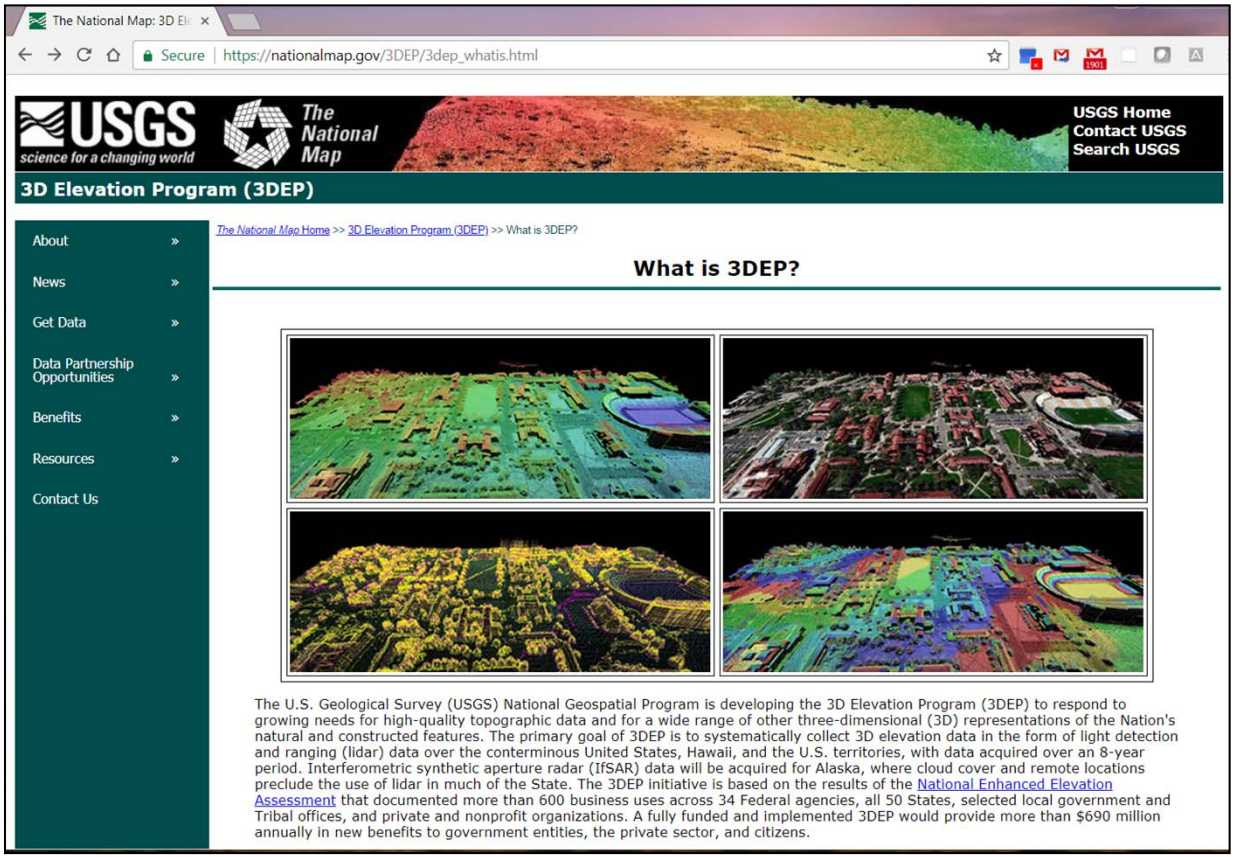
Oklahoma GI Council Meeting
November 2, 2018
Claire DeVaughan
US Geological Survey

3D Elevation Program (3DEP) Goals

- Complete acquisition in 8 years
- Address Federal, state and other mission-critical requirements
- Realize ROI 5:1 and potential to generate $13 billion/year
- Leverage the capability and capacity of private mapping firms
- Achieve a 25% cost efficiency gain
- Completely refresh national data holdings



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USGS Lidar Base Specification v1.3

- Version 1.3 published in February
- Notable changes:
  - Dropping the requirement for raw, unclassified swath data
  - Clarification on how to represent coordinate reference information
  - Changes to a few classification codes
  - Inclusion of a new guideline for breakline collections
  - New GIS data dictionary to provide a consistent data structure for hydrologic breaklines

https://www.usgs.gov/core-science-systems/ngp/3dep/standards-and-specifications

3DEP Quality

Quality Level 2 or better

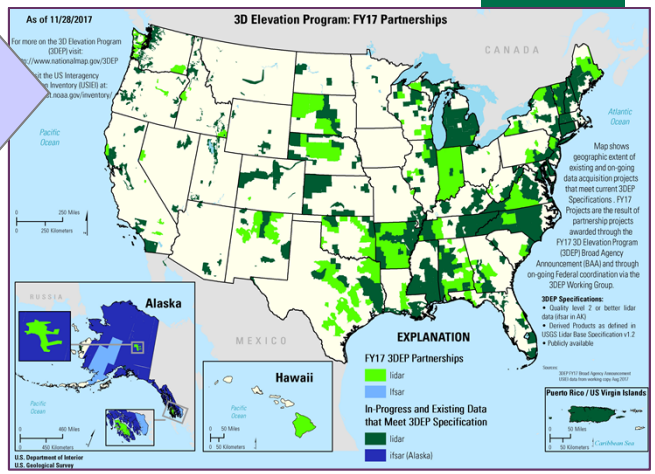
Quality Level	Data Source	Vertical Accuracy RMSEz (cm)	Nominal Pulse Spacing (NPS) (meters)	Nominal Pulse Density (NPD) (points per square meter)	Digital elevation mode (DEM) cell size (meters)
QL0	Lidar	5 cm	≤ 0.35 m	≥ 8 pts/meter^2	0.5 m
QL1	Lidar	10 cm	≤ 0.35 m	≥ 8 pts/meter^2	0.5 m
QL2	Lidar	10 cm	≤ 0.7 m	≥ 2 pts/meter^2	1 m
QL3	Lidar	20 cm	≤ 1.4 m	≥ 0.5 pts/meter^2	2 m
QL4	Imagery	139 cm	N/A	N/A	5 m
QL5	Ifsar	185 cm	N/A	N/A	5 m

3DEP Data Acquisition

3DEP is built on partnerships

Federal Partners = 3DEP Working Group

Federal Interagency Agreements (IA)



Non-Federal

Broad Agency Announcement (BAA)

- Fair and equitable process for non-Feds to partner with Federal Agencies
- Publicly announced
- Competitive, clear criteria
- Can include Federal Agencies
- Partners can propose to use USGS contract (GPSC) or their own contract

Together determine acquisition plan for the year

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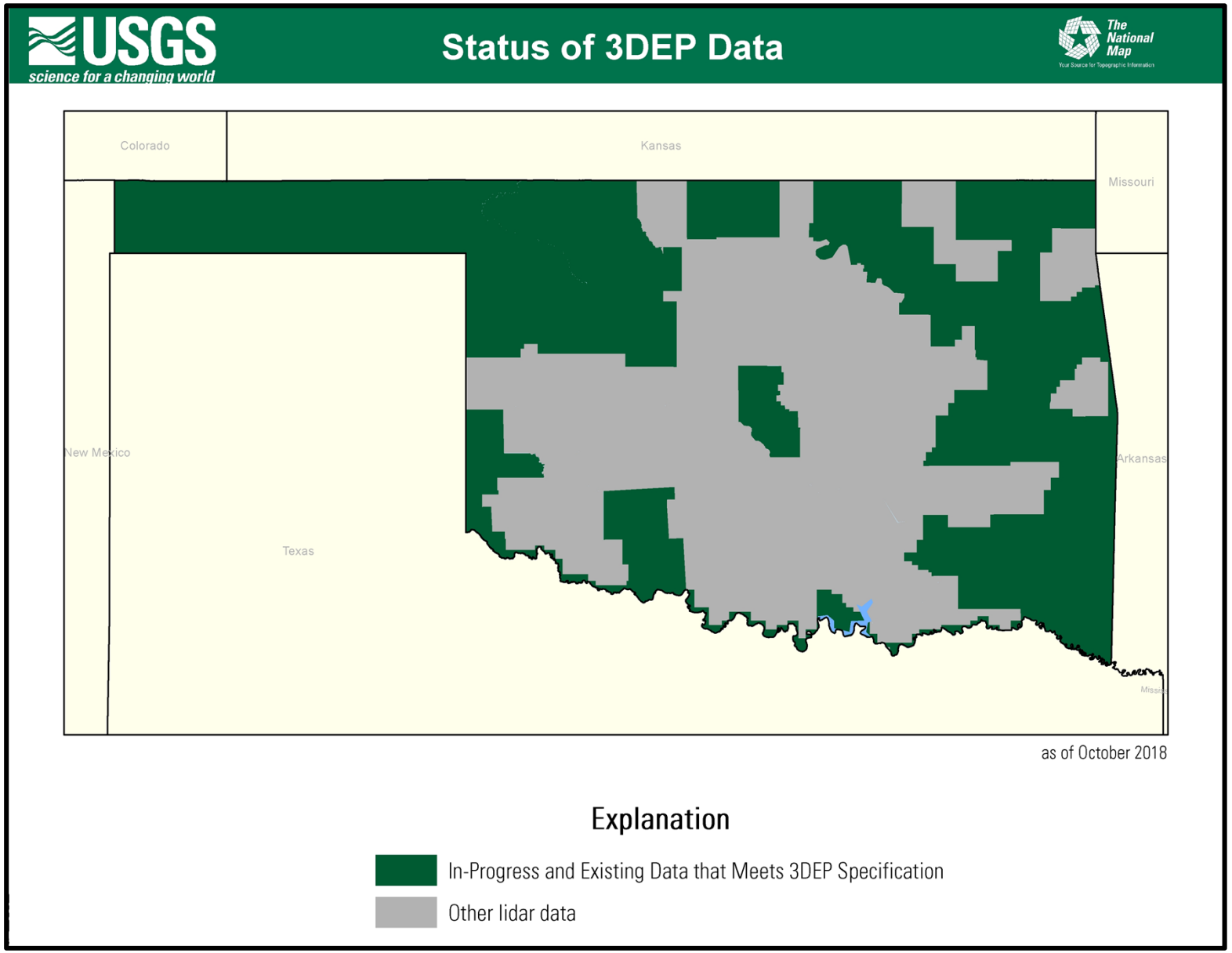
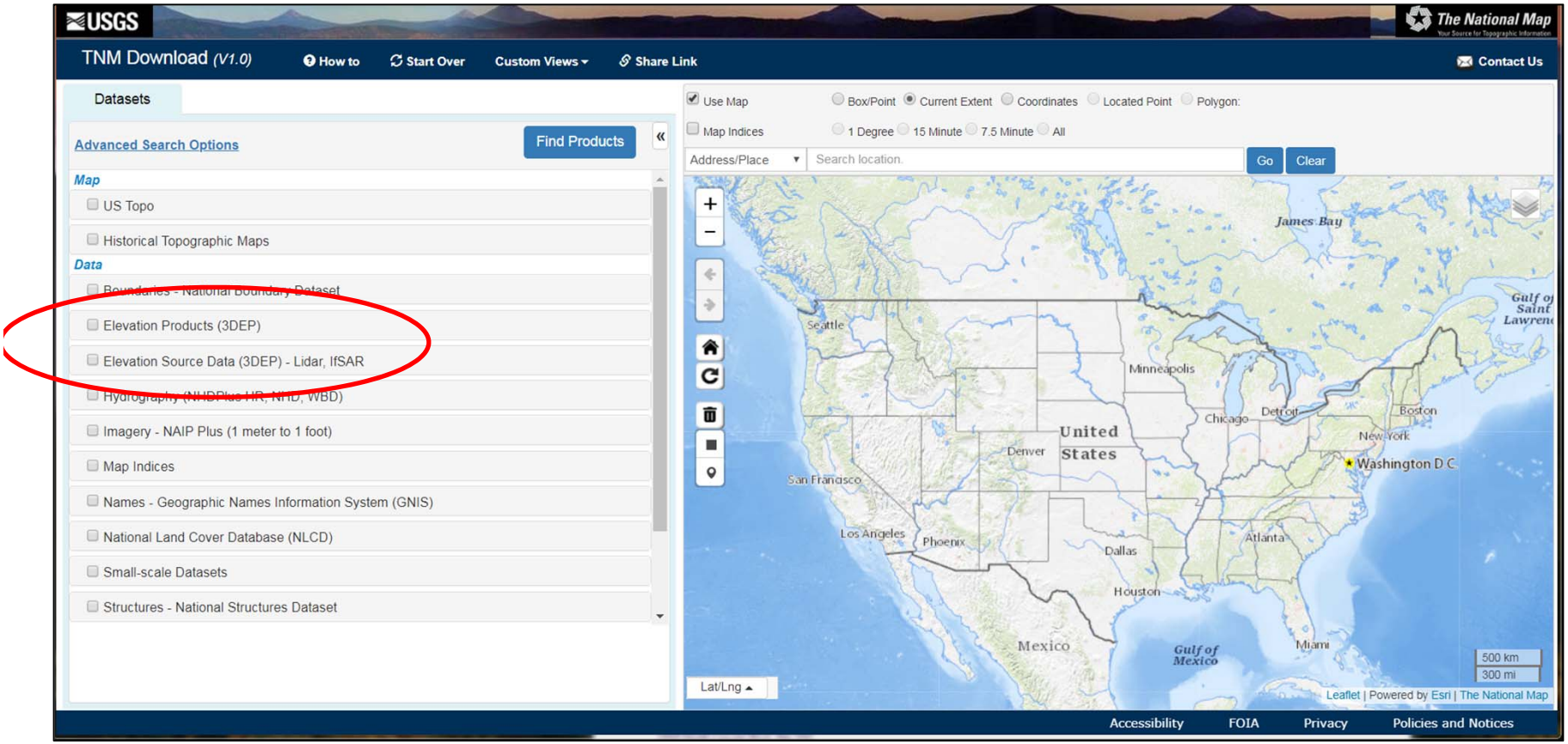
+ 3DEP Status – Oklahoma



Access 3DEP Data:

https://viewer.nationalmap.gov/basic/



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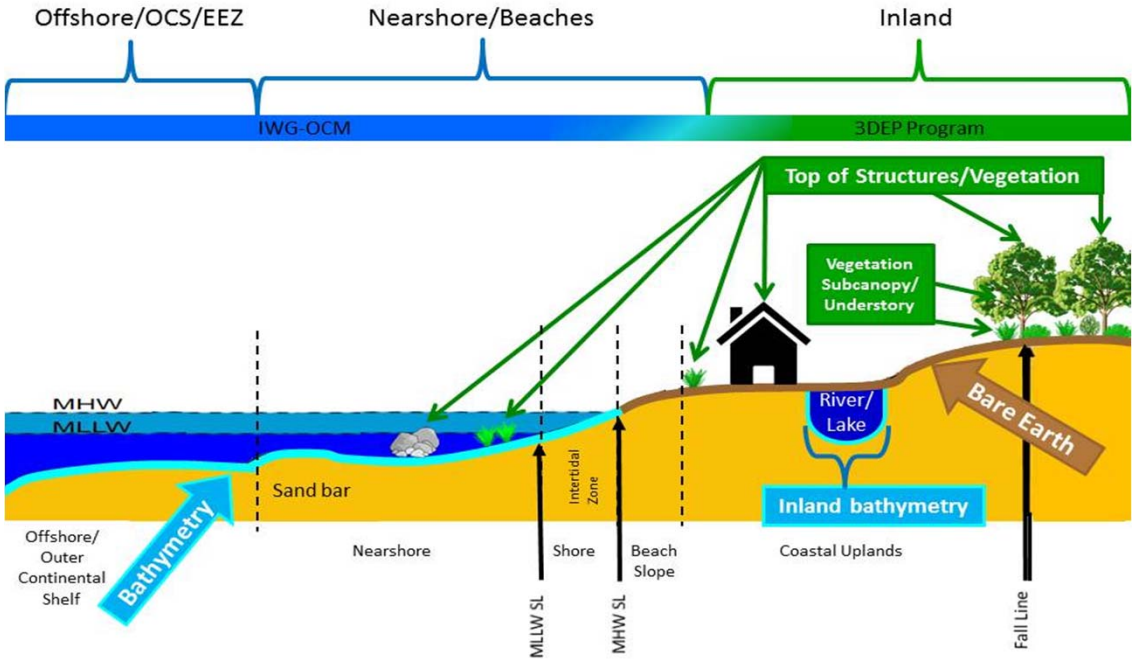
3D Nation Elevation

Requirements and Benefits Study - Goals

- Understand inland, nearshore and offshore bathymetric data requirements and benefits
- Understand how requirements and benefits dovetail in the nearshore coastal zone
- Plan for the next round of 3DEP after completion of nationwide coverage
- Gather technology-agnostic user information to be able to assess new technologies against requirements and identify the tradeoffs between different approaches
- Improve our understanding of needs to guide development of the next generation of 3DEP products and services



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3DEP Resources

USGS 3DEP Web Pages
https://www.usgs.gov/core-science-systems/ngp/3dep

3D Elevation Program (3DEP) FY18/19 Broad Agency Announcement (BAA) Information Sharing Site
https://www.usgs.gov/core-science-systems/ngp/3dep/fy19baa

NOAA sponsored Seasketch site: U.S. Federal Mapping Coordination, *A Demonstration Site for Federal Mapping Data Acquisition*
http://fedmap.seasketch.org

NOAA sponsored *US Interagency Elevation Inventory (USIEI) site*
http://www.coast.noaa.gov/inventory

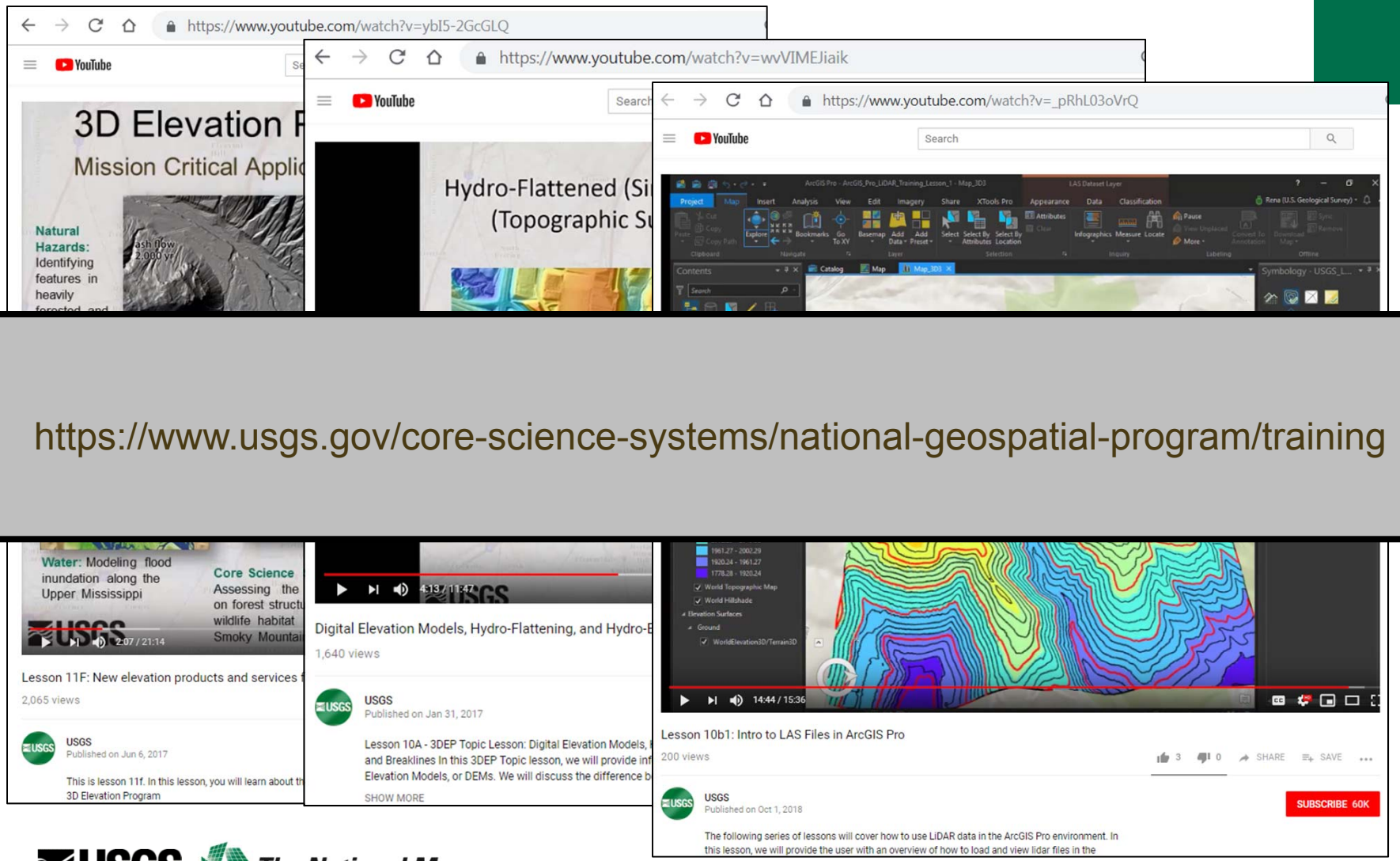
The 3D Elevation Program Initiative – A Call for Action
http://pubs.usgs.gov/circ/1399/

USGS NGP Lidar Base Specification V1.3
http://pubs.usgs.gov/tm/11b4/pdf/tm11-B4.pdf

Training Videos on YouTube

Using The National Map Products and Services

https://www.usgs.gov/core-science-systems/national-geospatial-program/training



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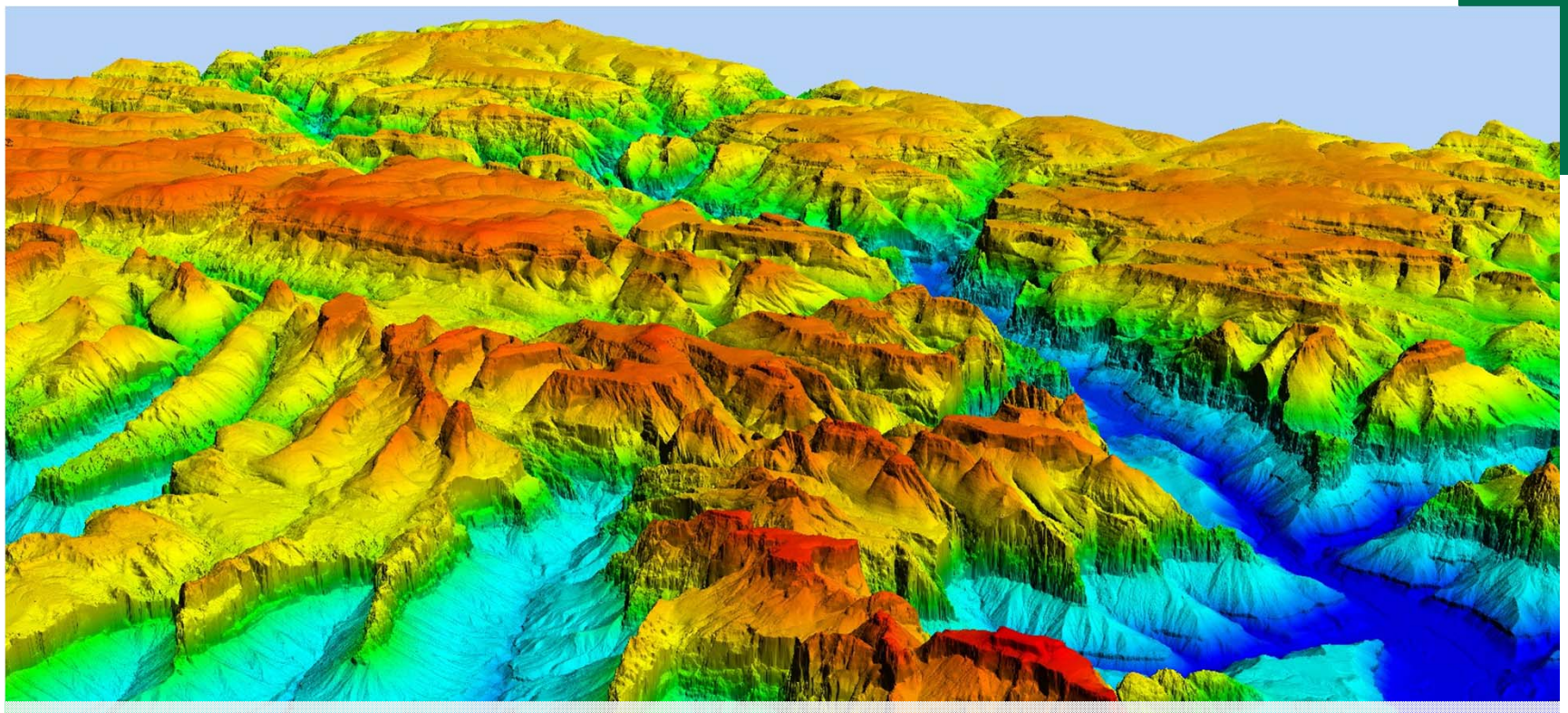
+ Thank you!



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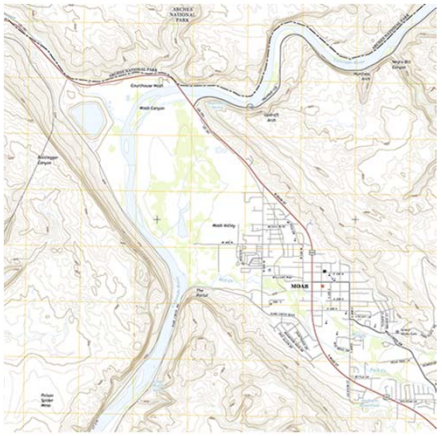
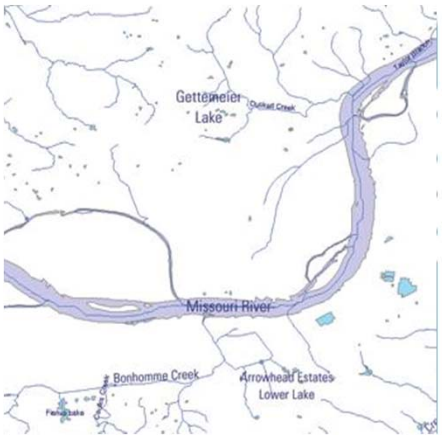
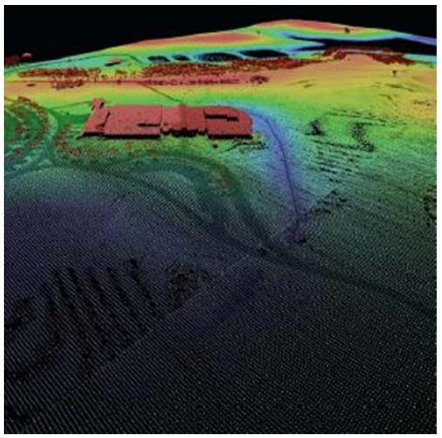
Markup Application for the National Hydrography Datasets







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USGS National Hydrography Datasets

Hydrologic networks, units, catchments, and more…

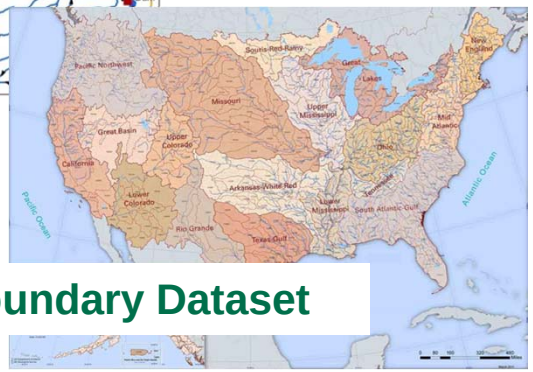
National Hydrography Dataset (NHD)

- The drainage network with features such as rivers, streams, canals, lakes, ponds, and stream gages.

National Hydrography Dataset

Watershed Boundary Dataset (WBD)

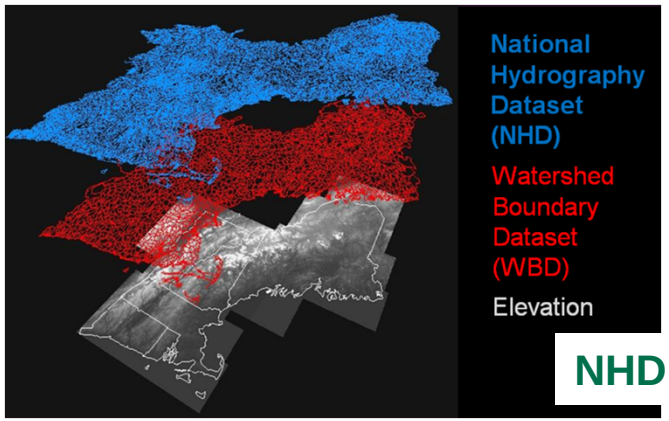
- The drainage basins at 8 scales of a nested hierarchy; defines the areal extent of surface water drainage to a point



Watershed Boundary Dataset

NHDPlus

- Incorporates many of the best features of the NHD, WBD and elevation data to enable estimates of flow volume and velocity



NHDPlus

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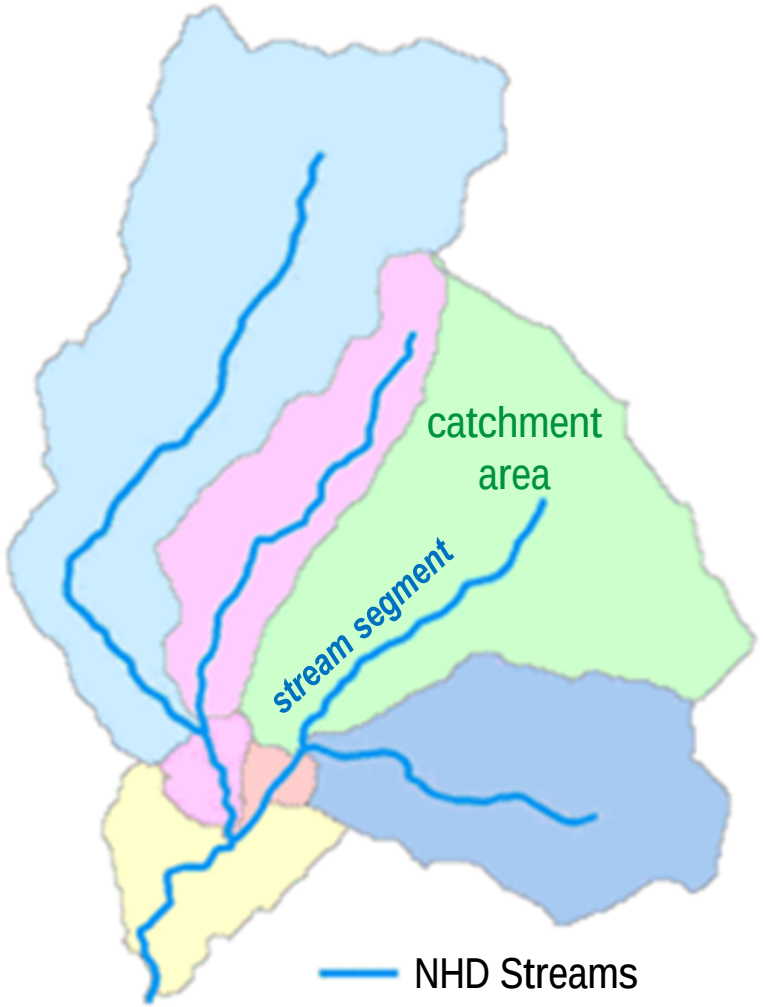
NHDPlus includes…

- A nationally seamless network of stream reaches
- Value-added attributes for stream network navigation and analysis
- Flow surfaces in raster format
- Elevation-based catchment areas for each stream segment that
  - Create a seamless, scalable hydrologic framework
  - Enable modeling of water flow across the landscape, linking terrestrial characteristics to the stream network



NHDPlus High Resolution

NHD Plus HR

- The Hydrography Requirements and Benefits Study: ~ 80% of users need the functionality of NHDPlus but ***at a higher resolution***
- USGS is building NHDPlus HR from the highest available resolution NHD and WBD data, and 10m 3DEP data
- The results are more accurate and better maintained than the current, medium resolution NHDPlus
- NHDPlus HR will have multi-scale representation capabilities with the new VisibilityFilter attribute

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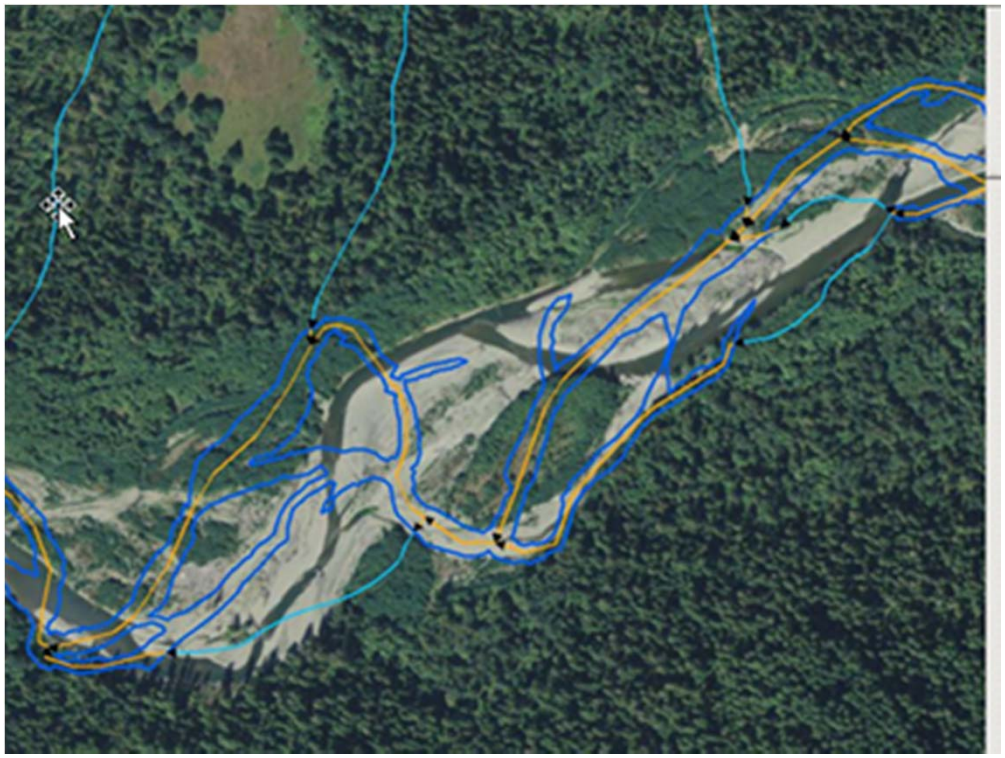
NHDPlus Data Comparison

Medium Resolution versus High Resolution

	NHDPlus Medium Resolution (V2)	NHDPlus High Resolution
Number of catchments	~2.7 Million nationally	~26 Million nationally
Elevation Input	National 1 Arc-Second Seamless DEM (30 meters)	National 1/3 Arc-Second Seamless DEM from 3DEP (10 meters)
NHD Input	Medium Resolution NHD 1:100K	High Resolution NHD 1:24K or better
WBD Input	Composite 2010-2012	Updated WBD
Catchment size	Avg. 1.2 square miles	Avg. ~0.2 square miles
Flow estimates	Mean annual, mean monthly	Mean annual

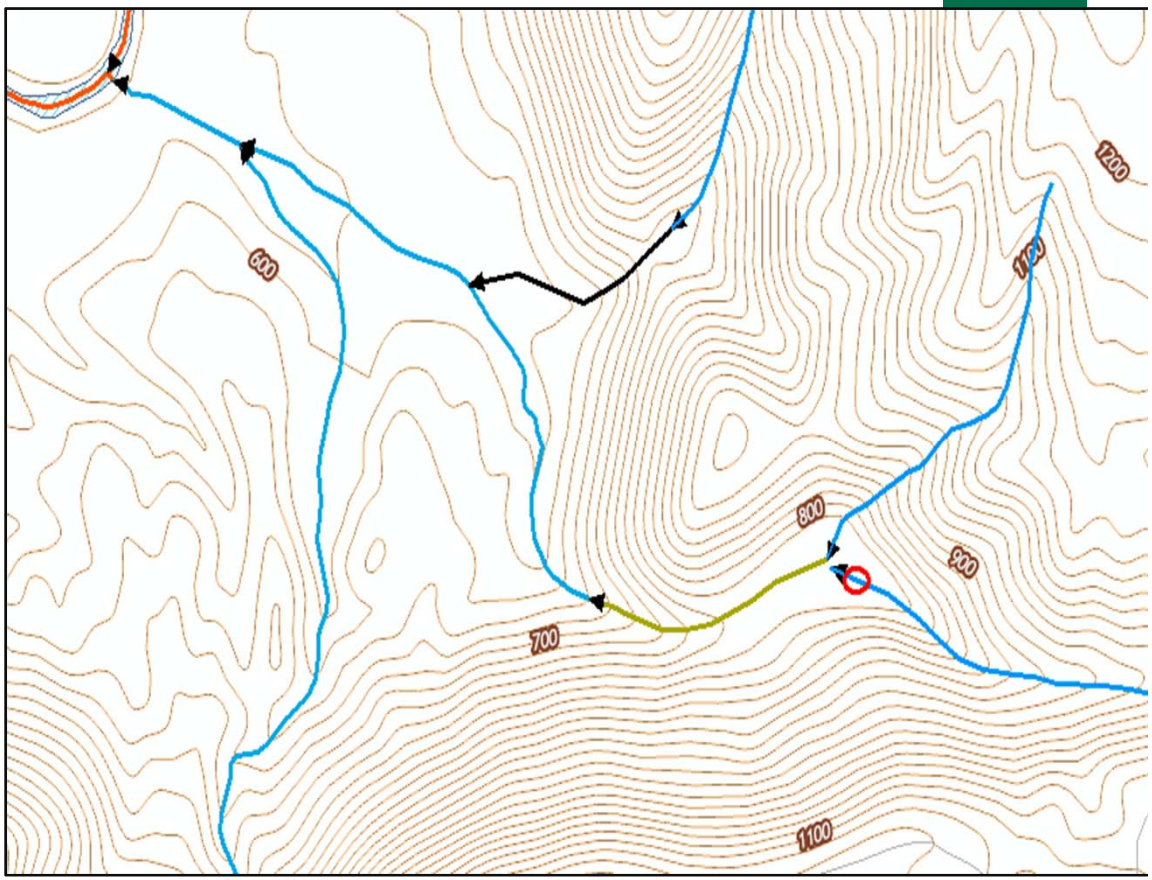
Keeping Up with Change



Isolated network

Flowline very close but not connected to network

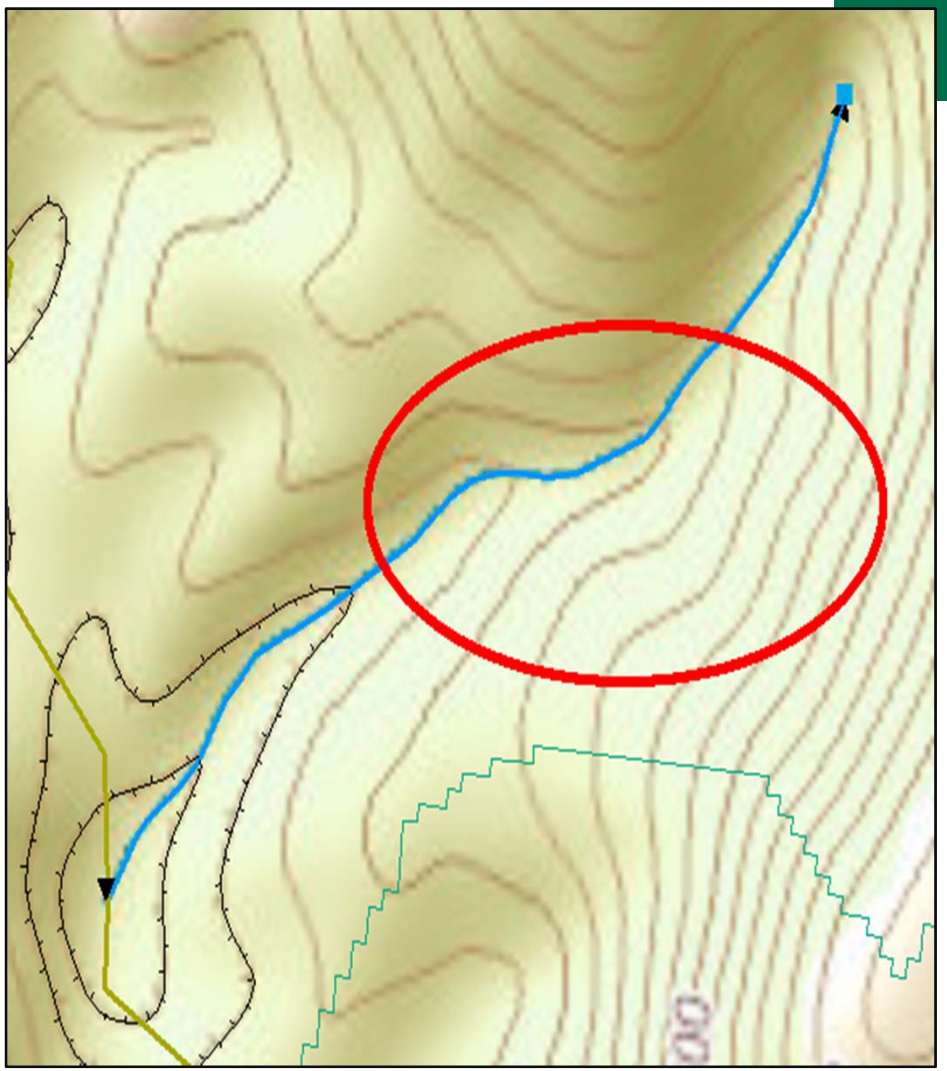
Contours support connecting the features



Incorrect Flow Direction

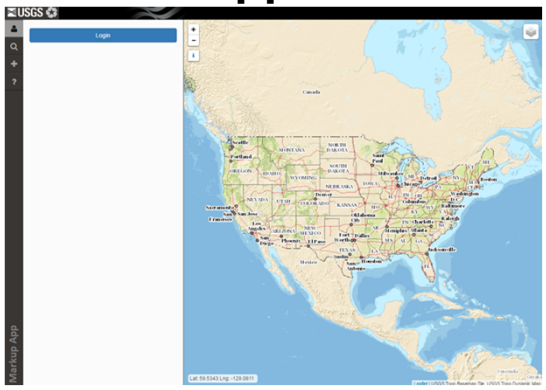
Contours show stream is flowing uphill

Change flow direction of the feature

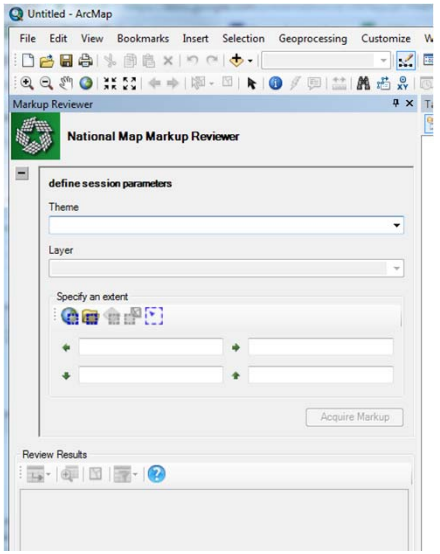


Markup Application

Markup App - Web Application



Markup Reviewer Desktop ArcGIS Add-in



Users: general public, NHD and WBD users, academia, etc.

Purpose:

- Viewing NHD, NHDPlus HR, WBD and submitted markups
- Creating new markups

Access: public access

Users: Internal NGTOC editors, trained NHD and WBD partners only

Purpose:

- View markups submitted through web application
- Update markup status

Access: restricted access for download on Hydrographic Data Community

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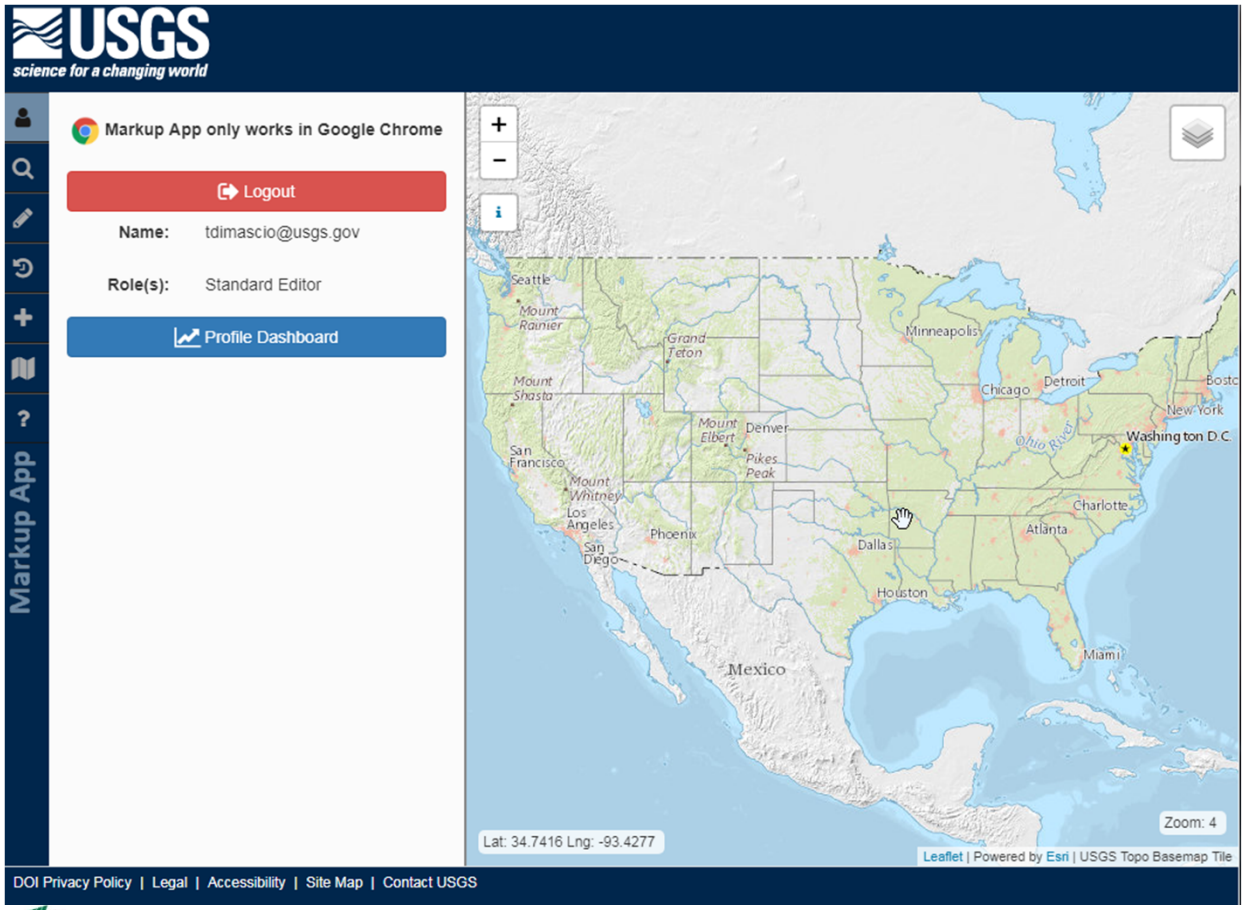
Markup Application – live demo

https://edits.nationalmap.gov/markup-app

- Suggest edits to NHD, WBD, and NHDPlus HR
- Requirements: Gmail account and Google Chrome



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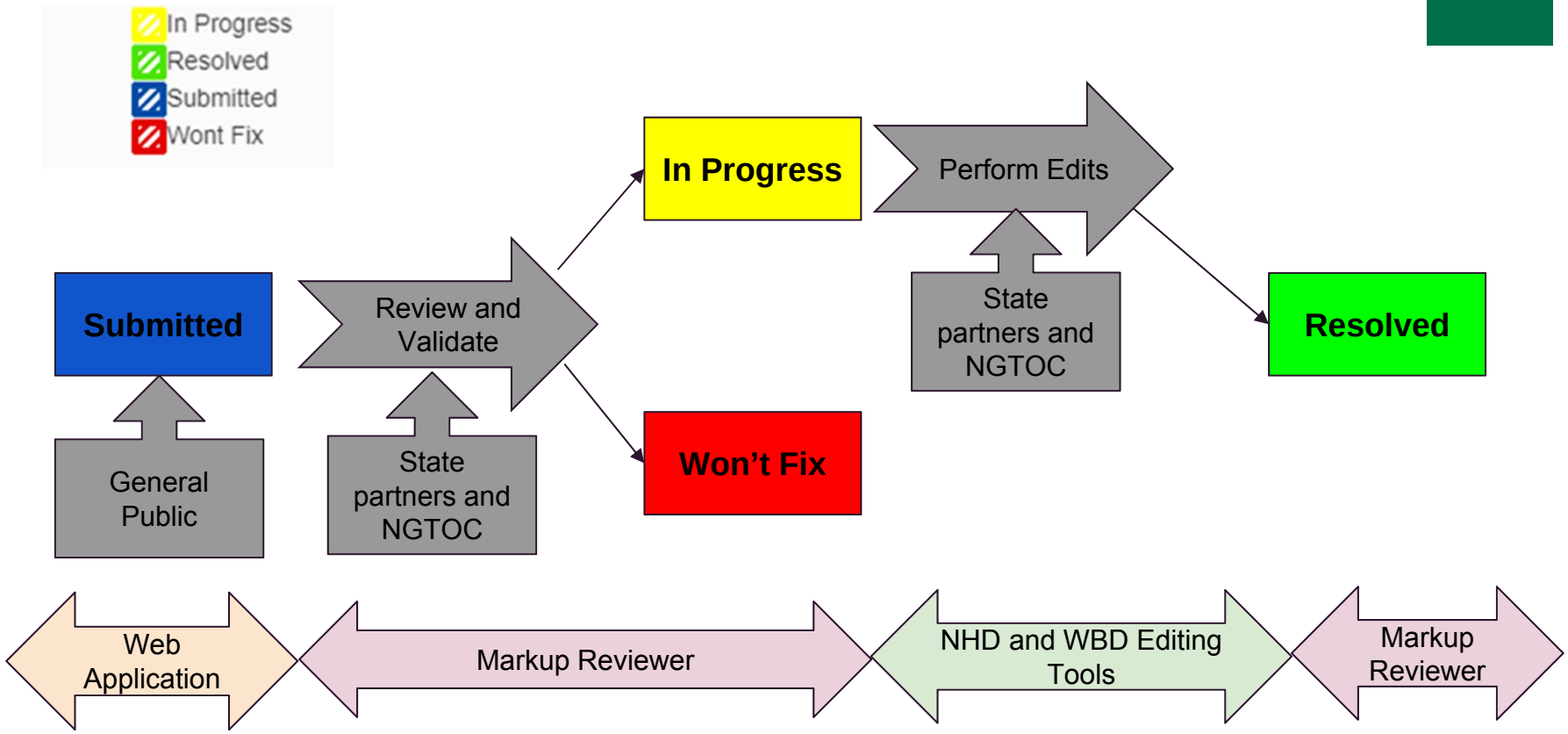
Markup Life Cycle - Validation and Editing

Markup Status Field Change: Who, where, how?



Markup Resources

NHD: https://www.usgs.gov/core-science-systems/ngp/national-hydrography

Markup Application: https://edits.nationalmap.gov/markup-app/

Markup App FAQs: https://usgs-mrs.cr.usgs.gov/MarkupWeb/WebHelp/Markup_Q_As.htm

Markup User Guide: https://usgs-mrs.cr.usgs.gov/MarkupWeb/WebHelp/MarkupUserGuide.htm

Training Video: https://www.youtube.com/watch?v=4hnvgPZxY5Q

Markup Community (contact Claire DeVaughan at cdevaugh@usgs.gov to request access):

https://my.usgs.gov/confluence/display/hdc/Markup+Community

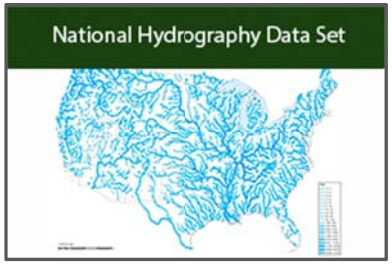
Questions and Training Requests: markup@usgs.gov

Twitter - @USGSNHD

Questions?

Claire DeVaughan
National Map Liaison for TX & OK
512-927-3583

cdevaugh@usgs.gov
or
markup@usgs.gov



NHD Markup Application – Resources

The Markup Application is a web-based mapping communication tool that allows users to suggest edits, or "markups", to the National Hydrography Dataset (NHD), Watershed Boundary Dataset (WBD), and National Hydrography Dataset Plus High Resolution (NHDPlus HR).

NHD: https://www.usgs.gov/core-science-systems/ngp/national-hydrography

Markup Application: https://edits.nationalmap.gov/markup-app/

Markup App FAQs: https://usgs-mrs.cr.usgs.gov/MarkupWeb/WebHelp/Markup_Q_As.htm

Markup User Guide: https://usgs-mrs.cr.usgs.gov/MarkupWeb/WebHelp/MarkupUserGuide.htm

Training Video: https://www.youtube.com/watch?v=4hnvgPZxY5Q

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