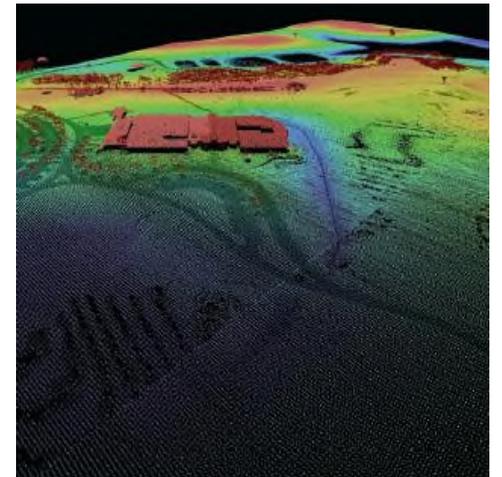
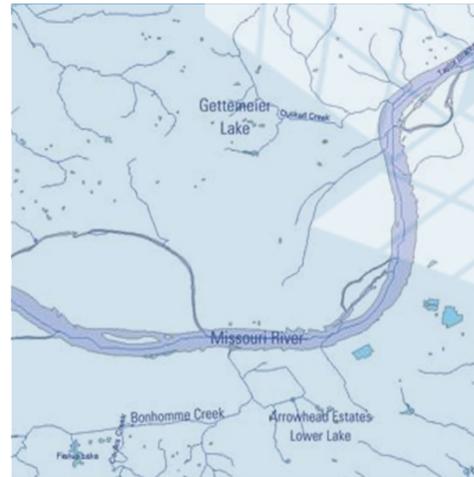
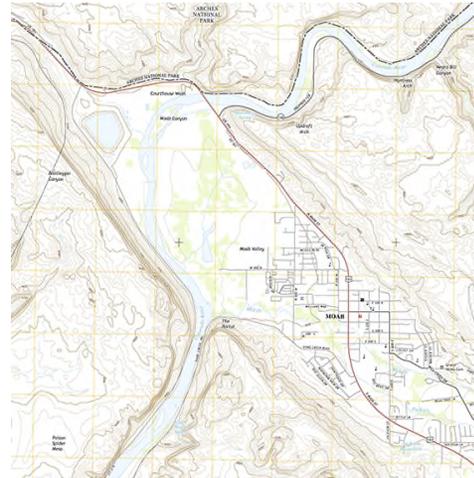




Geospatial Products of the USGS National Geospatial Program for Lake and Watershed Management



Alan Rea

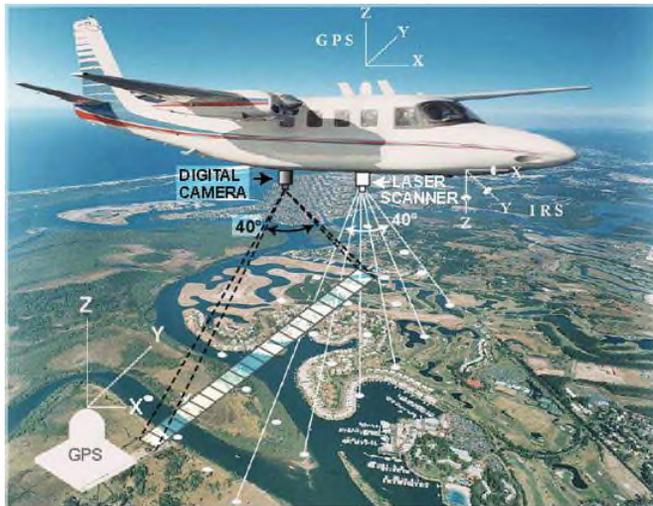
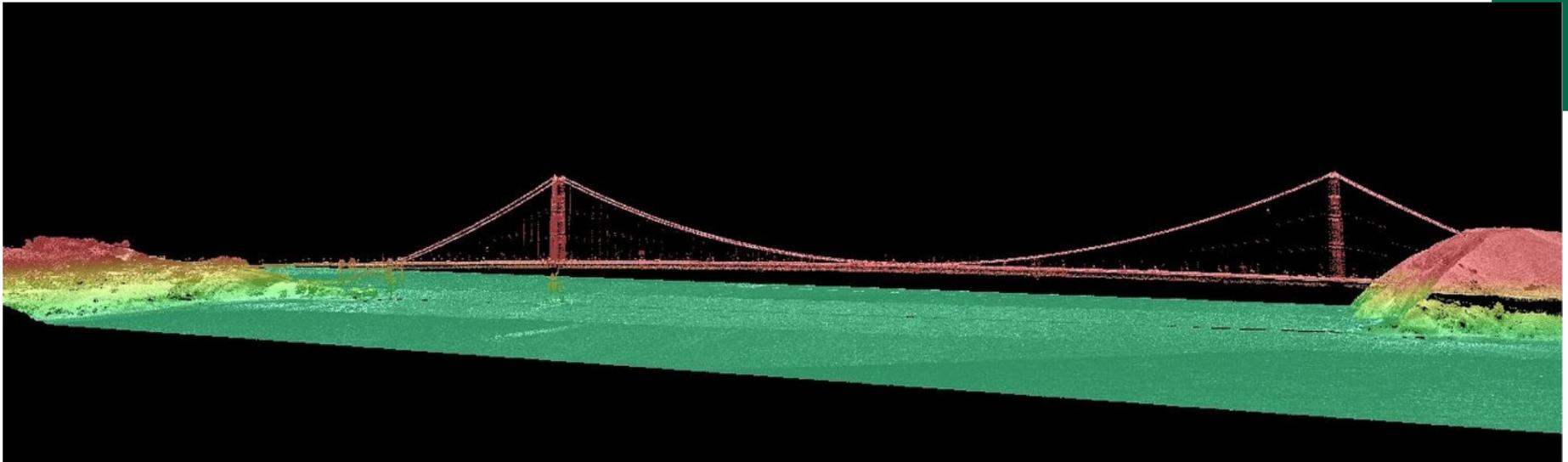
USGS

National Geospatial Program

+ Geography underpins water science and management



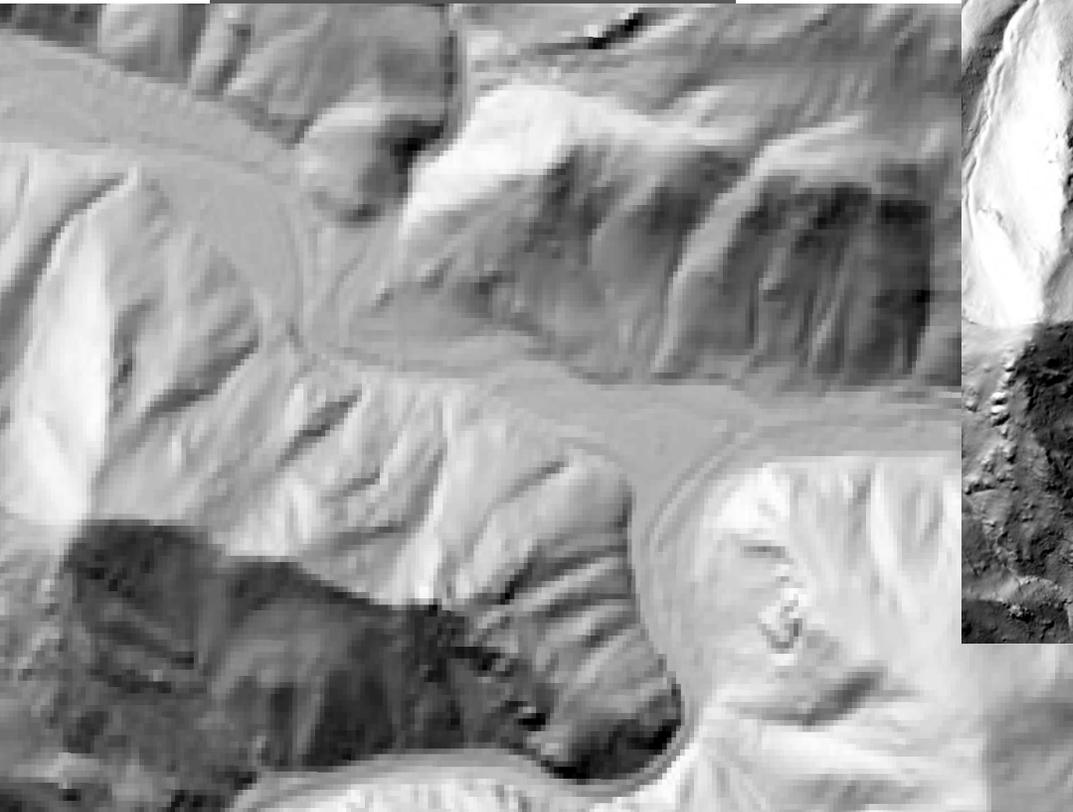
3D Elevation Program (3DEP)



- Applies lidar technology to acquire and distribute three-dimensional data of bare earth, vegetation and structures at centimeter-level accuracy
- Increases the quality level of lidar being acquired to enable more accurate understanding, modeling, and prediction
- Goal to acquire national coverage in 8 years to serve a broad range of critical applications

+ 3DEP Data Quality Improves and Enables Applications

10 meter resolution



1 meter resolution



Enable: Flood Risk Management

Centimeters Matter!

- Red River, MN lidar shows changing river morphology
- QL2 provides 10 cm of additional accuracy over QL3 – critical to flood risk management, particularly in areas of low relief

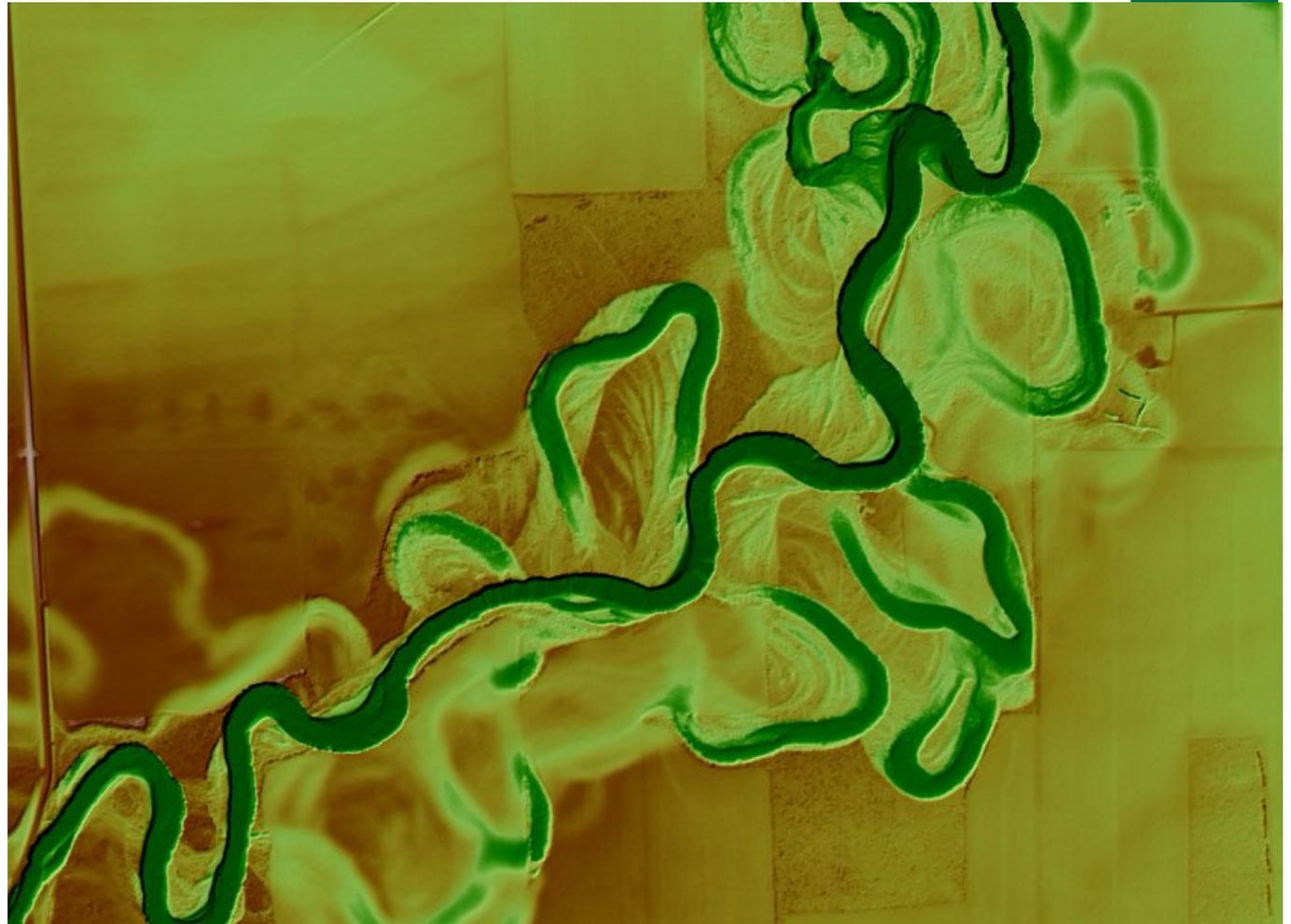
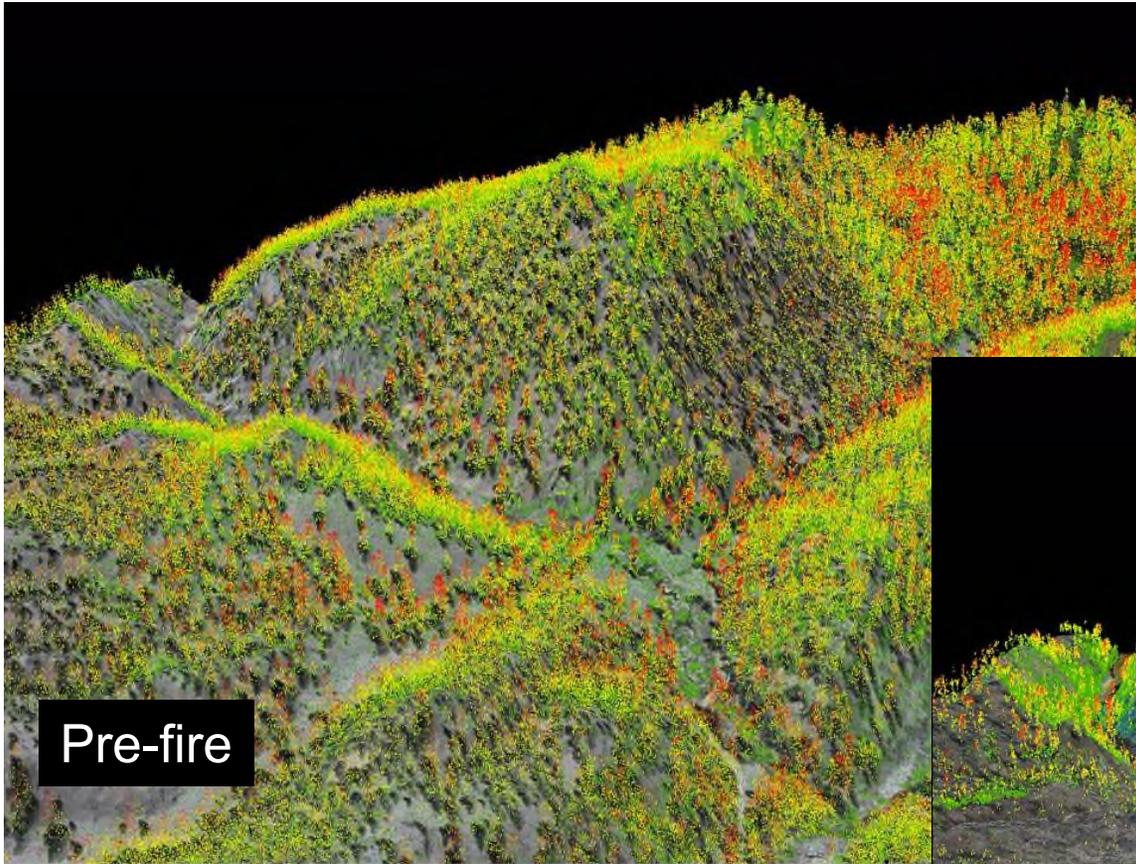
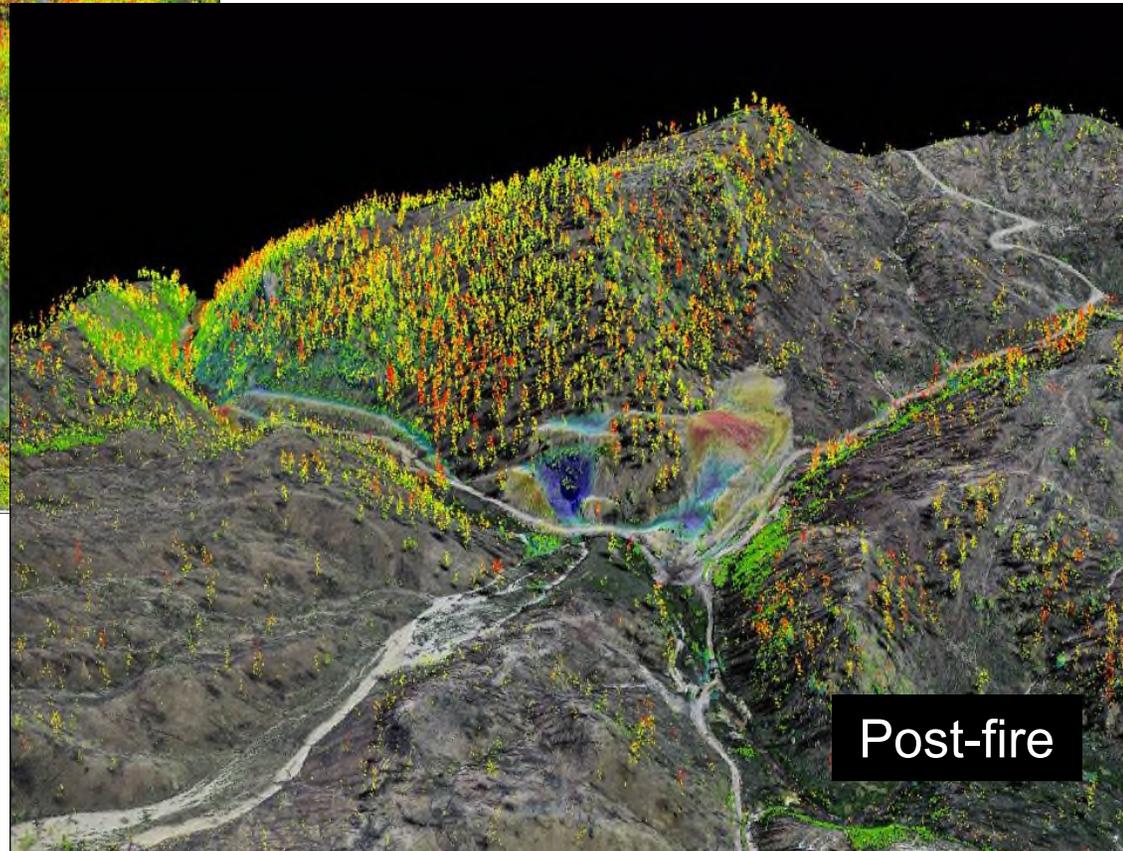


Image from Fugro Geospatial

+ Enable: Fire Disturbance Assessment



Hayman Fire, CO



As of 3/31/2016

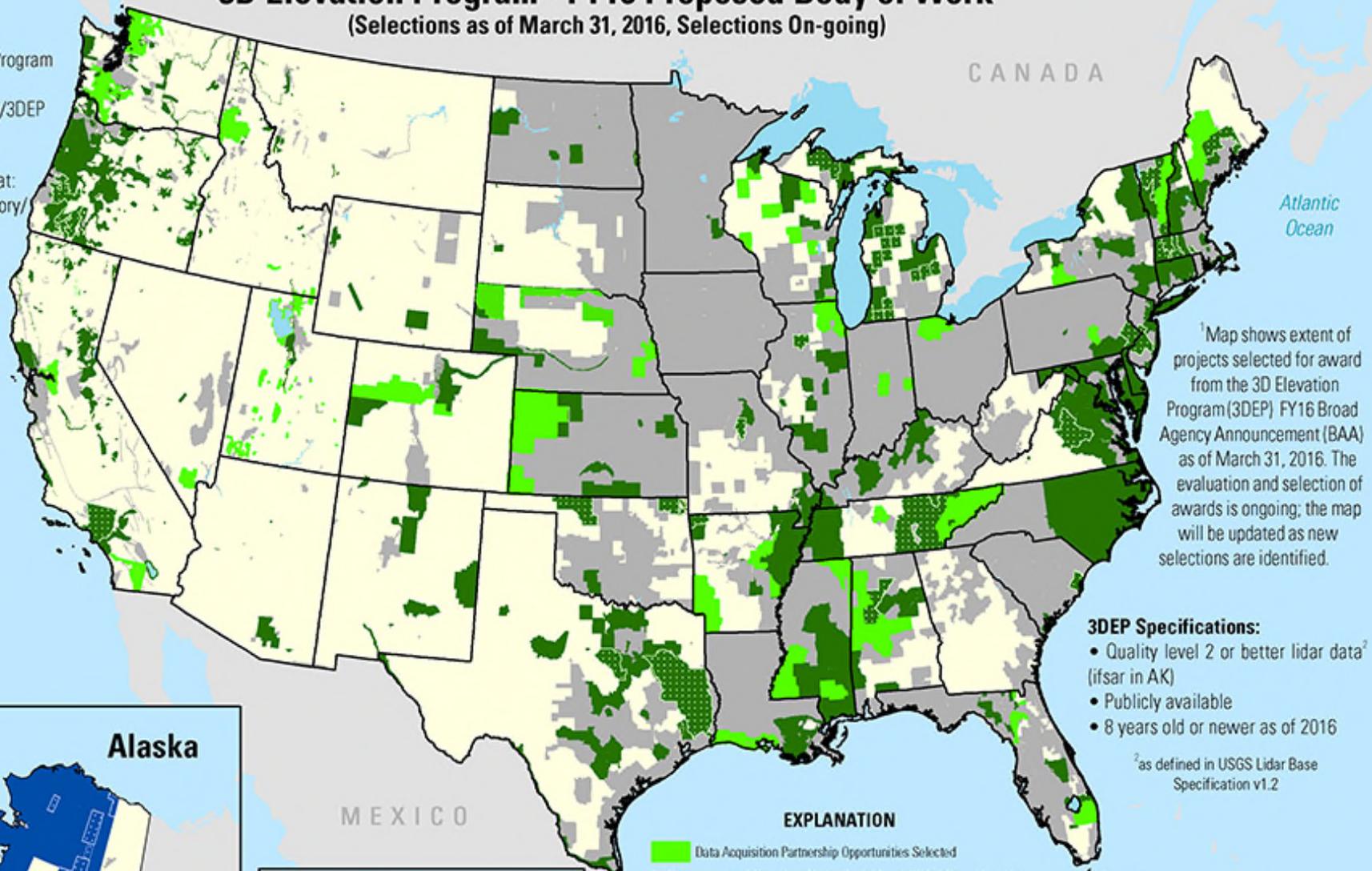
3D Elevation Program - FY16 Proposed Body of Work¹

(Selections as of March 31, 2016, Selections On-going)

For more on the 3D Elevation Program (3DEP) visit:
<http://www.nationalmap.gov/3DEP>

Visit the US Interagency Elevation Inventory (USIEI) at:
<http://coast.noaa.gov/inventory/>

Pacific Ocean



¹ Map shows extent of projects selected for award from the 3D Elevation Program (3DEP) FY16 Broad Agency Announcement (BAA) as of March 31, 2016. The evaluation and selection of awards is ongoing; the map will be updated as new selections are identified.

3DEP Specifications:

- Quality level 2 or better lidar data² (ifsar in AK)
- Publicly available
- 8 years old or newer as of 2016

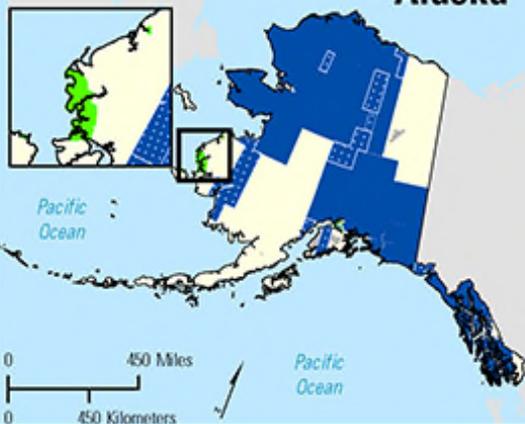
² as defined in USGS Lidar Base Specification v1.2

EXPLANATION

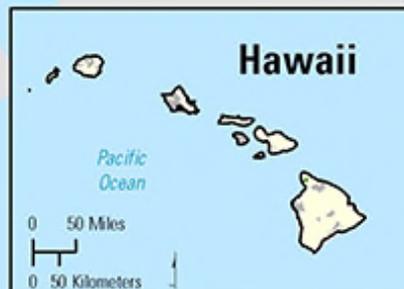
- Data Acquisition Partnership Opportunities Selected
- In Progress and Existing Data that Meet 3DEP Specification**
 - lidar
 - ifsar (Alaska)
- Planned Funded Data that Meet 3DEP Specification**
 - lidar
 - ifsar (Alaska)
- Data that Do NOT Meet 3DEP Specification**
 - Other lidar data
 - No publicly available lidar data (ifsar in Alaska)

Sources:
3DEP FY15/16 Broad Agency Announcement
USIEI data from October 2015

Alaska



Hawaii



Puerto Rico / US Virgin Islands

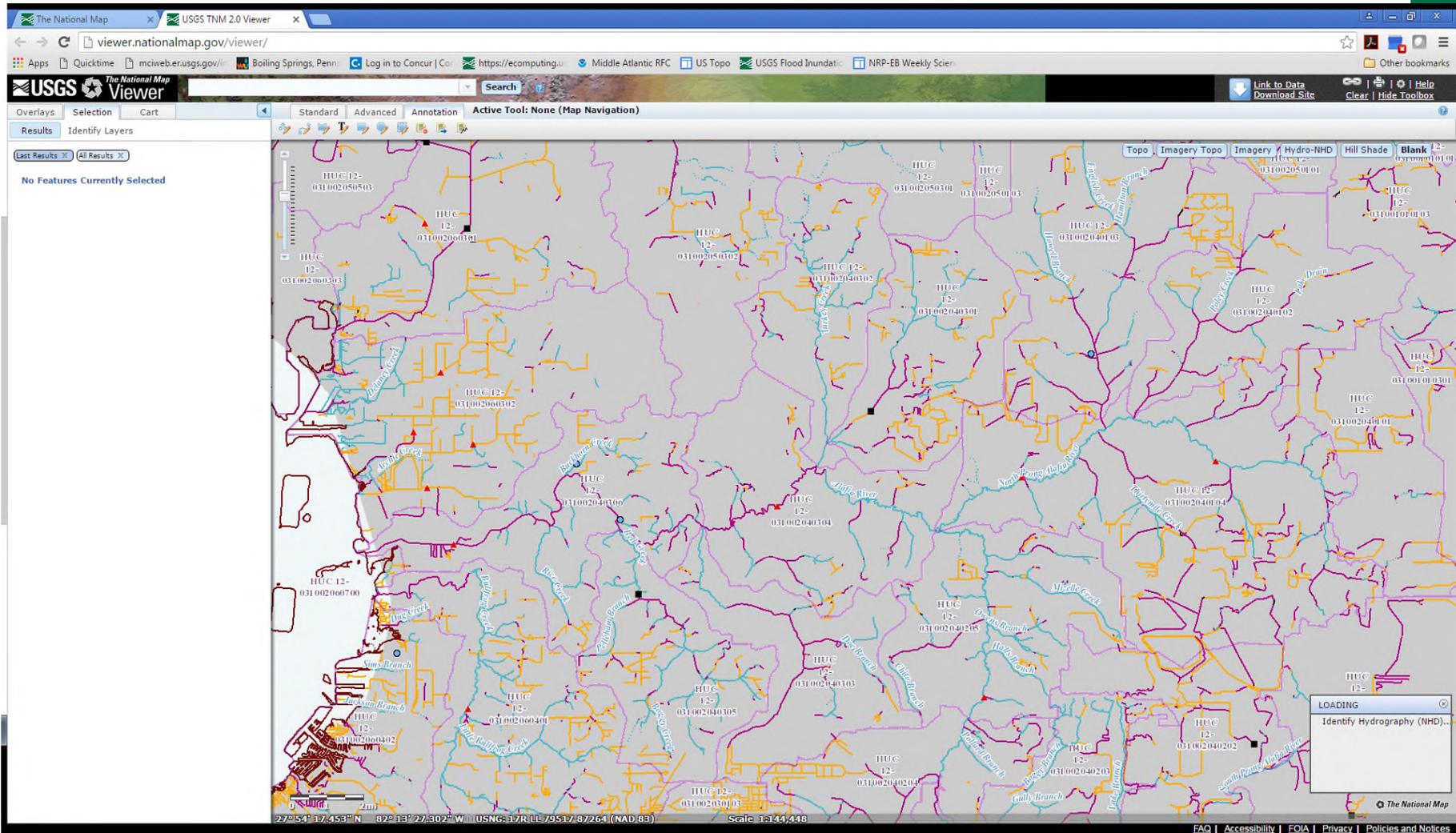


+ Hydrography

- National Hydrography Dataset (NHD)
- Watershed Boundary Dataset (WBD)
- NHDPlus (1:100K, with 1:24K or better coming soon)



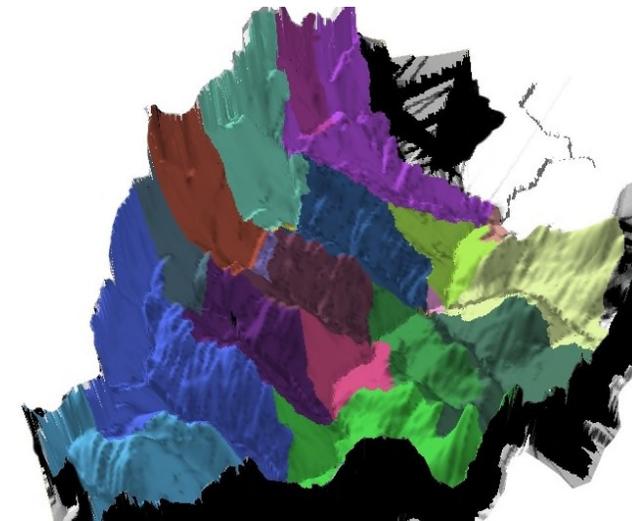
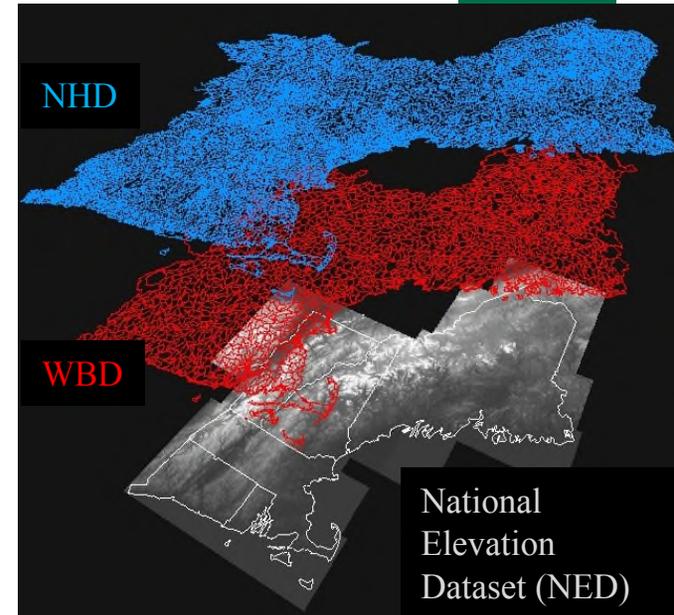
Hydrography near Tampa



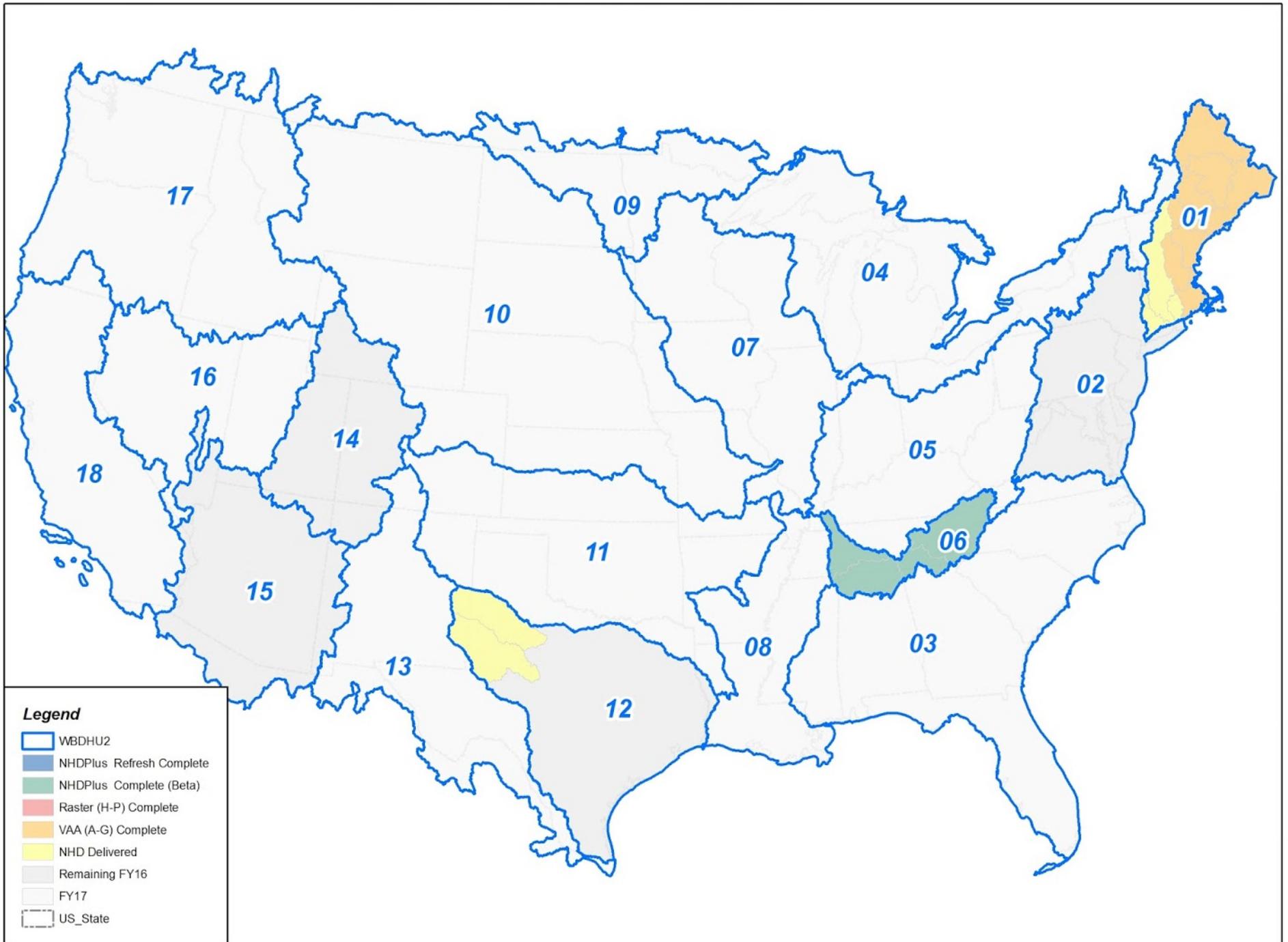
+ NHDPlus High Resolution

Integrating the Landscape with the Stream Network at 24K

- Builds on success of NHDPlus Medium Resolution (1:100K-scale)
 - Integrates NHD, NED, and WBD
- Addresses need for a single hydrographic frame of reference
 - User community currently divided:
 - NHDPlus (100K) regional/national applications
 - NHD HiRes (24K or better) local/state applications
 - NHDPlus HiRes provides both higher resolution data and ability to generalize to many different scales so that all users can link their data to the same core network
- Initial timeframes
 - Tools and procedures — Plan to have operational in Q3 FY16
 - Production will proceed by Sub-region, from upstream to downstream
 - FY 16 Goal: 1/4 of CONUS done (6 Regions)

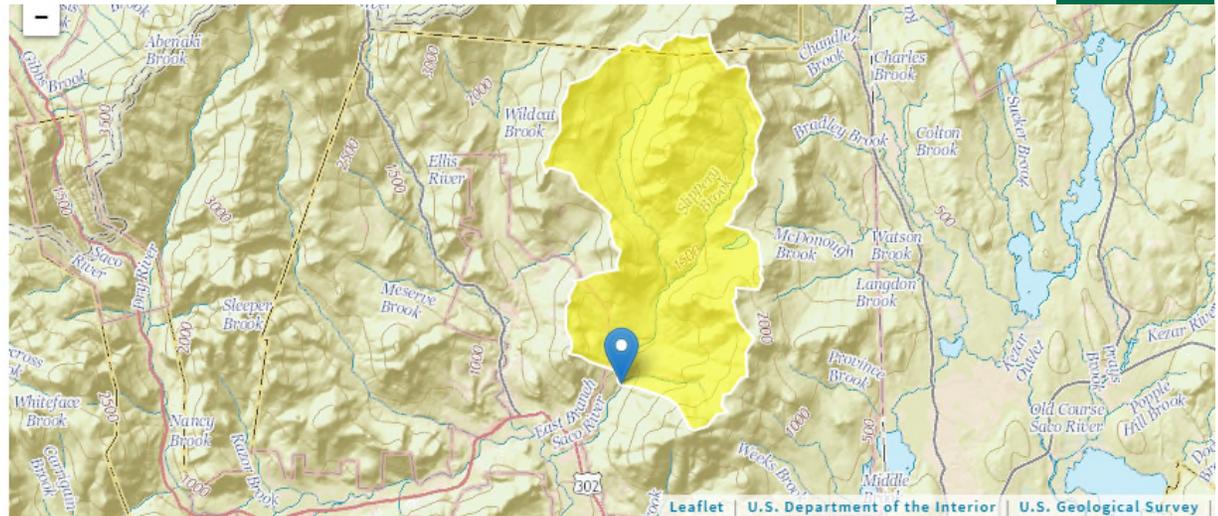


NHDPlus - Status 3/28/2016





StreamStats



Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	33.87	0.7	1290
Mean April Precipitation	4.898	2.79	6.23
Stream Slope 10 and 85 Method	148	5.43	543
Percent Wetlands	0.7821	0	21.8

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	2190	ft ³ /s	30.1
5 Year Peak Flood	3660	ft ³ /s	31.1
10 Year Peak Flood	4850	ft ³ /s	32.3
25 Year Peak Flood	6360	ft ³ /s	34.3
50 Year Peak Flood	7580	ft ³ /s	36.4
100 Year Peak Flood	9030	ft ³ /s	38.6
500 Year Peak Flood	12300	ft ³ /s	44.1

Stream velocity, feet per second

Most recent instantaneous value: 3.07 01-13-2014 11:00 EST

USGS 03198000 KANAWHA RIVER AT CHARLESTON, WV

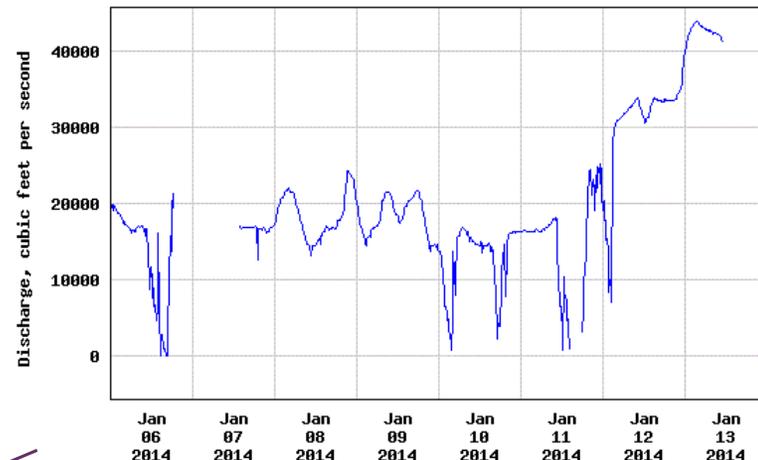


Measured velocity

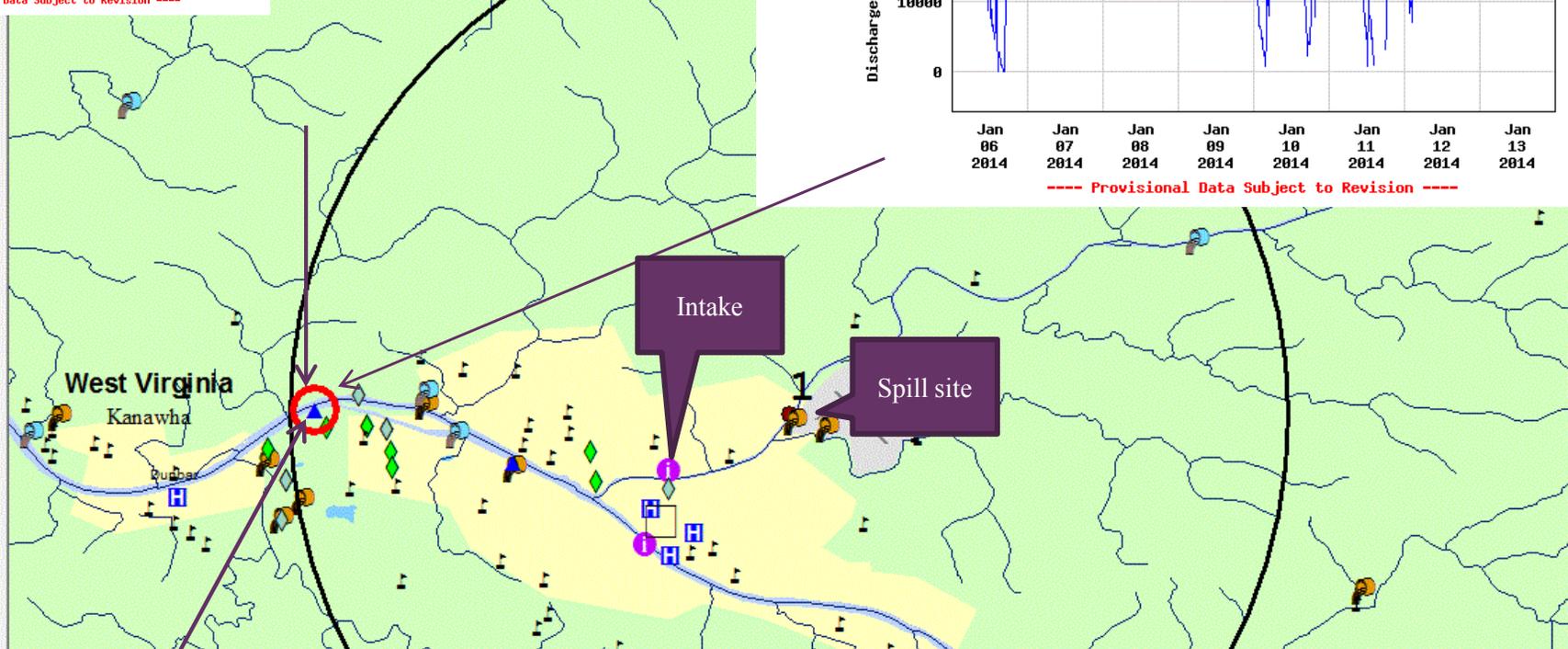
Discharge, cubic feet per second

Most recent instantaneous value: 41,200 01-13-2014 11:00 EST

USGS 03198000 KANAWHA RIVER AT CHARLESTON, WV



- Critical Customers: Schools
- Critical Customers: Hospitals
- HAZMAT: Risk Management Plan
- HAZMAT: Toxic Chemical Releases
- HAZMAT: Hazardous Waste Sites
- Dischargers: Municipal & Industrial
- Industrial Facilities
- Sewage Treatment Plants
- Public_Water_Supplies: Intakes
- Scenario Layer
- Point Sources
- Polygon Sources
- ICWater Base Map
 - Transportation Lines
 - NHD
 - NHDPlus05
 - Transportation Polygons
 - North America
 - World



Edit Flow Factor

User Specified

Flow: 41200.000 cfs Velocity: 3.149 fps
Flow Factor: 2.340 Velocity Factor: 1.260 Temperature: 20 °C

Selected Gage: KANAWHA RIVER AT CHARLESTON, WV

USGS Realtime

Gage Name	Realtime Flow	Realtime Velocity	NHD Flow	NHD Velocity	Flow Factor	Vel Factor
KANAWHA R...	No Flow Found	N/A	17606.42987	2.50441	N/A	N/A
KANAWHA RI...	41200	3.1487	17639.73754	2.5054	2.34	1.26

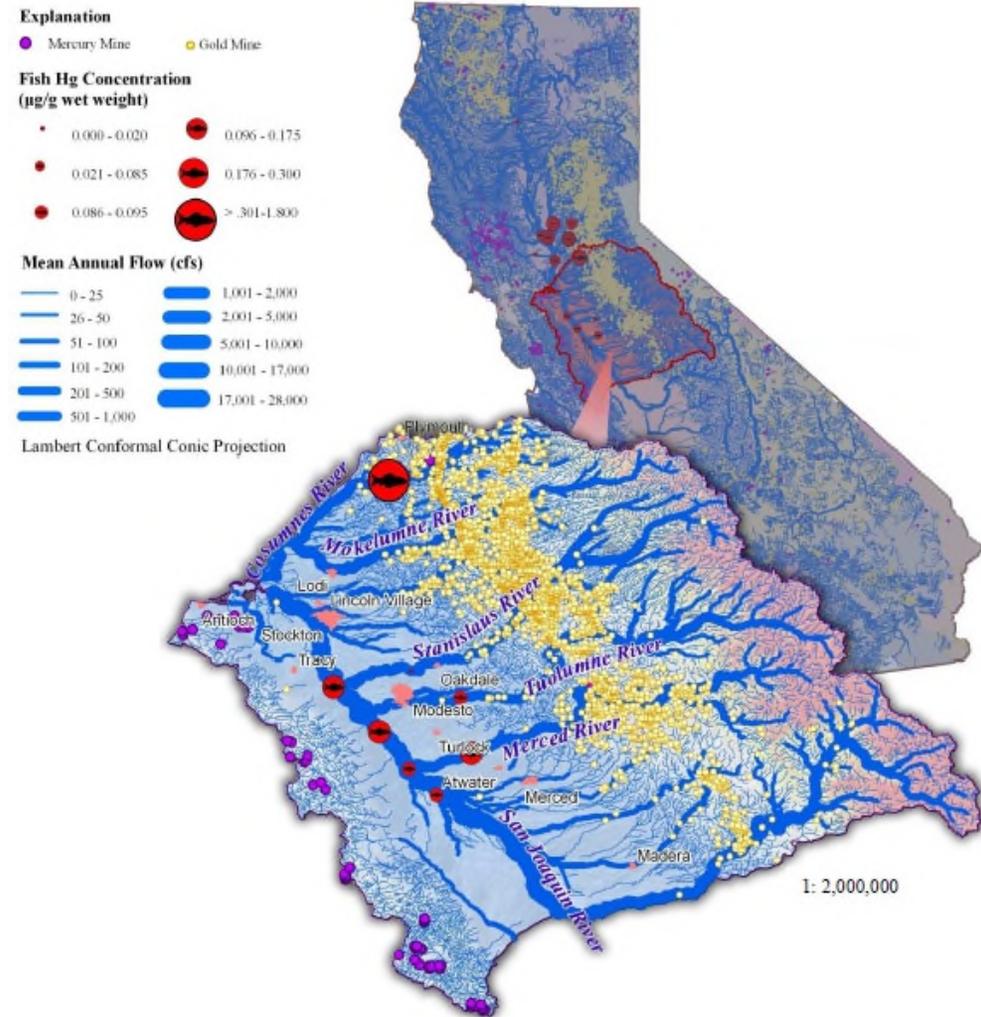
Model velocity

+

Operational Benefits Example

Cost Savings by Prioritizing Field Efforts

- Evaluation of mercury sampling sites, fish mercury concentrations, and upstream gold and mercury mines
- Visualizes possible relationships between mercury concentration and drainage patterns
- Can be used to prioritize additional sampling locations and analyses prior to field visits

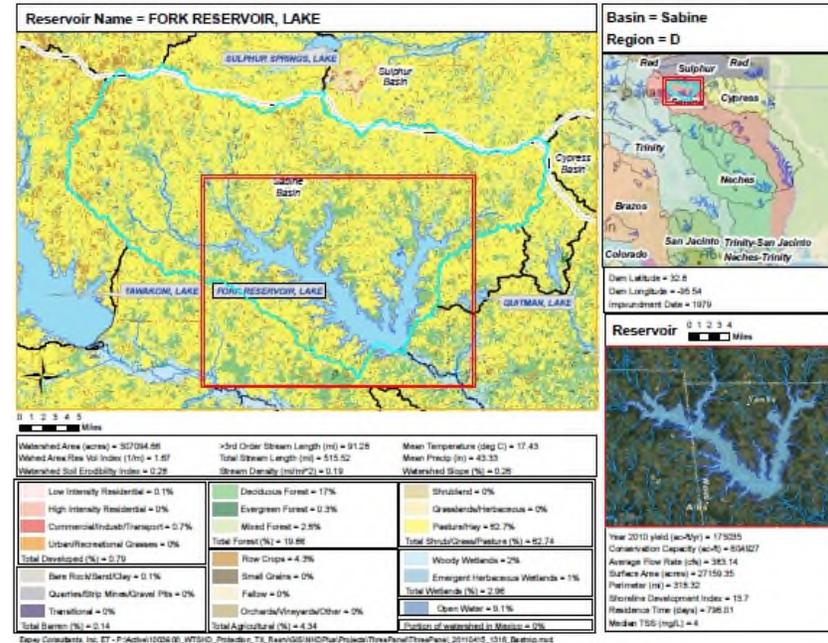
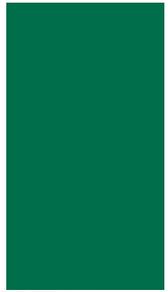




Operational Benefits Example

TX Reservoir Sedimentation Analyses

- Texas Water Development Board study of 194 major reservoirs at risk for sedimentation
- Annual loss of 90,000 acre-feet due to sedimentation exceeds projected increases from new reservoirs
- Reservoirs scored based on sedimentation weighting based on watershed area, slope, soil type, stream length and density, precipitation, reservoir characteristics, etc.
- Most at-risk reservoirs identified for watershed protection planning





Customer Service Benefits Example

Connecticut River Watershed Atlas

- Web-based tools using NHDPlus as spatial framework
- PDF reports with maps and attributes delivered based on user selections from 12,500 stream segments in Connecticut River watershed
- Customers can perform own analyses on-the-fly

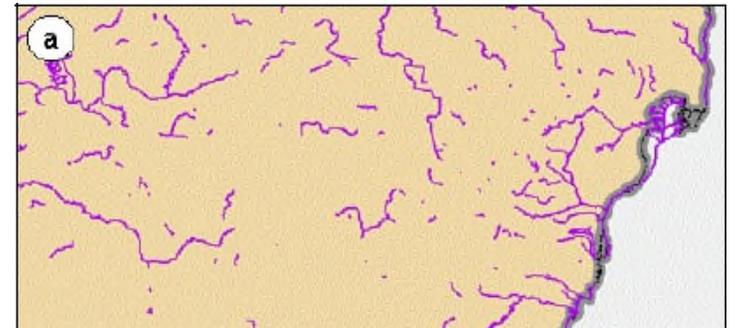


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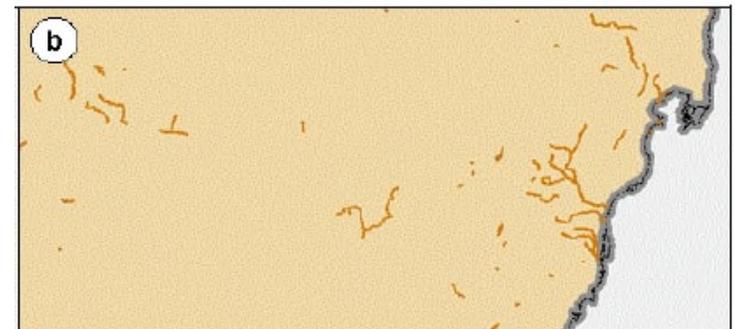
Customer Service Benefits Example

EPA Impaired Waters and TMDLs Datasets

- Supports widespread interest in GIS data on impaired waters
- On-line public access to spatial and tabular data for viewing or download
- Over 40,000 tracked waters consolidated from state listings of impaired waters and TMDLs indexed to the NHDPlus
- Linked to other EPA on-line documents and tools including WATERS

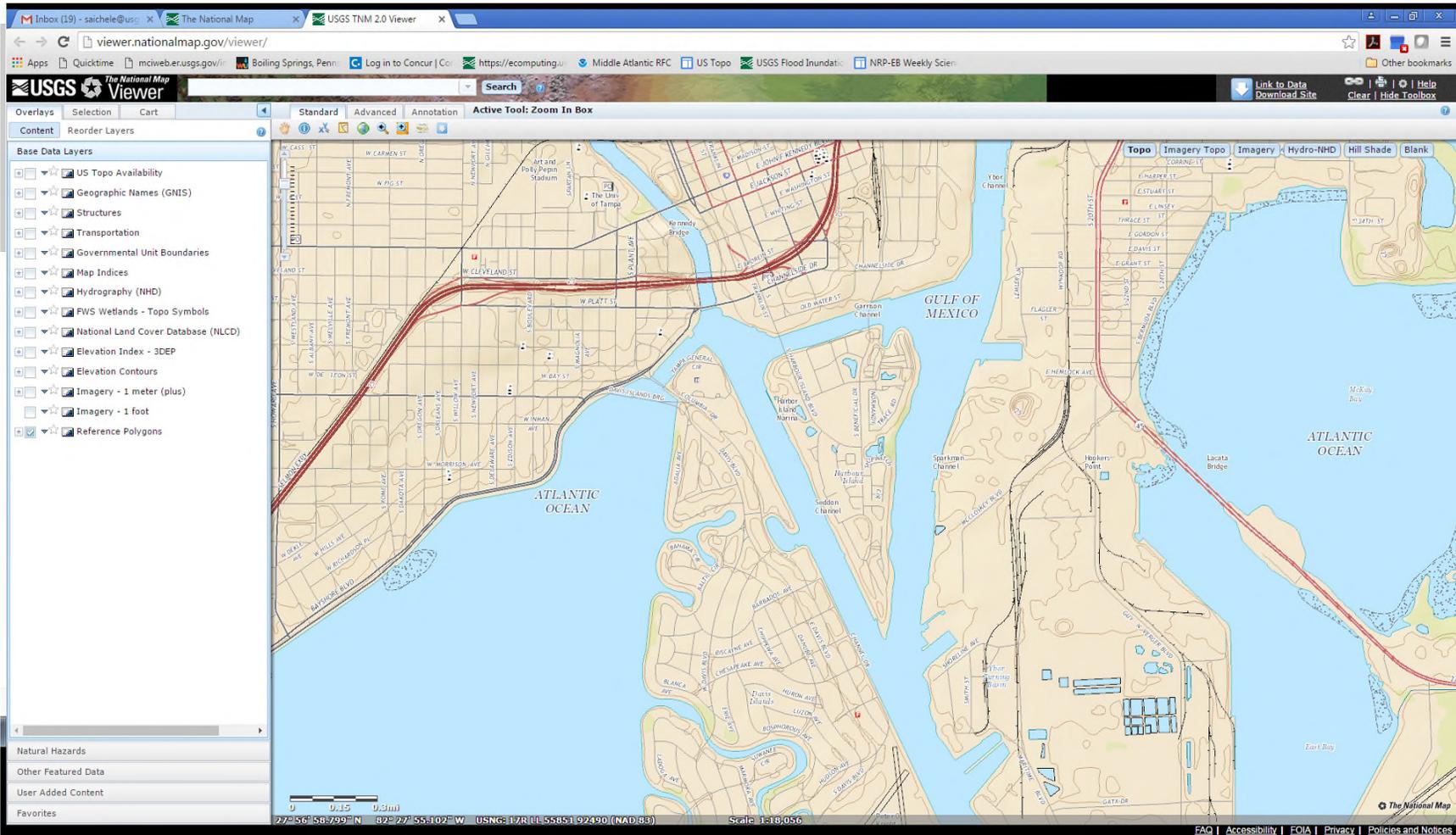


Impaired Waters



TMDLs

+ Cartographic products





Questions?

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U.S. Geological Survey
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(208)387-1323 ahrea@usgs.gov