Chesapeake Bay Program
Science. Restoration. Partnership.

Nontidal Waters Fish Habitat Assessment

Stephen Faulkner
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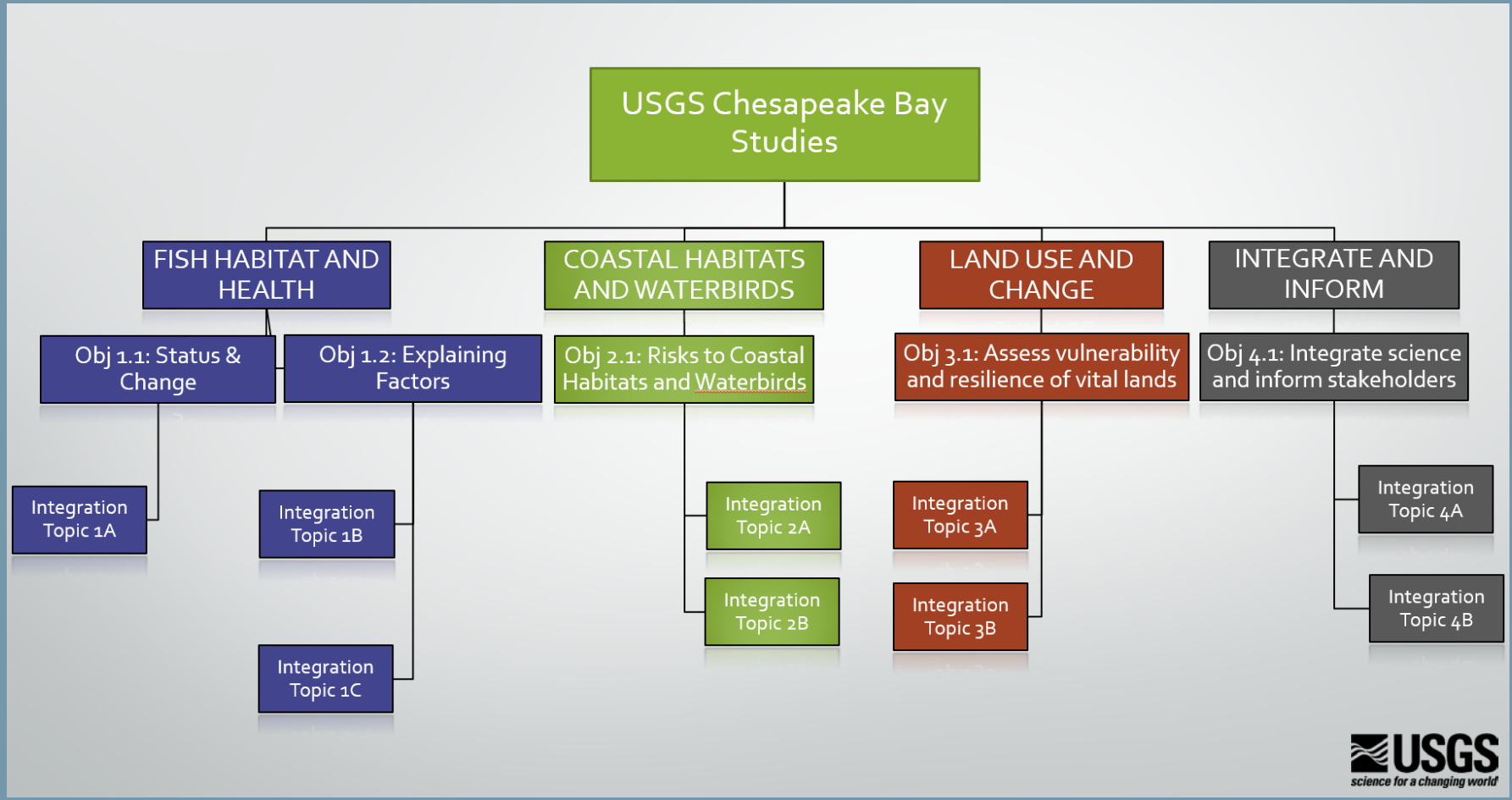
USGS Chesapeake Science to Inform CBP Goals



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Theme 1: Fish Habitat, Health, and Aquatic Conditions

Status and Trends

- Fish populations, stream, and aquatic conditions
- Consider HABs

Characterize and explain factors

Regional fish-habitat assessment

- Fish and macroinvertebrates
- Spatial patterns of factors

Explain changes and response to management

- Brook trout and invasive species
- Fish health, disease, and contaminants
- Aquatic conditions in different settings
- Relation to management practices

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Theme 1: Fish Habitat, Health, and Aquatic Conditions

Team: Leads: Kelly Maloney (LSC), John Young (LSC), Kevin Krause (LSC)

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Cindy Thatcher (NGP)
Christine Densmore (LSC)
Rich Walker (NSA/LSC
Jennifer Keisman (MDWSC)

2020-21 Logic and Action Plan - 2.1, 2.2 Assessment

2.1	Evaluation of different scales and summary assessment methods in a test area where data are available (nontidal only)	Final reports, publications, and data releases with results distributed to the Fisheries GIT, Fish Habitat Action Team, other stakeholders
2.2	Evaluation of information at 1:100,000 for the entire non-tidal portion of the watershed. and begin a nontidal watershed assessment at 1: 1:100K, (to compare with existing NFHP assessment)	Final reports, publications, and data releases with results distributed to the Fisheries GIT, Fish Habitat Action Team, other stakeholders

2020-21 Logic and Action Plan - 2.1, 2.2 Assessment

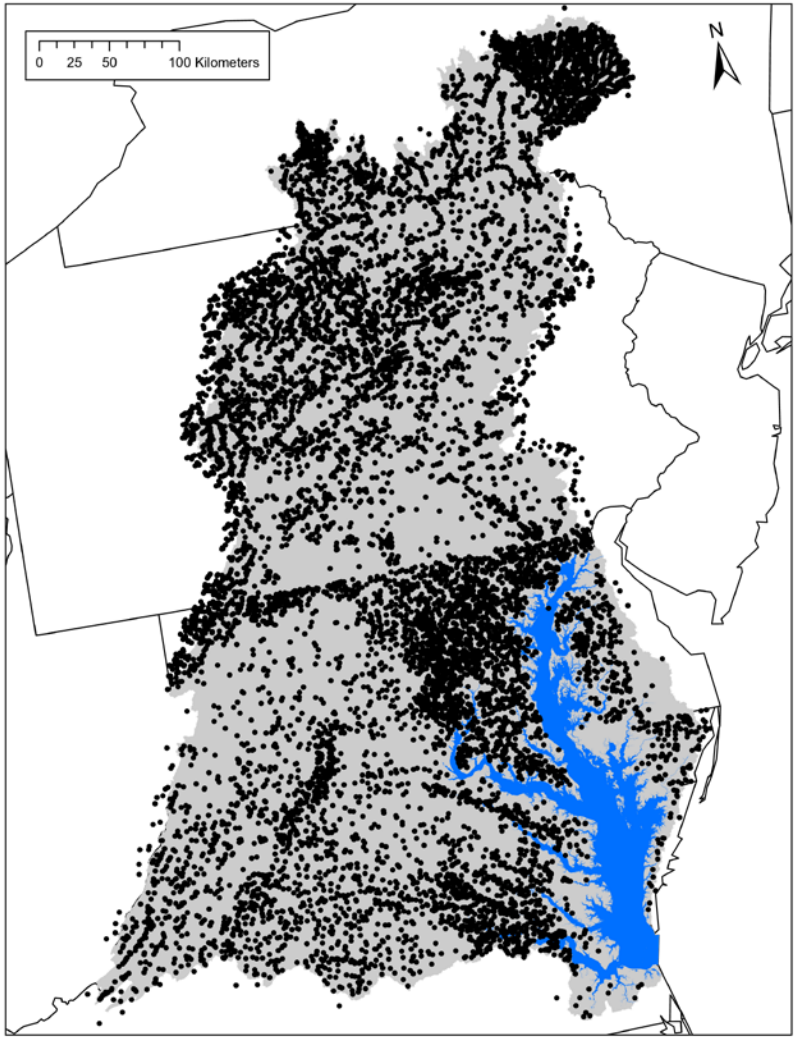
- 1:100k assessment by end of FY21 – predictive statistical model/GIS framework
- Additional FY20 funding to include agricultural BMPs for stream health, macroinvertebrates, fish
- Increasing coordination with the Stream Health WG and Healthy Watersheds GIT

2020-21 Logic and Action Plan – 2.5, 2.6 Data

2.5	Summary of fish metadata and data gaps (nontidal and tidal) Specific to biological fish data.	Receive fish metadata summary from Tetra Tech
		Combine USGS and Tetra Tech metadata
2.6	Updated inventory of stressors and predictors, their spatial scale and identification of data gaps (nontidal and tidal)	Collate new data sources for stressor, condition, and habitat variables with inventory from 2018 STAC Workshop
		Reformat data for simplified searching and viewing

Inland Fish Database

- Data compiled from over 20 separate data sources/sampling programs (data in hand)
- Composed of over 22,000 spatially and temporally explicit sampling events
- Sampling data are organized into a unified/common format with:
  - Common species names
  - Details regarding sampling target (community, species specific, abundance vs presence only)
  - Ancillary data about sampling protocol/effort (where available)
- Species are linked to life history/functional trait information (FishTraits; Frimpong and Angermeier, 2009)
- Spatially linked to NHDPlus V2 and NHDPlus HR (where appropriate) and working on linkage to EcoSHEDS
- Working on summarizing site specific summary metrics (species richness, diversity, species traits, etc.)
- Data summary, QA/QC - July 2020



Inland Fish Database

Program	Agency	Contact_Name	Purpose	Study_Area	Study_Length	Sampling_Method	Sampling_Target	Community_Data_Collected	Life_Stages_Sampled	Abiotic_Data_Collected	Gear_Type	Sampling_Area	Sampling_Time	DLT_Data	Public_Release	Data_Storage_Type	Data_Source
Freshwater Fisheries Program	MD DNR	Ross Williams (ross.williams@maryland.gov)	Various monitoring	Maryland Waters	1974-20	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	Access Database	Provided upon request
Watershed Assessment Section	WV DEP	Jeff Bailey (jeffrey.e.bailey@wv.gov	Monitoring	West Virginia waters	2006-20	yes	yes	yes	no	yes	yes	yes	yes	no	no	Excel spreadsheets	Provided upon request
Watershed Management Division	Montgomery County Department of Environmental Protection	Mark Rockman (mark.rockman@montgomerycountymd.gov)	Monitoring	Montgomery county waters	1990-20	yes	yes	yes	no	yes	yes	yes	yes	yes	no	Excel spreadsheets	Provided upon request

2020-21 Logic and Action Plan – 2.8 Eel habitat

2.8	American eel habitat assessment	White paper on scoping American eel habitat assessment from existing data. Results distributed to the Fisheries GIT, Fish Habitat Action Team, Fish Passage Workgroup, and other stakeholders

2020-21 Logic and Action Plan – 2.8 Eel habitat

Incorporating GIS habitat analysis into American eel stock assessments (ASMFC)

- A synthesis of existing GIS layers/data relevant to American eel to use in defining current available habitat; outputs include 1) quantitative measures of area by river system/tributary, 2) maps of eel habitat by river system/tributary, regionally, coastwide
- Use GIS outputs to generate new estimates of potential stock productivity and/or reference points by river system/tributary, regionally, coastwide
- Test new stock productivity estimates for application in assessment models to determine if improvements in carrying capacity estimation can be made
- Develop American Eel Productivity Classifications by river system/tributary based on system size, water quality attributes (T, Flow, etc.), and other variables important to eel; ground-truth habitat-based classifications with American eel monitoring data for YOY and yellow stages, as well as landings; attempt N/km^2 estimation; consider tying Classifications to new fisheries management approach.

2020-21 Logic and Action Plan – 2.8 Eel habitat

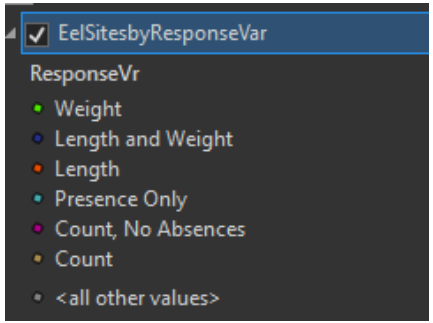
- Identifying sources, assembling records of American eel, and categorizing records by presence, abundance, density, etc. from various data bases

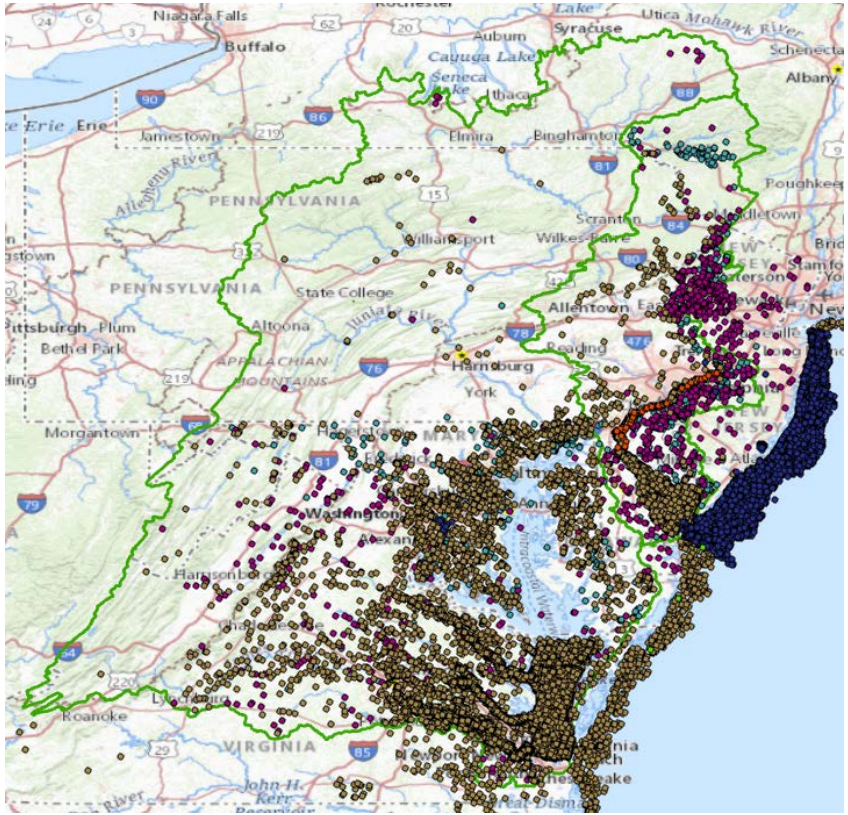
- Compiling databases of environmental predictors to use in habitat modeling.
  - Inland: NHD Plus V2 (1:100K) streams/catchments; linked summary environmental data
  - Tidal: Summarizing data by 1 Km hexagons

- Examining statistical modeling techniques appropriate to response variable type - machine learning (Random Forests, Boosted Regression Trees), logistic regression

2020-21 Logic and Action Plan – 2.8 Eel habitat

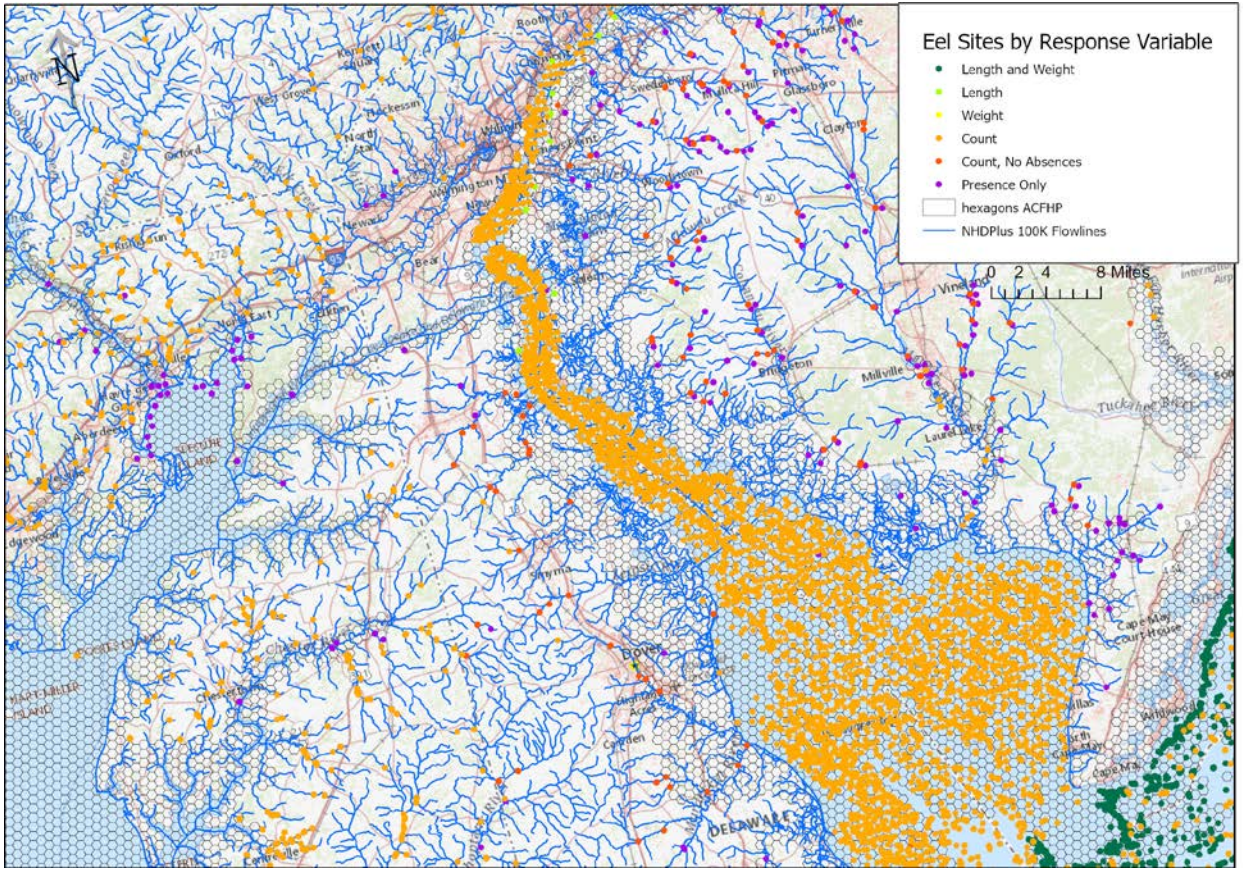
Sites by Response Variable





2020-21 Logic and Action Plan – 2.8 Eel habitat

Example American eel compiled sites and summary framework



2020-21 Logic and Action Plan – 2.9 Blue Catfish

2.9	Conduct co-designed 'test bed'study with MD DNR on invasive blue catfish in the Patuxent River	Final reports, publications, and data releases with results distributed to the Fisheries GIT, Fish Habitat Action Team, other stakeholders Data visualization tool of invasive blue catfish tagging study on distribution and movement patterns Summary of the management challenges and priority science needs of invasive blue and flathead catfish.

2020-21 Logic and Action Plan – 2.9 Blue Catfish

- Report to Chesapeake Bay Science Team, "Aquatic Invasive Species in the Chesapeake Bay Drainage: Research-based Needs and Priorities of USGS Partners and Collaborators" In Press

- Christine Densmore represents USGS Chesapeake Bay Team on:

  - Mid-Atlantic Panel for Aquatic Invasive Species, a regional panel of the Aquatic Nuisance Species Task Force
  - Invasive Catfish Work Group of the Chesapeake Bay Program

- USGS LSC scientists are working with MD DNR on a study to investigate invasive blue catfish populations, mesohabitat, and trophic impacts on the Patuxent River MD

- USGS LSC scientists are currently working to expand this scope of work to collaborate with other state level management agencies in Chesapeake Bay related to blue catfish science needs.

Christine L. Densmore
Veterinary Medical Officer

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2020-21 Logic and Action Plan – 3.1 Species Maps

3.1	Species Occupancy maps (Nontidal only) showing where different species occur

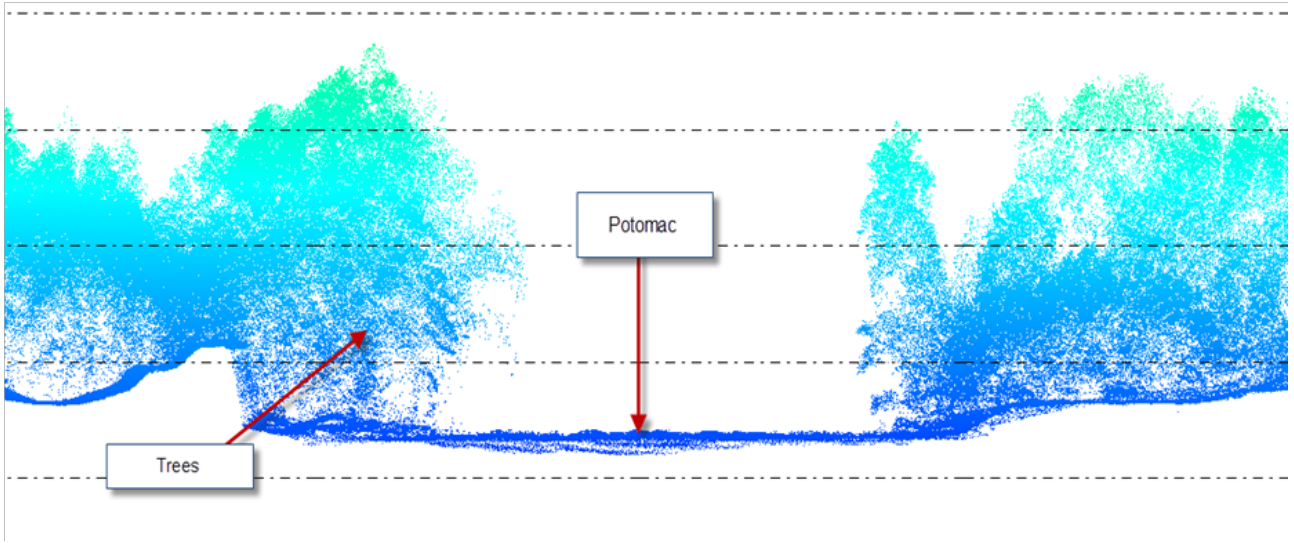
- Will begin once the data are all finalized
- Priority species?

2020-21 Logic and Action Plan – 3.2 LIDAR

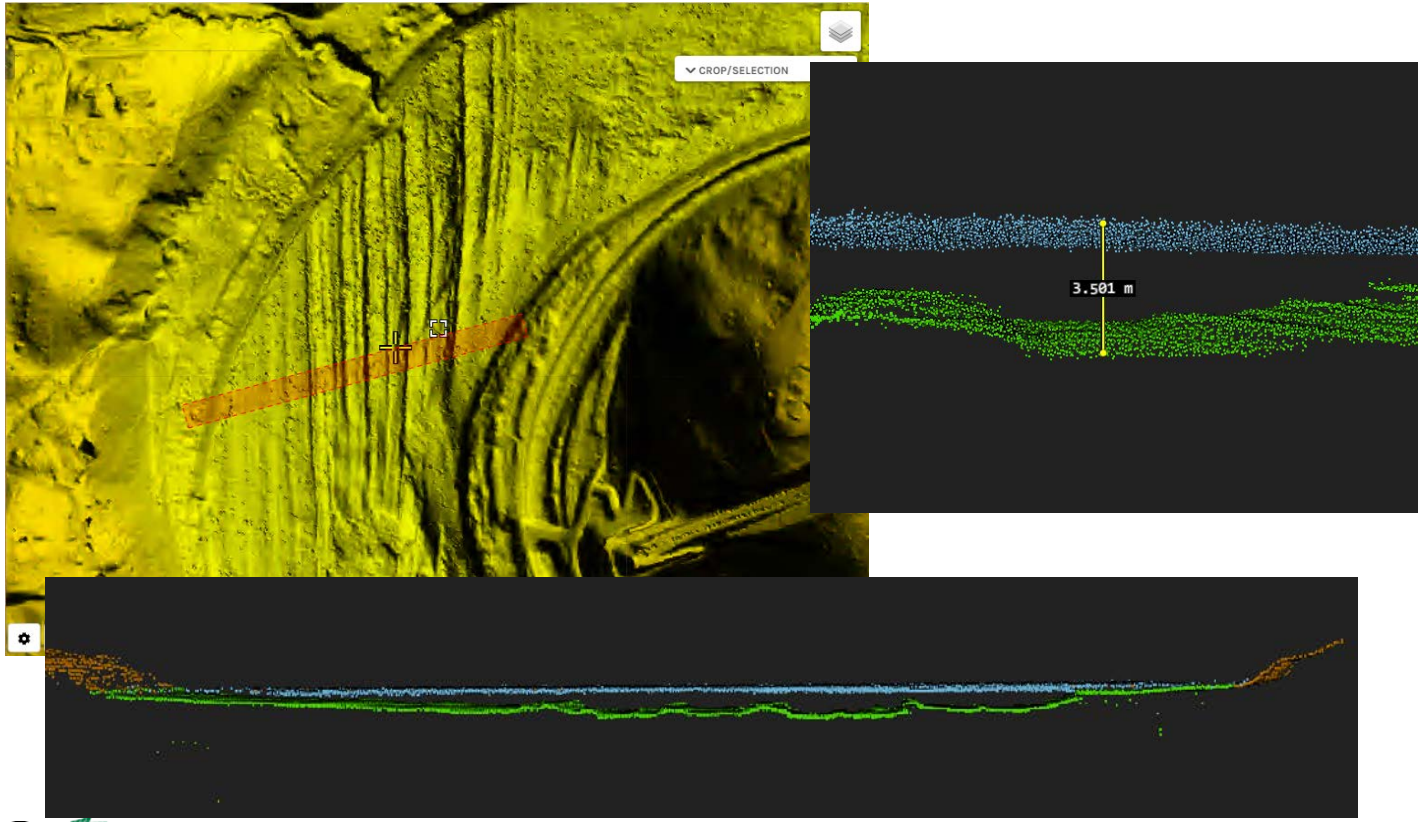
3.2	Potomac River and Shenandoah River bathymetric LIDAR.	Collect and assess bathymetric LIDAR data on the Potomac and Shenandoah Rivers. Report and data release

USGS Science Integration on the Potomac - Topo/Bathymetric Lidar

Initial returns indicate close to bank-to-bank coverage



X-section with enlargement



USGS Science Integration on the Potomac - Topo/Bathymetric Lidar

- Project lead by John Young, Leetown Science Center, -use case- fish habitat characterization, monitoring, sensor comparison
- Cherie Schultz ICPRB coordinating agreements, funding, field support, -use case- time & travel of spills to drinking water intakes
- NGP coordination, JFA & SOW, contract Liaison, field support, Region funding support, Roger Barlow, Cindy Thatcher. CPT support Leslie Lansbery, Tim Saultz. Refine inland topo/bathy process, contracting costs, sensor comparison. *–Data integration- Standards development-*
- Region and Science Center support from MD-DE-DC WSC, Woods Hole, Water Discipline, VA-WV WSC. UAV, boats, towed acoustic instruments. Use case-improved flow modeling, flood inundation modeling
- EROS Data Center, data calibration, data comparison, Jeff Danielson, others, -use case- bathy data comparison
- Chesapeake Bay Ecosystem Study –use case- fish health, rare plants


Questions?
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