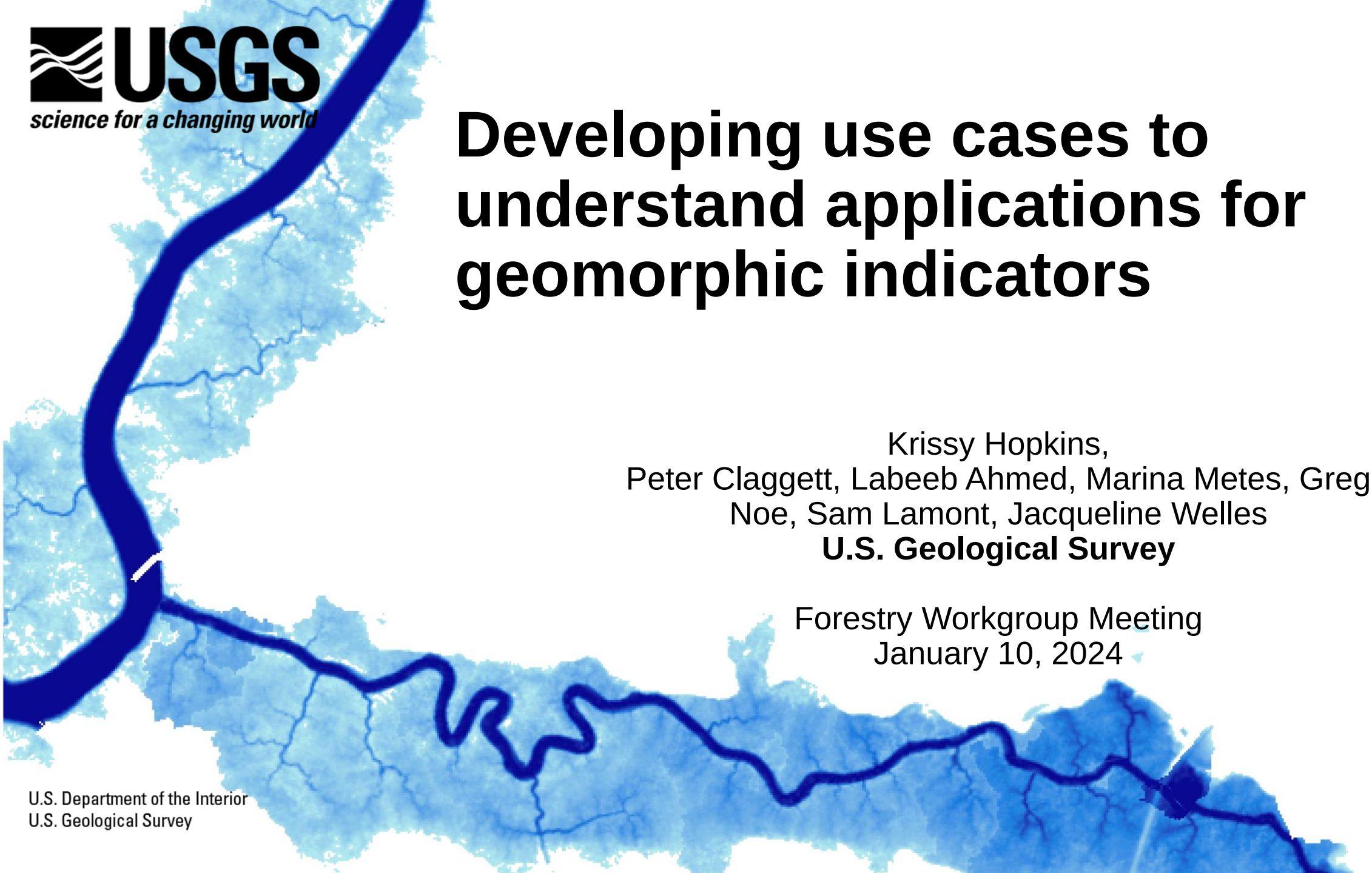


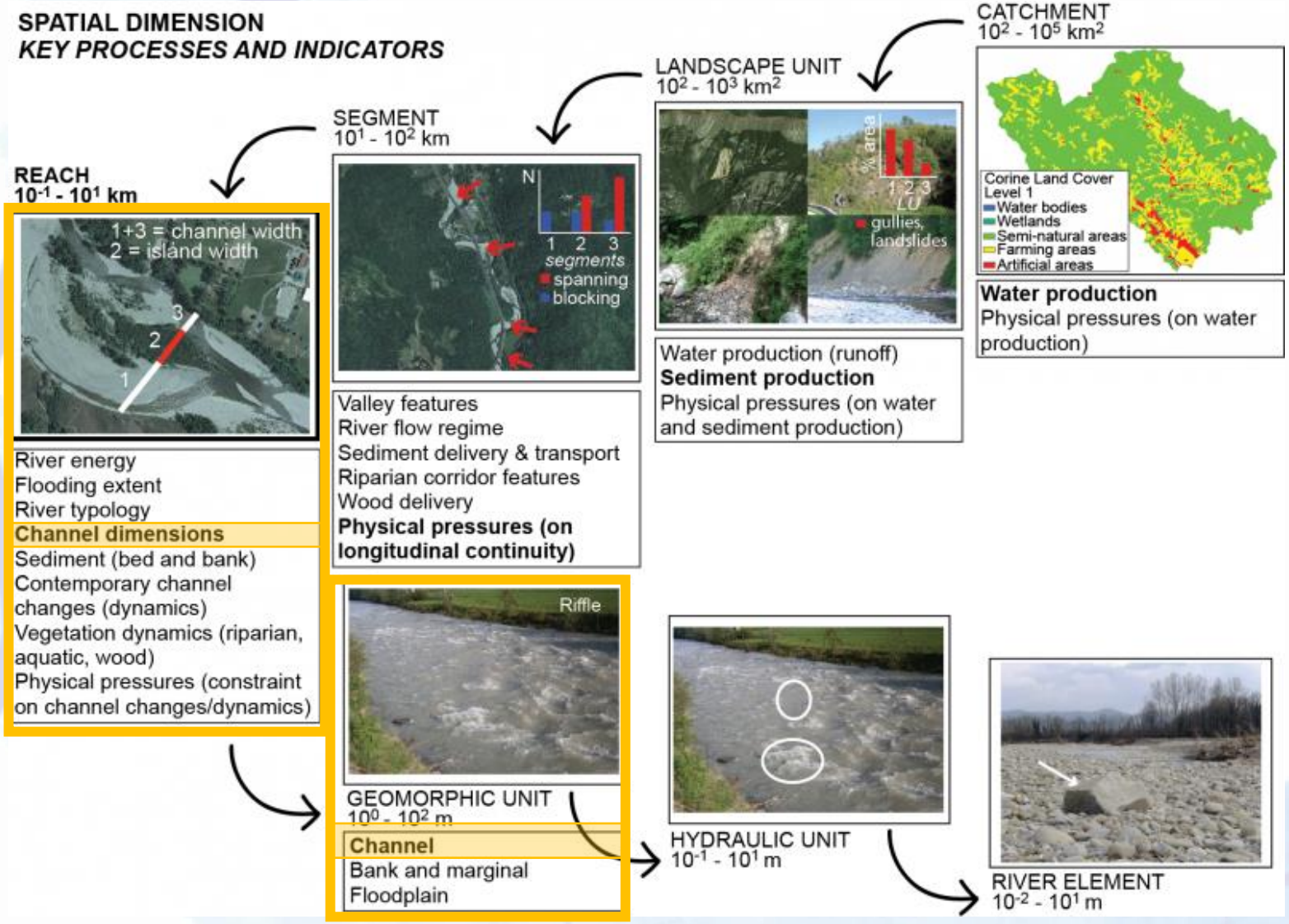
Developing use cases to understand applications for geomorphic indicators

Krissy Hopkins,
Peter Claggett, Labeeb Ahmed, Marina Metes, Greg Noe, Sam Lamont, Jacqueline Welles
U.S. Geological Survey

Forestry Workgroup Meeting
January 10, 2024

U.S. Department of the Interior
U.S. Geological Survey

How are rivers organized across space?



European Commission REFORM hierarchical framework, 2015

Which indicators to track for stream health?

Hydrogeomorphic indicators

- Valley type/confinement
- **Floodplain connectivity**
- Riparian vegetation
- Bedform diversity/stability
- **Lateral stability**

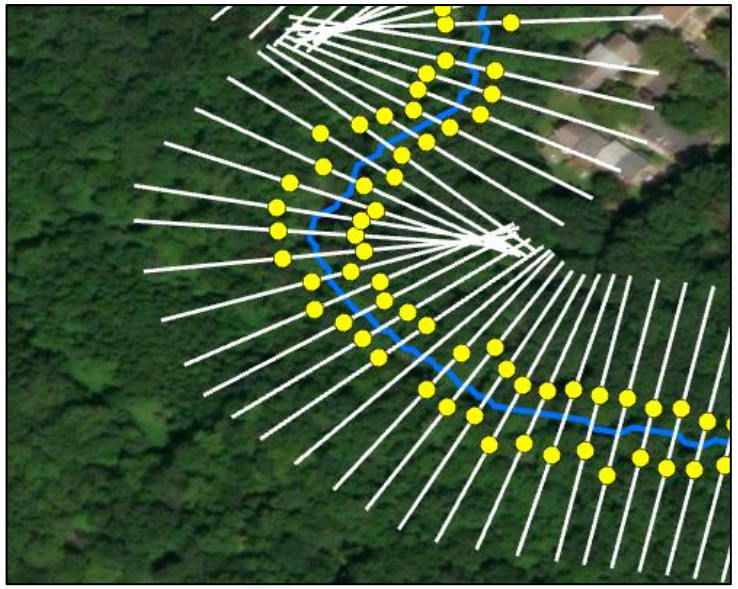
GIT#12, Tetra Tech, 2023

Reach scale: The Floodplain and Channel Evaluation Tool: FACET

Channel and floodplain dimensions at each cross section

- **Bank height**
- Bank angle, avg
- Bank angle, max
- **Channel width**
- Channel length
- Bank-full area
- **Active floodplain width (~2yr)**
- Floodplain elevation range
- Floodplain elevation, sd

Spatial scale



Reach
Individual cross sections

Segment
Stream segment
Future release will be at 24K scale

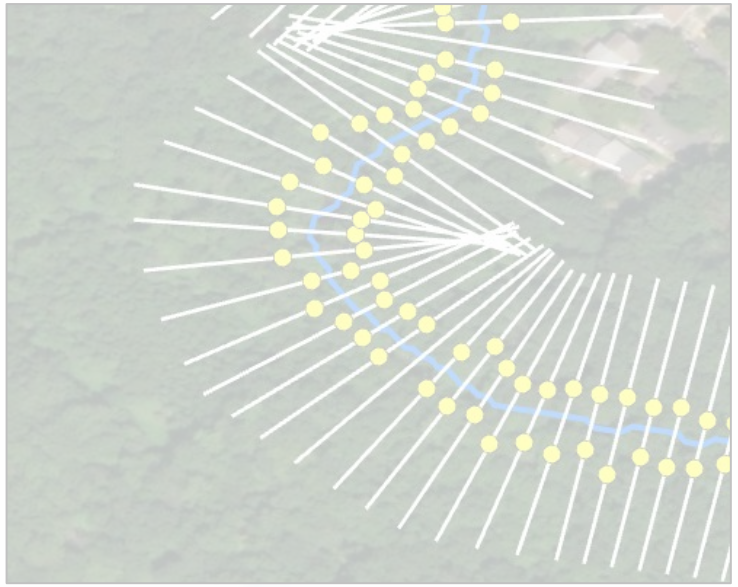
Data Release: Hopkins et al. 2020, https://doi.org/10.5066/P9RQJPT1

Segment scale: The Floodplain and Channel Evaluation Tool: FACET

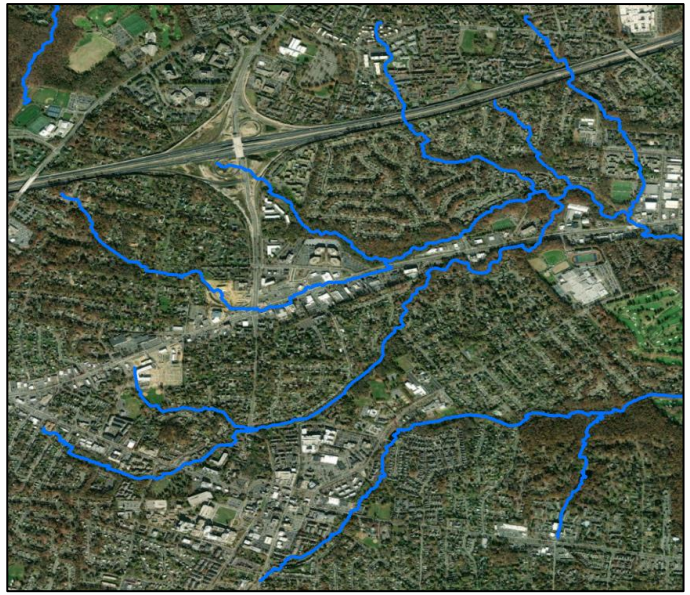
Segment mean channel and floodplain dimensions

- **Bank height**
- Bank angle, avg
- Bank angle, max
- **Channel width**
- Channel length
- Bank-full area
- **Active floodplain width (~2yr)**
- Floodplain elevation range
- Floodplain elevation, sd
- Sinuosity
- Stream slope

Spatial scale



Reach
Individual cross sections



Segment
Stream segment
Future release will be at 24K scale

Data Release: Hopkins et al. 2020, https://doi.org/10.5066/P9RQJPT1

FACET 1-m data release coming Spring 2024

Will be aggregated to the NHD HiRes (24K) catchments

Geomorphic metrics relevant to stream health

- Width to depth (incision)
- Entrenchment ratio (channel width/floodplain width)
- Deviation from Bieger regional curve for width (Observed/Expected)
- Deviation from Bieger regional curve for depth (Observed/Expected)
- Valley confinement (degree of confinement or Y/N)

Planning for these 1-m metrics to be incorporated into the regional assessment models

Co-developing use cases that use hydrogeomorphic indicators

Objective: Develop use cases using hydrogeomorphic indicators to address a management challenge.

Timeline: January – September, 2024
Coincides with release of 1-m geomorphic metrics in the Spring 2024.

Time Commitment: Attend 2-4 meetings to provide direction and feedback on the use case.

Product: A 2-pg summary of the use case.

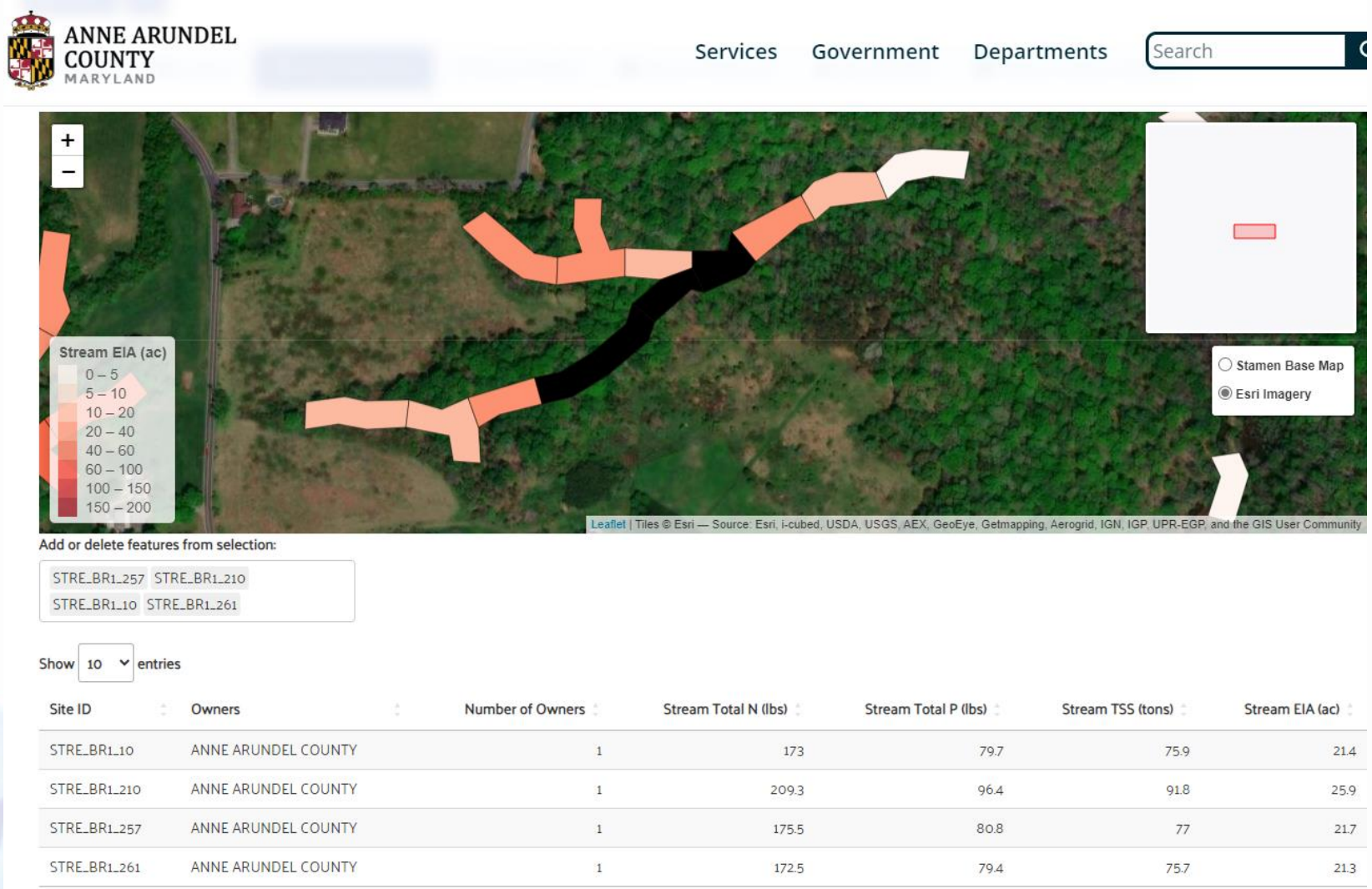
USGS

Example from Anne Arundel County, MD

Anne Arundel County, MD

Estimates stream restoration credits based lidar elevation changes between 2017 and 2020.

200-ft stream segment credits
- Total nitrogen
- Total phosphorus
- Total suspended sediment



Site ID	Owners	Number of Owners	Stream Total N (lbs)	Stream Total P (lbs)	Stream TSS (tons)	Stream EIA (ac)
STRE_BR1_10	ANNE ARUNDEL COUNTY	1	173	79.7	75.9	21.4
STRE_BR1_210	ANNE ARUNDEL COUNTY	1	209.3	96.4	91.8	25.9
STRE_BR1_257	ANNE ARUNDEL COUNTY	1	175.5	80.8	77	21.7
STRE_BR1_261	ANNE ARUNDEL COUNTY	1	172.5	79.4	75.7	21.3

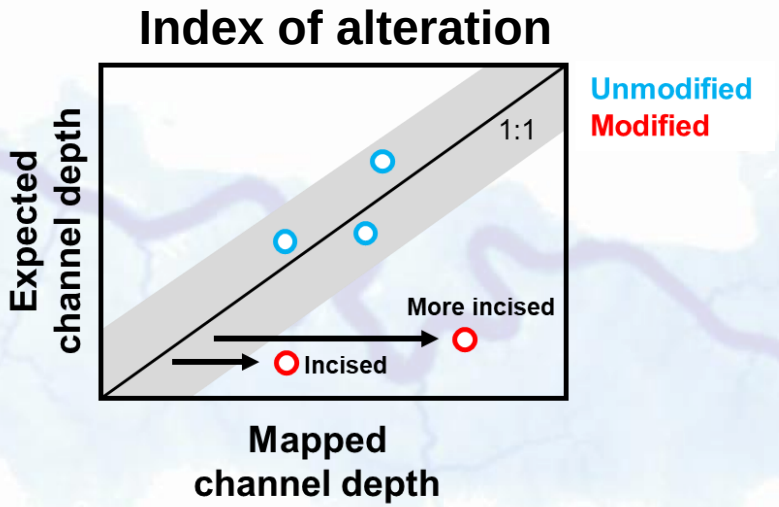
USGS

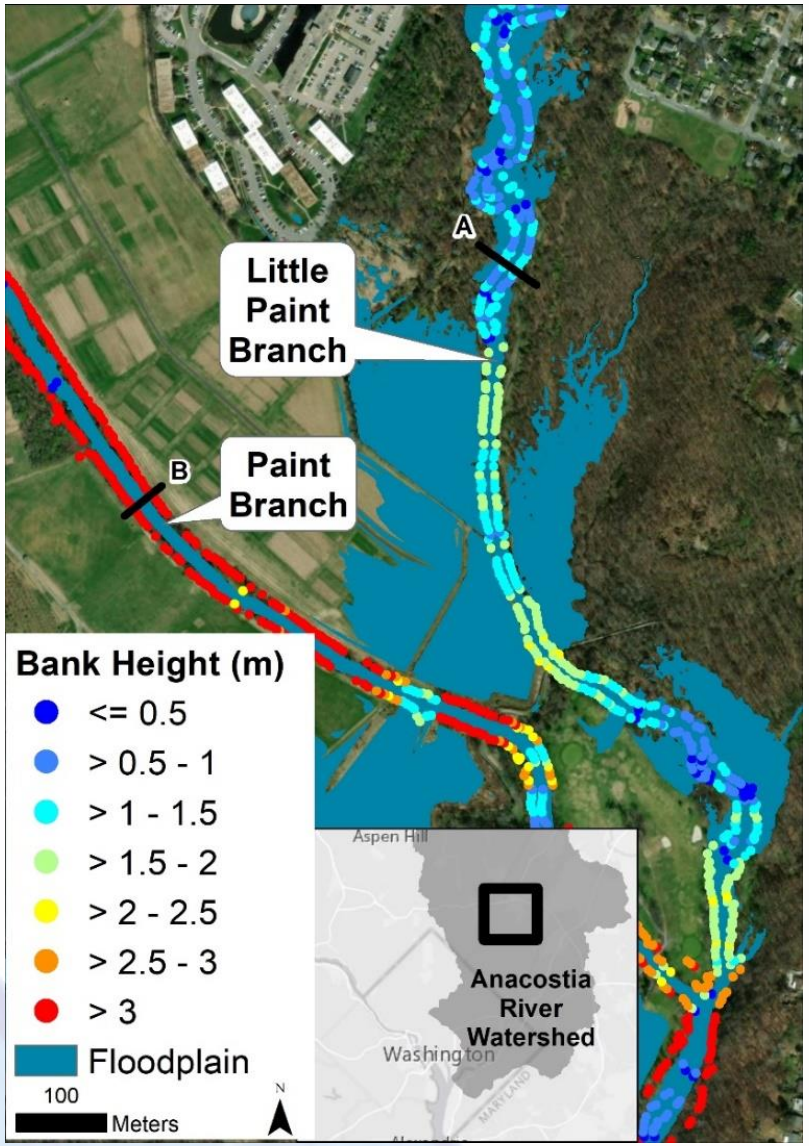
Anne Arundel County, Maryland - Restoration Estimator Tool

Use Case 1: Channel depth and width

How is this variable useful in a management context?

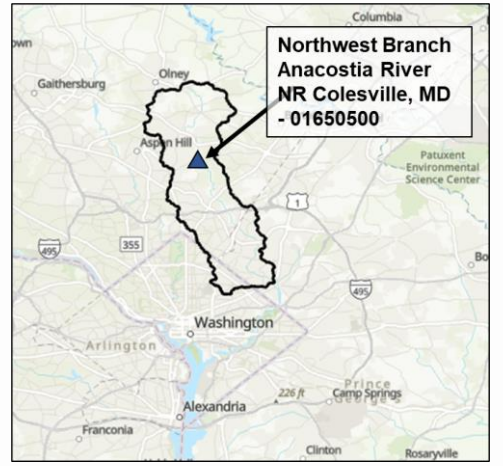
- Identify and triage areas for restoration
- Develop incision proxy (width/depth)
- Develop an index of alteration within a county or watershed





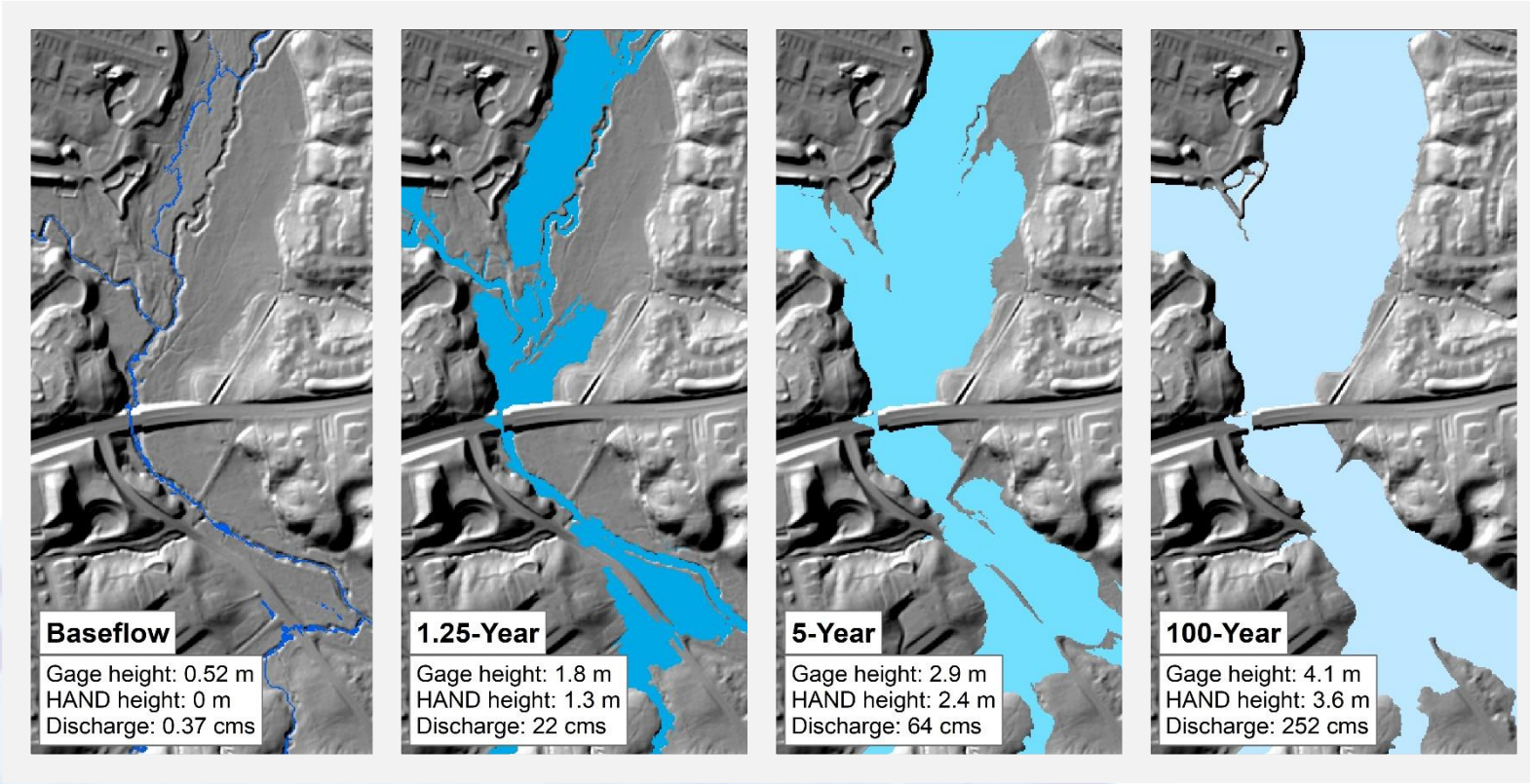
Data Release: Hopkins et al. 2020, https://doi.org/10.5066/P9RQJPT1

Use Case 2: Floodplain inundation



How is this variable useful in a management context?

- Maps the **active river area** that could be used to identify riparian areas
- Are any members managing floodplains using something other than FEMA's 100 yr floodplain?
- Implications for floodplain conservation



USGS

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Contact: Krissy Hopkins, khopkins@usgs.gov

USGS