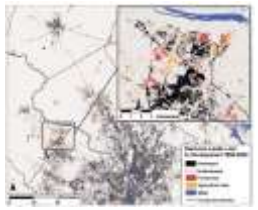

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.
Precision Conservation:
Using New Technologies to Identify Landscape Scale Conservation and Restoration Priorities
Chesapeake Conservancy
Saving the Chesapeake's Great Rivers and Special Places

Developing new tools and resources to help partners improve the effectiveness and efficiency of their conservation programs

- *Precision Conservation*
- *Interactive Web-mapping*
- *Water Quality Monitoring*
- *Climate Adaptation*
- *University Engagement*
- *Contractual Services*

Water Quality Monitoring

Interactive Web-mapping



Precision Conservation

University Participation

Better Understanding of What Land to Protect and What Land to Restore

Indicator Species Assessments

CONSERVATION INNOVATION CENTER
CHESAPEAKE CONSERVANCY

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

NRCS
Natural Resources Conservation Service

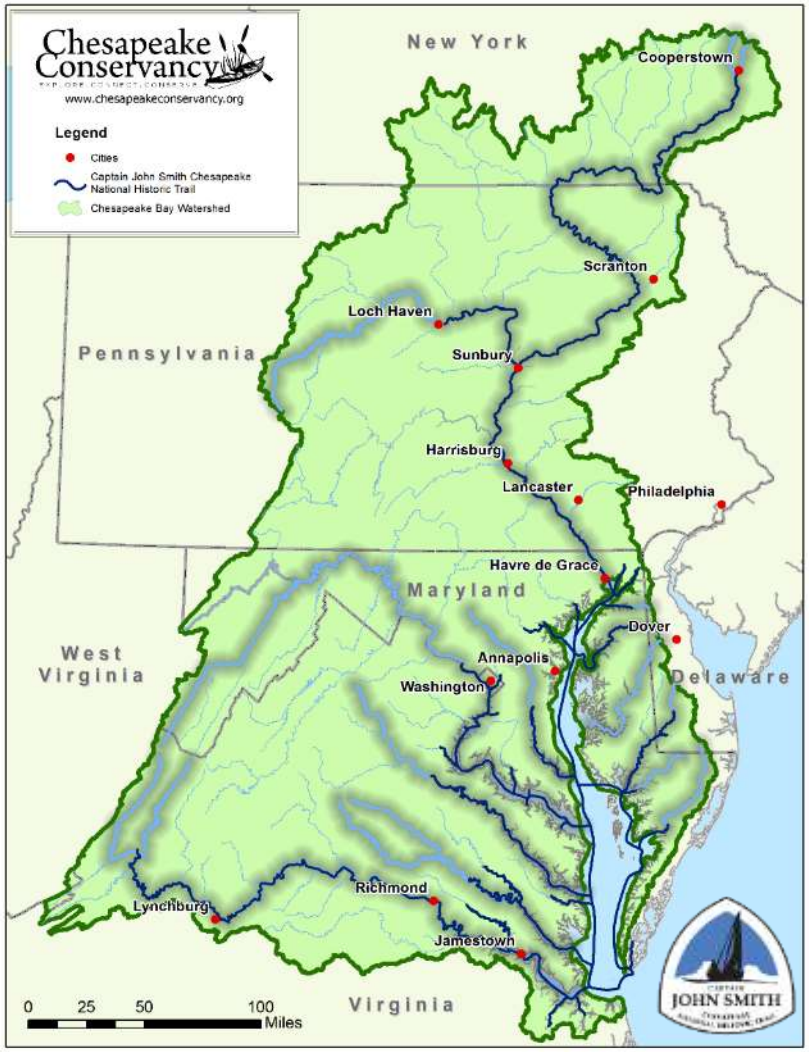
NATIONAL GEOGRAPHIC

WILDLIFE MANAGEMENT INSTITUTE
ESTABLISHED IN 1911

esri

intel

dessc
digital energy & sustainability solutions campaign



Saving the Chesapeake's Great Rivers and Special Places

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

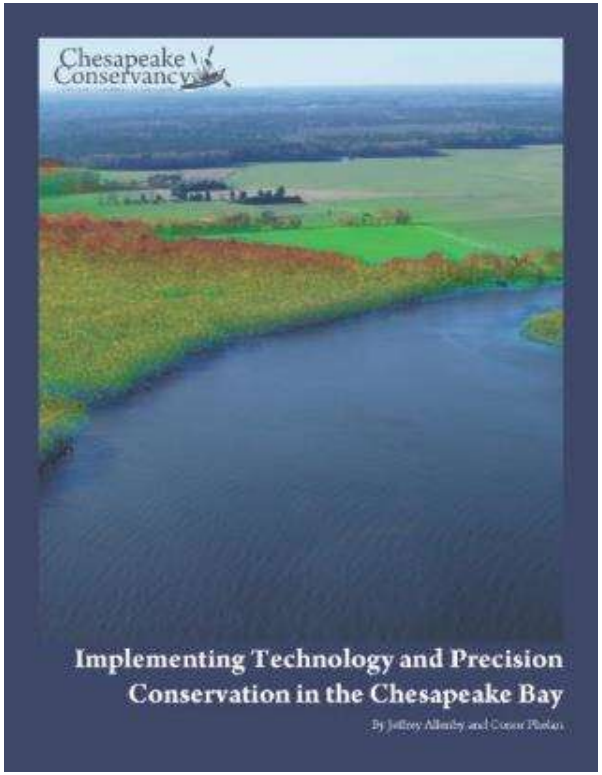
Precision Conservation: Eastern Shore High-Resolution Landscape Analysis

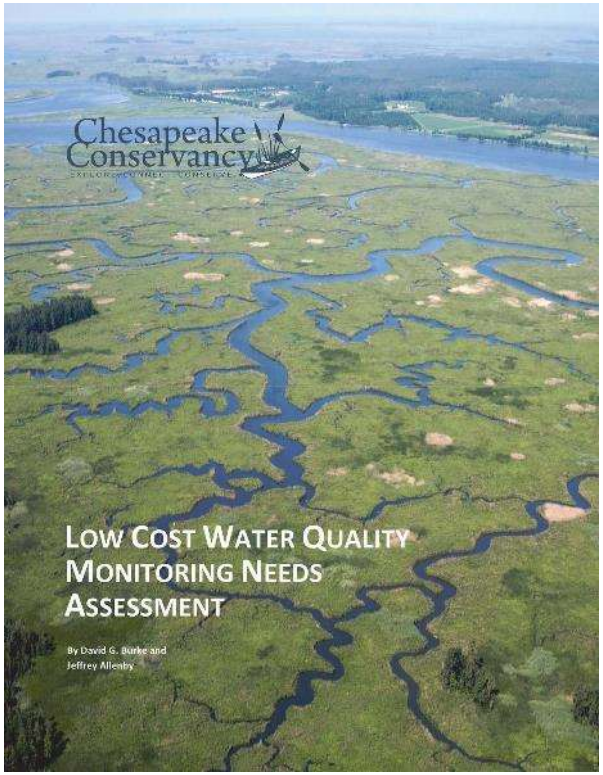
Saving the Chesapeake's Great Rivers and Special Places

Precision Conservation Landscape Analysis

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

*"Getting the **right practices**, in the **right places**, at the **right scale**, at the **right time** and making sure **they are working**"*





The Need for Precision Conservation

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

Existing datasets work well for watershed-scale planning but lack the resolution needed to identify opportunities to implement solutions at the field scale

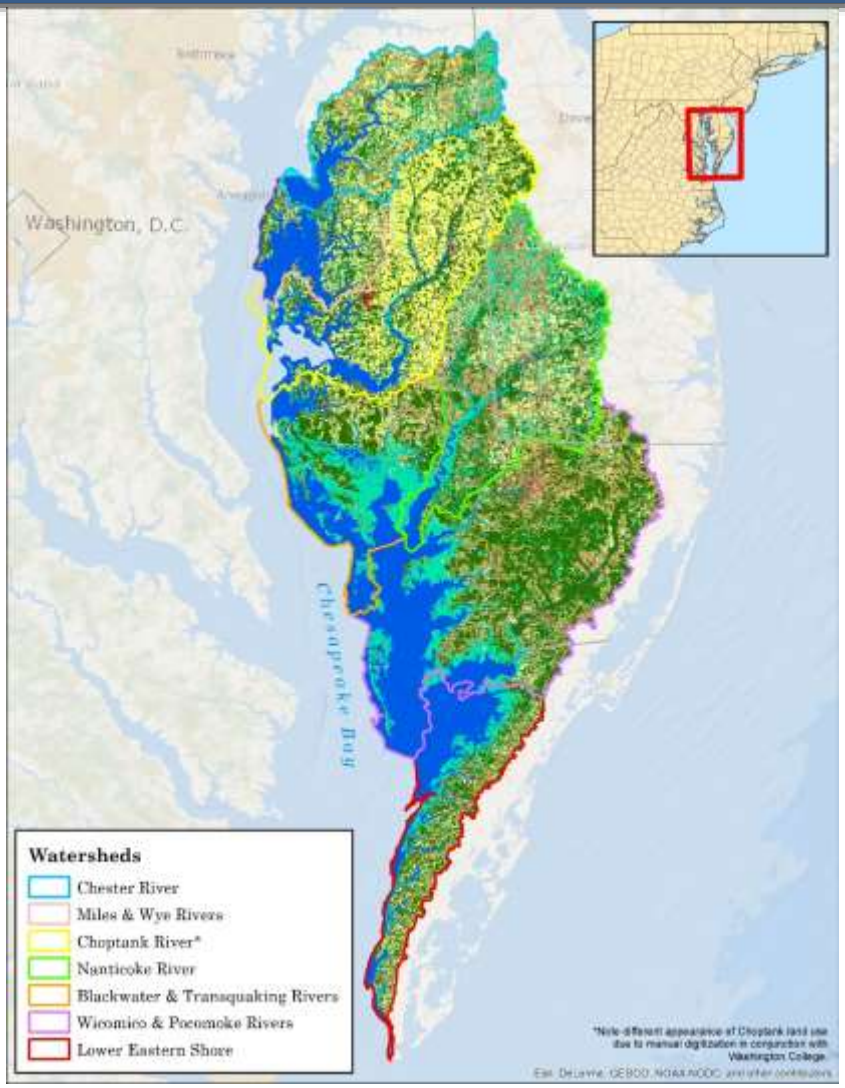
The Need for Precision Conservation

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

We are applying advanced GIS and remote sensing to identify priorities for conservation and restoration at the *parcel-scale*

Landscape Analysis

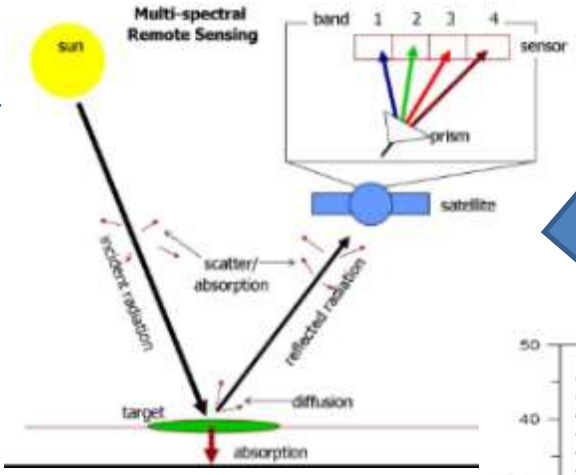
- *High-resolution Land Use Classification*
- *Concentrated Flow Path Analysis*
- *Normalized Difference Flow Index*

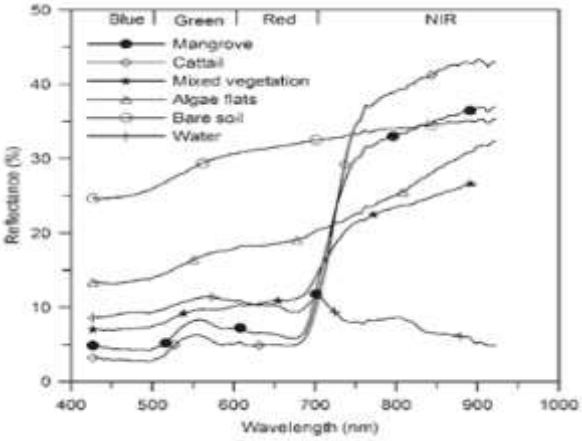


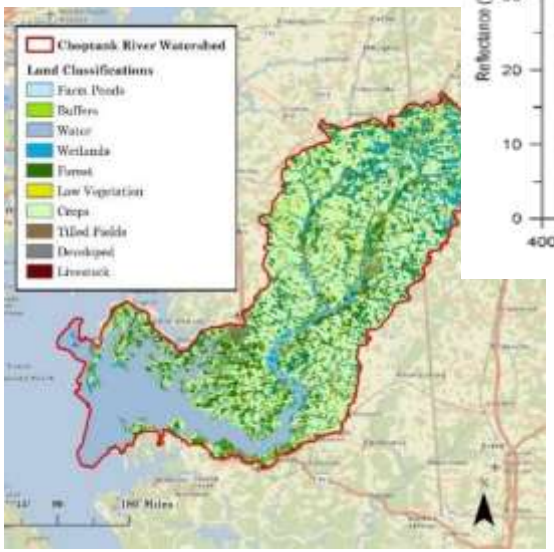
High-resolution Land Use Classification

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

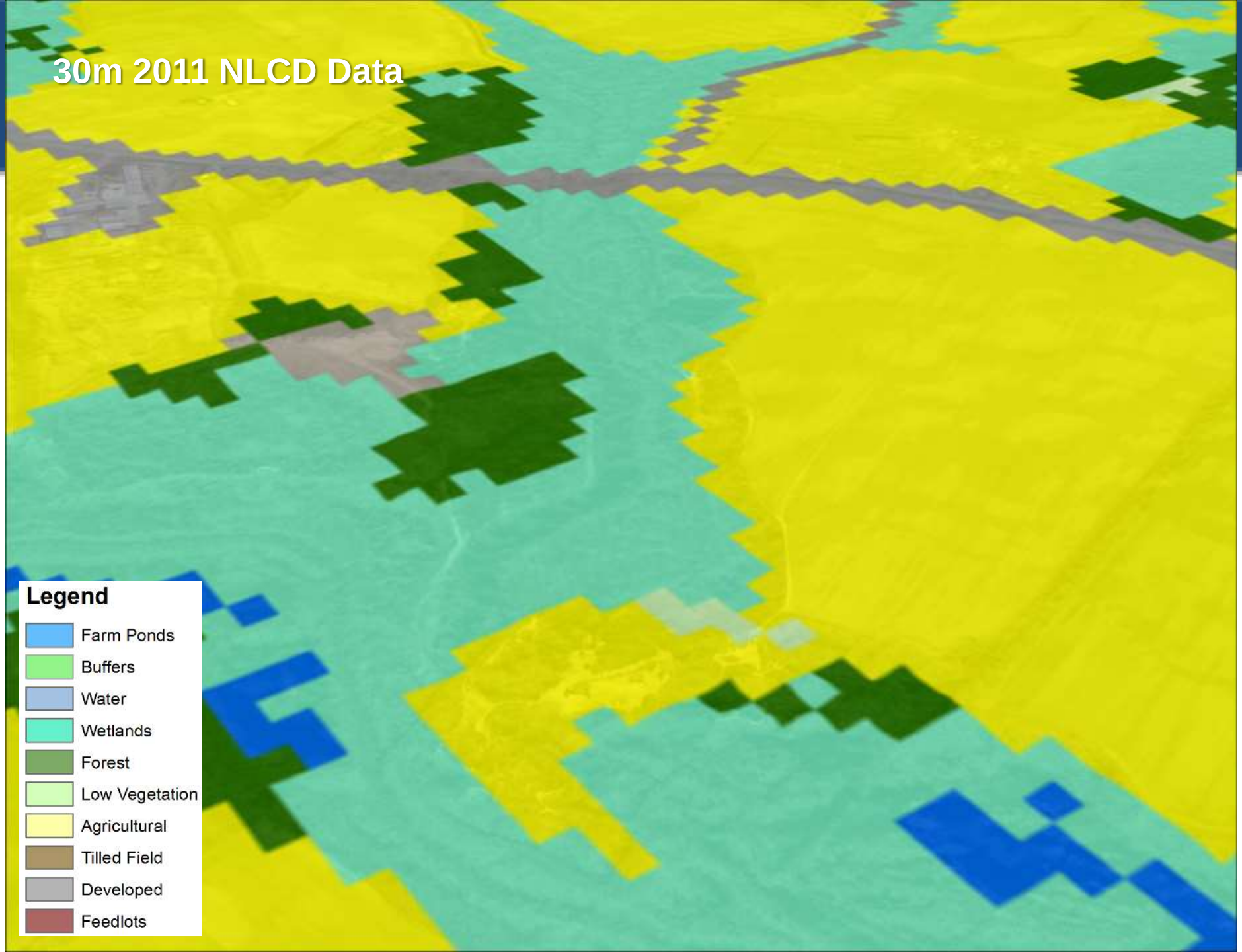
- **Rule-based, object oriented image classification identifies specific land use/land class types with over 900x the resolution of existing data**
- **Identifies 7 major land use types with an additional three detailing agricultural lands in the Choptank River**



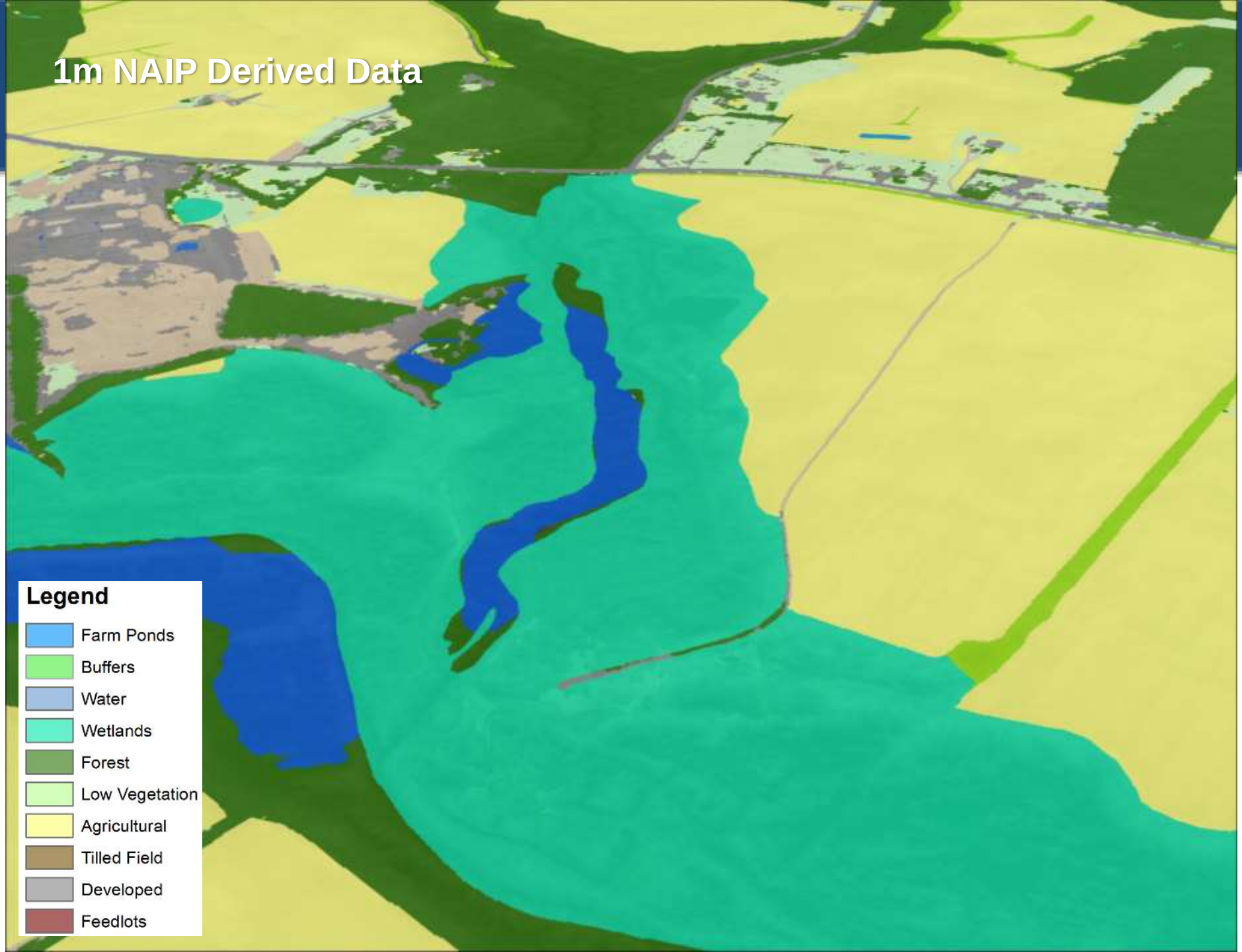




30m 2011 NLCD Data



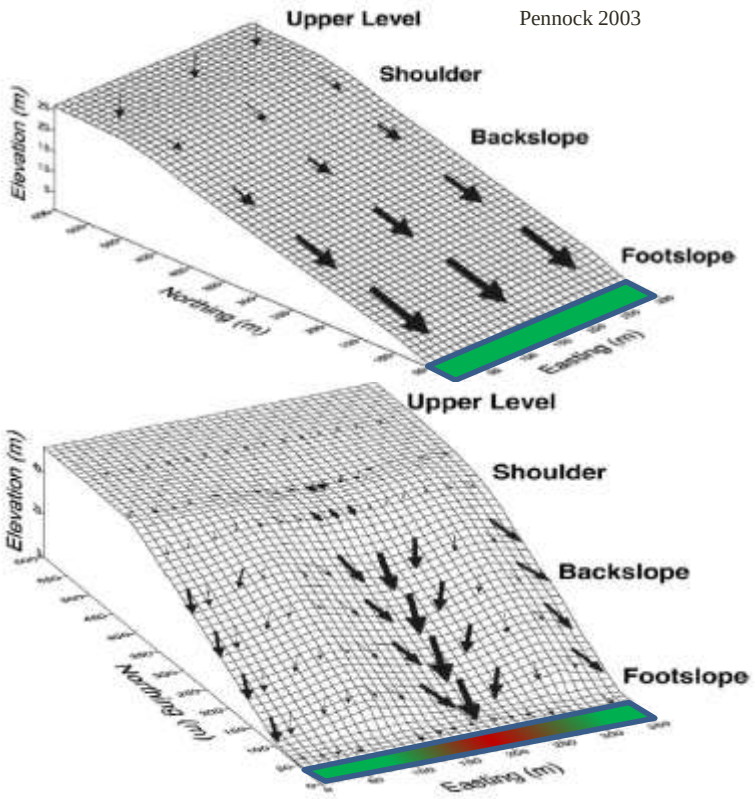
1m NAIP Derived Data



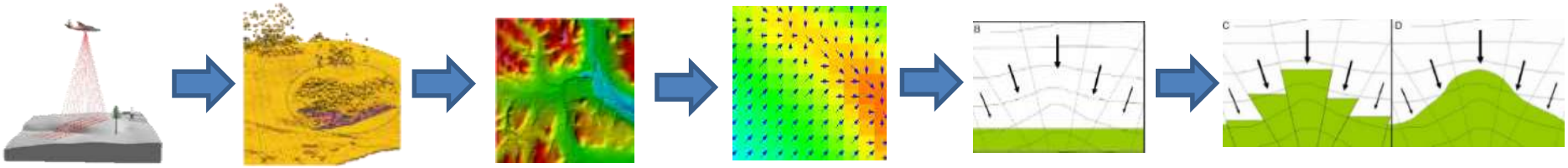
Concentrated Flow Path Mapping

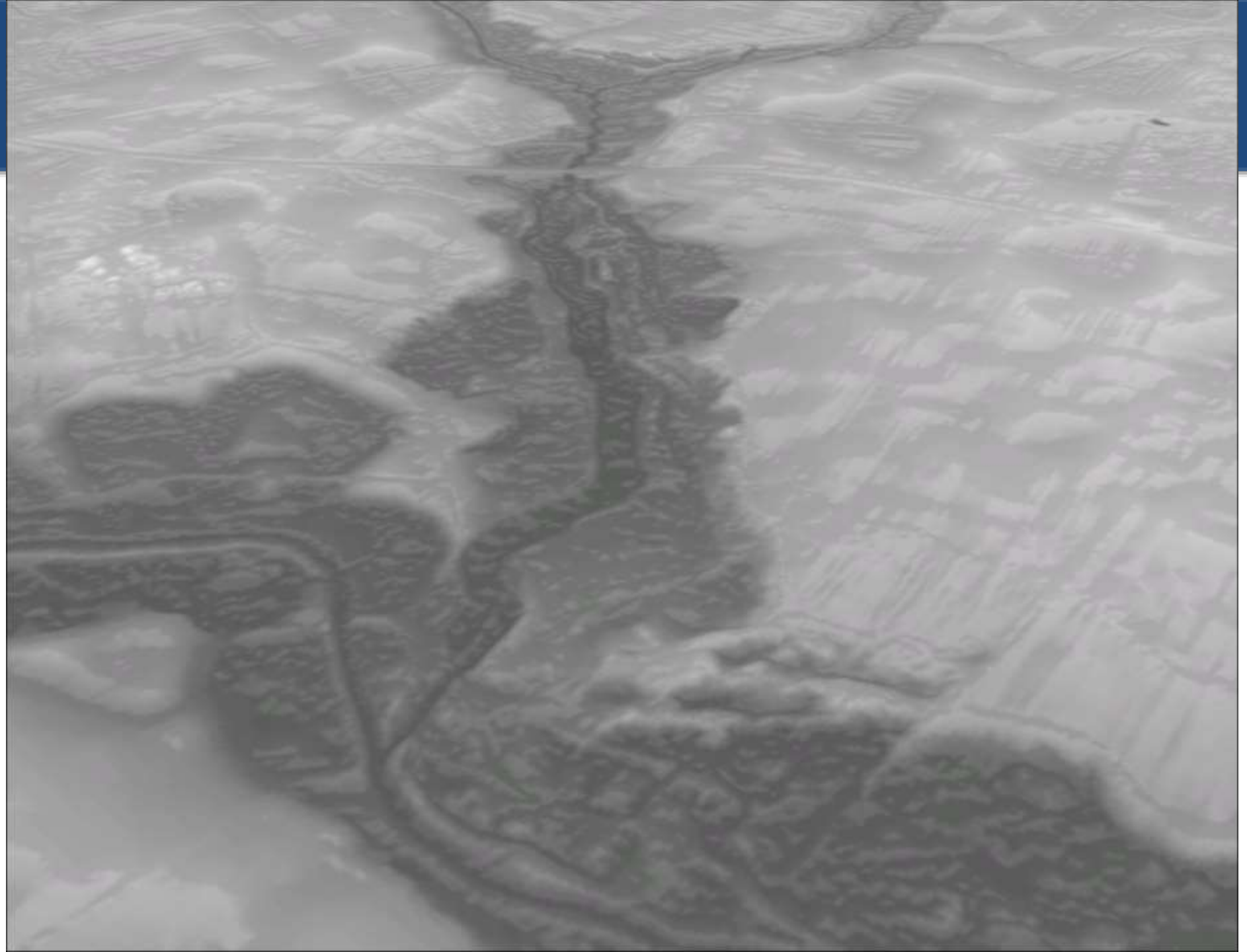
Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

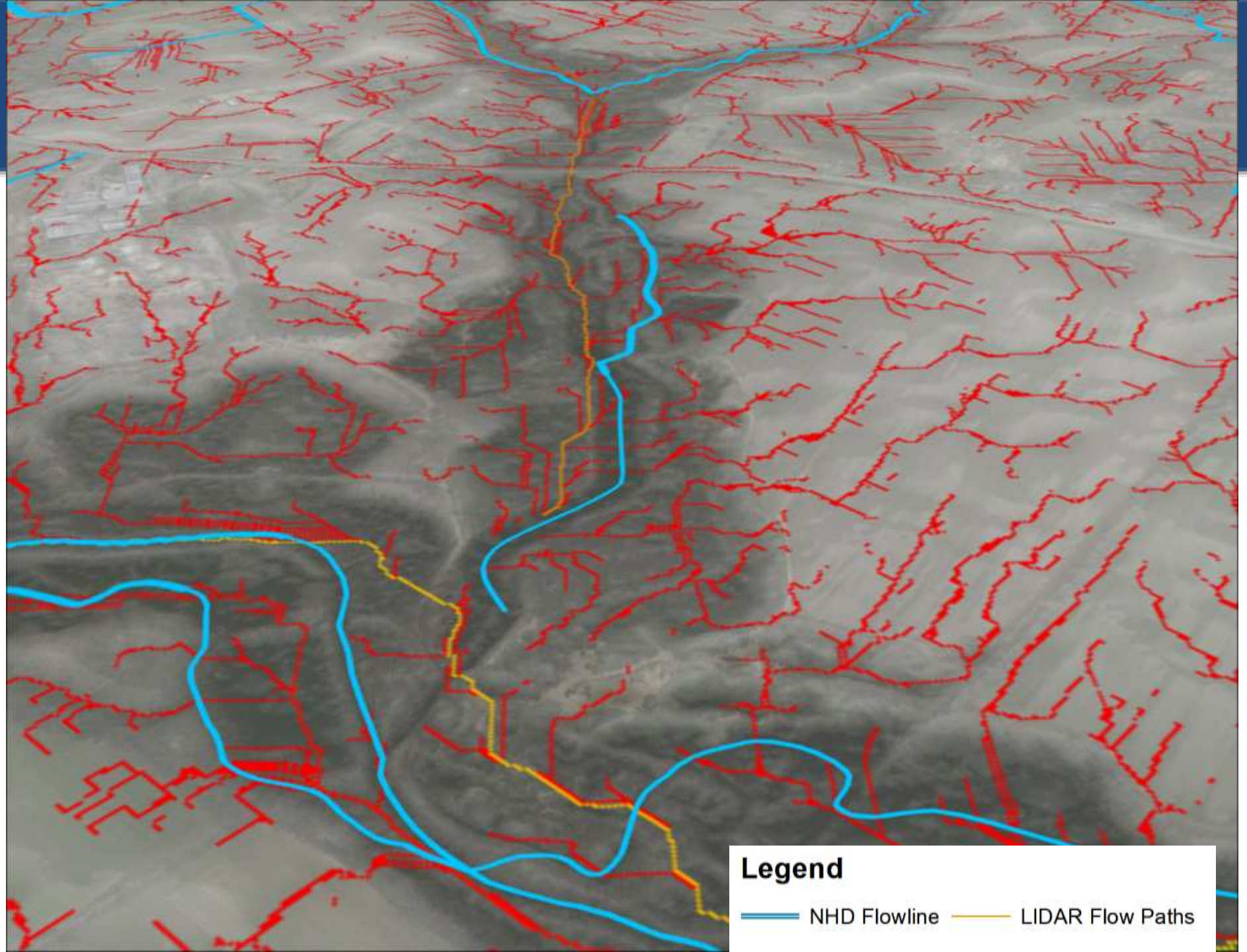
- **Most models assume consistent flow off a landscape**
- **Our D-Infinity analysis identifies how water actually flows across the land and where it accumulates**
- **Determines how much water is flowing from "upstream" into each pixel to determine optimal buffer placement and size**



Pennock 2003



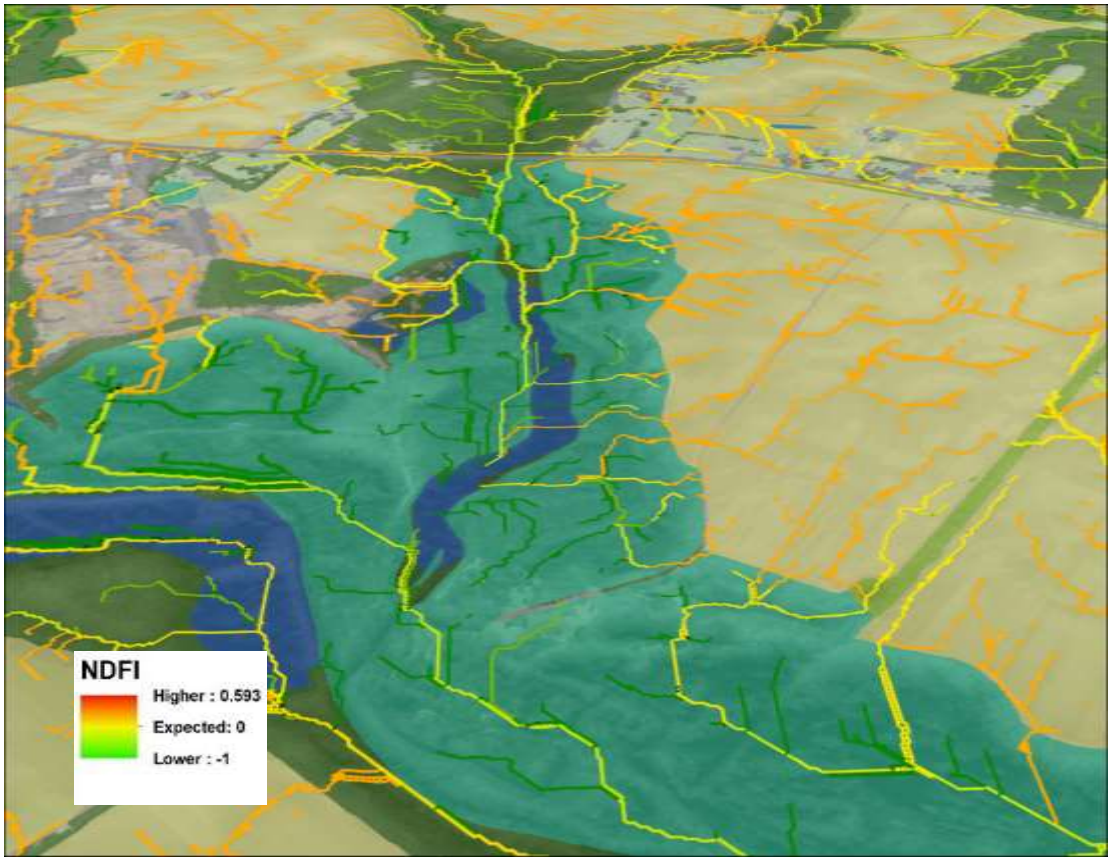



Legend
NHD Flowline
LIDAR Flow Paths

Normalized Difference Flow Index (NDFI)

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

- **Compares a weighted and unweighted flow accumulation to identify high-functioning landscapes that are a priority for conservation (lower NDFI) and underperforming landscapes that are a priority for restoration (higher NDFI)**



$$NDFI = \frac{(Weighted\ flow\ accumulation\ -\ Unweighted\ flow\ accumlation)}{(Weighted\ flow\ accumulation\ +\ Unweighted\ flow\ accumulation)}$$

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

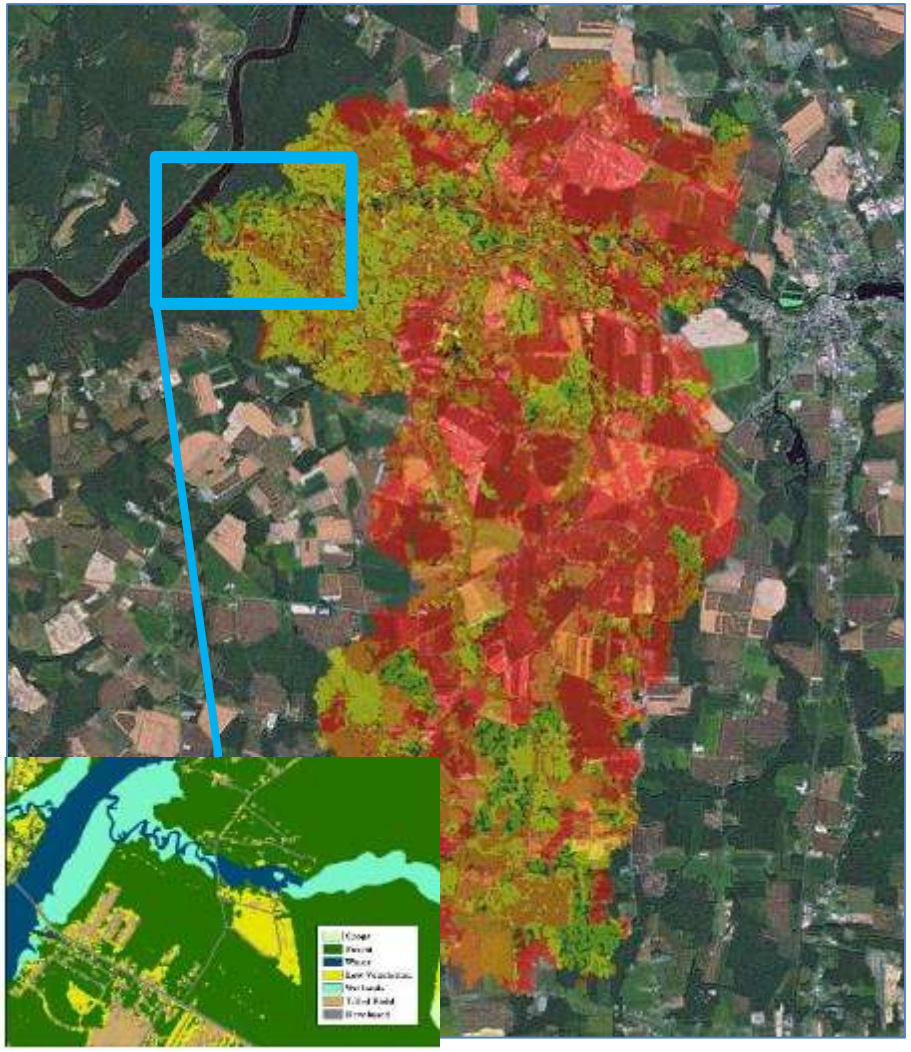
Core Benefits of Precision Conservation

Conservation and Restoration Prioritization

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

We are improving targeting for:

- *Identifying or comparing potential projects in a high-priority watershed*
- *Working with a willing landowner to locate a potential project where it will have the greatest impact on water quality*
- *Education and outreach to landowners to help them understand what they can do reduce the impact of their land and improve ecosystems*



Detailing the Importance of Projects in Grant Proposals

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

We are helping our partners identify and prioritize projects, while communicating the need for implementation funding, to protect and restore the most important habitats and improve water quality


Chester River Association

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

Anticipated benefits for the Chesapeake Bay Program's Goal Implementation Teams

Ben Fertig

Sustainable Fisheries (GIT 1)

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

- **Improve the characterization of edge-of-shore habitats (e.g. wetlands, riparian corridors)**
- **Increase the predictive modeling capabilities of river and stream suitability for anadromous and catadromous fish habitat and spawning**

Habitats (GIT 2)

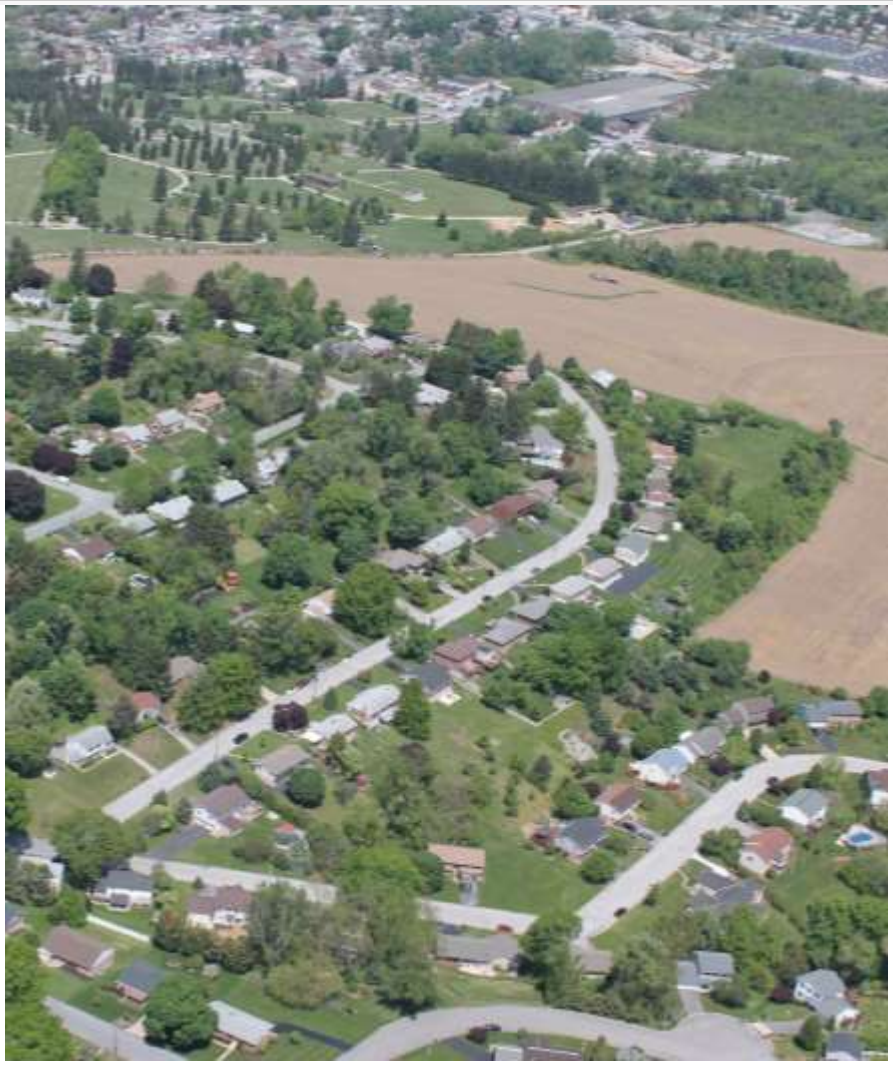
Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

- **Create more detailed and complete habitat connectivity models**
- **Identify priorities for habitat restoration with greater precision**
- **Provide a baseline for critical habitat change with a greater accuracy (e.g. wetland loss and forest conversion)**
- **Track development pressure and internal fragmentation of core habitats to prioritize conservation efforts**
- **Monitor success and implementation of restoration efforts across entire landscapes (e.g. increased riparian buffers, wetland restoration, etc.)**

Water Quality (GIT 3)

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

- **Increase the accuracy of modeling efforts by providing better estimates of land use composition (e.g. impervious surface percentage)**
- **Identify specific landscapes (often at the parcel scale) that are priorities for restoration or BMP implementation**
- **Provide increased resolution for models of sediment and nutrient loading coming off the land**



Healthy Watersheds (GIT 4)

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

- **Create a highly accurate baseline to track changes in impervious surface and natural landscape coverage in high-functioning sub-watersheds**
- **Calculate and track highly accurate natural landscape condition metrics (e.g. riparian buffer coverage, ecological connectivity, headwater stream condition, etc.)**
- **Identify specific high-functioning landscapes that are priorities for conservation because they are providing water quality benefits**

Stewardship (GIT 5)

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

- **Target outreach and education efforts to landowners that have been identified as having high-functioning or underperforming landscapes on their property**
- **Identify tangible actions landowners could take to reduce the impact of their land (e.g. install BMPs) or conserve high-functioning landscapes (e.g. conservation easements) that would maximize the benefits of available funding**
- **Create individualized reports for land owners detailing the land use composition of their properties and how they fit into the watersheds they are a part of (e.g. showing that they have critical habitat)**

Appalachian Mountains Joint Venture

Next Steps

- **Continue to develop data for new landscapes**
- **Help incorporate existing data into conservation and restoration targeting**
  - *Identify Hotspots*
  - *Target outreach and education*
  - *Direct project funding to where it will have the greatest impact*
  - *Design BMPs based on the landscape*

Next Steps

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

- **Create cohesive, science-based, conservation and restoration plans for the Chesapeake Bay's tributaries**

- **Expand our local, state, and federal partnerships to coordinate conservation and restoration efforts throughout the Chesapeake Bay watershed**

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

Contact:

Jeffrey Allenby
jallenby@chesapeakeconservancy.org