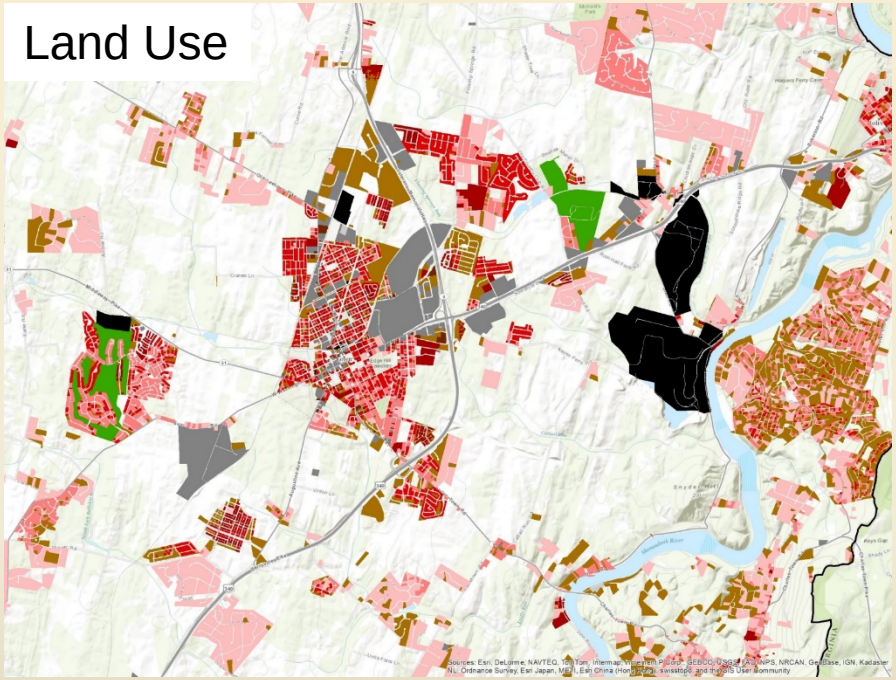
Chesapeake Bay Program
A Watershed Partnership

Phase 6 Land Use

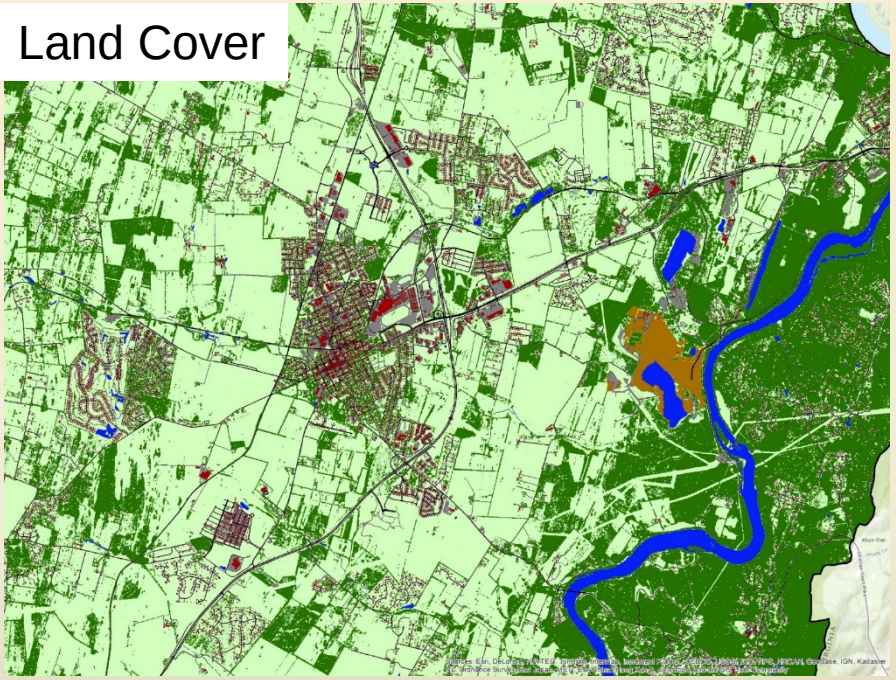
Peter Claggett, U.S. Geological Survey
Quentin Stubbs, U.S. Geological Survey

Building a 2012 Phase 6 Land Use Raster Database:

Land Use



Land Cover



USGS

Two Primary Approaches
Towards constructing the Phase 6 Land Use dataset

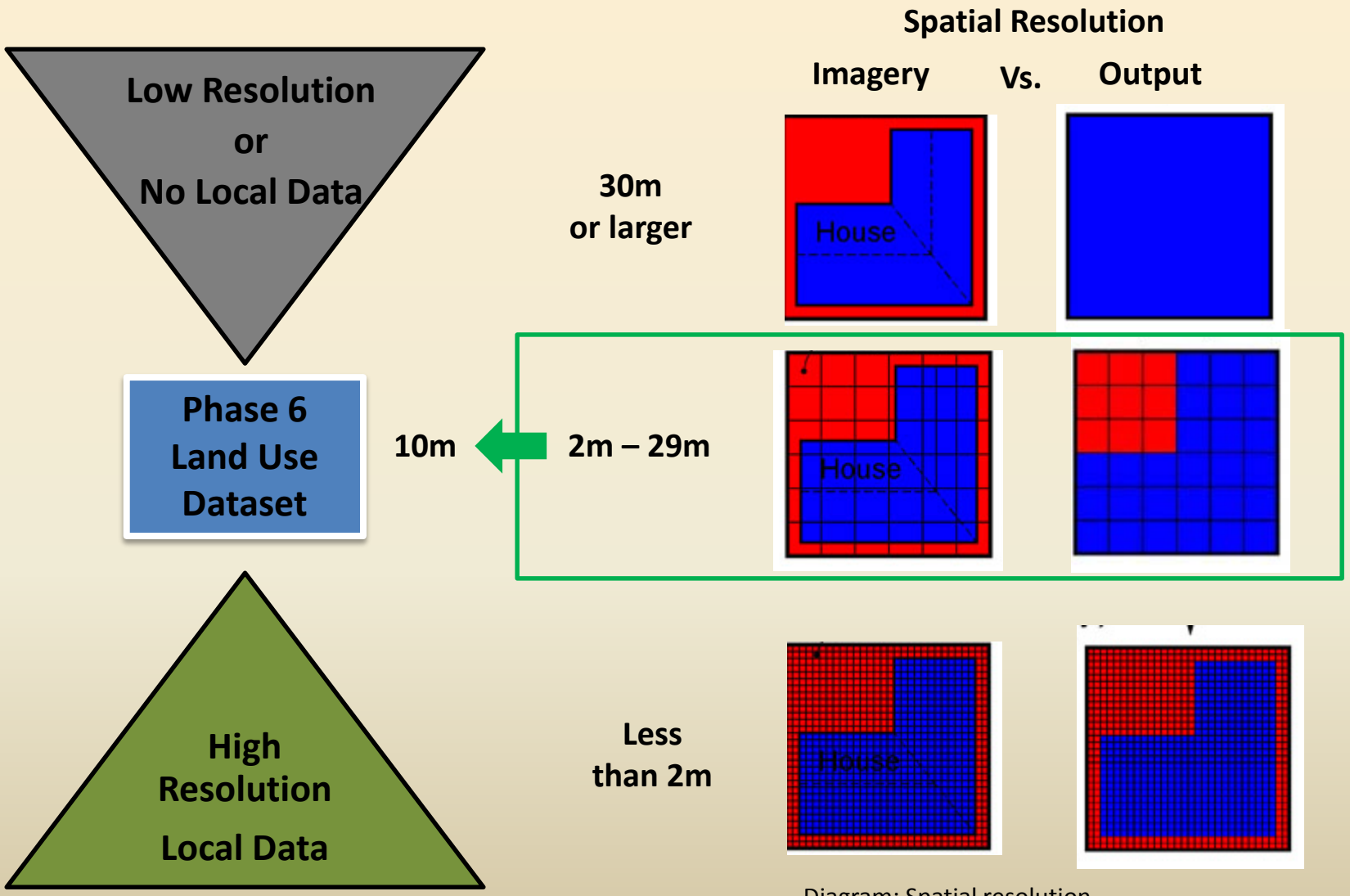
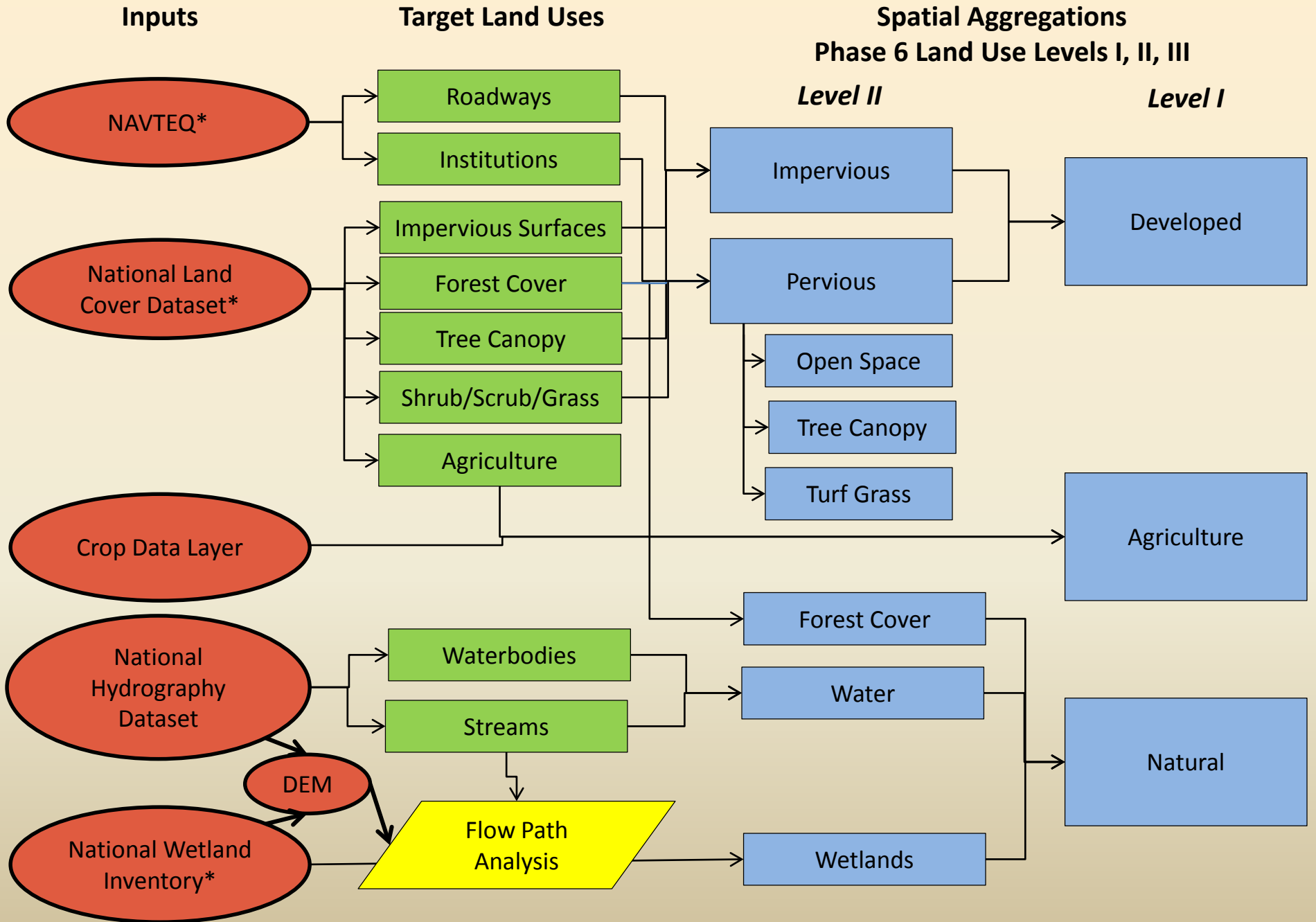


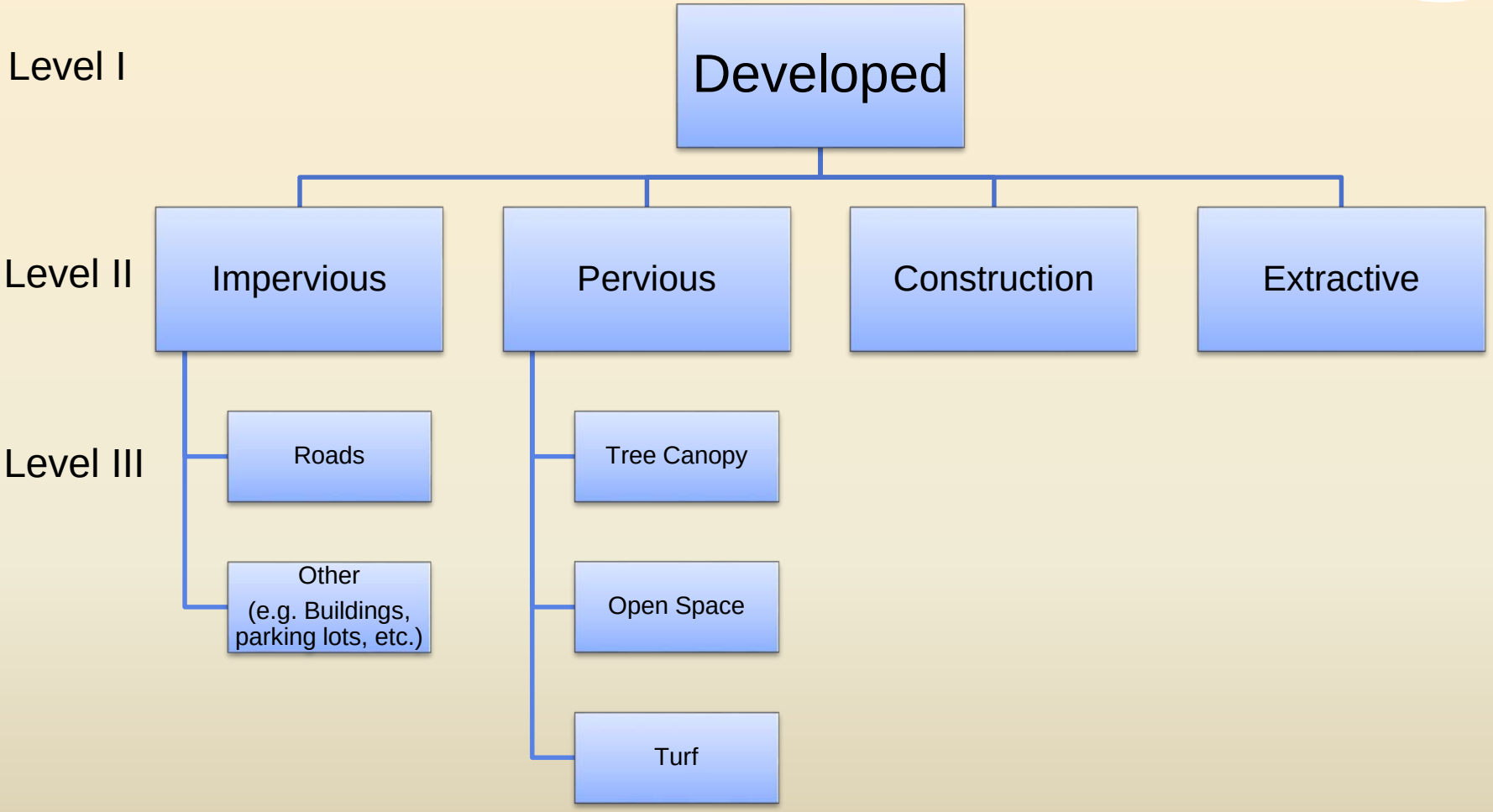
Diagram: Spatial resolution.
Source: Satellite Imaging Corporation

Methods (example)



Proposed Developed Phase 6 Land Uses

Developed



USGS

PG County, MD 2009 LUD with NAVTEQ at 10m resolution

USGS

NLCD 2011 with NAVTEQ at 10m resolution

Proposed Developed Phase 6 Land Uses

Developed

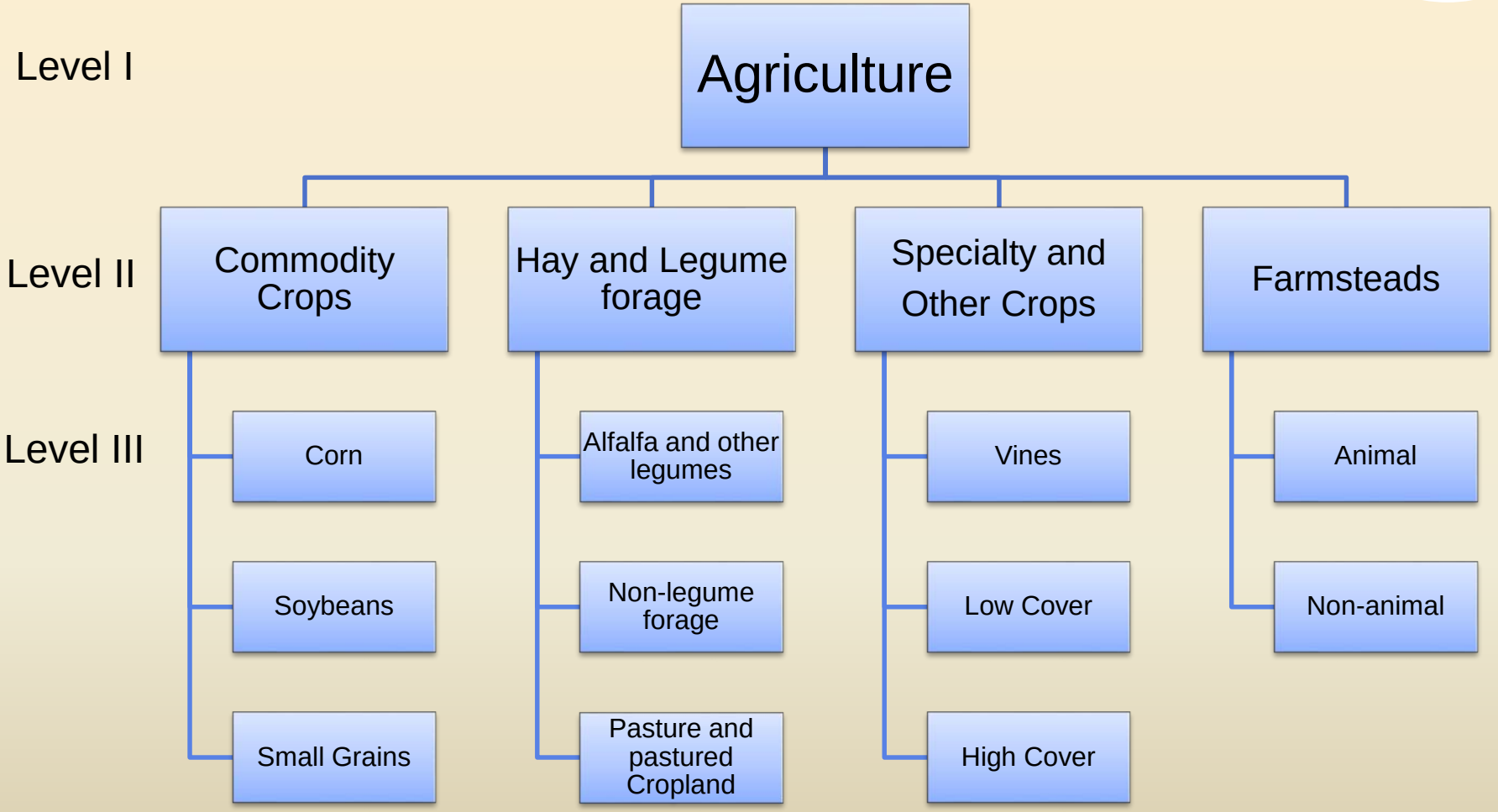
Phase 6	Phase 5.3.2
Roads Buildings, parking lots, etc.	Impervious surfaces
Turf grass Tree canopy Open space	Turf grass (pervious)
Construction Extractive	Construction Extractive

* provisional, pending further work on loading differences and model fitness

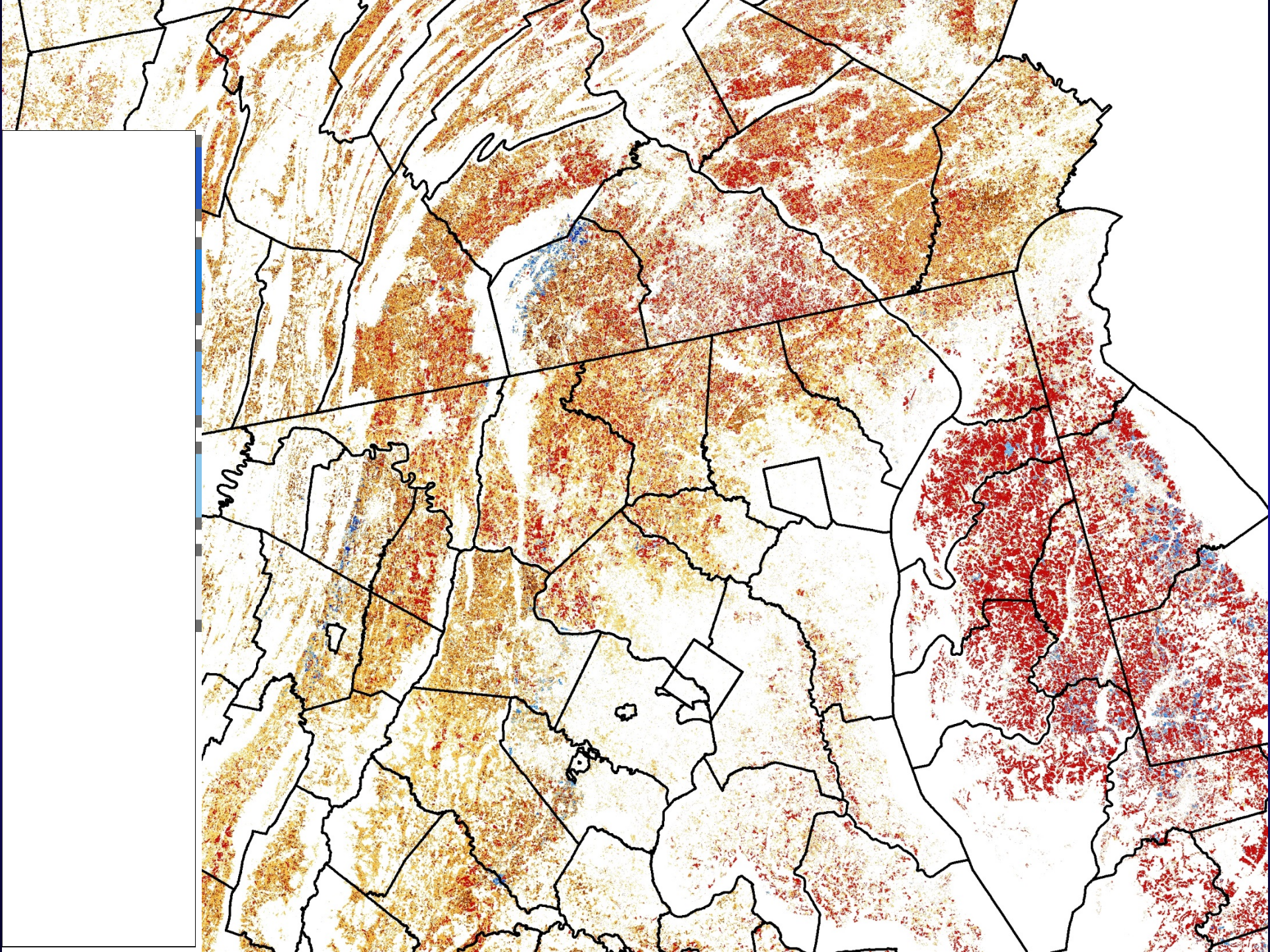
USGS

Proposed Developed Phase 6 Land Uses

Agriculture



USGS



Proposed Agricultural Phase 6 Land Uses (from Ag Workgroup and Ag Modeling Subcommittee)

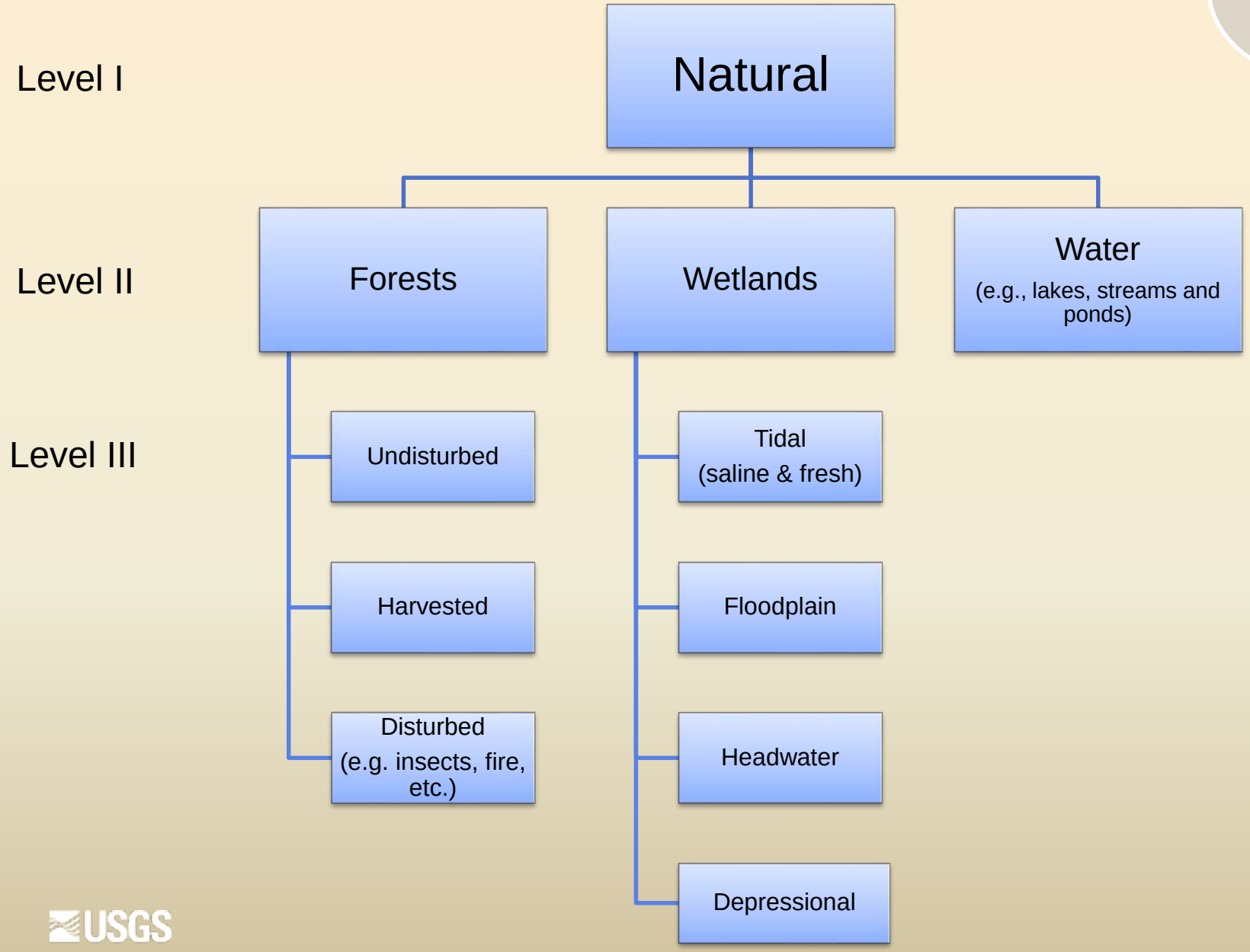
Agriculture

Phase 6	Phase 5.3.2
Corn	Hightill w/ & w/o manure
Soybeans	Lowtill with manure
Small grains	Nutrient management hightill w/ & w/o manure
Alfalfa	Nutrient management lowtill
Non-legume forage	Alfalfa
Pasture	Hay w/ & w/o nutrients
Vines	Nutrient management alfalfa
Low cover specialty	Nutrient management hay
High cover specialty	Pasture
Impervious CAFO & AFO farmsteads	Nutrient management pasture
Impervious non-animal farmsteads	Nursery
Pervious CAFO & AFO farmsteads	AFOs
Pervious non-animal farmsteads	CAFOs
	Degraded riparian pasture

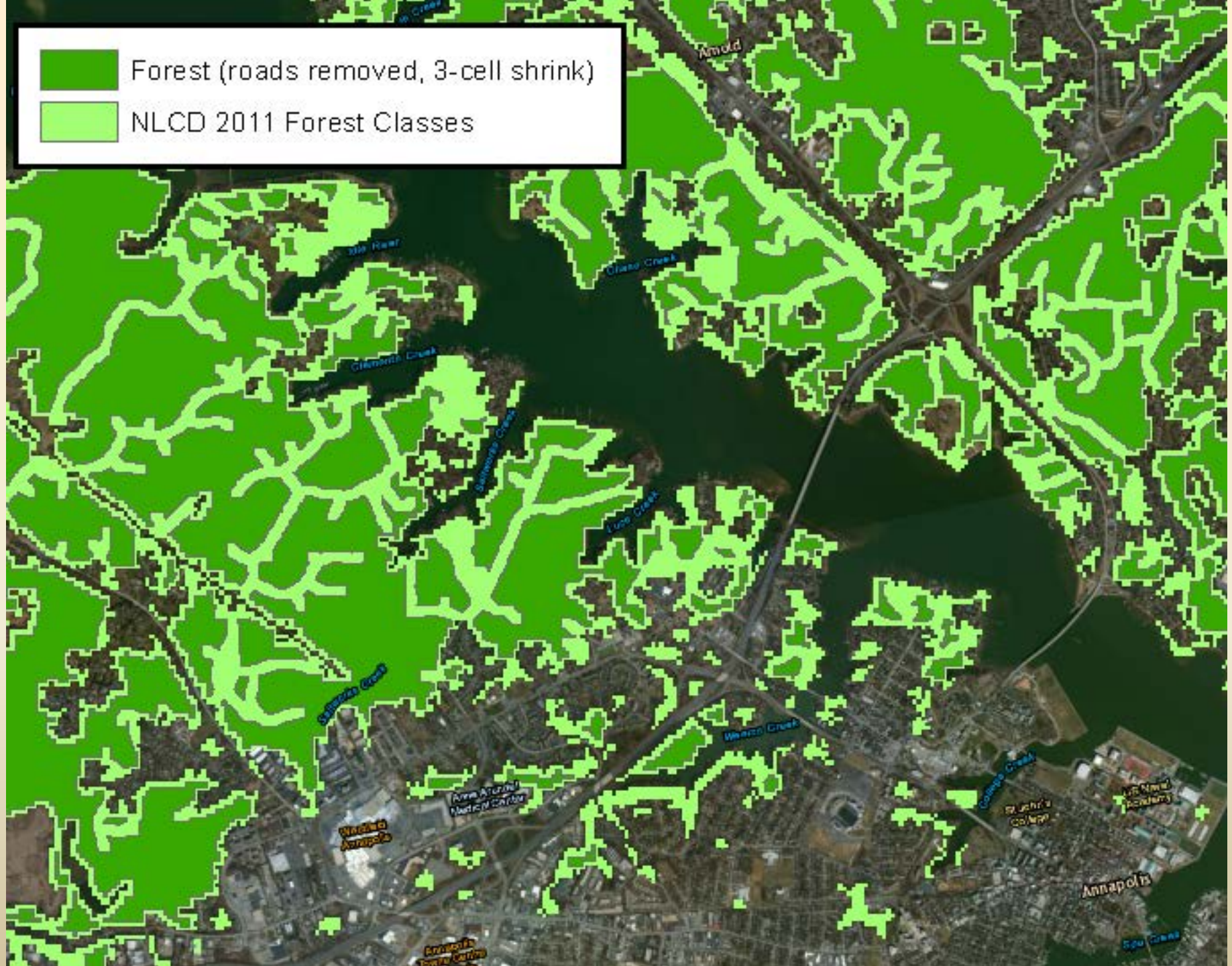
USGS

Proposed Developed Phase 6 Land Uses

Natural

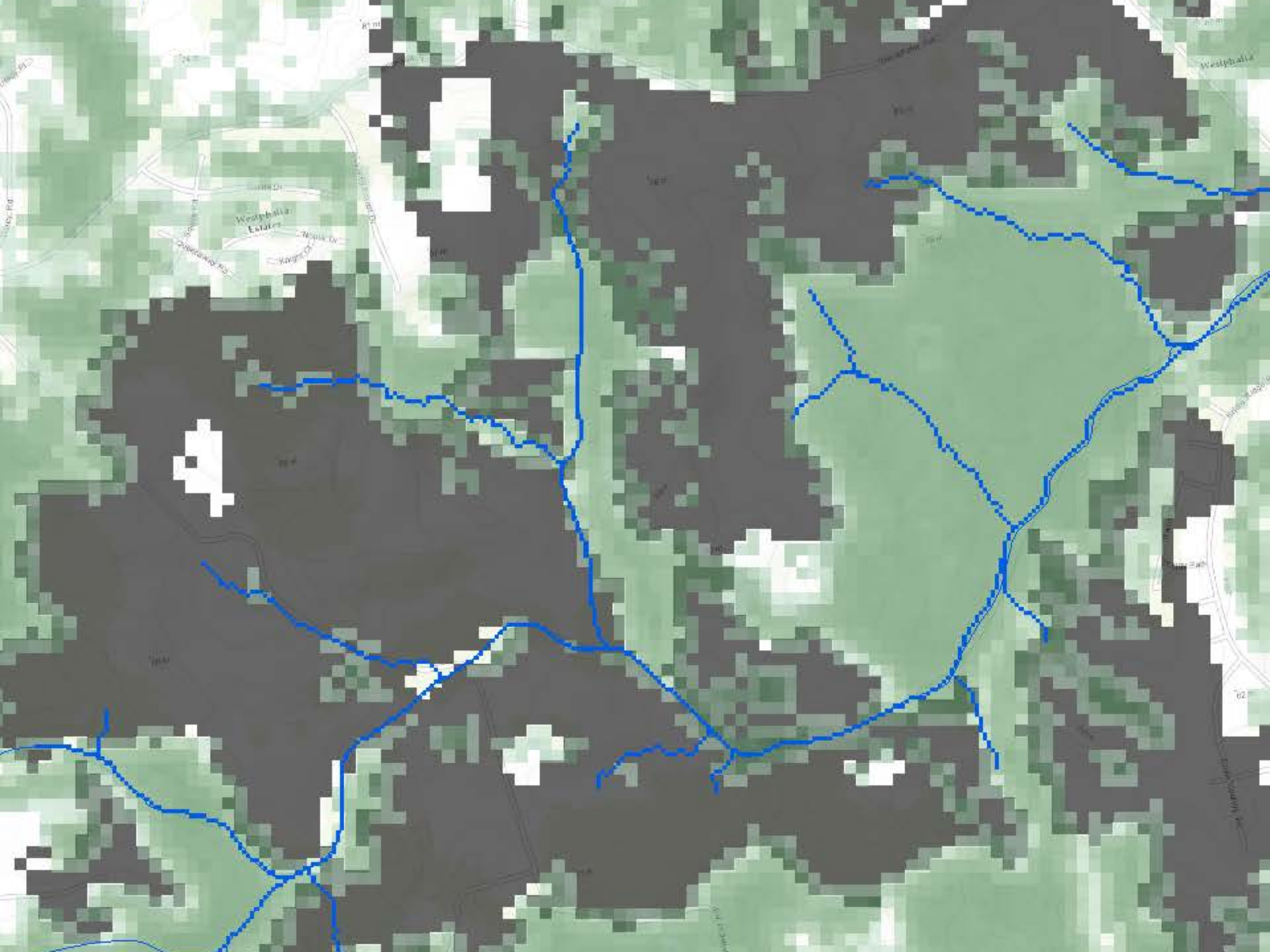


USGS


Forest (roads removed, 3-cell shrink)
NLCD 2011 Forest Classes
Arnold
Annapolis


Forest (roads removed, 3-cell shrink)
NLCD 2011 Forest Classes
Manresa


Upper
Marlboro


Westphalia Estates

Proposed Natural Phase 6 Land Uses

Natural

Phase 6	Phase 5.3.2
Forests	Woody/open
Harvested forest	Harvested forest
Disturbed forest	
Tidal emergent wetlands	
Fresh emergent wetlands	
Non-tidal woody wetlands	
Water*	Water

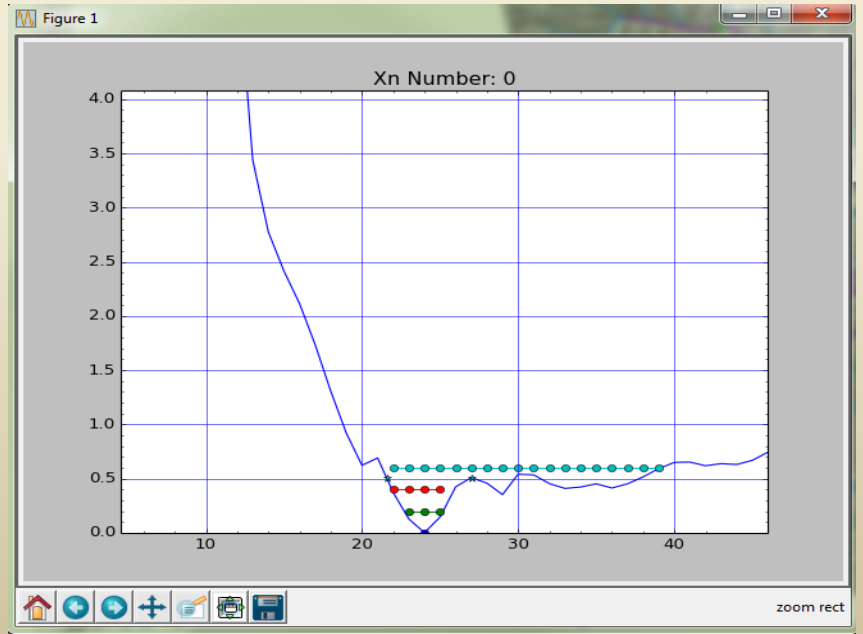
* Will expand water coverage to include 1:24K National Hydrography Dataset waterbodies and possibly Dynamic Surface Water Extent.

USGS

Modeling Sediment (update)

What's been done for Phase 6:

- WVU automated stream cross-section techniques to extract fluvial geomorphic data from LiDAR: bank height, channel width, valley width.
- WVU compared results with field data with favorable results.
- CWP refined techniques to estimate contribution of stream bank erosion to urban stream sediment loads.

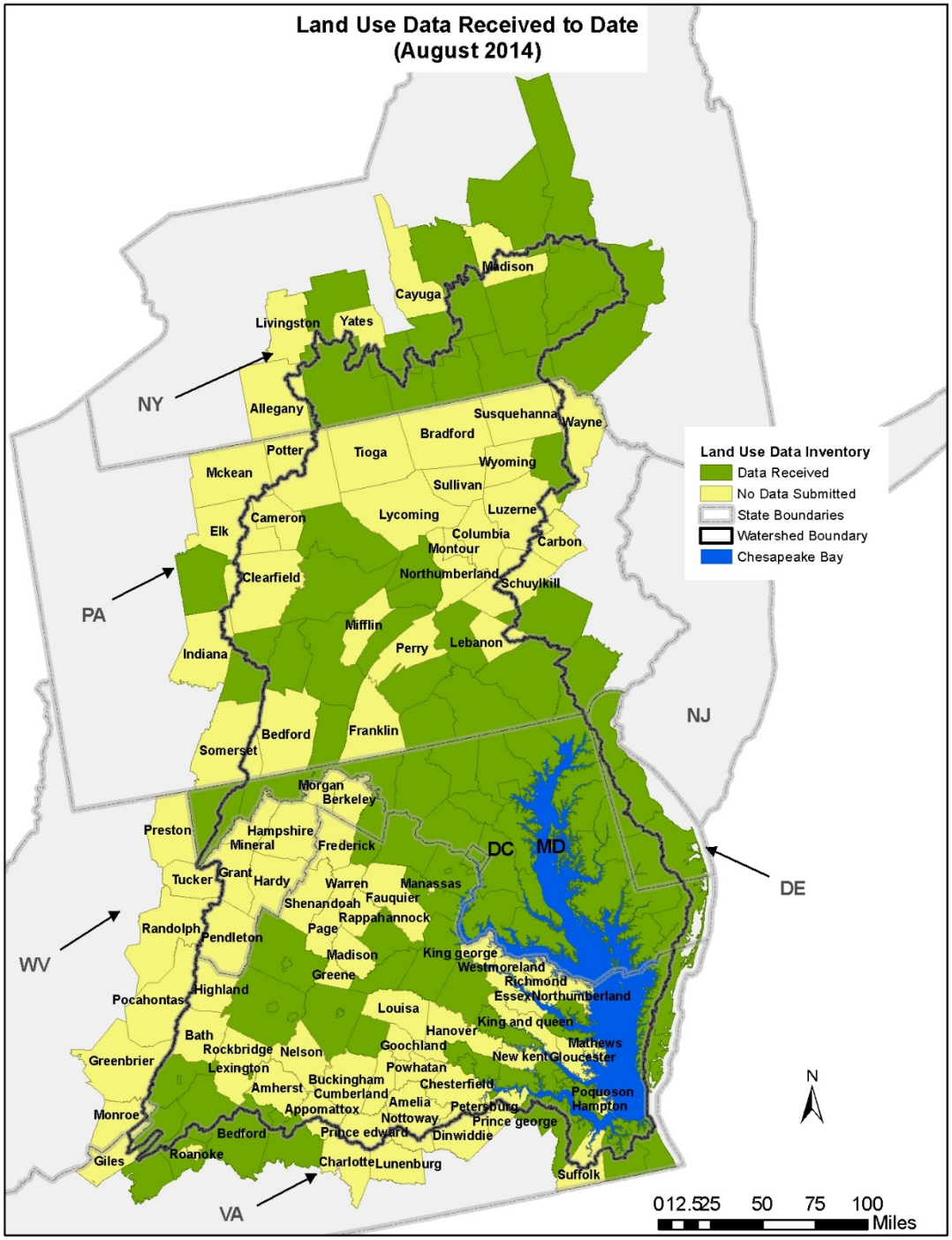


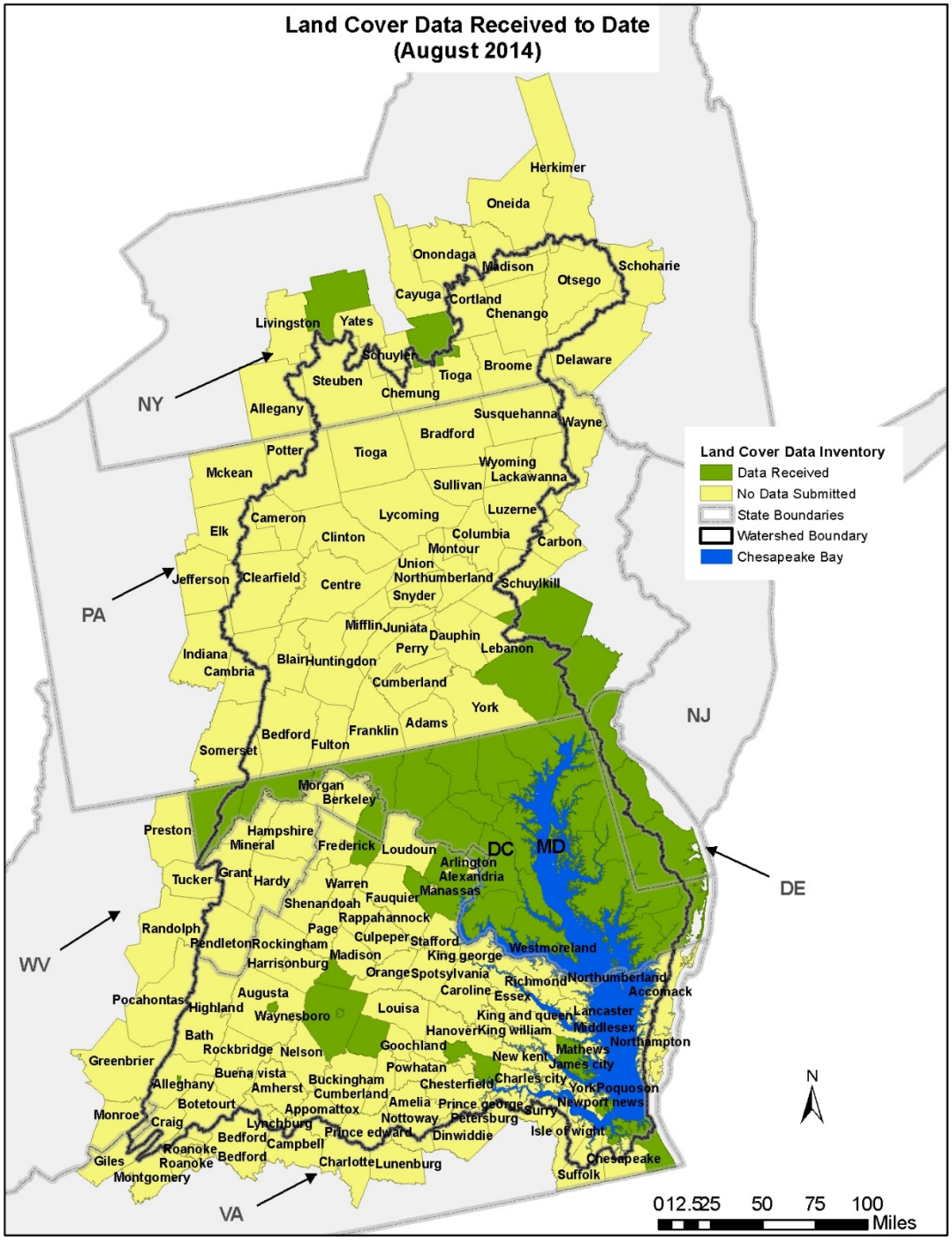
USGS

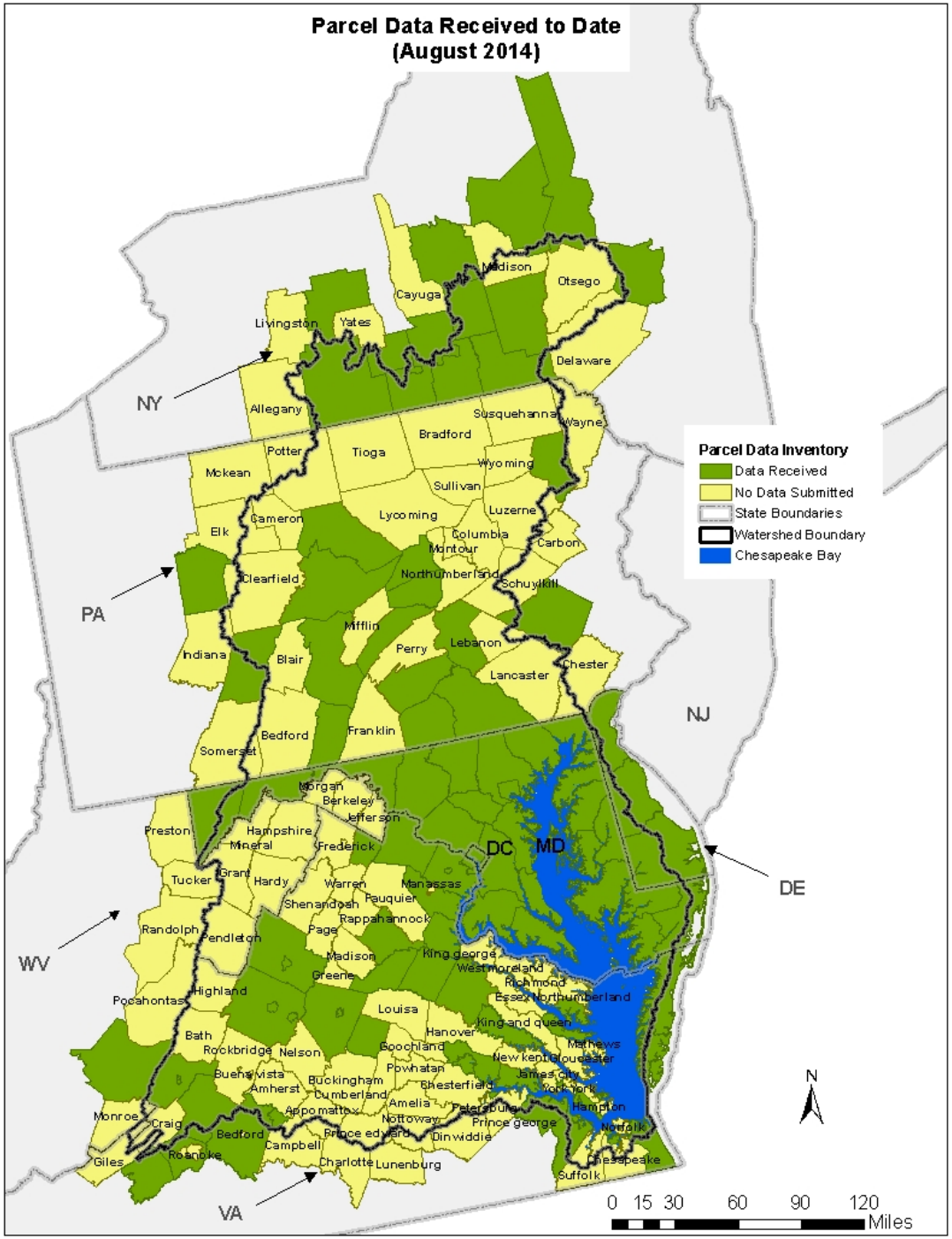
Modeling Sediment (update)

What will be done for Phase 6:

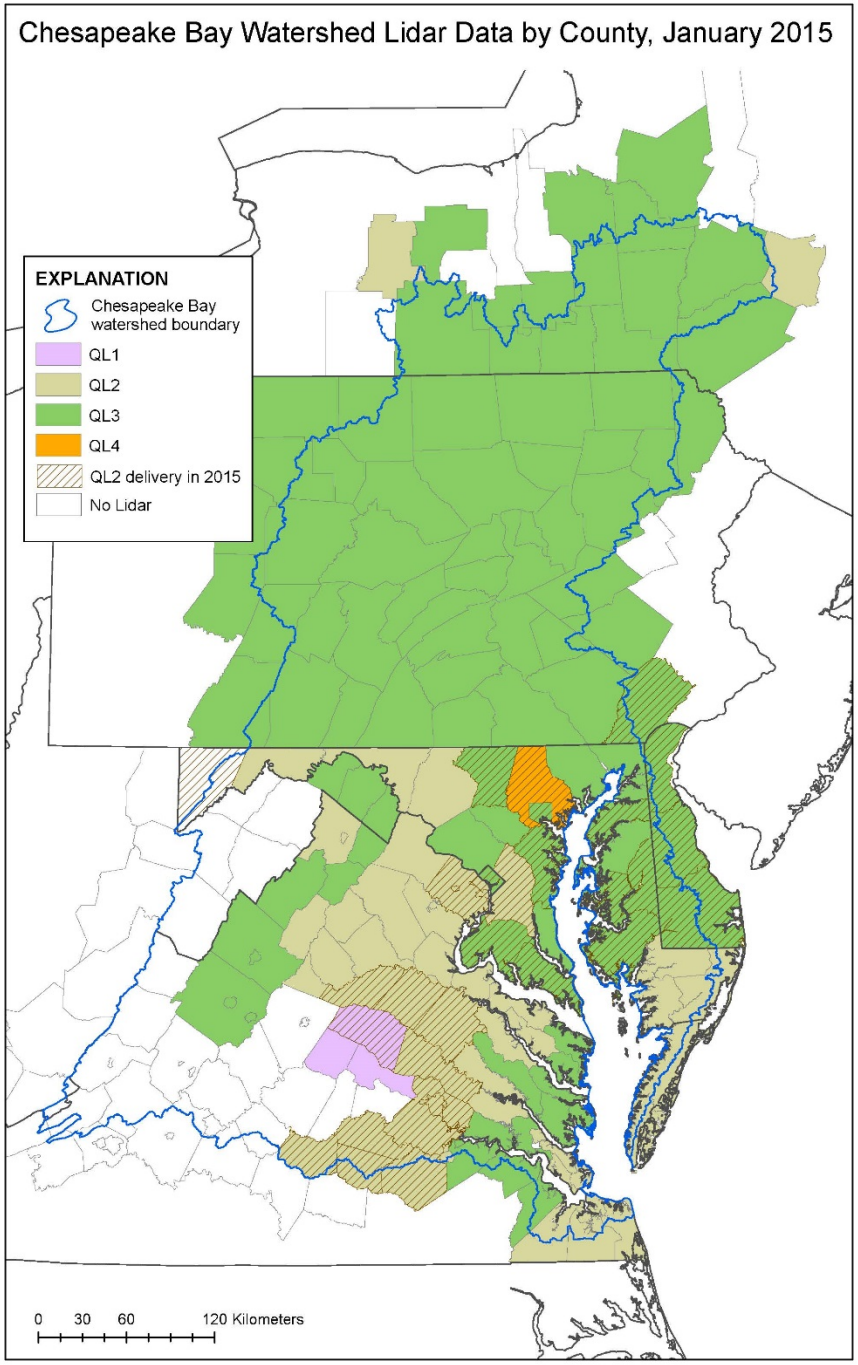
- Develop conceptual models to represent spatial variability in sediment processes by physiographic province (e.g., urban Piedmont vs rural Piedmont).
- Enhance automated methods to include: bank angle, channel and floodplain profile slopes, active floodplain width, and drainage area.
- Generate and compare continuous geospatial indicators of bank erosion and floodplain deposition with cross-section derived indicators.
- Summarize metrics by NHD+ catchment and evaluate with SPARROW
- Develop regression model for the Piedmont and Ridge and Valley provinces relating metrics to dendro-geomorphic measures of floodplain deposition.
- Expand analysis of stream source ratios of sediment to more urban areas.


Land Use Data Received to Date
(August 2014)
Land Use Data Inventory
Data Received
No Data Submitted
State Boundaries
Watershed Boundary
Chesapeake Bay
NY
PA
WV
VA
NJ
DE
MD
DC
Madison
Cayuga
Livingston
Yates
Allegany
Susquehanna
Wayne
Bradford
Potter
Tioga
Wyoming
Mckean
Sullivan
Cameron
Lycoming
Luzerne
Elk
Columbia
Montour
Carbon
Clearfield
Northumberland
Schuylkill
Mifflin
Perry
Lebanon
Indiana
Franklin
Bedford
Somerset
Morgan
Berkeley
Preston
Hampshire
Mineral
Frederick
Tucker
Grant
Hardy
Warren
Manassas
Fauquier
Shenandoah
Rappahannock
Randolph
Pendleton
Page
Madison
King george
Westmoreland
Greene
Richmond
Essex
Northumberland
Highland
Pocahontas
Louisa
King and queen
Hanover
Bath
Goochland
Mathews
Rockbridge
Nelson
New kent
Gloucester
Greenbrier
Lexington
Powhatan
Buckingham
Chesterfield
Amherst
Cumberland
Poquoson
Hampton
Amelia
Petersburg
Appomattox
Nottoway
Prince george
Monroe
Prince edward
Dinwiddie
Bedford
Roanoke
Giles
Charlotte
Lunenburg
Suffolk
N
0 12.5 25 50 75 100
Miles


Land Cover Data Received to Date
(August 2014)
Land Cover Data Inventory
Data Received
No Data Submitted
State Boundaries
Watershed Boundary
Chesapeake Bay
NY
PA
WV
VA
NJ
DE
MD
DC
Herkimer
Oneida
Onondaga
Madison
Schoharie
Otsego
Cayuga
Cortland
Chenango
Livingston
Yates
Schuyler
Tioga
Broome
Delaware
Steuben
Chemung
Allegany
Susquehanna
Wayne
Bradford
Potter
Tioga
Wyoming
Lackawanna
Mckean
Sullivan
Luzerne
Cameron
Lycoming
Elk
Clinton
Columbia
Carbon
Montour
Union
Jefferson
Clearfield
Centre
Northumberland
Schuylkill
Snyder
Mifflin
Juniata
Dauphin
Perry
Lebanon
Indiana
Blair
Huntingdon
Cambria
Cumberland
York
Adams
Bedford
Franklin
Fulton
Somerset
Morgan
Berkeley
Preston
Hampshire
Mineral
Frederick
Loudoun
Arlington
Alexandria
Manassas
Tucker
Grant
Hardy
Warren
Fauquier
Shenandoah
Rappahannock
Randolph
Page
Culpeper
Stafford
Rendleton
Rockingham
Madison
King george
Westmoreland
Harrisonburg
Orange
Spotsylvania
Richmond
Northumberland
Caroline
Essex
Accomack
Pocahontas
Augusta
Highland
Waynesboro
Louisa
King and queen
Lancaster
Middlesex
Bath
Hanover
King william
Northampton
Rockbridge
Nelson
Goochland
Mathews
Greenbrier
New kent
James city
Powhatan
Buena vista
Buckingham
Chesterfield
Charles city
York
Poquoson
Alleghany
Amherst
Cumberland
Botetourt
Amelia
Prince george
Surry
Newport news
Monroe
Appomattox
Nottoway
Petersburg
Craig
Lynchburg
Prince edward
Dinwiddie
Isle of wight
Bedford
Campbell
Roanoke
Bedford
Chesapeake
Giles
Roanoke
Charlotte
Lunenburg
Suffolk
Montgomery
N
0 12.5 25 50 75 100
Miles


Parcel Data Received to Date
(August 2014)
Parcel Data Inventory
Data Received
No Data Submitted
State Boundaries
Watershed Boundary
Chesapeake Bay
NY
PA
WV
VA
NJ
DE
MD
DC
Madison
Otsego
Cayuga
Livingston
Yates
Delaware
Allegany
Susquehanna
Wayne
Bradford
Potter
Tioga
Wyoming
Mckean
Sullivan
Cameron
Lycoming
Luzerne
Elk
Columbia
Montour
Carbon
Clearfield
Northumberland
Schuylkill
Mifflin
Lebanon
Indiana
Blair
Perry
Chester
Lancaster
Bedford
Franklin
Somerset
Morgan
Berkeley
Jefferson
Preston
Hampshire
Mineral
Frederick
Tucker
Grant
Hardy
Warren
Manassas
Shenandoah
Pauquier
Rappahannock
Randolph
Pendleton
Page
King george
Madison
Westmoreland
Greene
Richmond
Highland
Essex
Northumberland
Pocahontas
Louisa
King and queen
Bath
Hanover
Mathews
Rockbridge
Nelson
Goochland
New kent
Gloucester
Buena vista
Powhatan
James city
Amherst
Buckingham
Chesterfield
York
Cumberland
Amelia
Hampton
Monroe
Appomattox
Petersburg
Craig
Nottoway
Prince george
Norfolk
Bedford
Prince edward
Dinwiddie
Campbell
Giles
Roanoke
Charlotte
Lunenburg
Chesapeake
Suffolk
N
0 15 30 60 90 120
Miles

Chesapeake Bay Watershed Lidar Data by County, January 2015



Three Approaches for Monitoring Land Cover Change

Option 1

Coarse 30m
Wall-to-Wall Mapping

Pros:
Comprehensive
Flexible- multiple uses
Adaptable- changing objectives

Cons:
Accuracy
Interpretation
Level of expertise

Option 2

High-res 1m
Wall-to-Wall Mapping

Pros:
Accuracy
Comprehensive
Flexible- multiple uses
Adaptable- changing objectives

Cons:
Cost
Interpretation
Level of expertise

Option 3

High-res 1m
Stratified Random Sampling

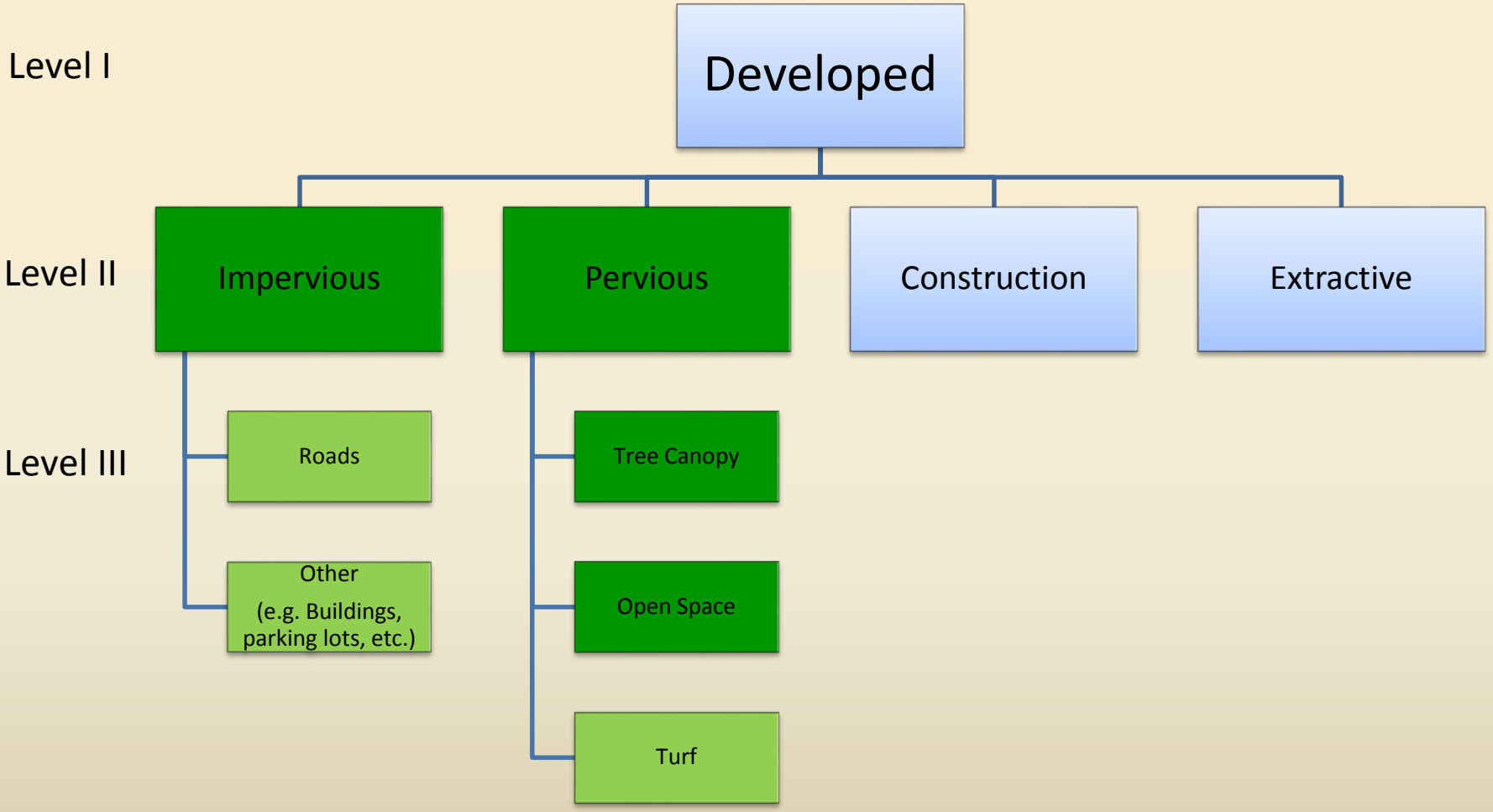
Pros:
Accuracy
Interpretation
Level of expertise
Citizen participation and education

Cons:
Focused
Limited utility
Fixed
QA/QC

Value of High-res Land Cover for Phase 6

High-Direct

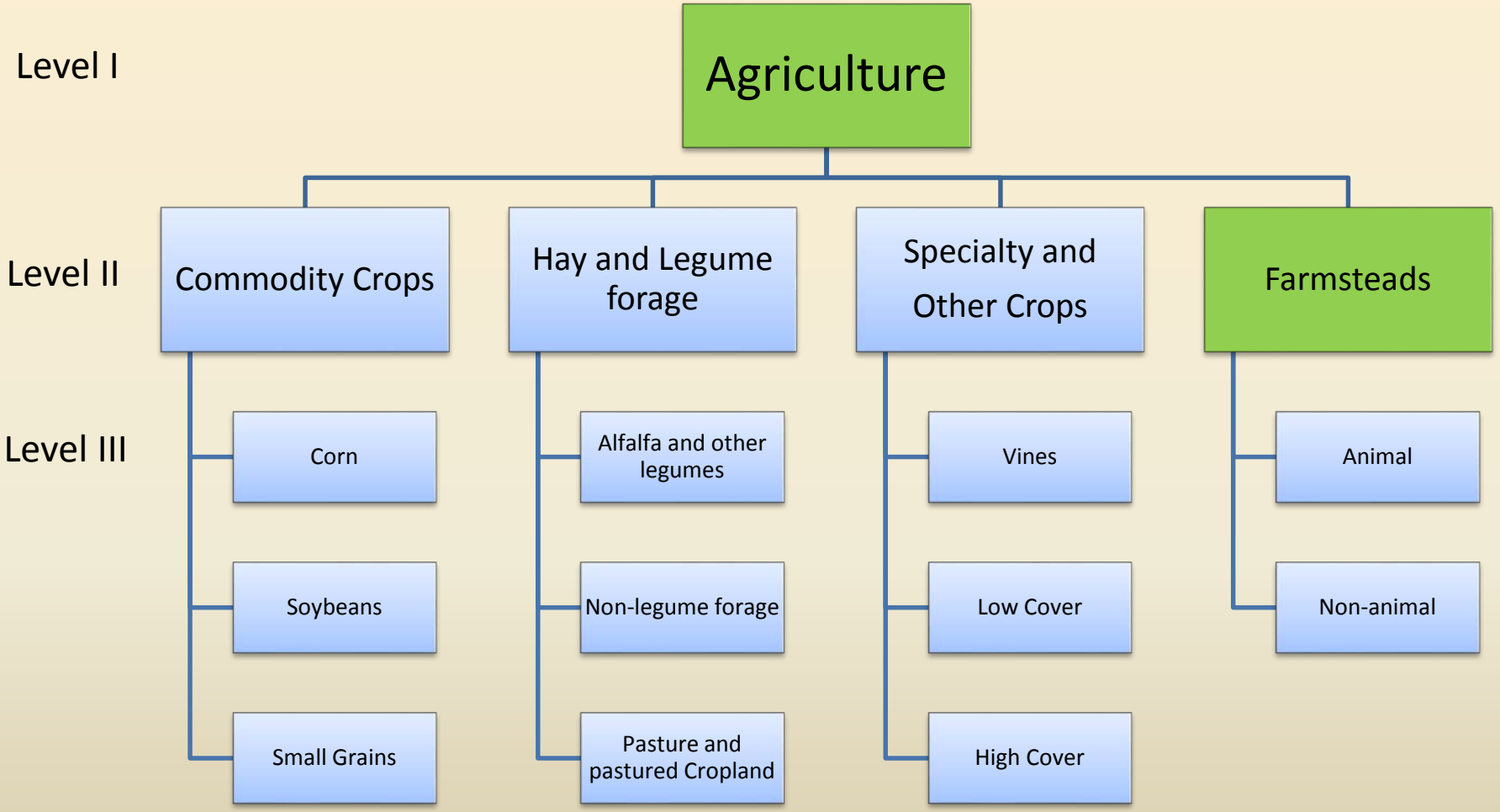
Partial- Indirect



Value of High-res Land Cover for Phase 6

High-Direct

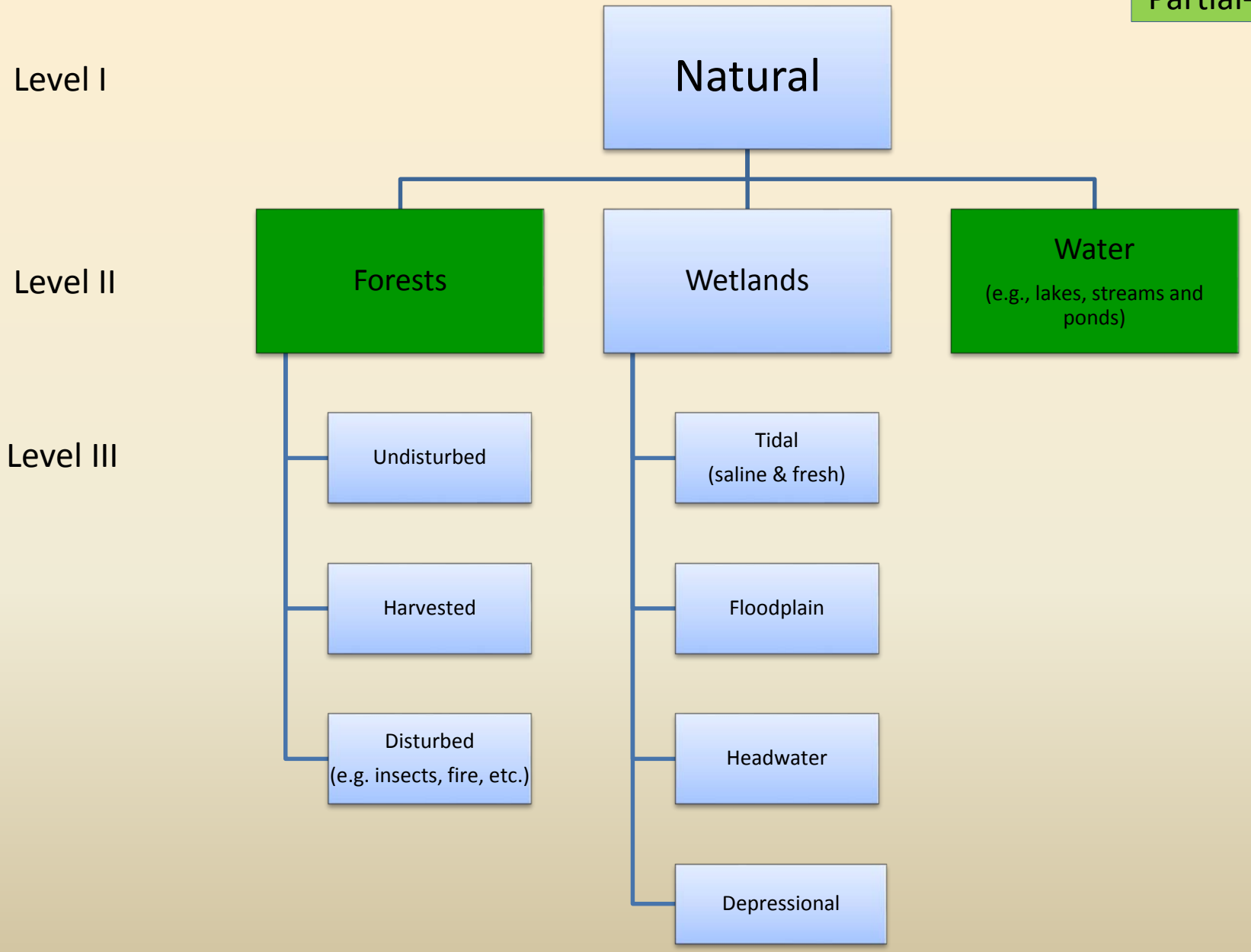
Partial- Indirect



Value of High-res Land Cover for Phase 6

High-Direct

Partial- Indirect



Chesapeake Bay Program
A Watershed Partnership

Phase 6 Land Use

Peter Claggett, pclaggett@usgs.gov
Quentin Stubbs, qstubbs@usgs.gov