

Rolling-up 59 Mapped Land Uses to the 13 "Phase 6" Land Uses

Peter R. Claggett¹, Labeeb Ahmed¹, Jacob Czawlytco², Sarah McDonald¹, Patrick McCabe², Rachel Soobitsky²

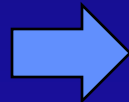
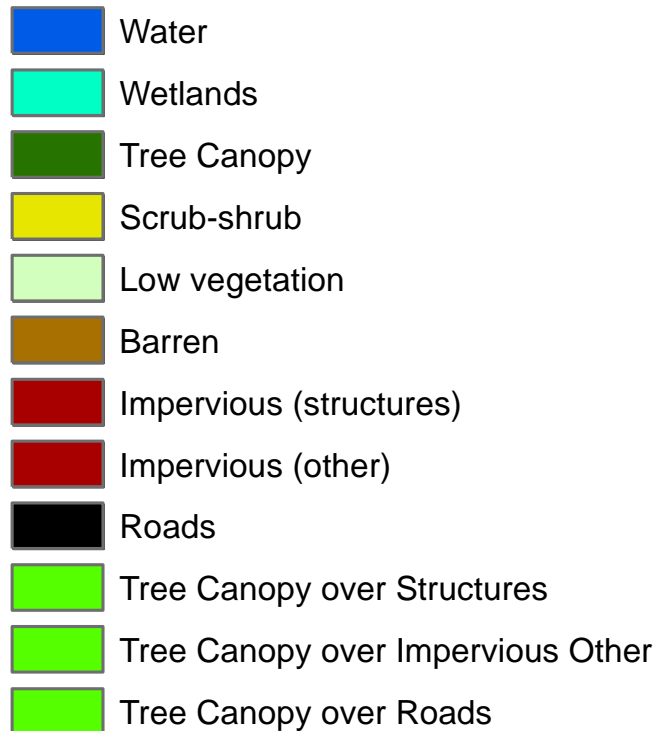
1 Lower Mississippi-Gulf Water Science Center, U.S. Geological Survey, Annapolis, MD 21403

2 Chesapeake Conservancy, Annapolis, MD 21403

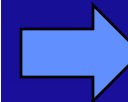
**LUWG Workgroup Meeting
January 6, 2021**

2013/14 Chesapeake Bay Watershed Land Cover/Use Data

1m Land Cover



1m Land Use



10m Land Cover/Use

Impervious Roads
Impervious Non-Roads
Tree Canopy Over Impervious
Tree Canopy Over Turf Grass
Turf Grass
Forest
Wetlands (Floodplain)
Wetlands (Other)
Wetlands (Tidal)
Water
Mixed Open
Cropland
Pasture

[https://chesapeake.usgs.gov/ph
ase6/map/#map=7/-
8582732.74/4851421.17/0.0/0,4](https://chesapeake.usgs.gov/phase6/map/#map=7/-8582732.74/4851421.17/0.0/0,4)

Chesapeake Bay Program Land Use Classification (59 classes)

1. Water (8)

1.1 Lentic

- 1.1.1 Estuary
- 1.1.2 Lakes & Ponds

1.2 Lotic

- 1.2.1 Streams
 - 1.2.1.1 Sunlit
 - 1.2.1.2 Shaded
 - 1.2.1.3 Culverted/ Buried
- 1.2.2 Ditches
 - 1.2.2.1 Sunlit
 - 1.2.2.2 Shaded
 - 1.2.2.3 Culverted/ Buried

2. Developed (12)

2.1 Impervious

- 2.1.1 Roads
- 2.1.2 Structures
- 2.1.3 Other Impervious (Parking lots, driveways)

2.2 Pervious

- 2.2.1 Turf Grass
- 2.2.2 Bare Developed
- 2.2.3 Suspended Succession (rights-of-way)
 - 2.2.3.1 Barren
 - 2.2.3.2 Herbaceous
 - 2.2.3.3 Scrub-shrub

2.3 Tree Canopy (TC)

- 2.3.1 TC over Roads
- 2.3.2 TC over Structures
- 2.3.3 TC over Other Impervious
- 2.3.4 TC over Turf Grass

3. Forest (7)

3.1 Forest (≥ 1 acre)

3.2 Fragmented Forest (< 1 acre)

3.3 Harvested Forest

- 3.3.1 Barren
- 3.3.2 Herbaceous

3.4 Natural Succession (> 3 years)

- 3.4.1 Barren
- 3.4.2 Herbaceous
- 3.4.3 Scrub-shrub

4. Production (13)

4.1 Agriculture

- 4.1.1 Cropland
 - 4.1.1.1 Barren
 - 4.1.1.2 Herbaceous
- 4.1.2 Pasture
 - 4.1.2.1 Barren
 - 4.1.2.2 Herbaceous
- 4.1.3 Orchard/vineyard
 - 4.1.3.1 Barren
 - 4.1.3.2 Herbaceous
 - 4.1.3.3 Scrub-shrub

4.2 Solar fields

- 4.2.1 Barren
- 4.2.2 Herbaceous
- 4.2.3 Scrub-shrub
- 4.2.4 Impervious

4.3 Extractive

- 4.3.1 Barren
- 4.3.2 Impervious

5. Wetlands and Water Margins (19)

5.1 Tidal

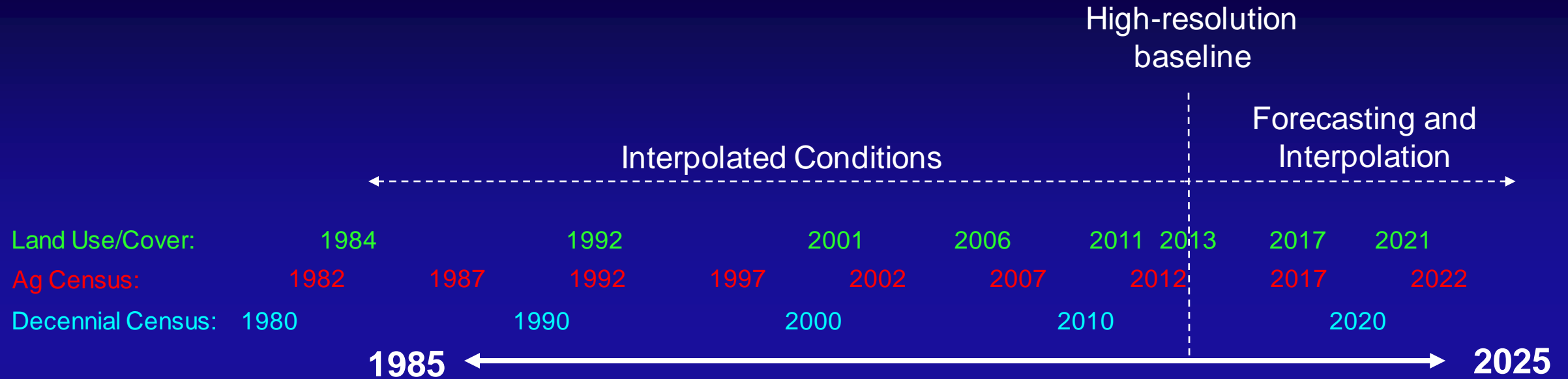
- 5.1.1 Barren
- 5.1.2 Herbaceous
- 5.1.3 Scrub-shrub

5.2 Non-tidal

- 5.2.1 Riverine - Floodplain
 - 5.2.1.1 Barren
 - 5.2.1.2 Herbaceous
 - 5.2.1.3 Scrub-shrub
 - 5.2.1.4 Forest
 - 5.2.1.5 Fragmented Forest
- 5.2.2 Riverine - Headwater
 - 5.2.2.1 Barren
 - 5.2.2.2 Herbaceous
 - 5.2.2.3 Scrub-shrub
 - 5.2.2.4 Forest
 - 5.2.2.5 Fragmented Forest
- 5.2.3 Terrene
 - 5.2.3.1 Barren
 - 5.2.3.2 Herbaceous
 - 5.2.3.3 Scrub-shrub
 - 5.2.3.4 Forest
 - 5.2.3.5 Fragmented Forest

5.3 Bare shore

High-res Land Use Updates and the Phase 6 Model



Phase III WIPs... 2013 high-res land use + Forecasted 2025 scenarios

CAST-19..... 2013 high-res land use + 2017 Census of Agriculture + Updated 2025 scenarios

CAST-21..... 2013 high-res land use + 2013 to 2017 land use change + 2017 Census of Agriculture + Updated 2025 scenarios

CAST-23..... 2013 high-res land use + 2013 to 2017 to 2021 land use change + 2017 Census of Agriculture + Updated 2025 scenarios

CAST-25..... 2013 high-res land use + 2013 to 2017 to 2021 land use change + 2017 and 2022 Census of Agriculture + Updated 2025 scenarios

Important considerations related to the Phase 6 land use “roll up”

1. 2013 Phase 6 land use acres are fixed and will not be updated.
2. For CAST-21, post-2013 land uses will be updated to 2017 by adding only the change from 2013-2017 to the original 2013 land use acreages. Post-2017 land uses will be interpolated between 2017 and updated 2025 forecasted conditions.
3. For CAST-23, post-2013 land uses will be updated to 2021 by adding only the change from 2013-2017-2021 to the original 2013 land use acreages. Post-2021 land uses will be interpolated between 2021 and updated 2025 forecasted conditions.

Chesapeake Bay Program Land Use Classification (59 classes)

1. Water (8)

1.1 Lentic

- 1.1.1 Estuary
- 1.1.2 Lakes & Ponds

1.2 Lotic

- 1.2.1 Streams
 - 1.2.1.1 Sunlit
 - 1.2.1.2 Shaded
 - 1.2.1.3 Culverted/ Buried
- 1.2.2 Ditches
 - 1.2.2.1 Sunlit
 - 1.2.2.2 Shaded
 - 1.2.2.3 Culverted/ Buried

2. Developed (12)

2.1 Impervious

- 2.1.1 Roads
- 2.1.2 Structures
- 2.1.3 Other Impervious (Parking lots, driveways)

2.2 Pervious

- 2.2.1 Turf Grass
- 2.2.2 Bare Developed
- 2.2.3 Suspended Succession (rights-of-way)
 - 2.2.3.1 Barren
 - 2.2.3.2 Herbaceous
 - 2.2.3.3 Scrub-shrub

2.3 Tree Canopy (TC)

- 2.3.1 TC over Roads
- 2.3.2 TC over Structures
- 2.3.3 TC over Other Impervious
- 2.3.4 TC over Turf Grass

3. Forest (7)

3.1 Forest (≥ 1 acre)

3.2 Fragmented Forest (< 1 acre)

3.3 Harvested Forest

- 3.3.1 Barren
- 3.3.2 Herbaceous

3.4 Natural Succession (> 3 years)

- 3.4.1 Barren
- 3.4.2 Herbaceous
- 3.4.3 Scrub-shrub

4. Production (13)

4.1 Agriculture

- 4.1.1 Cropland
 - 4.1.1.1 Barren
 - 4.1.1.2 Herbaceous
- 4.1.2 Pasture
 - 4.1.2.1 Barren
 - 4.1.2.2 Herbaceous
- 4.1.3 Orchard/vineyard
 - 4.1.3.1 Barren
 - 4.1.3.2 Herbaceous
 - 4.1.3.3 Scrub-shrub

4.2 Solar fields

- 4.2.1 Barren
- 4.2.2 Herbaceous
- 4.2.3 Scrub-shrub
- 4.2.4 Impervious

4.3 Extractive

- 4.3.1 Barren
- 4.3.2 Impervious

5. Wetlands and Water Margins (19)

5.1 Tidal

- 5.1.1 Barren
- 5.1.2 Herbaceous
- 5.1.3 Scrub-shrub

5.2 Non-tidal

- 5.2.1 Riverine - Floodplain
 - 5.2.1.1 Barren
 - 5.2.1.2 Herbaceous
 - 5.2.1.3 Scrub-shrub
 - 5.2.1.4 Forest
 - 5.2.1.5 Fragmented Forest
- 5.2.2 Riverine - Headwater
 - 5.2.2.1 Barren
 - 5.2.2.2 Herbaceous
 - 5.2.2.3 Scrub-shrub
 - 5.2.2.4 Forest
 - 5.2.2.5 Fragmented Forest
- 5.2.3 Terrene
 - 5.2.3.1 Barren
 - 5.2.3.2 Herbaceous
 - 5.2.3.3 Scrub-shrub
 - 5.2.3.4 Forest
 - 5.2.3.5 Fragmented Forest

5.3 Bare shore

Phase 6 Land Use Classification (21/59 classes)

1. Impervious, Roads – IR (1)

2.1 Impervious

2.1.1 Roads

2. Impervious, Non-Roads – INR (4)

2.1 Impervious

2.1.2 Structures

2.1.3 Other Impervious (Parking lots, driveways)

4.2 Solar fields

4.2.4 Impervious

4.3 Extractive

4.3.2 Impervious

3. Tree Canopy Over Impervious – TCI (3)

2.3 Tree Canopy (TC)

2.3.1 TC over Roads

2.3.2 TC over Structures

2.3.3 TC over Other Impervious

4. Tree Canopy over Turf Grass – TCT (1)

2.3 Tree Canopy (TC)

2.3.4 TC over Turf Grass

5. Turf Grass – TG (1)

2.2 Pervious

2.2.1 Turf Grass

6. Mixed Open – MO (13)

2.2 Pervious

2.2.2 Bare Developed

2.2.3 Suspended Succession (rights-of-way)

2.2.3.1 Barren

2.2.3.2 Herbaceous

2.2.3.3 Scrub-shrub

3.4 Natural Succession (> 3 years)

3.4.1 Barren

3.4.2 Herbaceous

3.4.3 Scrub-shrub

4.2 Solar fields

4.2.1 Barren

4.2.2 Herbaceous

4.2.3 Scrub-shrub

4.3 Extractive

4.3.1 Barren

Phase 6 Land Use Classification (38/59 classes)

7. Forest – FORE (4)

3.1 Forest (≥ 1 acre)

3.2 Fragmented Forest (< 1 acre)

3.3 Harvested Forest

3.3.1 Barren

3.3.2 Herbaceous

8. Cropland - CRP (5)

4.1 Agriculture

4.1.1 Cropland

4.1.1.1 Barren

4.1.1.2 Herbaceous

4.1.3 Orchard/vineyard

4.1.3.1 Barren

4.1.3.2 Herbaceous

4.1.3.3 Scrub-shrub

9. Pasture – PAS (2)

4.1 Agriculture

4.1.2 Pasture

4.1.2.1 Barren

4.1.2.2 Herbaceous

10. Water – WAT (9)

1.1 Lentic

1.1.1 Estuary

1.1.2 Lakes & Ponds

1.2 Lotic

1.2.1 Streams

1.2.1.1 Sunlit

1.2.1.2 Shaded

1.2.1.3 Culverted/ Buried

1.2.2 Ditches

1.2.2.1 Sunlit

1.2.2.2 Shaded

1.2.2.3 Culverted/ Buried

5.3 Bare Shore

11. Wetlands, Floodplain – WLF (5)

5.2 Non-tidal

5.2.1 Riverine - Floodplain

5.2.1.1 Barren

5.2.1.2 Herbaceous

5.2.1.3 Scrub-shrub

5.2.1.4 Forest

5.2.1.5 Fragmented Forest

12. Wetlands, Other – WLO (10)

5.2 Non-tidal

5.2.2 Riverine - Headwater

5.2.2.1 Barren

5.2.2.2 Herbaceous

5.2.2.3 Scrub-shrub

5.2.2.4 Forest

5.2.2.5 Fragmented Forest

5.2.3 Terrene

5.2.3.1 Barren

5.2.3.2 Herbaceous

5.2.3.3 Scrub-shrub

5.2.3.4 Forest

5.2.3.5 Fragmented Forest

13. Wetlands, Tidal – WLT (3)

5.1 Tidal

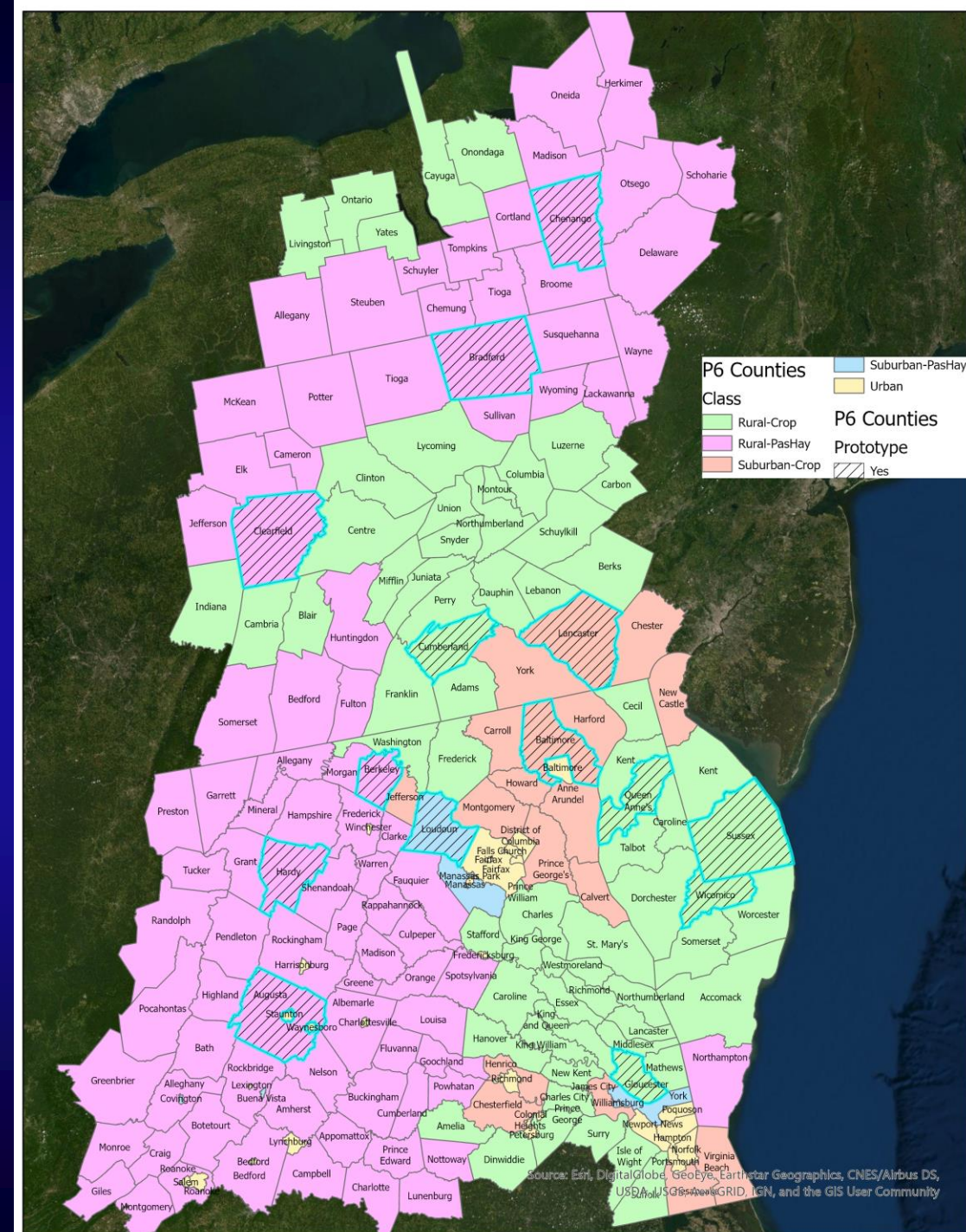
5.1.1 Barren

5.1.2 Herbaceous

5.1.3 Scrub-shrub

Fourteen Counties Selected to Prototype Development of the 2017 High-res Land Use Data

FIPS	CNTY_NAME	P_Crop	P_Dev	Class
10005	SUSSEX	97.4%	18.8%	Rural-Crop
24005	BALTIMORE	66.7%	38.6%	Suburban-Crop
24035	QUEEN ANNES	96.3%	14.2%	Rural-Crop
24045	WICOMICO	94.5%	20.6%	Rural-Crop
36017	CHENANGO	28.3%	5.8%	Rural-PasHay
42015	BRADFORD	39.2%	5.7%	Rural-PasHay
42033	CLEARFIELD	42.0%	8.1%	Rural-PasHay
42041	CUMBERLAND	65.8%	24.6%	Rural-Crop
42071	LANCASTER	68.2%	29.2%	Suburban-Crop
51015	AUGUSTA	27.1%	9.3%	Rural-PasHay
51073	GLOUCESTER	85.1%	12.6%	Rural-Crop
51107	LOUDOUN	33.1%	27.7%	Suburban-PasHay
54003	BERKELEY	33.1%	23.8%	Rural-PasHay
54031	HARDY	22.2%	6.4%	Rural-PasHay



Land Use Production for CAST-21

2017 Land Use Production Schedule		2020			2021							
Order	Task	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
1	Local review of 2017 Land Cover Data			LUWG			LUWG	LUWG				
2	Draft Hyper-resolution Hydrography			LUWG	gaps		LUWG	LUWG				
3	Cropland, Pasture, Orchards, and Turf Grass	AGWG										
4	Suspended Succession, Bare Shore, and Solar Fields	LUWG										
5	Tidal & NonTidal Wetlands	WWG										
6	Review ag and wetland mapping procedures, schedule		LUWG									
7	Forests, Tree Canopy, Timber Harvests, and Natural Succession			FWG								
8	Finalize Wetland Methodology			WWG								
9	Bare Construction, P6 Roll-up Decision Rules, FedFac Land Uses				LUWG, FedFac							
10	Prototype Land Use in 14 counties											
11	Approve 2017 Land Use Mapping and P6 Roll-up Methods					LUWG, AGWG, USWG, WWG, FWG, FedFac						
12	Complete 2017 Land Use Dataset									LUWG		
13	Revise 2013 Land Use (to match 2017)						LUWG			LUWG		
14	Update MS4s, Sewer, Septic, Zoning, and Population Estimates and Projections											
15	Revise Agricultural Forecast Methodology	AGWG					AGWG					
16	Update Land Use Forecasts									LUWG		
17	Update 2013, 2017, and 2025 CAST Inputs										LUWG	WQGIT



science for a changing world