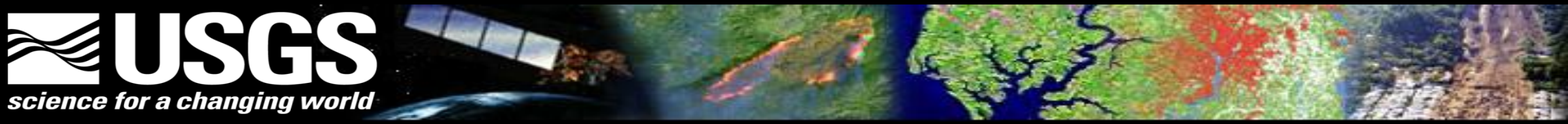

CAST Land Use Change: 2013-2017

Peter R. Claggett[1], Labeeb Ahmed[1], Jacob Czawlytco[2], Sean MacFaden[3], Sarah McDonald[1], Jarlath O'Neil-Dunne[3], and Rachel Soobitsky[2]

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2 Chesapeake Conservancy, Annapolis, MD 21403
3 University of Vermont Spatial Analysis Laboratory, Burlington, VT 05405
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Water Quality Goal Implementation Team Meeting
August 23, 2021

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

2013 - 2017 Land Use Change Review for CAST-21

August – September 2021

August 4th: FWG briefed on the implications of the high-res land use change data on our understanding of forest trends.

August 4th: LUWG endorsed use of the high-res land use change data, 2013-2017, as the “best available data” to inform CAST-21.

August 23rd: WQGIT decides to approve use of the high-res land use change data for 2013-2017 in CAST-21.

September 1st: USGS delivers land use data to CAST team.

Land Use Change Viewer

Not secure | cicapps.org/obj1lu/

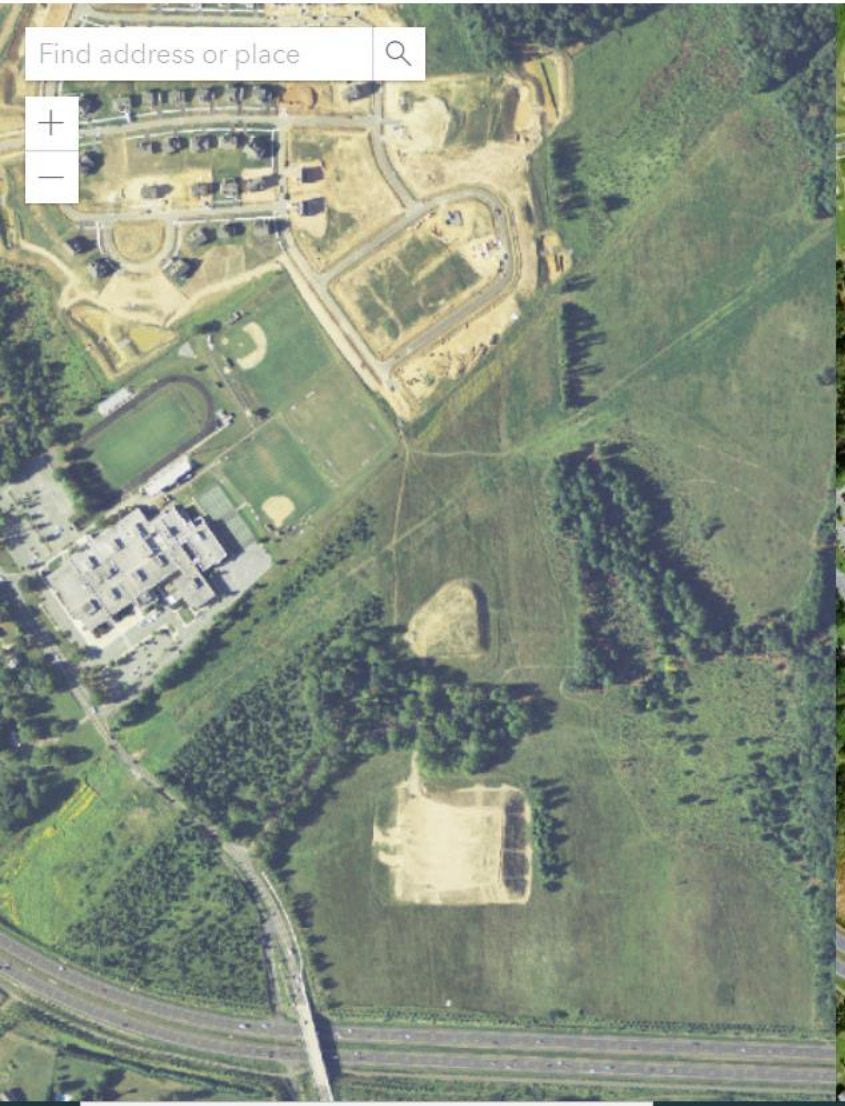
NAIP 2013/2014

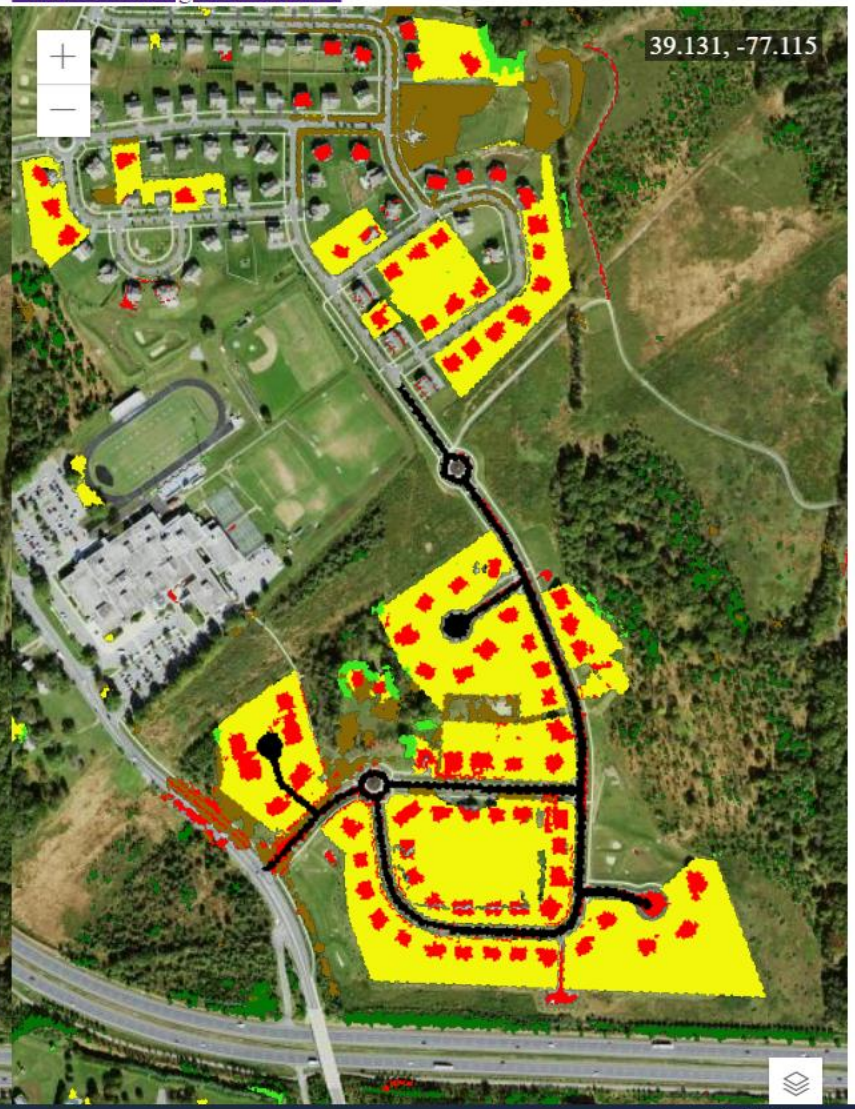
NAIP 2017/2018

Version 1 Land Use Change

NAIP 2017/2018

Land Use Change Pivot Tables





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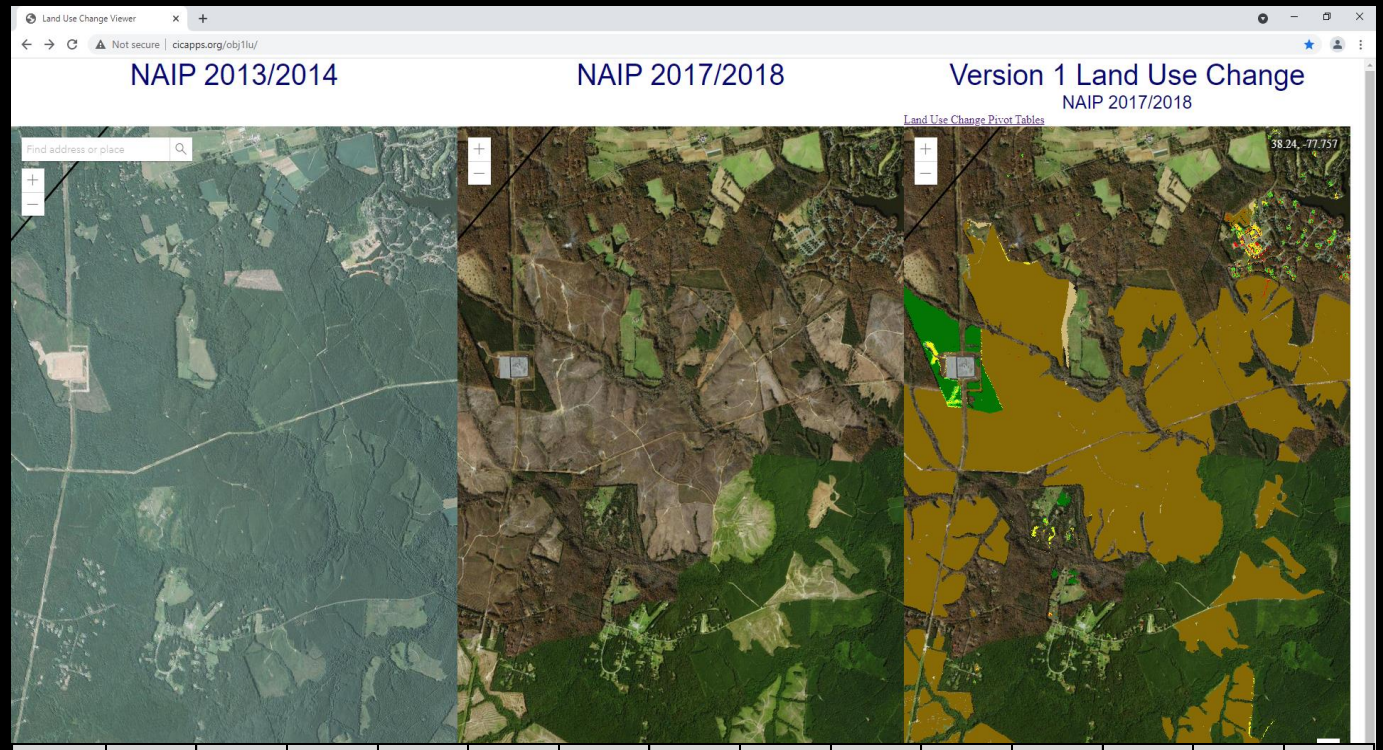
Benefits of High-resolution Land Use Data for CAST

1. Transparent

2. Verifiable

3. Logical

http://cicapps.org/obj1lu/



T1-T2 LU	IR	INR	TCI	TG	TCT	FORE	WLF	WLO	WLT	MO	CRP	PAS	WAT	Loss
IR	-	-	12	-	0	0	-	-	-	-	-	-	-	12
INR	3	-	28	24	0	1	0	-	-	8	1	4	0	70
TCI	0	17	-	6	-	-	-	-	-	5	0	0	-	28
TG	10	42	-	-	86	2	-	-	-	54	-	0	-	194
TCT	0	57	-	40	-	1	-	-	-	64	1	1	-	164
FORE	24	160	1	625	310	-	-	-	-	10,985	16	78	1	12,202
WLF	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WLO	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WLT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MO	34	270	0	440	14	1,126	-	-	-	-	0	7	19	1,910
CRP	3	3	-	3	-	1	-	-	-	19	-	18	0	47
PAS	5	29	-	22	2	130	-	-	-	27	7	-	10	232
WAT	-	-	-	-	0	1	0	-	-	1	-	3	-	5
Gain	80	577	41	1,160	412	1,262	0	-	-	11,165	24	111	31	14,863
TotGain	80	577	41	1,160	412	1,262	0	-	-	11,165	24	111	31	
TotLoss	12	70	28	194	164	12,202	-	-	-	1,910	47	232	5	
Net	68	508	13	967	248	(10,940)	0	-	-	9,255	(23)	(121)	26	

Generalized Phase 6 Land Use/Cover Classes

DEVELOPED (DEV)

1. **Impervious Roads**
   - 2.1 Impervious
     - 2.1.1 Roads

2. **Impervious Non-Roads**
   - 2.1 Impervious
     - 2.1.2 Structures
     - 2.1.3 Other Impervious
   - 4.2 Solar fields
     - 4.2.1 Impervious

3. **Tree Canopy Over Impervious**
   - 2.1 Impervious
     - 2.1.4 Tree Canopy over Impervious

4. **Turf Grass**
   - 2.2 Pervious, Developed
     - 2.2.1 Turf Grass

5. **Tree Canopy over Turf Grass**
   - 2.2 Pervious. Developed
     - 2.2.4 Tree Canopy over Turf Grass

NATURAL (NAT)

6. **Forest**
   - 3.1 Forest (>= 1 acre, 240-ft width)
   - 3.2 Tree Canopy in Agriculture

7. **Wetlands, Floodplain**
   - 5.2 Riverine, Wetlands

8. **Wetlands, Other**
   - 5.3 Terrene/Isolated, Wetlands

9. **Water**
   - 1.1 Lentic
     - 1.1.1 Estuary (tidal)
     - 1.1.2 Lakes & Ponds
   - 1.2 Lotic
     - 1.2.1 Streams
     - 1.2.2 Ditches

AGRICULTURE (AG)

10. **Cropland**
    - 4.1 Agriculture
      - 4.1.1 Cropland
      - 4.1.3 Orchard/vineyard

11. **Pasture**
    - 4.1 Agriculture
      - 4.1.2 Pasture

MIXED OPEN (MO)

12. **Mixed Open**
    - 2.2 Pervious, Developed
      - 2.2.2 Bare Developed
      - 2.2.3 Suspended Succession
    - 3.3 Harvested Forest (<= 3 years)
    - 3.4 Natural Succession (> 3 years)
    - 4.2 Solar fields
      - 4.2.2 Pervious
    - 4.3 Extractive (active mines)
    - 5.4 Bare shore, Water Margins

Generalized Land Use Changes: 2013 – 2017
CAST-19 (pre-BMP) vs CAST-21 (pre-BMP)

	CAST 2019				
	2013-2017	DEV	NAT	AG	MO
2013 to 2017	Delaware	1,431	(7,534)	14,724	(8,621)
	District of Columbia	64	(64)	-	(0)
	Maryland	18,027	(2,077)	(9,693)	(6,257)
	New York	28,305	132,912	(163,996)	2,779
	Pennsylvania	36,453	49,781	(81,583)	(4,650)
	Virginia	31,407	(65,551)	46,699	(12,555)
	West Virginia	1,099	(17,751)	20,116	(3,464)
	Total	116,785	89,716	(173,733)	(32,769)

CAST 2021				
2013-2017	DEV	NAT	AG	MO
Delaware	11,180	(4,473)	(2,567)	(4,140)
District of Columbia	78	(34)	-	(44)
Maryland	24,974	(11,361)	(8,068)	(5,545)
New York	7,622	(6,154)	(3,103)	1,636
Pennsylvania	34,619	(79,060)	(6,278)	50,720
Virginia	38,974	(242,427)	(1,920)	205,374
West Virginia	4,108	(11,677)	(386)	7,955
Total	121,555	(355,187)	(22,324)	255,956

CAST 2021 - CAST 2019				
2013-2017	DEV	NAT	AG	MO
Delaware	9,750	3,061	(17,292)	4,481
District of Columbia	14	29	-	(44)
Maryland	6,947	(9,284)	1,625	712
New York	(20,683)	(139,066)	160,892	(1,143)
Pennsylvania	(1,834)	(128,841)	75,305	55,370
Virginia	7,567	(176,876)	(48,619)	217,929
West Virginia	3,009	6,074	(20,502)	11,419
Total	4,770	(444,903)	151,409	288,724

DEV = Developed (impervious surfaces and turf grass); NAT = Natural (forest, wetlands, and water), AG = Agriculture (cropland and pasture), MO = Mixed Open (natural and suspended succession, bare developed)

Generalized Land Use Changes: 2013 – 2017

CAST-21 (pre-BMP)

FIPS	ST	CountyName	IMP	PERV	CRP	PAS	NAT*	MO*	HAR
10001	de	Kent	1,858	942	(400)	(97)	(503)	(1,790)	(8)
42033	pa	Clearfield	417	132	15	59	(3,823)	3,257	(58)
51101	va	King William	20	195	16	35	(1,792)	3,983	(2,457)

CAST-19 (pre-BMP)

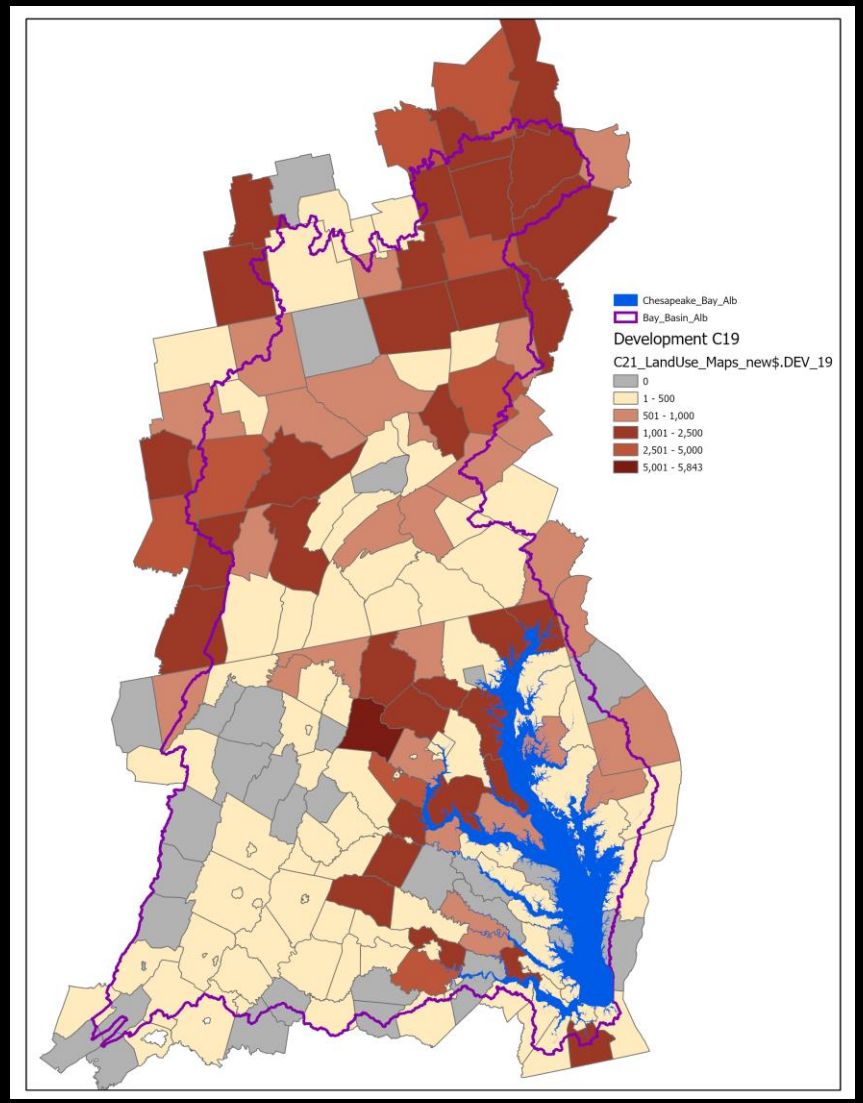
FIPS	ST	CountyName	IMP	PERV	CRP	PAS	NAT*	MO*	HAR
10001	de	Kent	630	(630)	5,726	(1,401)	(1,636)	(2,684)	(4)
42033	pa	Clearfield	946	2,495	(6,067)	(12,945)	11,595	3,827	148
51101	va	King William	115	398	(1,025)	142	2,802	25	(2,457)

CAST-19 Issues:

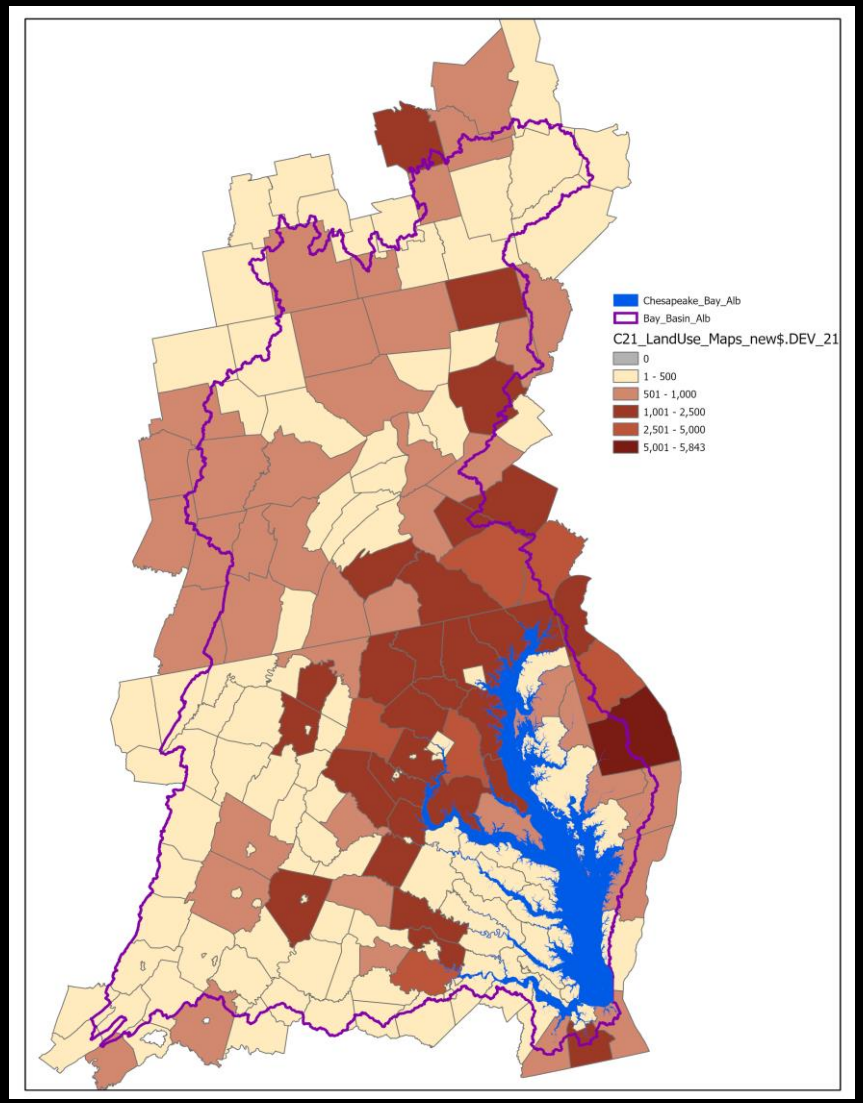
- Kent: illogical loss of turf grass despite growing population and increase in impervious surfaces
- Clearfield: large decline in farmland and associated increase in natural lands despite mapped evidence to the contrary
- King William: no recognition of the dominant change in the county: timber harvest

Developed Lands: 2013 – 2017

CAST-19 (pre-BMP)

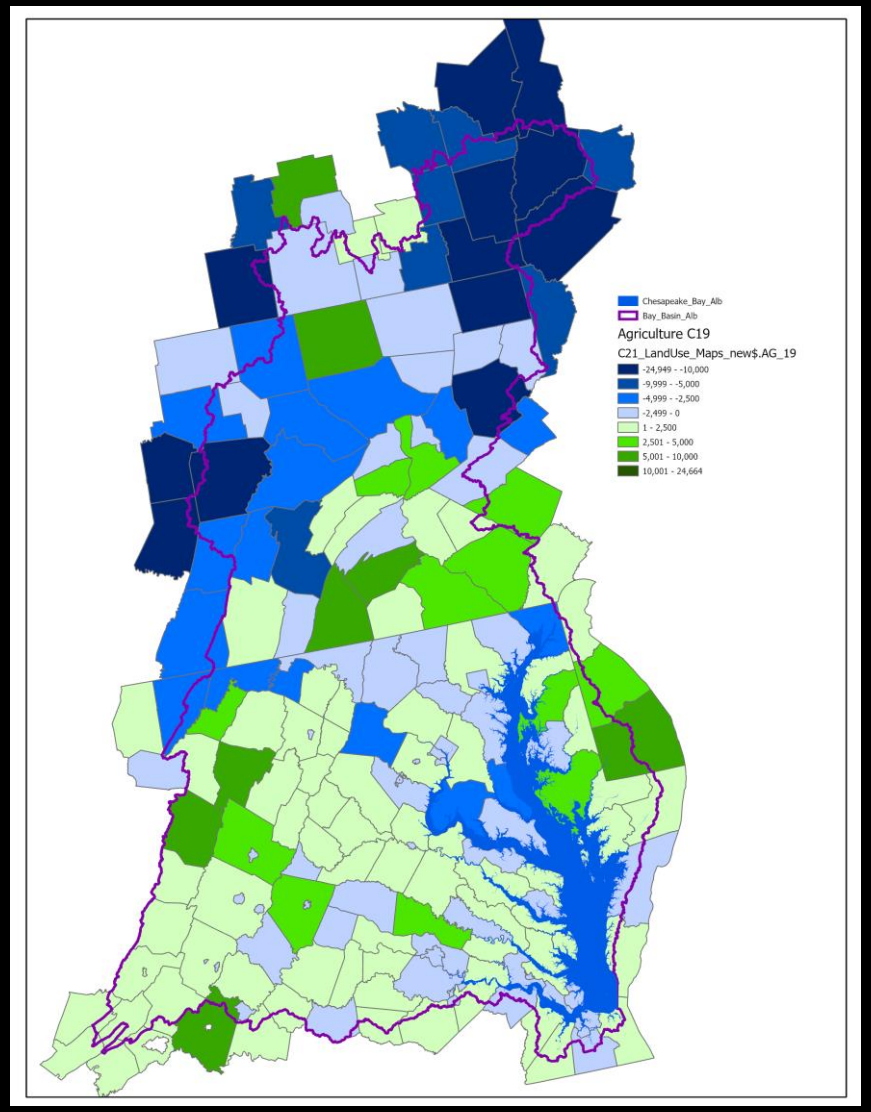


CAST-21 (pre-BMP)

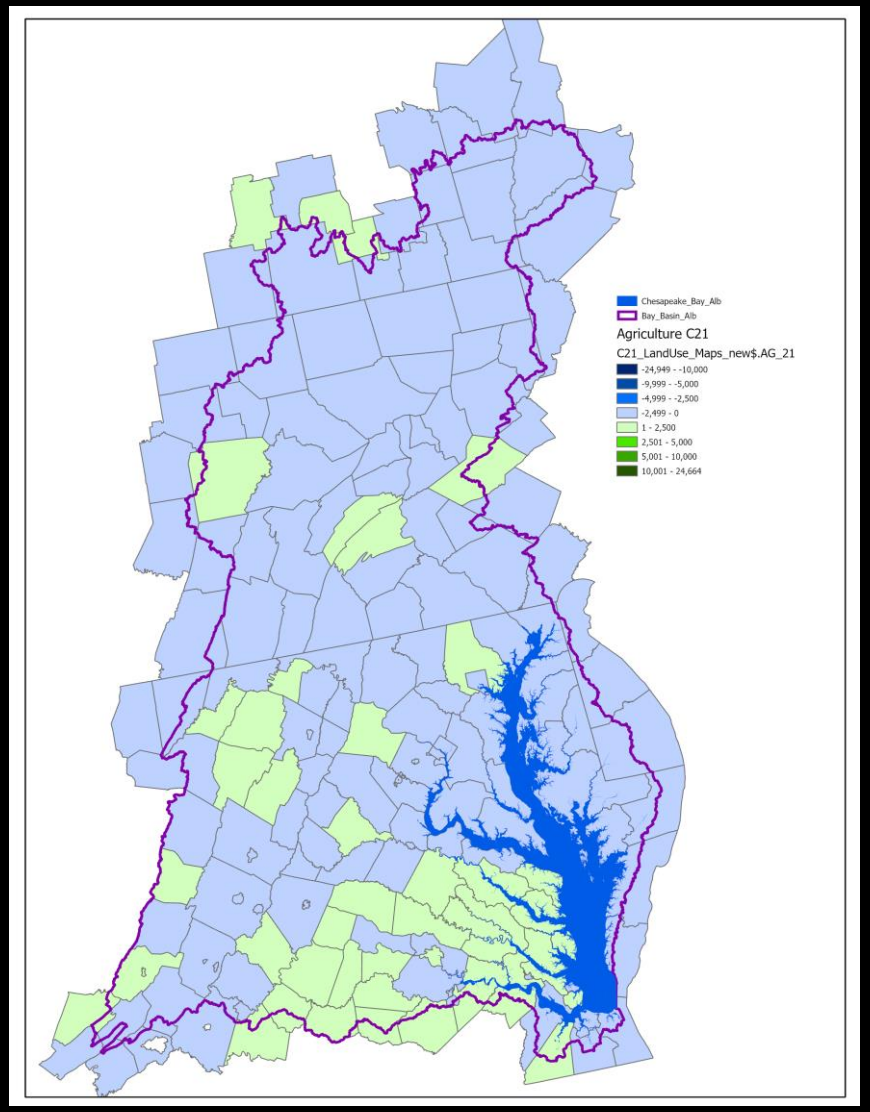


Agricultural Lands: 2013 – 2017

CAST-19 (pre-BMP)

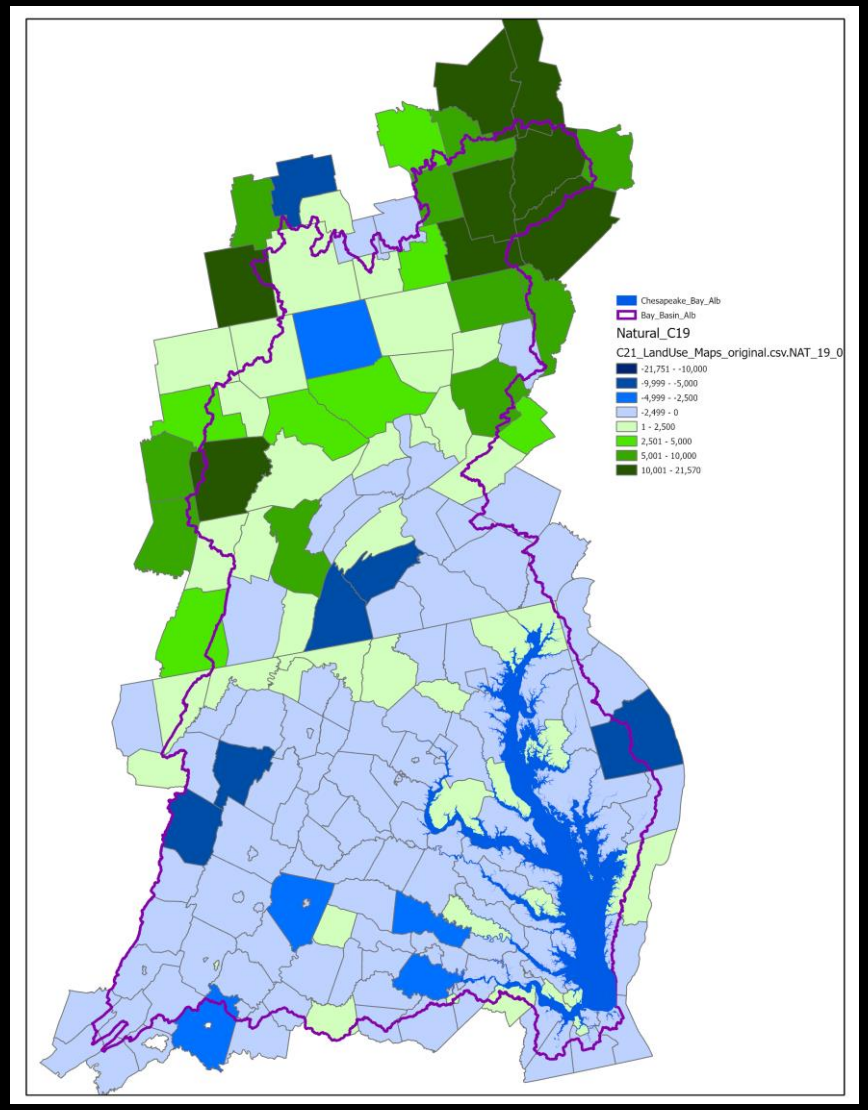


CAST-21 (pre-BMP)

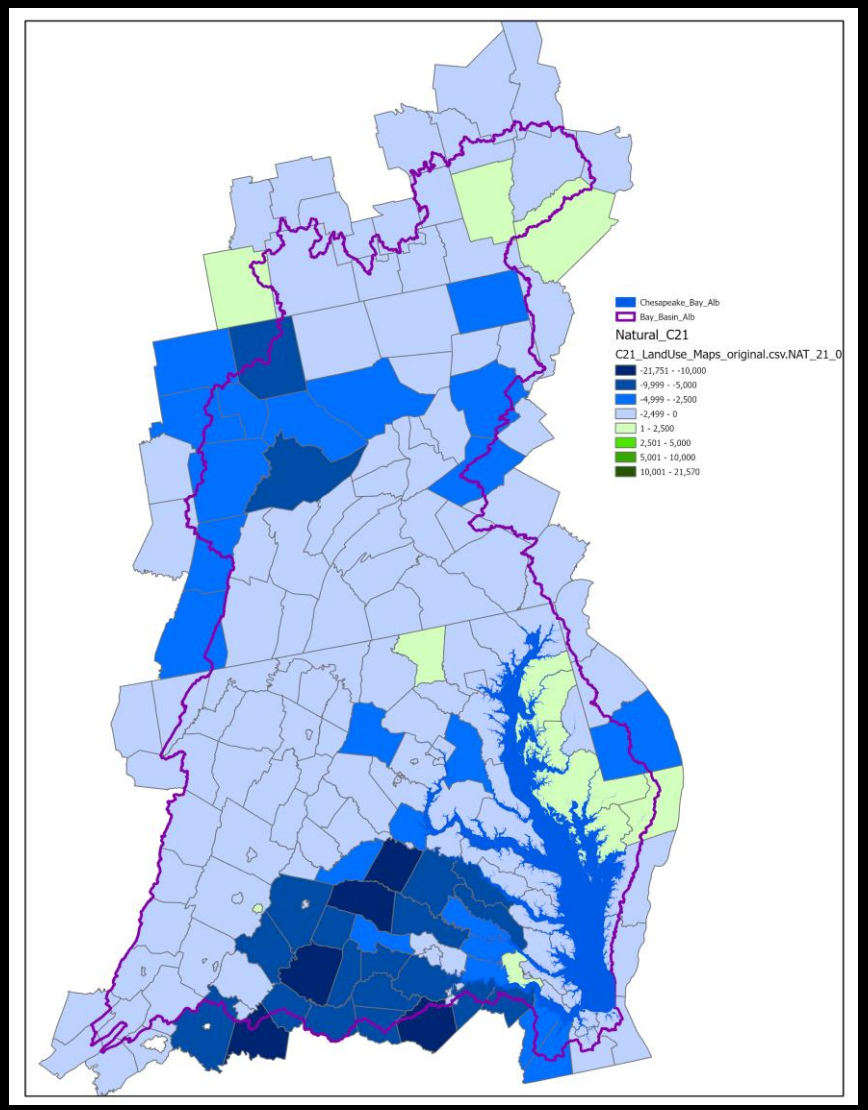


Natural Lands: 2013 – 2017

CAST-19 (pre-BMP)

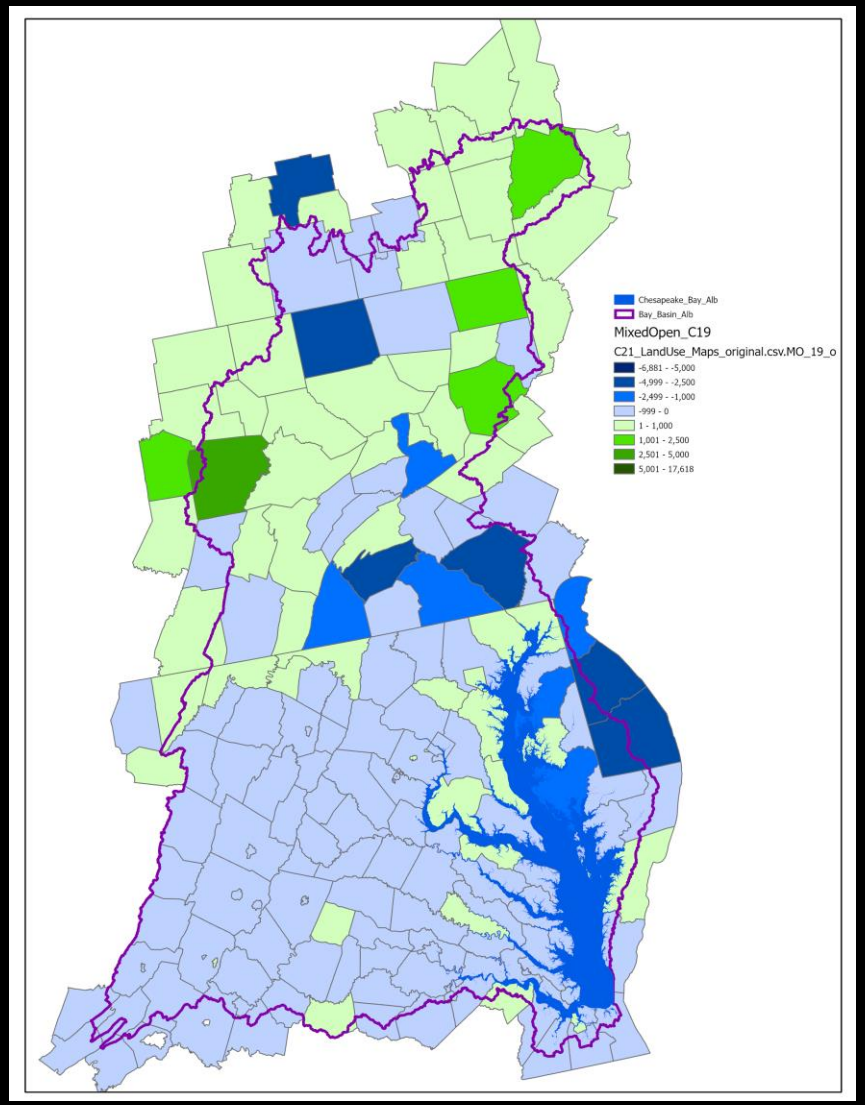


CAST-21 (pre-BMP)

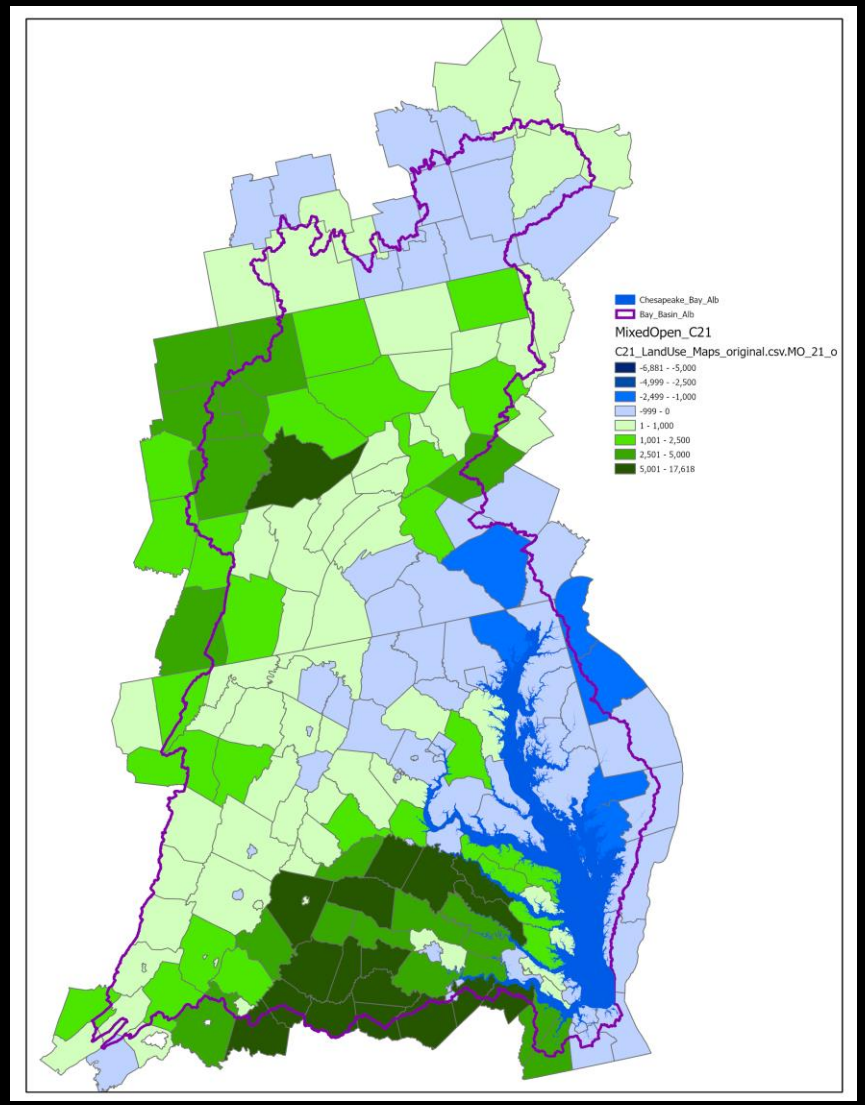


Mixed Open Lands: 2013 – 2017

CAST-19 (pre-BMP)



CAST-21 (pre-BMP)



High-resolution Land Use Data for CAST-21
Summary

The 2013-2017 high-resolution land use change data are transparent, verifiable, and logical and have been extensively reviewed and vetted by state agencies and local governments and endorsed by the Land Use Workgroup for use in CAST-21.

Temporal trends and spatial patterns of land use change represented in CAST-19 are not substantiated by mapped change in the high-resolution data and are not transparent, challenging to verify, and sometimes illogical.

Decision

Are the 2013/14 – 2017/18 high-resolution land use change data the best available data to inform CAST-21?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