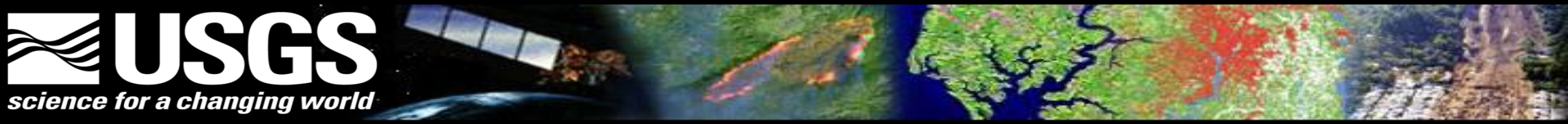

Land Use Change Data for CAST-21

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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Land Use Workgroup Call
July 14, 2021

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

Timeline for 2013 - 2017 Land Use Change Review for CAST-21

July – Aug 2021

July 14th: LUWG decides whether to endorse use of the land use change product as the "best available data" to inform CAST-21.

July 26th: The WQGIT is presented with CAST data on 2017 land use conditions (via Tableau) comparing CAST-17d, CAST-19, and CAST-21 for all counties in the watershed.

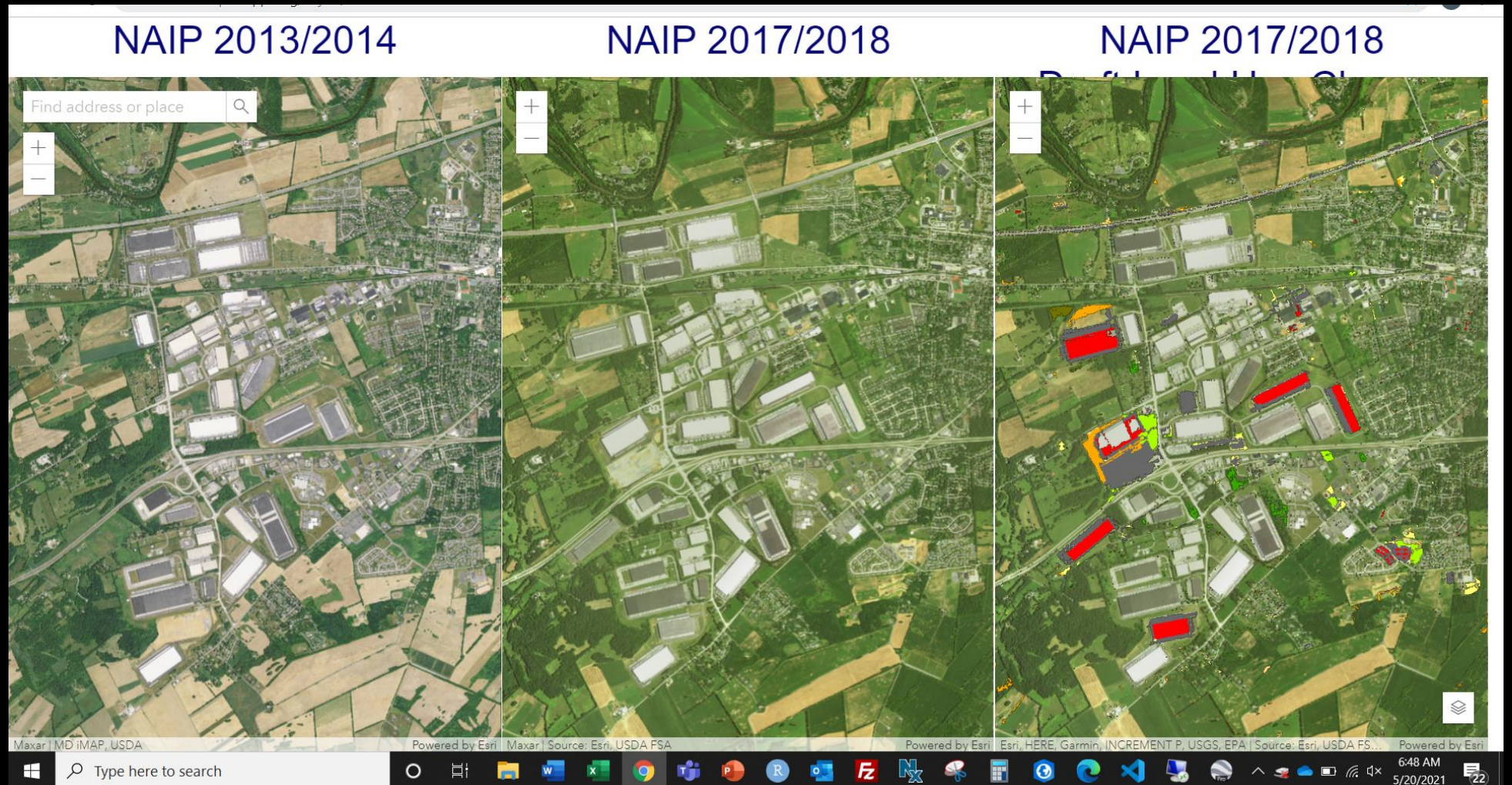
August 23rd: The WQGIT decides whether to approve use of the high-res land use change data in CAST-21.

Status of Land Use Change Data for CAST-21

Version 1 Land Use Change (2013/14 – 2017/18):

- Rolled up to mapped Phase 6 land uses
- Complete and posted for all 206 counties on July 9th
- Summarized in tabular and graphical form

http://cicapps.org/obj1lu/



Summary of Measured/Observed/Mapped Change for all 206 Counties

2013/14 "From" Land Use	2017/18 "To" Land Use													
	IR	INR	TCI	TG	TCT	FORE	WLF	WLO	WLT	MO	CRP	PAS	WAT	Loss
IR		77	1,562	10	53	279	3	0	0	34	1	4	0	2,023
INR	704		3,535	6,472	681	315	74	24	4	5,477	621	1,562	20	19,490
TCI	140	1,634		2,799	18	8	16	2	0	3,660	72	142	0	8,492
TG	317	7,992	0		15,323	431	22	3	2	2,390	57	91	27	26,655
TCT	120	8,113	1	13,573		129	-	-	-	5,484	618	783	4	28,824
FORE	1,304	20,368	27	13,033	20,157		-	-	-	426,910	27,569	34,409	185	543,961
WLF	0	0	-	2	-	-		-	-	-	-	-	0	3
WLO	-	-	-	2	-	-	-		-	-	-	-	0	2
WLT	-	-	-	1	-	-	-	-		-	-	-	0	1
MO	2,126	36,881	2	37,239	1,311	135,351	-	-	-		1,168	2,173	982	217,234
CRP	118	5,096	0	375	45	4,020	-	-	-	1,966		185	150	11,954
PAS	154	6,199	0	532	56	6,443	-	-	-	1,629	242		84	15,339
WAT	3	104	-	2	40	334	26	0	11	335	35	28		919
Gain	4,987	86,464	5,126	74,040	37,683	147,310	141	31	17	447,885	30,383	39,377	1,454	874,897

TotGain	4,987	86,464	5,126	74,040	37,683	147,310	141	31	17	447,885	30,383	39,377	1,454	
TotLoss	2,023	19,490	8,492	26,655	28,824	543,961	3	2	1	217,234	11,954	15,339	919	
Net	2,964	66,974	(3,366)	47,385	8,859	(396,652)	138	28	16	230,651	18,428	24,038	535	

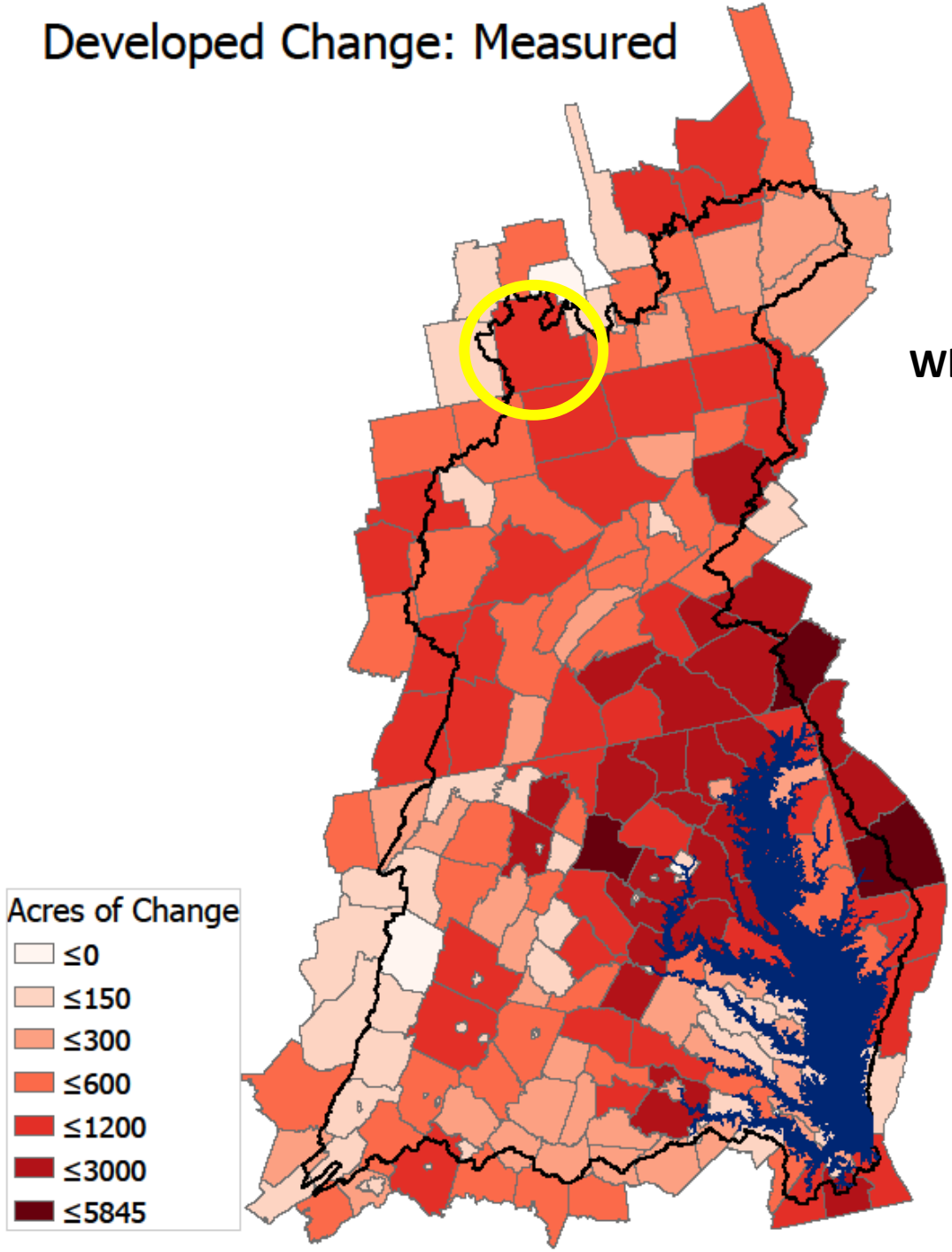
Similar pivot tables for individual counties can be downloaded here:

https://drive.google.com/drive/folders/19NxOUHwpt98_pFThpSOwiVfyGGUTP5Z8

Summary of Measured (Observed) Change vs Modeled Change for all 206 Counties

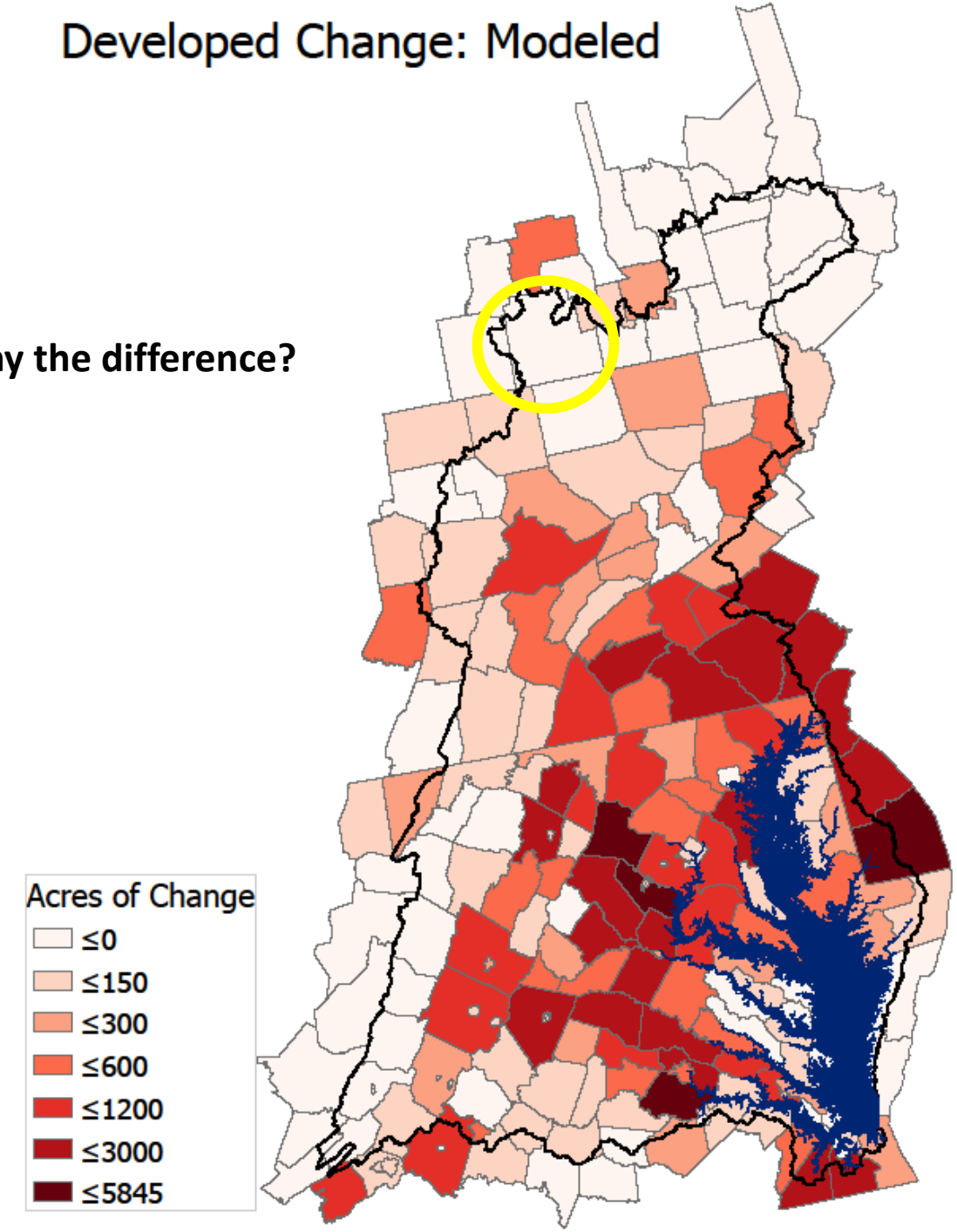
ST	CNTYNAME	FIPS	DEV_ObsChg	DEV_ModChg	NAT_ObsChg	NAT_ModChg	AG_ObsChg	AG_ModChg	MO_ObsChg	MO_ModChg
DC	DIST OF COLUMBIA	11001	85	64	(37)	(64)	0	-	(48)	-
DE	KENT	10001	2,810	1,822	(509)	(236)	(205)	(1,661)	(2,096)	75
DE	NEW CASTLE	10003	2,472	1,943	(204)	(580)	(211)	(1,453)	(2,056)	91
DE	SUSSEX	10005	5,842	5,553	(3,749)	(1,160)	552	(4,520)	(2,645)	127
MD	ALLEGANY	24001	145	31	(626)	(25)	12	(8)	469	2
MD	ANNE ARUNDEL	24003	1,927	1,356	(1,966)	(1,180)	19	(205)	20	28
MD	BALTIMORE	24005	1,415	533	(756)	(364)	74	(206)	(734)	37
MD	BALTIMORE	24510	185	-	(5)	-	-	-	(180)	-
MD	CALVERT	24009	1,602	133	(919)	(115)	(2)	(21)	(681)	3
MD	CAROLINE	24011	564	188	(8)	(41)	(123)	(159)	(433)	11
MD	CARROLL	24013	1,486	162	6	(46)	(266)	(127)	(1,226)	11
MD	CECIL	24015	1,024	484	(424)	(232)	(102)	(273)	(499)	21
MD	CHARLES	24017	1,382	893	(812)	(681)	33	(220)	(603)	8
MD	DORCHESTER	24019	300	326	258	(80)	(20)	(262)	(539)	16
MD	FREDERICK	24021	1,930	959	(143)	(220)	(305)	(776)	(1,482)	37
MD	GARRETT	24023	273	179	(1,824)	(116)	77	(71)	1,474	9
MD	HARFORD	24025	1,955	608	(499)	(375)	(56)	(290)	(1,400)	56
MD	HOWARD	24027	1,945	559	(834)	(310)	(26)	(272)	(1,085)	22
MD	KENT	24029	196	79	14	(16)	(104)	(72)	(106)	9
MD	MONTGOMERY	24031	959	587	(1,847)	(270)	168	(355)	720	38

Developed Change: Measured



Why the difference?

Developed Change: Modeled

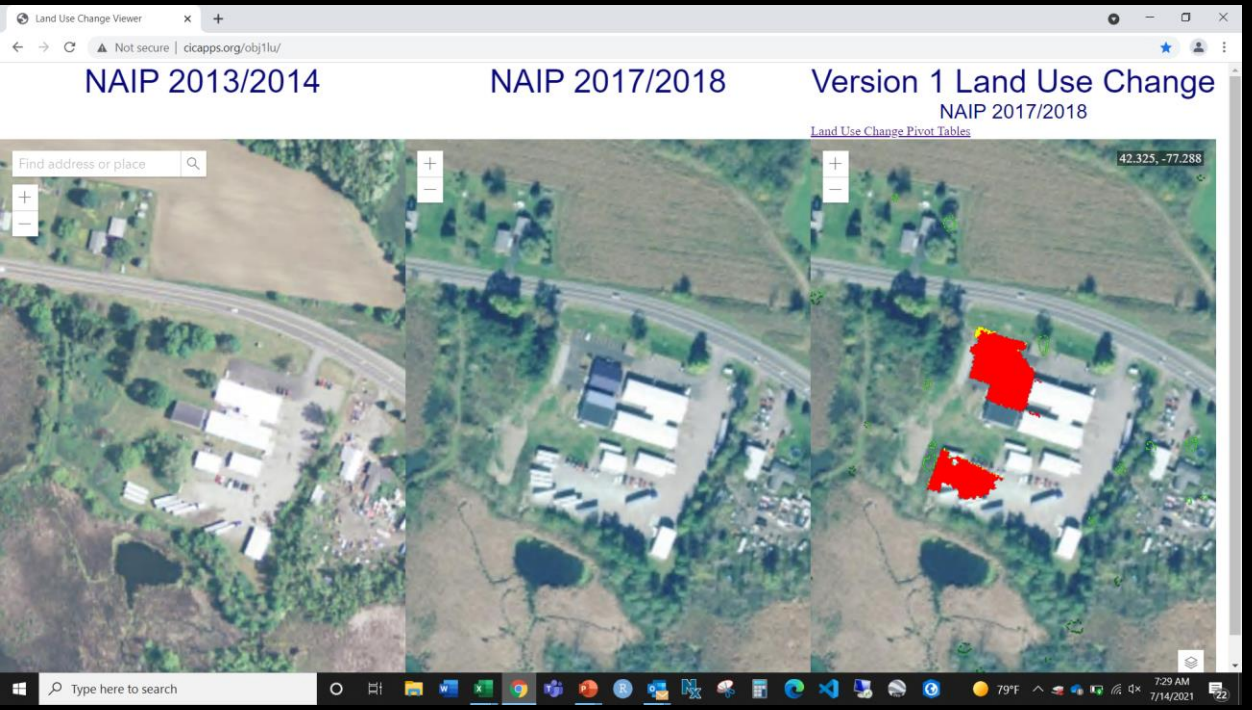


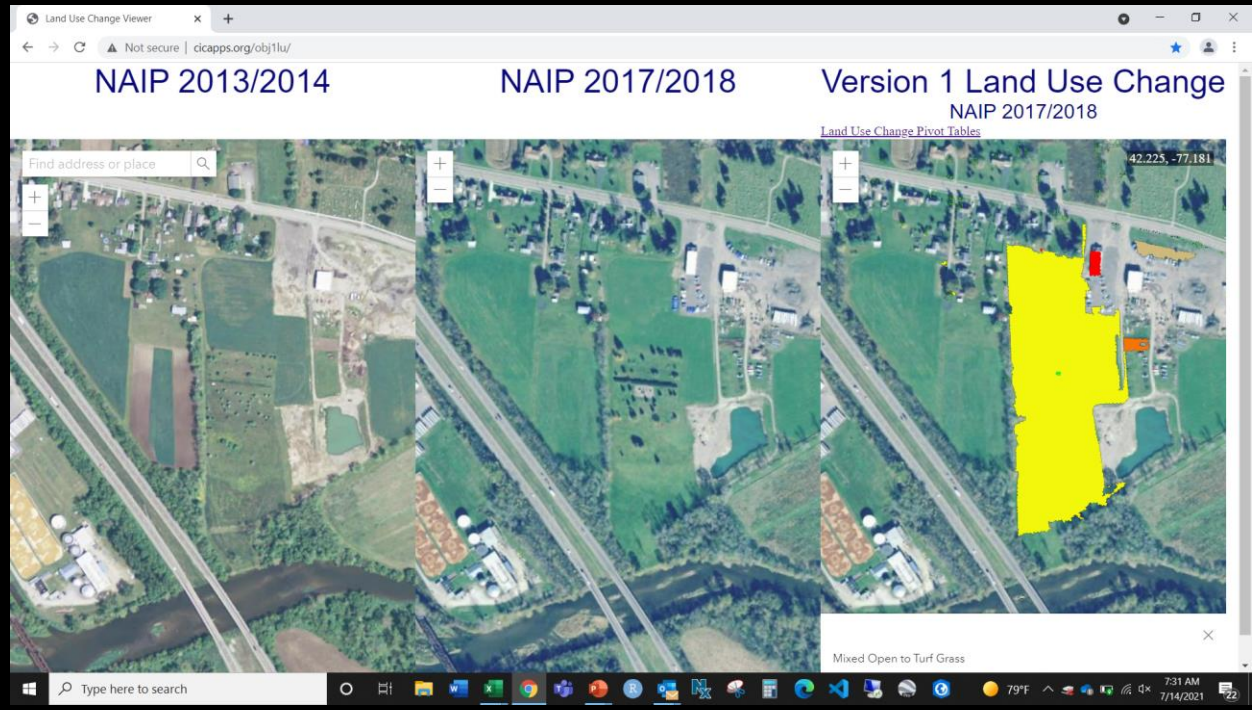
Measured vs Modeled Change in Steuben County, New York

Population of Steuben County declining and projected to continue to decline through 2025, therefore land change model projected NO change.

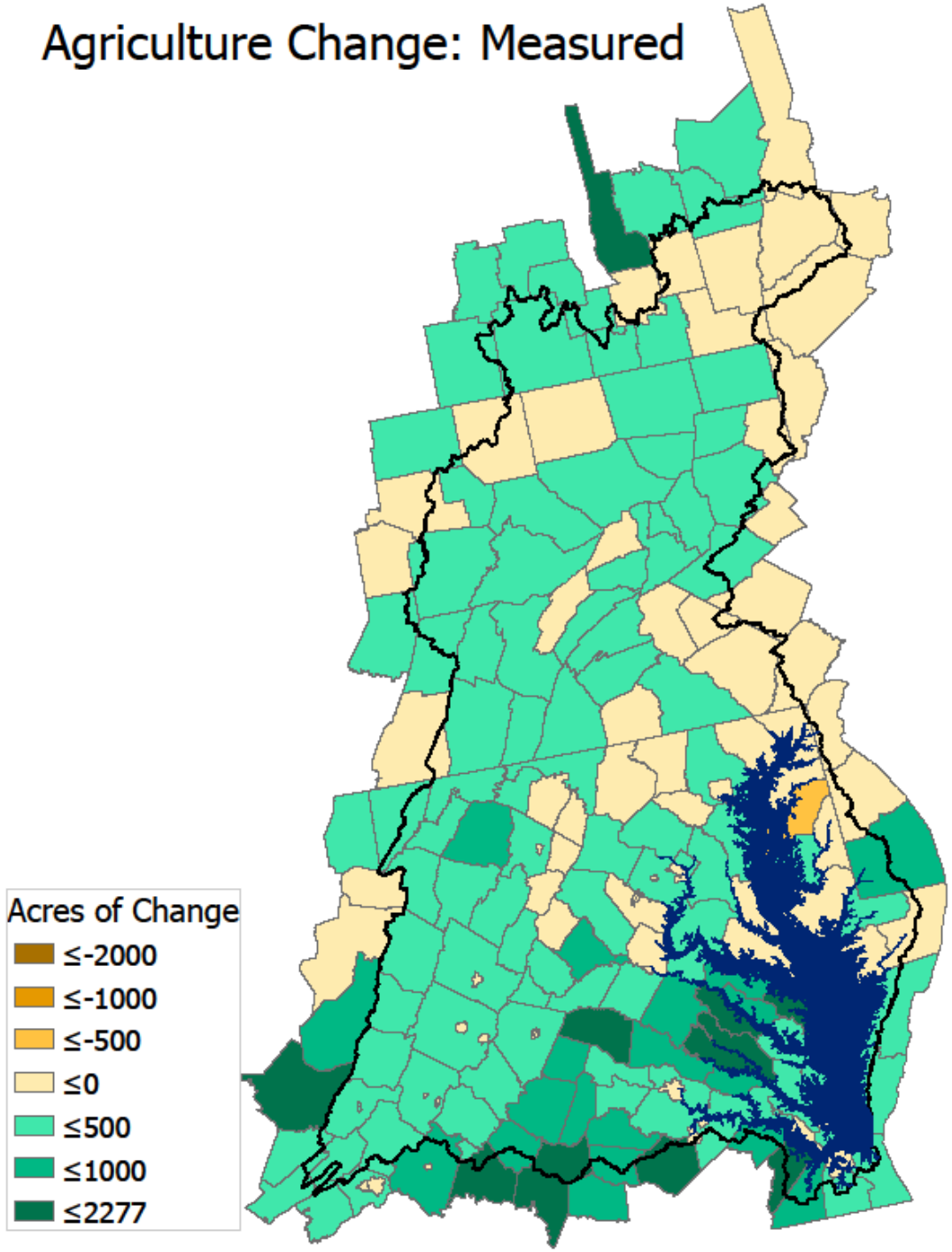
Interpretation of NAIP imagery revealed actual change on the ground, despite declining population.

ST	CNTYNAME	FIPS	DEV_ObsChg	DEV_ModChg	NAT_ObsChg	NAT_ModChg	AG_ObsChg	AG_ModChg	MO_ObsChg	MO_ModChg
NY	STEUBEN	36101	784	-	(651)	-	459	-	(592)	-

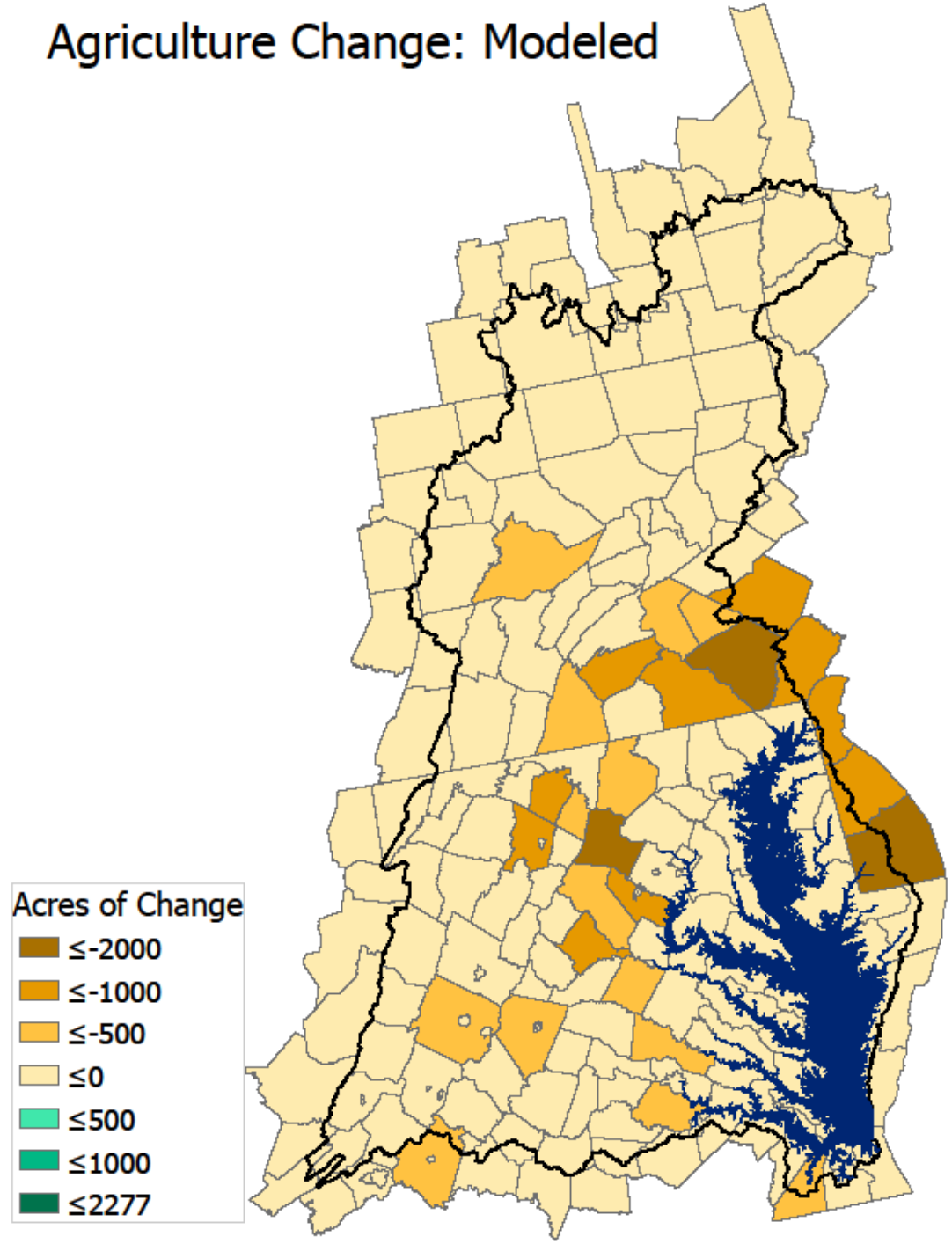




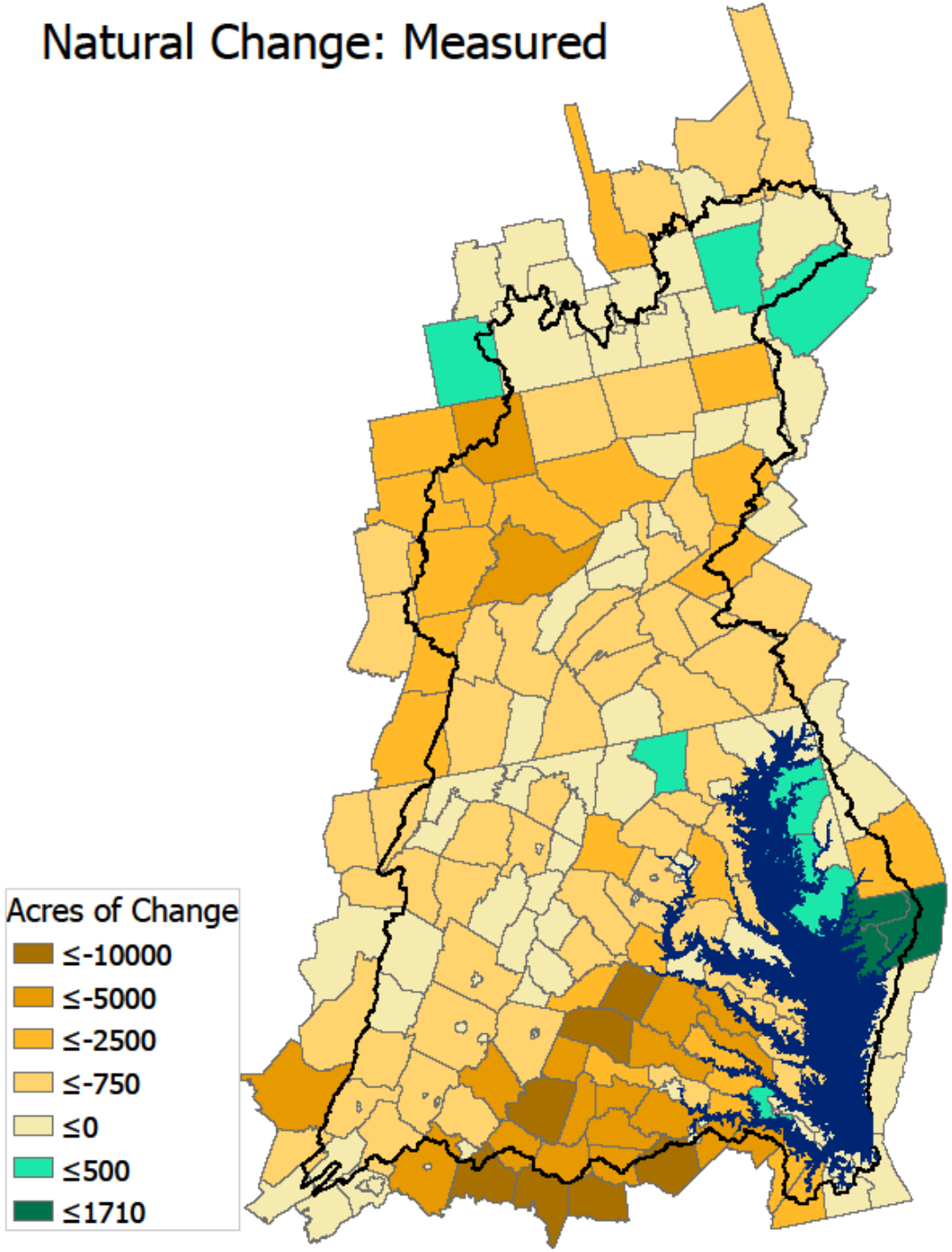
Agriculture Change: Measured



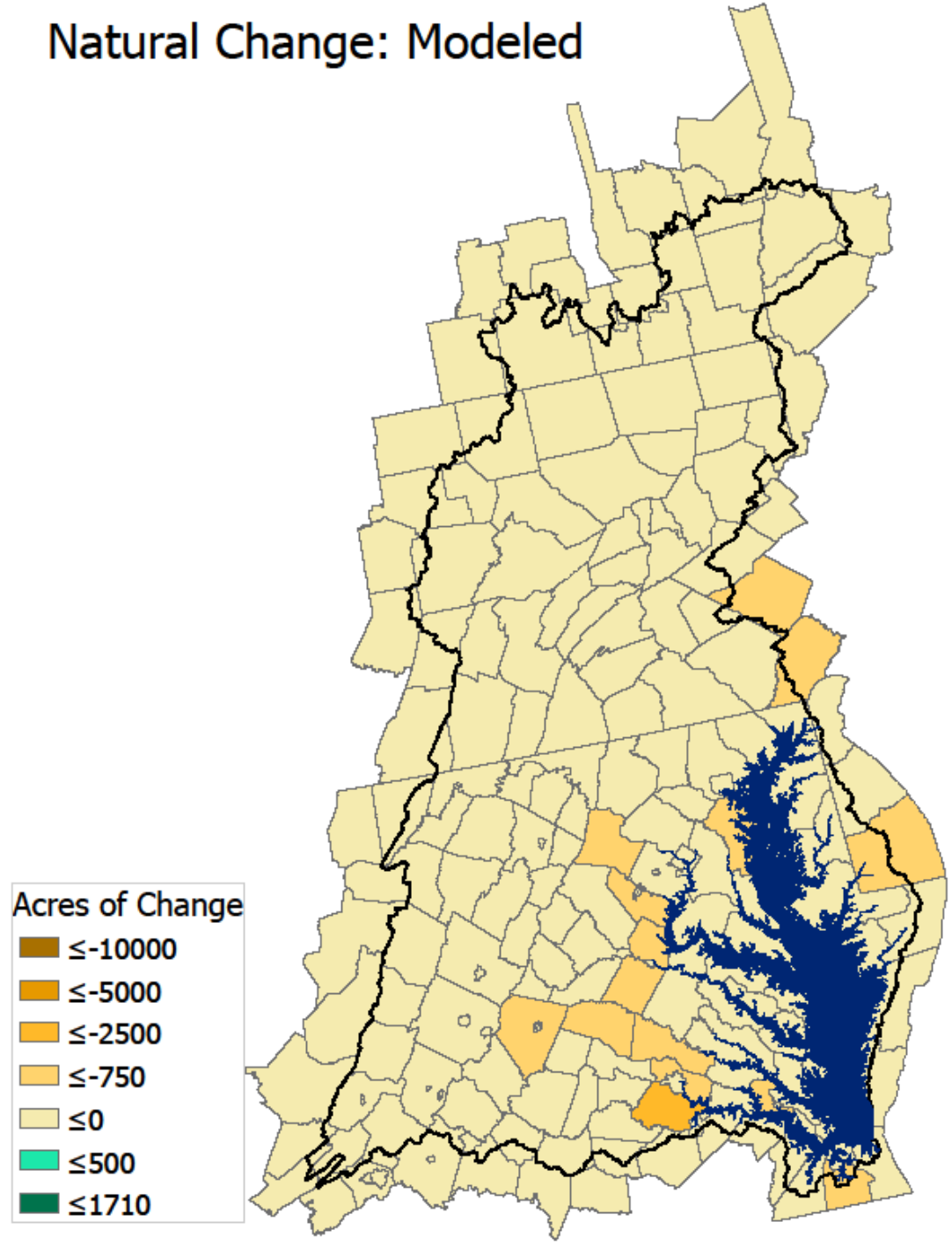
Agriculture Change: Modeled



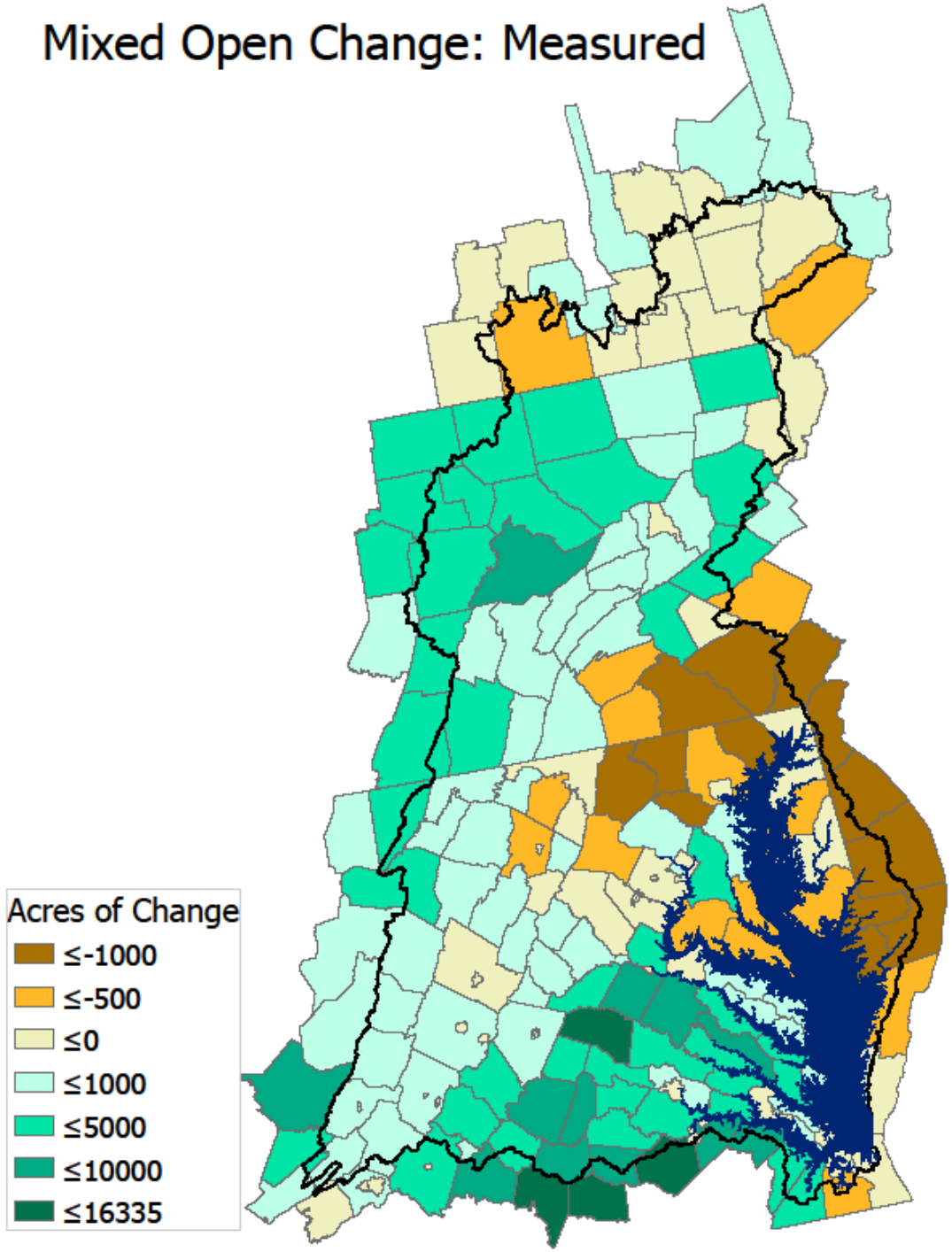
Natural Change: Measured



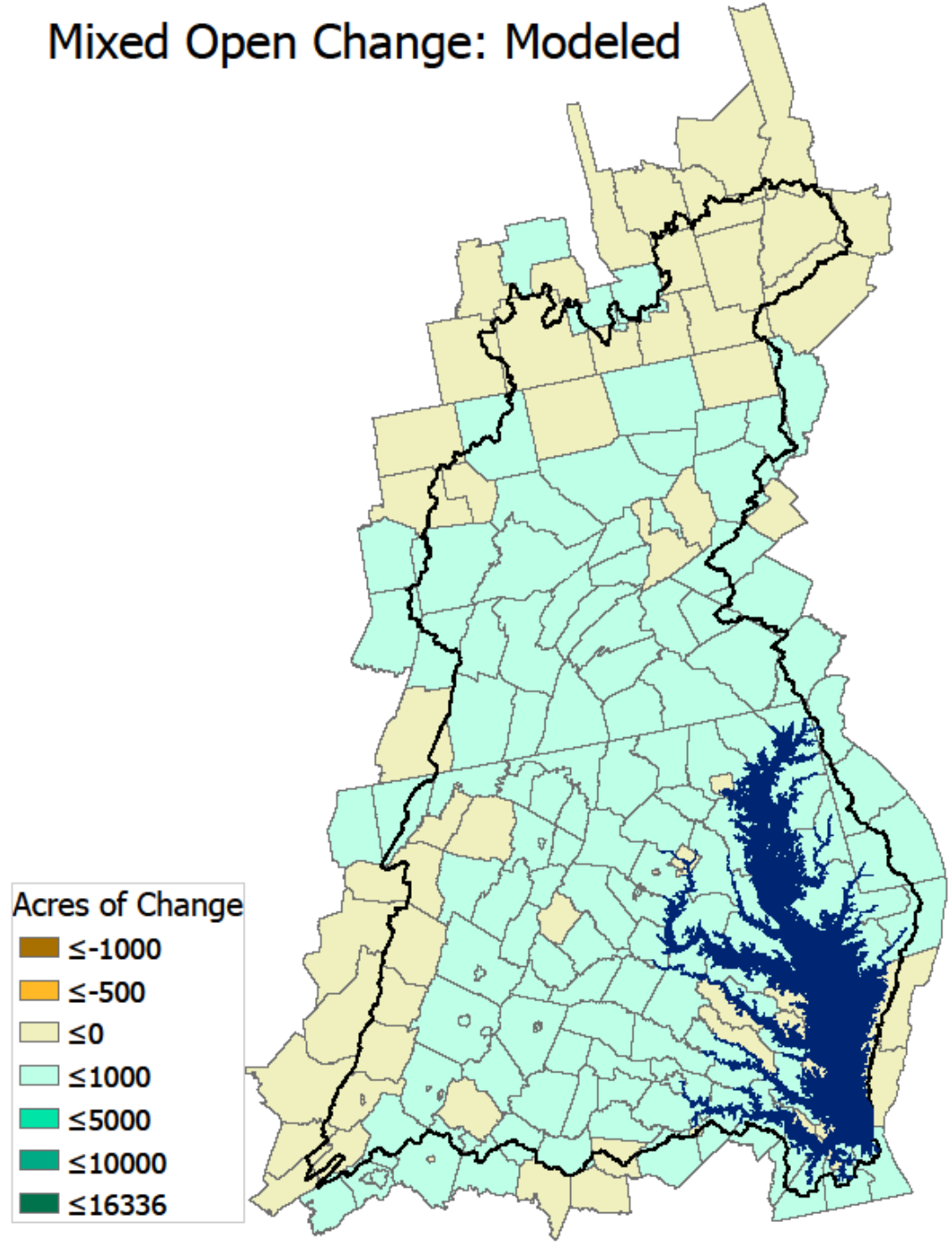
Natural Change: Modeled



Mixed Open Change: Measured



Mixed Open Change: Modeled



Measured vs Modeled Change in Lancaster County, Pennsylvania

Modeled amount of development similar to measured.
Consequences of growth very different. Modeled conversion of farmland 10x greater than measured.

ST	CNTYNAME	FIPS	DEV_ObsChg	DEV_ModChg	NAT_ObsChg	NAT_ModChg	AG_ObsChg	AG_ModChg	MO_ObsChg	MO_ModChg
PA	LANCASTER	42071	2,693	2,529	(969)	(517)	(290)	(2,192)	(1,434)	180

Interpretation of pivot tables reveals development displaces forest 2:1 compared to farmland.

T1-T2 LU	IR	INR	TCI	TG	TCT	FORE	WLF	WLO	WLT	MO	CRP	PAS	WAT	Loss
IR	0	0.21	6.99	0.2	0.22	1.57	0	0	0	0.52	0	0	0	9.71
INR	9.64	0	48.9	35.34	2.45	0.51	0	0	0	48.2	26.49	7.88	0	179.41
TCI	0.09	49.9	0	10.84	0	0	0	0	0	12.08	1.87	0.49	0	75.28
TG	3.76	489.25	0	0	296.61	4.72	0	0	0	25.34	1.14	0.22	0	821.05
TCT	0.07	162.67	0.02	151.87	0	2	0	0	0	44.76	30.8	6.15	0.01	398.36
FORE	2.12	212.67	0.41	137.12	257.22	0	0	0	0	413.86	251.53	65	0	1339.93
WLF	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WLO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WLT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MO	20.98	999.98	0.01	494.82	11	339.62	0	0	0	0	42.17	85.55	2.22	1996.35
CRP	1.61	545.25	0	10.33	0.02	18.15	0	0	0	9.74	0	3.5	0	588.62
PAS	0.08	207.02	0	4.08	0.02	5.47	0	0	0	7.33	0.45	0	0	224.44
WAT	0	2.5	0	0	0.63	3.34	0	0	0	0	0	0	0	6.47
Gain	38.36	2669.45	56.32	844.6	568.17	375.39	0	0	0	561.84	354.46	168.79	2.23	5639.6

TotGain	38.36	2669.45	56.32	844.6	568.17	375.39	0	0	0	561.84	354.46	168.79	2.23
TotLoss	9.71	179.41	75.28	821.05	398.36	1339.93	0	0	0	1996.35	588.62	224.44	6.47
Net	28.65	2490.04	-18.96	23.55	169.82	-964.54	0	0	0	-1434.51	-234.15	-55.65	-4.24

Measured vs Modeled Change in Lancaster County, Pennsylvania

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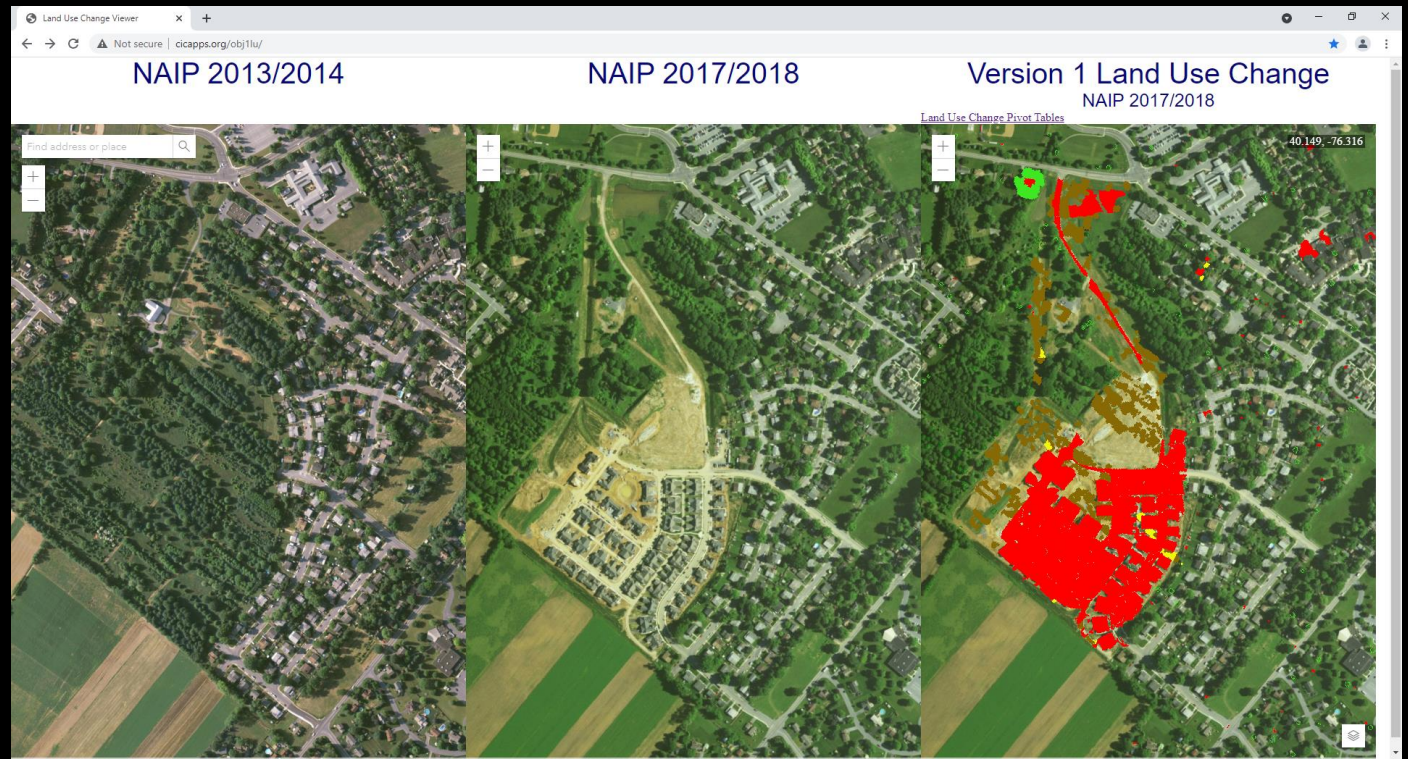
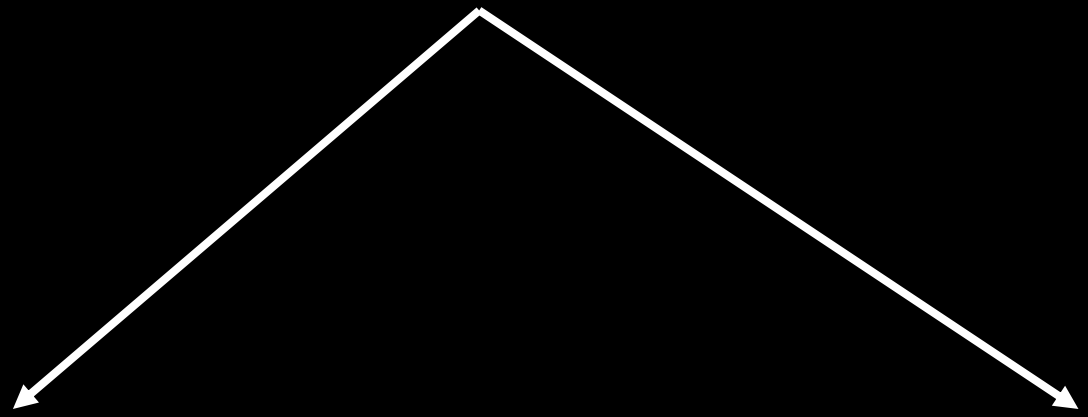


LUWG Decision

The LUWG is asked to endorse the use of the land use change product as the “best available data” to inform CAST-21.



Yes.

Measured high-res land use change data replace modeled urban development for the period 2013-2017 in CAST.

No.

Modeled urban development continues to be used for the period 2013-2017 in CAST.