Moose Hill

Wildlife Sanctuary, Sharon, MA

Grace Wu & Lisa Penfield

Fall 2022 | Intro to Remote Sensing Final Presentation

Agenda

1 Study Area

2 Data

3 Vegetation Indices

4 Supervised Classification

Vegetation Indices:
NDVI, EVI, NDWI, NDBI

Study Area

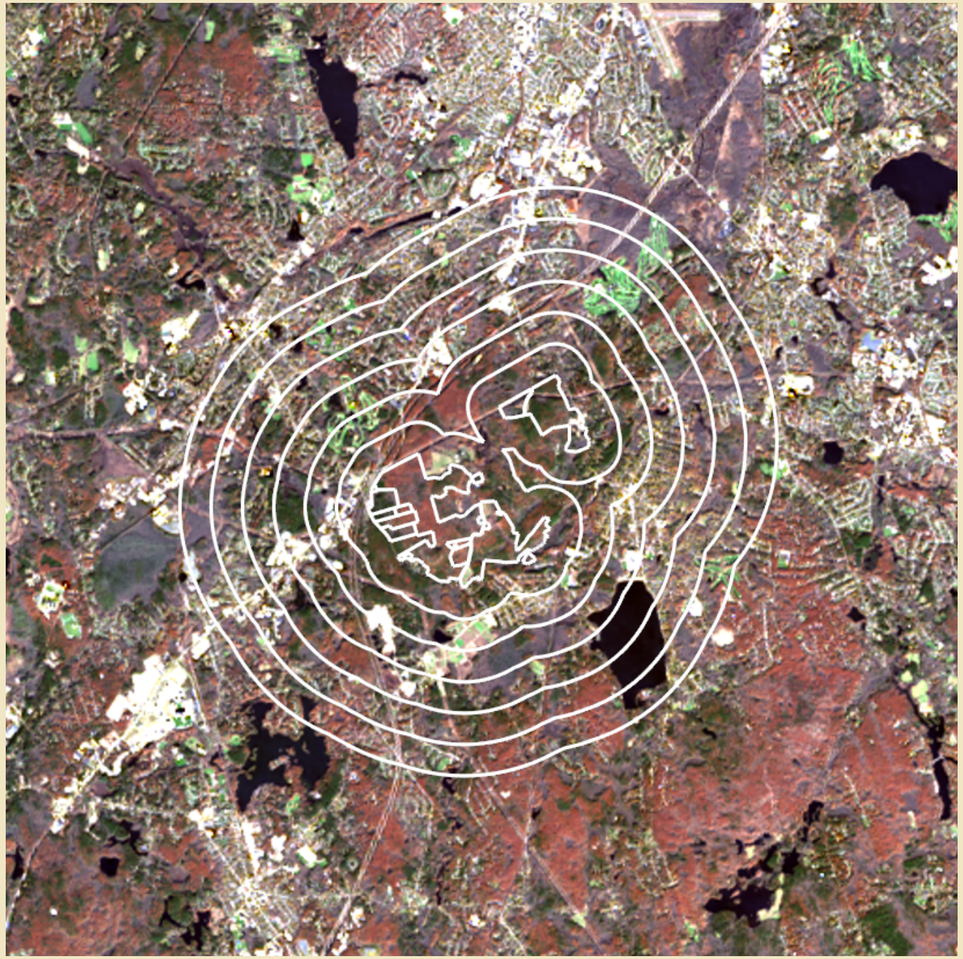
Study Area

Moose Hill Wildlife Sanctuary

- Forty minutes away from Boston
- Mass Audubon's oldest wildlife sanctuary
- Services include hiking trails, an organic farm, educational programs
- Surrounded by several bodies of water, forested areas, agricultural land, as well as multiple municipal buildings

Image Credit: Mass Audubon. 2022. Moose Hill Wildlife Sanctuary. https://www.massaudubon.org/get-outdoors/wildlife-sanctuaries/moose-hill

November 16, 2021



July 22, 2022

Data

Data

Bands	Wavelength (micrometers)	Resolution (meters)
Band 1 - Coastal aerosol	0.43-0.45	30
Band 2 - Blue	0.45-0.51	30
Band 3 - Green	0.53-0.59	30
Band 4 - Red	0.64-0.67	30
Band 5 - Near Infrared (NIR)	0.85-0.88	30
Band 6 - SWIR 1	1.57-1.65	30
Band 7 - SWIR 2	2.11-2.29	30

Landsat 8 OLI Level-2 (16-bit)

- November 16, 2021
- July 22, 2022

MTL.txt files

LC08_L2SP_012031_20211116_20211125_02_T1_MTL.txt TXT File

LC09_L2SP_012031_20220722_20220724_02_T1_MTL.txt TXT File

	Band Names	Wavelengths	FWHM
Units		µm	µm
1	SRB1	0.443	0.016
2	SRB2	0.4826	0.0601
3	SRB3	0.5613	0.0574
4	SRB4	0.6546	0.0375
5	SRB5	0.8646	0.0282
6	SRB6	1.609	0.0847
7	SRB7	2.201	0.1867

Benefits from using a MTL.txt file

- Do not need to Build Band Stack
- It is ready to be used for the NDVI tool after saving as it an ENVI file.

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Vegetation Indices

Formula

NDVI

= (NIR - red)/(NIR + red)

= (B5-B4)/(B5+B4)

EVI

= G ×[(NIR - red)/(NIR + C1 ×red - C2 ×blue + L)]

= 2.5 ×[(B5 - B4)/(B5 + 6 ×B4-7.5×B2+1)]

NDWI

=(green-NIR)/(green+NIR)

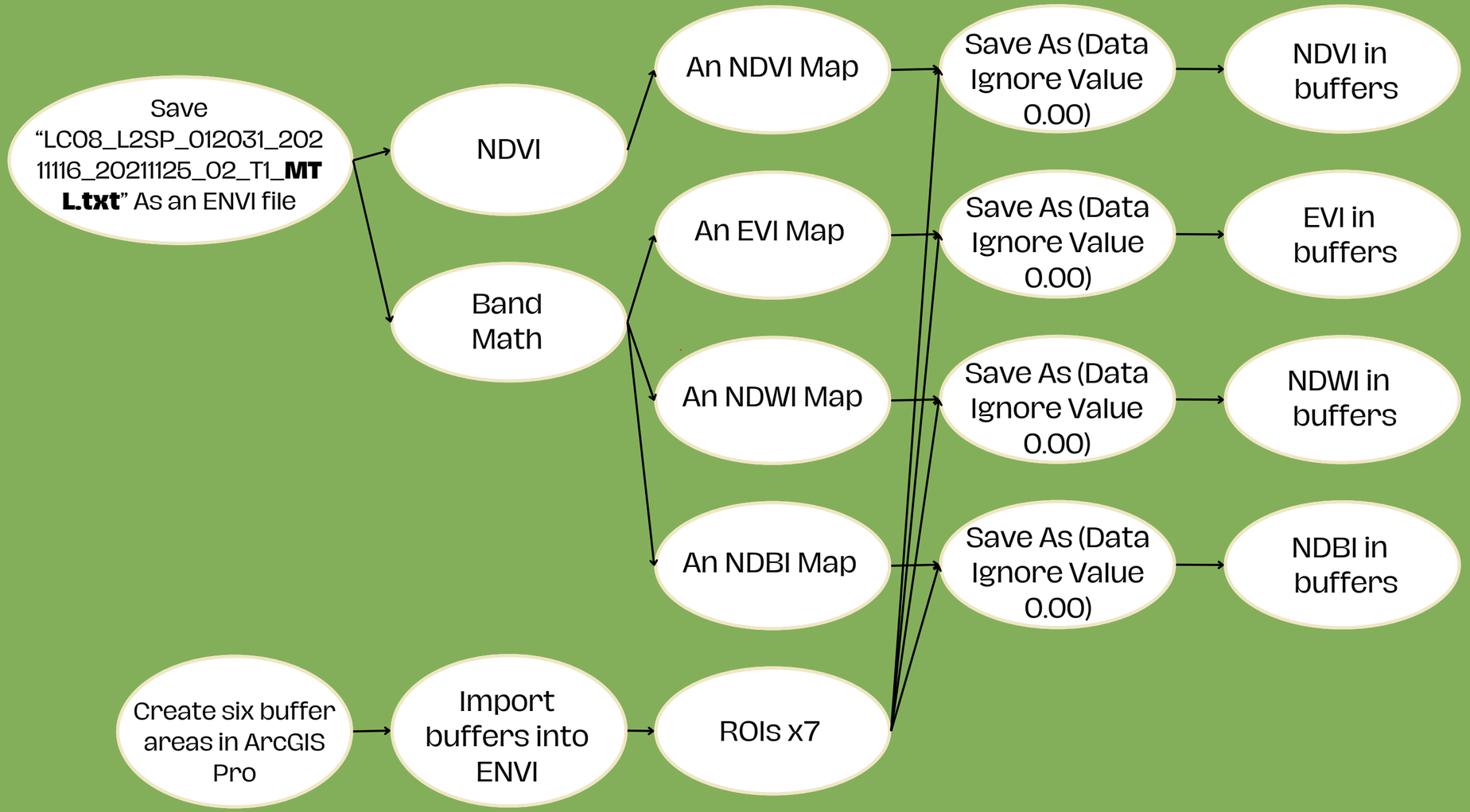
=(B3-B5)/(B3+B5)

NDBI

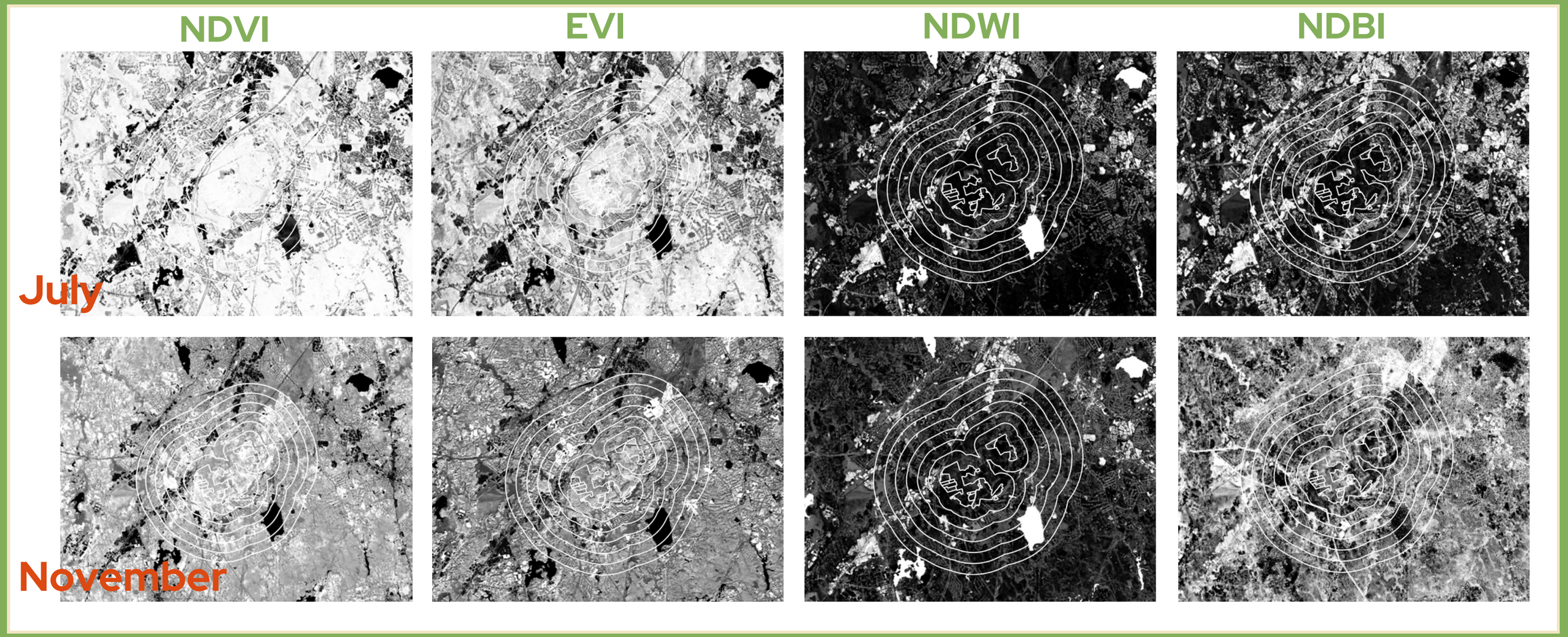
= (SWIR-NIR)/(SWIR+NIR)

= (B6-B5)/(B6+B5)

Methods


Save "LC08_L2SP_012031_20211116_20211125_02_T1_**MTL.txt**" As an ENVI file
NDVI
Band Math
An NDVI Map
An EVI Map
An NDWI Map
An NDBI Map
Save As (Data Ignore Value 0.00)
Save As (Data Ignore Value 0.00)
Save As (Data Ignore Value 0.00)
Save As (Data Ignore Value 0.00)
NDVI in buffers
EVI in buffers
NDWI in buffers
NDBI in buffers
Create six buffer areas in ArcGIS Pro
Import buffers into ENVI
ROIs x7

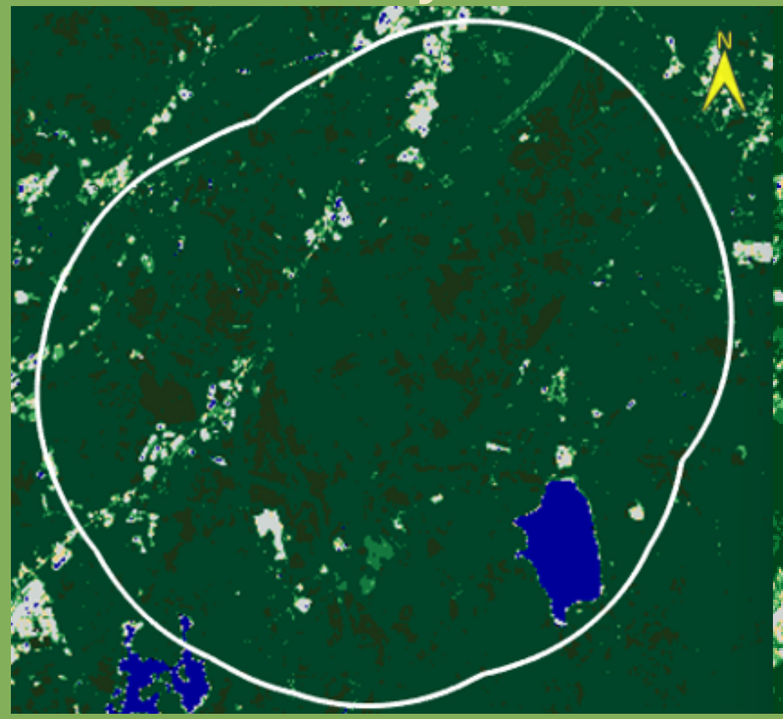
Maps



NDVI

Color	Slice Min	Slice Max
	-1.000000	0.015000
	0.015000	0.140000
	0.140000	0.180000
	0.180000	0.270000
	0.270000	0.360000
	0.360000	0.740000
	0.740000	1.000000

July

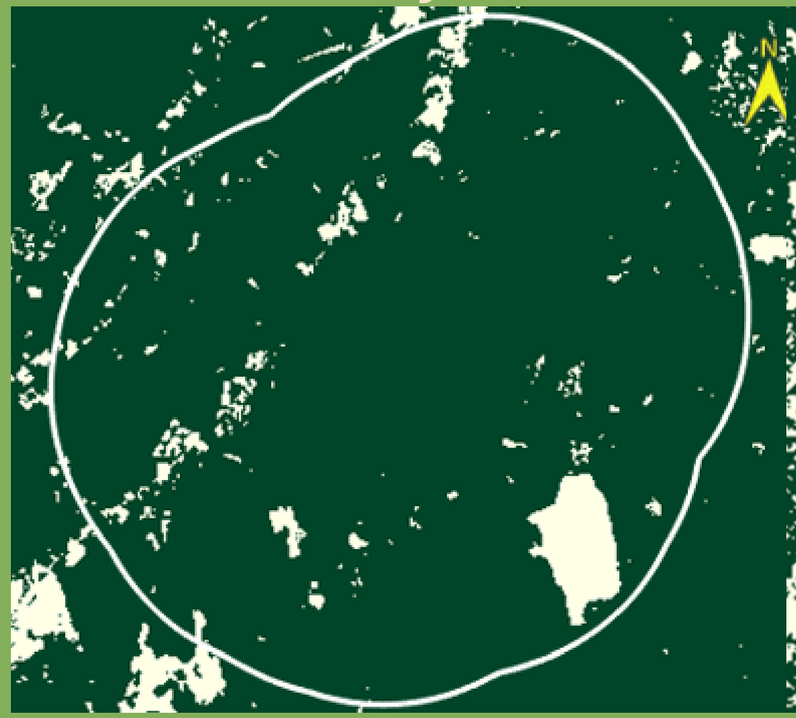


November

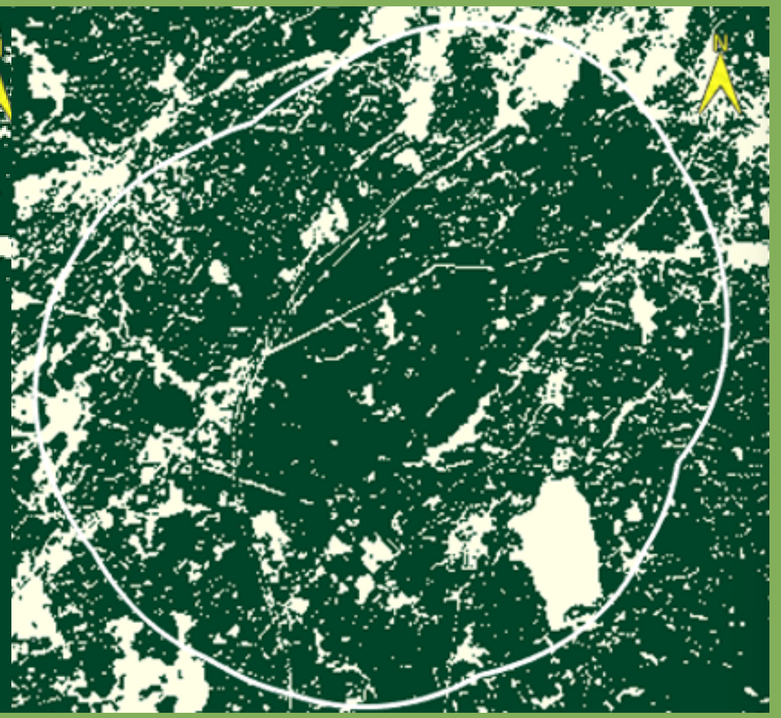
-0.28	0.015	Water
0.015	0.14	Built-up
0.14	0.18	Barren Land
0.18	0.27	Shrub and Grassland
0.27	0.36	Sparse Vegetation
0.74	0.74	Dense Vegetation

EVI

July



November



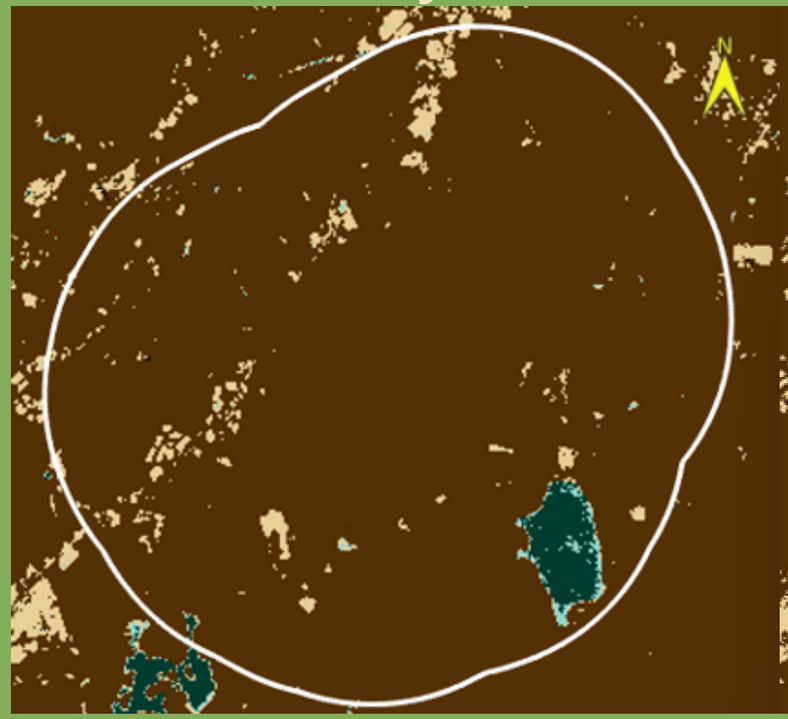
Color	Slice Min	Slice Max
	-1.000000	0.200000
	0.200000	0.800000

-1.00	0.2	Unhealthy Vegetation
0.2	0.8	Healthy Vegetation

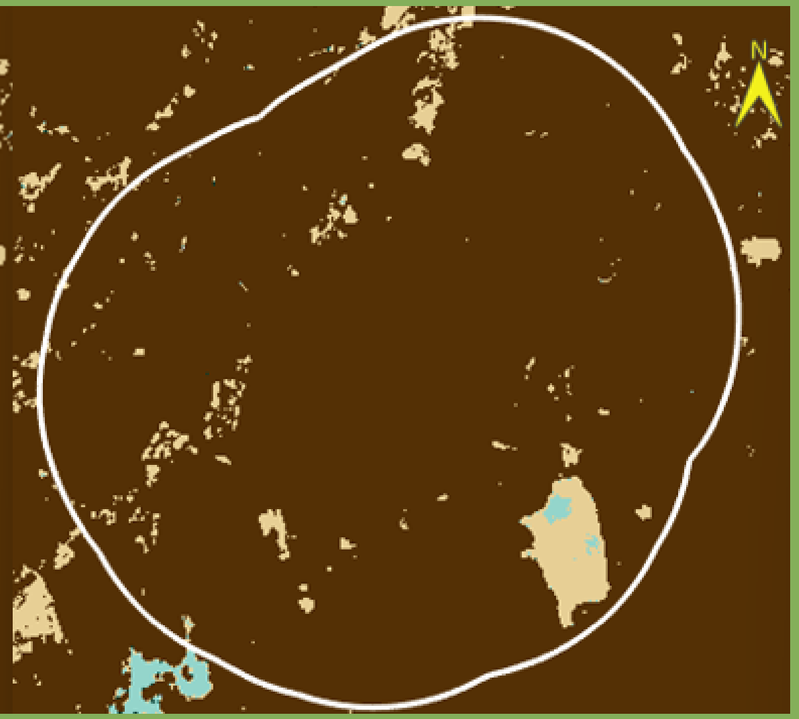
NDWI

Color	Slice Min	Slice Max
	-1.000000	-0.300000
	-0.300000	0.000000
	0.000000	0.200000
	0.200000	1.000000

July



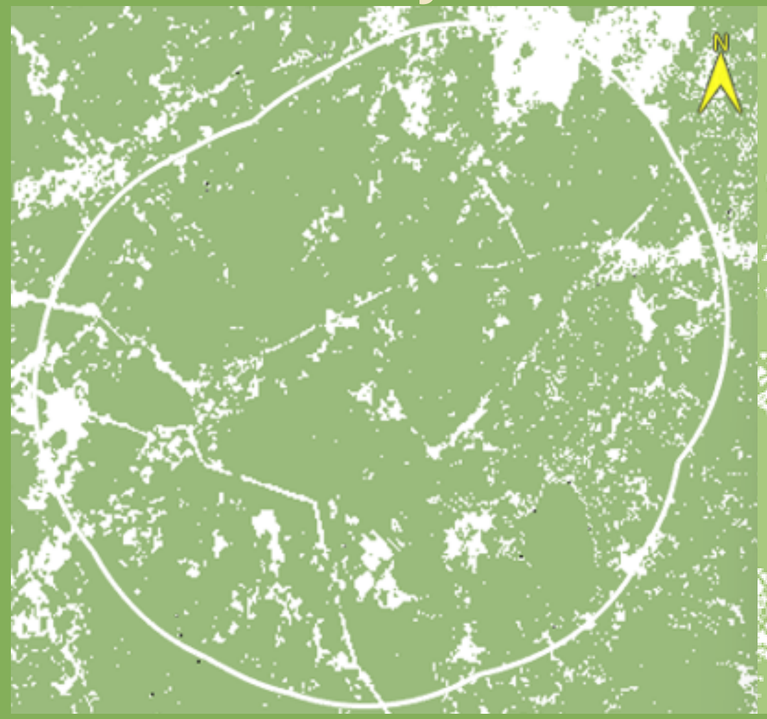
November



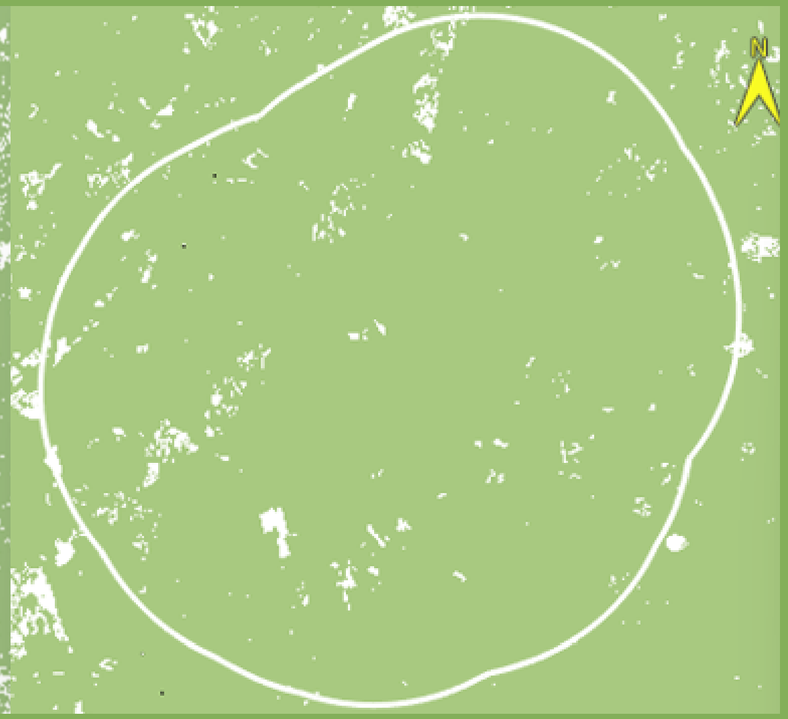
-1.00	-0.3	Drought, non-aqueous surfaces
-0.3	0.00	Moderate drought, non-aqueous surfaces
0.00	0.2	Flooding, humidity
0.2	1.00	Water surface

NDBI

July



November

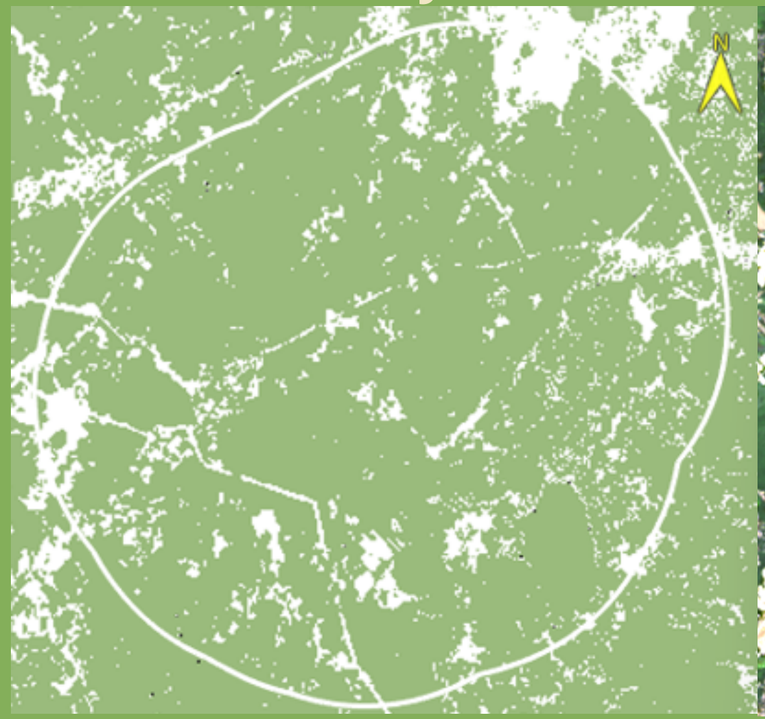


Color	Slice Min	Slice Max
	-1.000000	0.000000
	0.000000	1.000000

-1.00	0.00	Non-built-up
0.00	0.8	Build-up

NDBI

July



Natural Color

Color	Slice Min	Slice Max
	-1.000000	0.000000
	0.000000	1.000000

-1.00	0.00	Non-built-up
0.00	0.8	Build-up

Vegetation Index Values

July

Buffer	Total Area	NDVI	EVI	NDWI	NDBI
	(m^2)	Average			
In-Site	3481348	0.886	0.667	-0.810	-0.450
500	12118217	0.845	0.614	-0.778	-0.412
1000	20382216	0.820	0.590	-0.758	-0.388
1500	29632953	0.795	0.567	-0.738	-0.368
2000	40396836	0.781	0.554	-0.724	-0.362
2500	52707621	0.776	0.549	-0.719	-0.357
3000	66579648	0.773	0.547	-0.718	-0.351

November

Buffer	Total Area	NDVI	EVI	NDWI	NDBI
	(m^2)	Average			
In-Site	3481348	0.648	0.306	-0.699	-0.190
500	12118217	0.640	0.298	-0.683	-0.200
1000	20382216	0.624	0.293	-0.667	-0.192
1500	29632953	0.607	0.285	-0.646	-0.183
2000	40396836	0.597	0.279	-0.629	-0.179
2500	52707621	0.579	0.273	-0.618	-0.169
3000	66579648	0.572	0.270	-0.614	-0.158

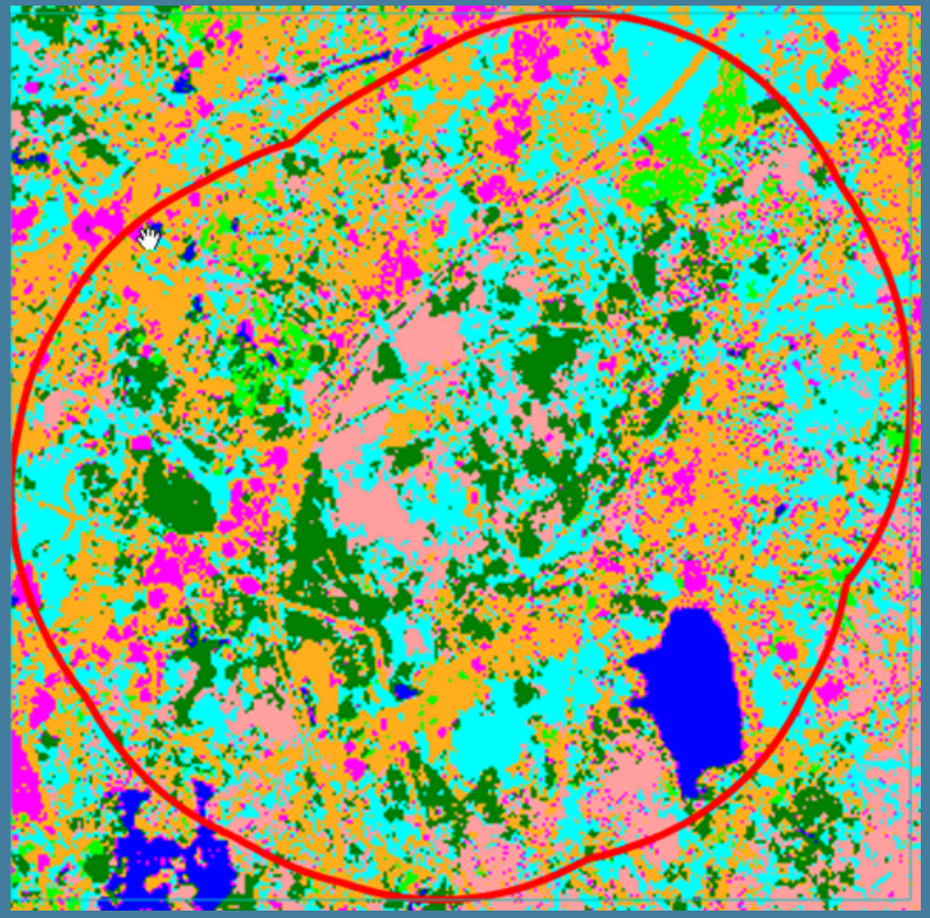
Supervised Classification

Summarized Results

July, 22 2022												
Buffer	**Total Area**	**NDVI**	**EVI**	**NDWI**	**NDBI**	**Water**	**Dec. Forest**	**Ev. Forest**	**Urban**	**Agriculture**	**Flat Grass**	**Wetlands**
	(m^2)	**Average**				**Area of Class within Buffer in m^2**						
In-Site	3481348	0.886	0.667	-0.810	-0.450	0	0	2637759	97116	61726	337436	347312
500	12118217	0.845	0.614	-0.778	-0.412	0	0	6723156	2105604	315753	1848780	1124924
1000	20382216	0.820	0.590	-0.758	-0.388	17769	0	9410594	4530270	1001297	3799065	1623221
1500	29632953	0.795	0.567	-0.738	-0.368	168496	0	11264249	8094925	1763410	5766297	2575577
2000	40396836	0.781	0.554	-0.724	-0.362	752736	0	13939458	11877693	2407327	8228307	3191315
2500	52707621	0.776	0.549	-0.719	-0.357	1262672	0	17317030	16112484	3138796	11069843	3806796
3000	66579648	0.773	0.547	-0.718	-0.351	1466630	0	20824361	21123947	4109247	14584028	4471434

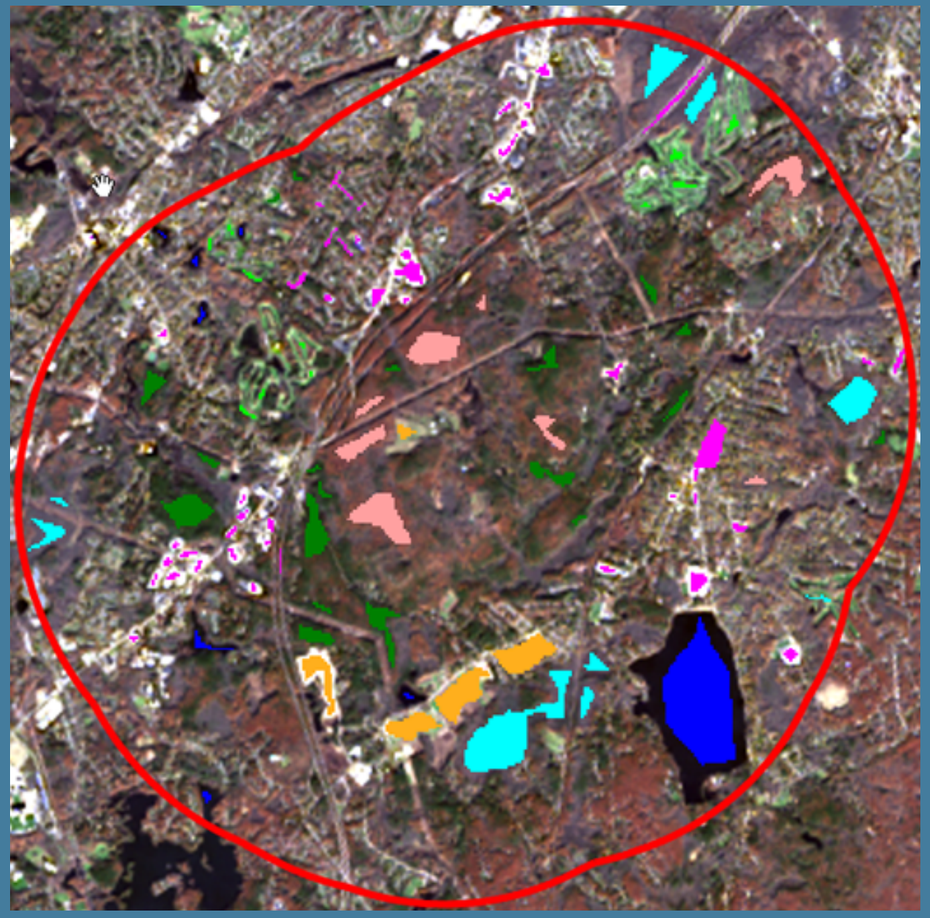
November, 16 2021												
Buffer	Total Area	NDVI	EVI	NDWI	NDBI	Water	Dec. Forest	Ev. Forest	Urban	Agriculture	Flat Grass	Wetlands
	(m^2)	Average				Area of Class within Buffer in m^2						
In-Site	3481348	0.648	0.306	-0.699	-0.190	0	1158803	888032	45266	333321	9053	1046873
500	12118217	0.640	0.298	-0.683	-0.200	0	2757339	3338710	383477	2263041	66845	3308806
1000	20382216	0.624	0.293	-0.667	-0.192	28431	3913677	5018924	961316	5132647	321623	5005597
1500	29632953	0.607	0.285	-0.646	-0.183	192566	4492327	6462567	1914967	8697587	658827	7214112
2000	40396836	0.597	0.279	-0.629	-0.179	801847	5528101	7897925	2673419	12500955	1093834	9900756
2500	52707621	0.579	0.273	-0.618	-0.169	1334212	7001929	8865533	3382924	17172163	1447781	13503081
3000	66579648	0.572	0.270	-0.614	-0.158	1593619	8835553	9680654	4388265	22536026	1898571	17646960

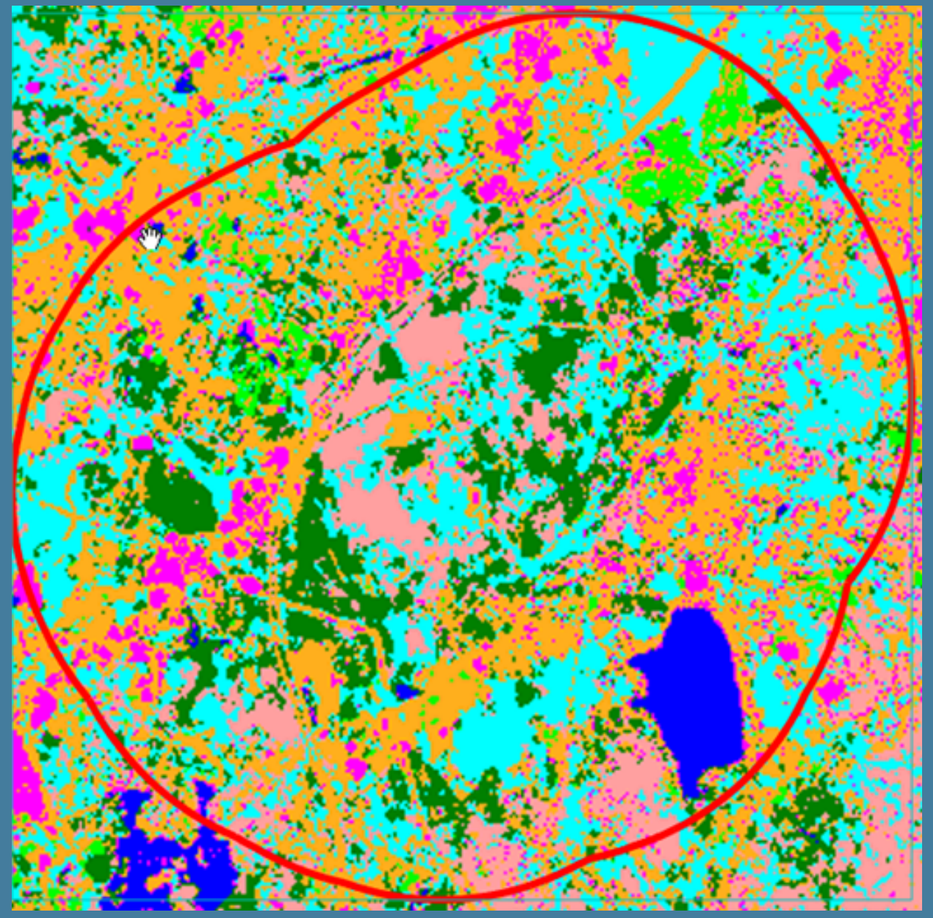
November 16, 2021



- 1: Evergreen Forest
- 2: Flat grass
- 3: Wetlands
- 4: Urban
- 5: Agriculture
- 6: Deciduous Forest
- 7: Water

November 16, 2021





1: Evergreen Forest
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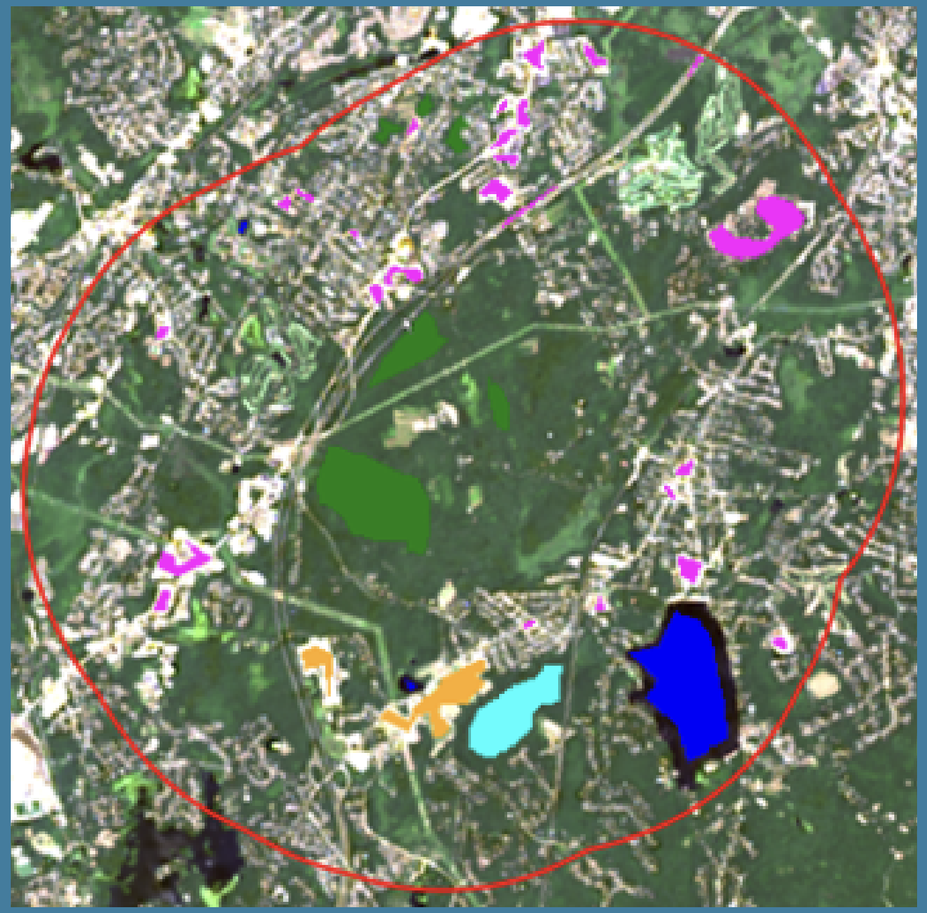
July 22, 2022



1: Flat grass
2: Urban
3: Evergreen Forest
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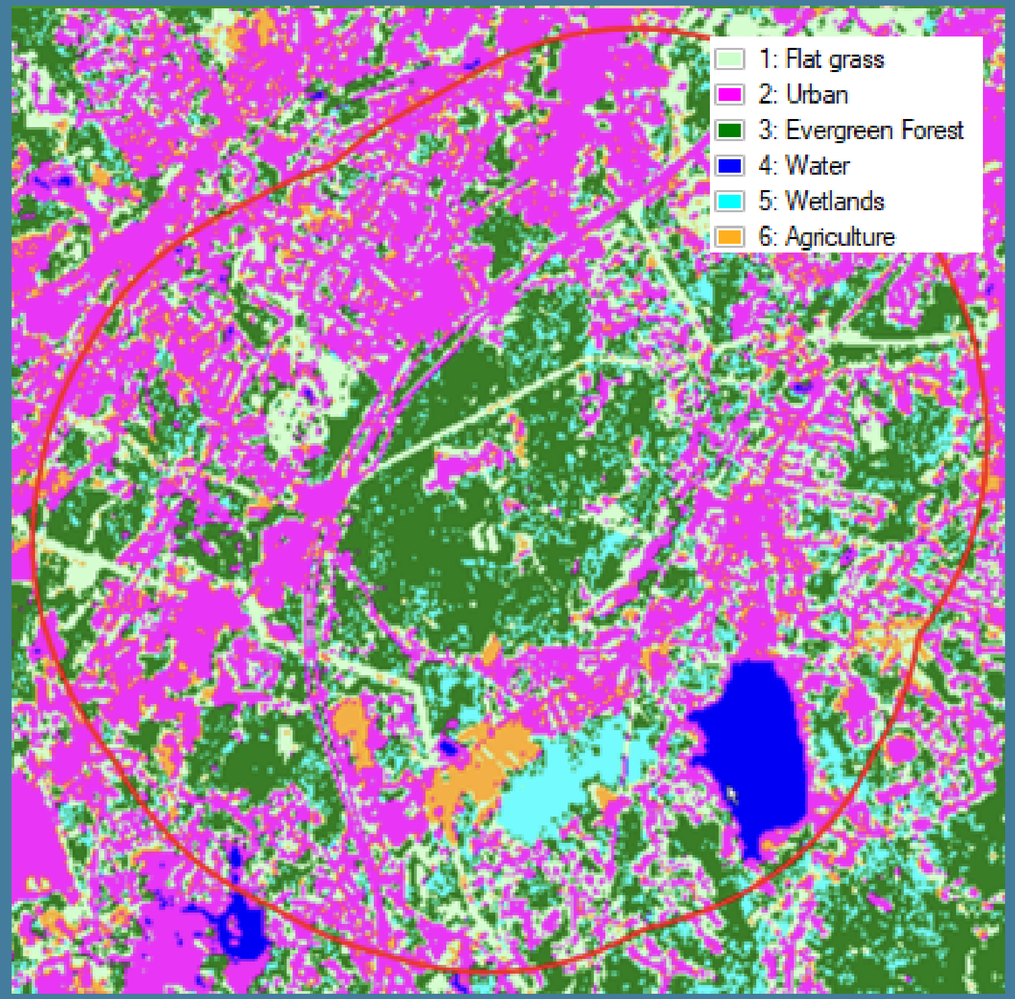
July 22, 2022



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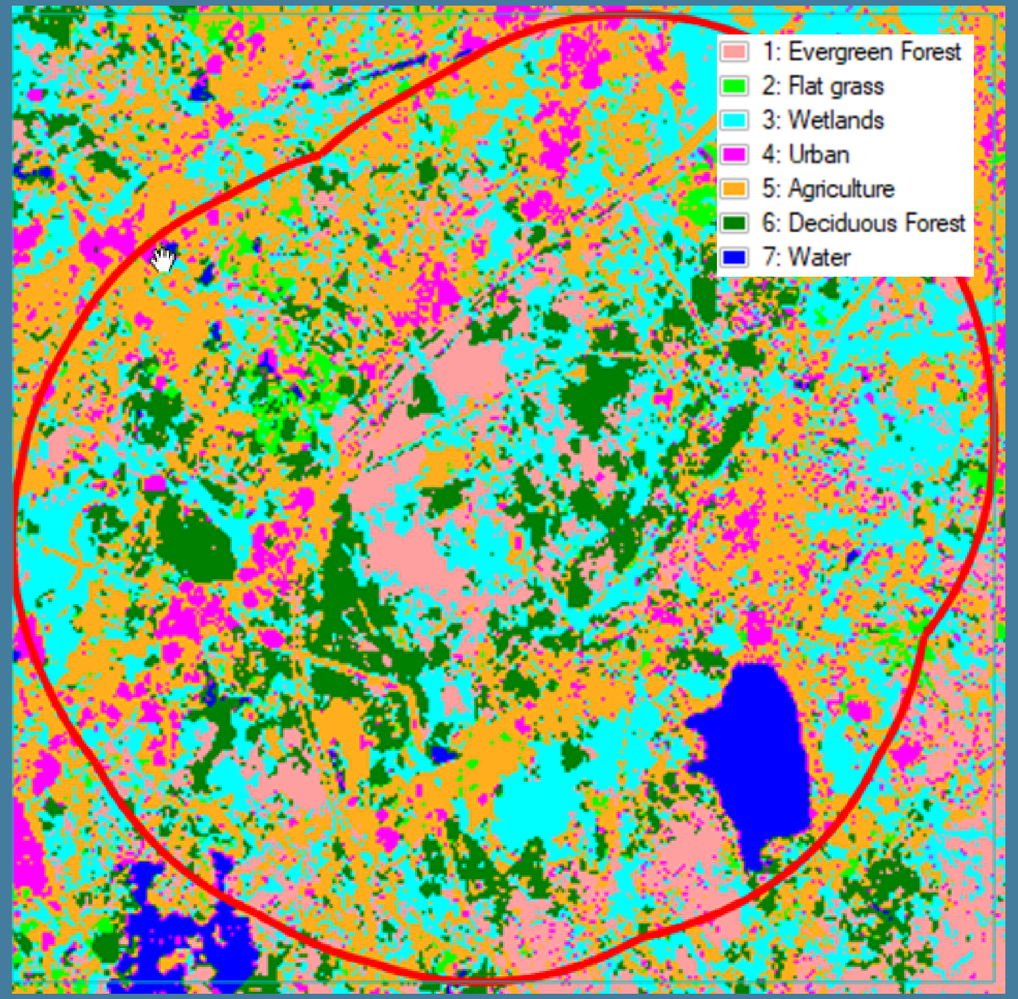
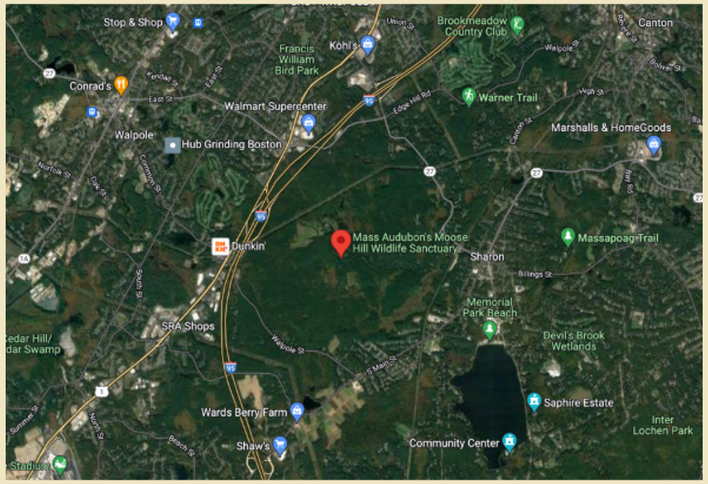
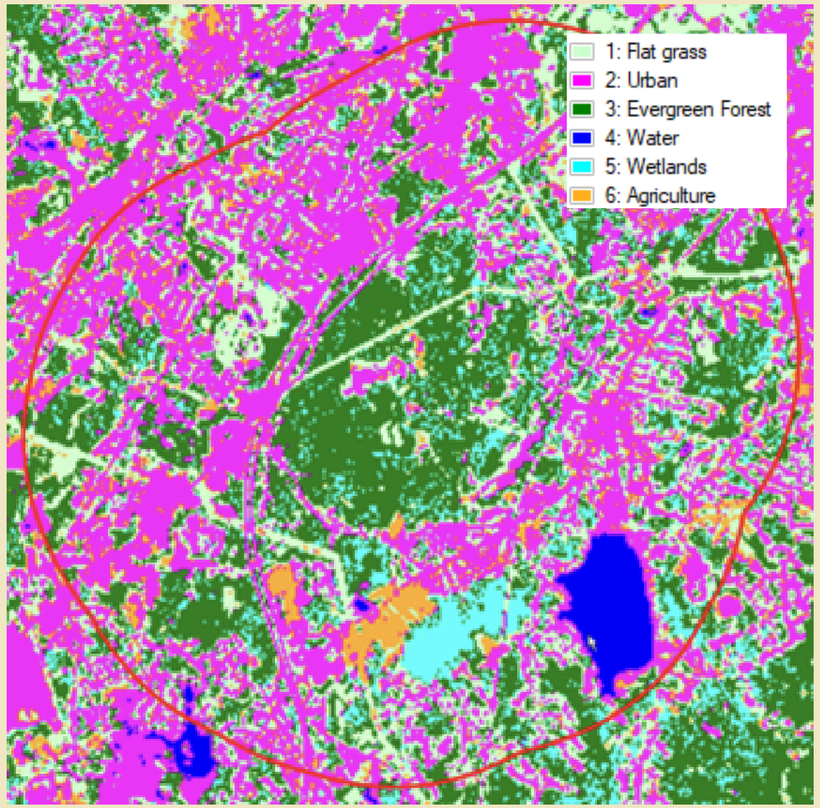


Validation





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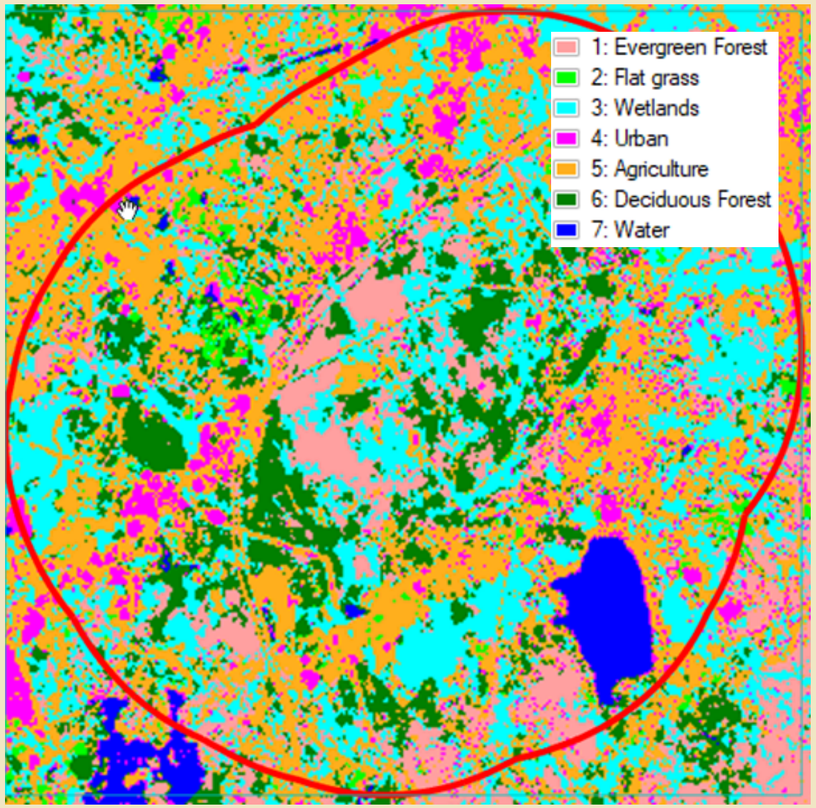

November 16, 2021

Thank you!

Image Credit: Mass Audubon. 2022. Moose Hill Wildlife Sanctuary.
https://www.massaudubon.org/get-outdoors/wildlife-sanctuaries/moose-hill