

Alachua County Agricultural Land Protection Strategy Development Contract – Draft Deliverable – Geographic Land Ranking Model

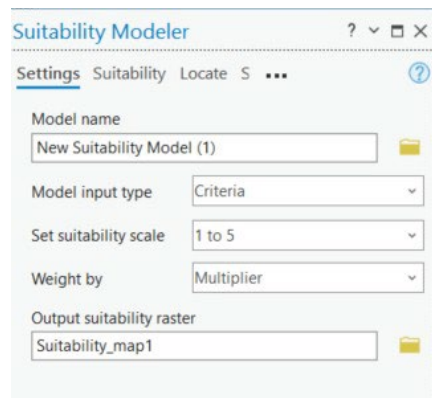
2.2.2.3. Develop a GIS Strategic Agricultural Land Ranking Model based on defined strategy goals in consultation with the University of Florida GeoPlan Center and other partners.

The Suitability Modeler tool in ArcPro was used for this analysis. Information on the tool can be found in this link <https://pro.arcgis.com/en/pro-app/latest/help/analysis/spatial-analyst/suitability-modeler/what-is-the-suitability-modeler.htm>

Alachua County Agricultural Land Protection Suitability Model

Summary: The purpose of the Alachua County Agricultural Land Protection Suitability Model is to evaluate agricultural lands suitability for protection primarily via conservation easement acquisition using geospatial analysis. Lands that rank high may indicate a greater probability for easement acquisition given they will meet geospatial ranking matrix requirements as well as qualify for additional cost-share acquisition funding. Lands that rank low in the suitability model may score low in the geospatial portion of the ranking matrix and may not qualify for cost-share acquisition funding. Model Outputs will be one aspect of what is considered for land evaluation and prioritization.

Description: The model takes in 8 unique datasets and assigns a suitability value on a scale from 1-5 based on criteria within the data. The datasets are described in detail below.



1. Agricultural Land Use

Data Source – FDACS – FSAID 2021 data

Data Use Reasoning: The FDACS FSAID data is an accurate land cover data set for agricultural land. Utilizing an accurate agricultural land cover dataset in the suitability model ensures the model assesses agricultural land.

Workflow Description:

- FSAID data was clipped to Alachua County
- Crop 2020 field was used to simplify symbology and agriculture operation type
- Data was converted to raster with 10 m cell size
- Suitability scores were assigned based on Crop 2020 categories with highest potential for agricultural conservation.

Livestock – This category of agriculture was assigned a value of 1, or low suitability, given it captures horse farms and dairies. Horse farms are not recognized as agriculture by the USDA and do not qualify for the ACEP-ALE program. Dairies are typically intensive operations that are not compatible with an agricultural conservation easement that limits intensive agriculture.

Grazing Land- This category was assigned a value of 5, or high suitability, given grazing land is typically low intensity agriculture that qualifies for all agricultural easement protection programs and is vulnerable to development assuming the land is mostly cleared pasture

Hay – This category was assigned a value of 5, or high suitability, given hay production is typically a low intensity operation that qualifies for all agricultural easement protection programs and is vulnerable to development.

Fruit (Non Citrus) – This category primarily captures blueberry farms in Alachua County. This category was assigned a value of 4, or medium high suitability, as it is a unique agricultural operation to Alachua County that qualifies for agricultural easement protection programs.

Field Crops - This category was assigned a value of 3, or medium suitability, given field crops are typically intensive production that requires irrigation and may not be suitable for all easement acquisition funding programs or conservation easements designed to limit nutrient and water inputs.

Other - This category captures “herbaceous(dryprairie),” “cropland_pastureland,” and “grass pasture.” This category was assigned a value of 5, or high suitability, given dry prairie and grass pastureland captures low intensity agriculture that qualifies for easement acquisition programs, is readily developable, and meets conservation easements designed to limit water and nutrient inputs.

Fallow – This category was assigned a value of 5, or high suitability, given it captures land not currently in production and potentially vulnerable to development or conversion.

Aquaculture – This category was assigned a value of 2, or low medium suitability, given aquaculture operations are typically very small acreages with lots of infrastructure not always compatible with the terms of a conservation easement that limits excavation of surface material and manipulation of waterways.

Vegetables (Fresh Market) – This category was assigned a value of 4, or high medium suitability, given vegetable production is a diversified cropping operation that provides unique agricultural value, requires lower amounts of nutrient and water inputs than commodity row crops, and meets requirements for agricultural easement protection programs.

Greenhouse/Nursery – This category was assigned a value of 1, or low suitability, given this type of production requires numerous structures not compatible with a conservation easement designed to limit impervious surfaces

Unique categories Range of Classes Continuous Functions

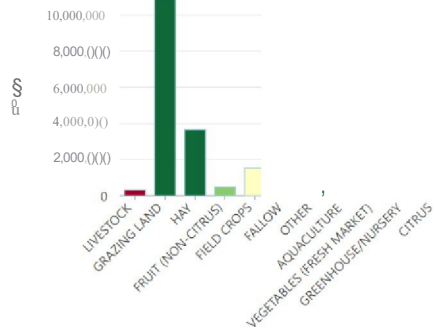
Field: CROP2010

Class	Category
1	LIVESTOCK
2	GRAZING LAND
3	HAY
4	FRUIT (NON-CITRUS)
5	FIELD CROPS
6	FALLOW
7	OTHER
8	AQUACULTURE
9	VEGETABLES (FRESH MARKET)
10	GREENHOUSE/NURSERY
11	CITRUS

Save to MFO (med dataset when model is run)

med _SAIDCONSERVATIONLANDSREMOVED

Transformation of FSAIDCONSERVATIONLANDSREMOVED



Unique Categories Range of Classes Continuous Functions

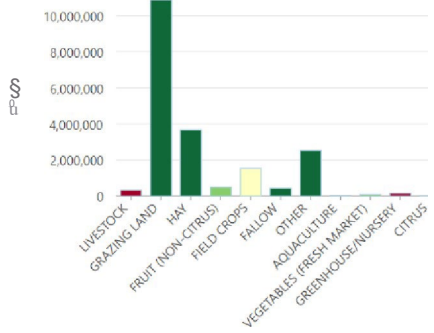
Field: CROP2020

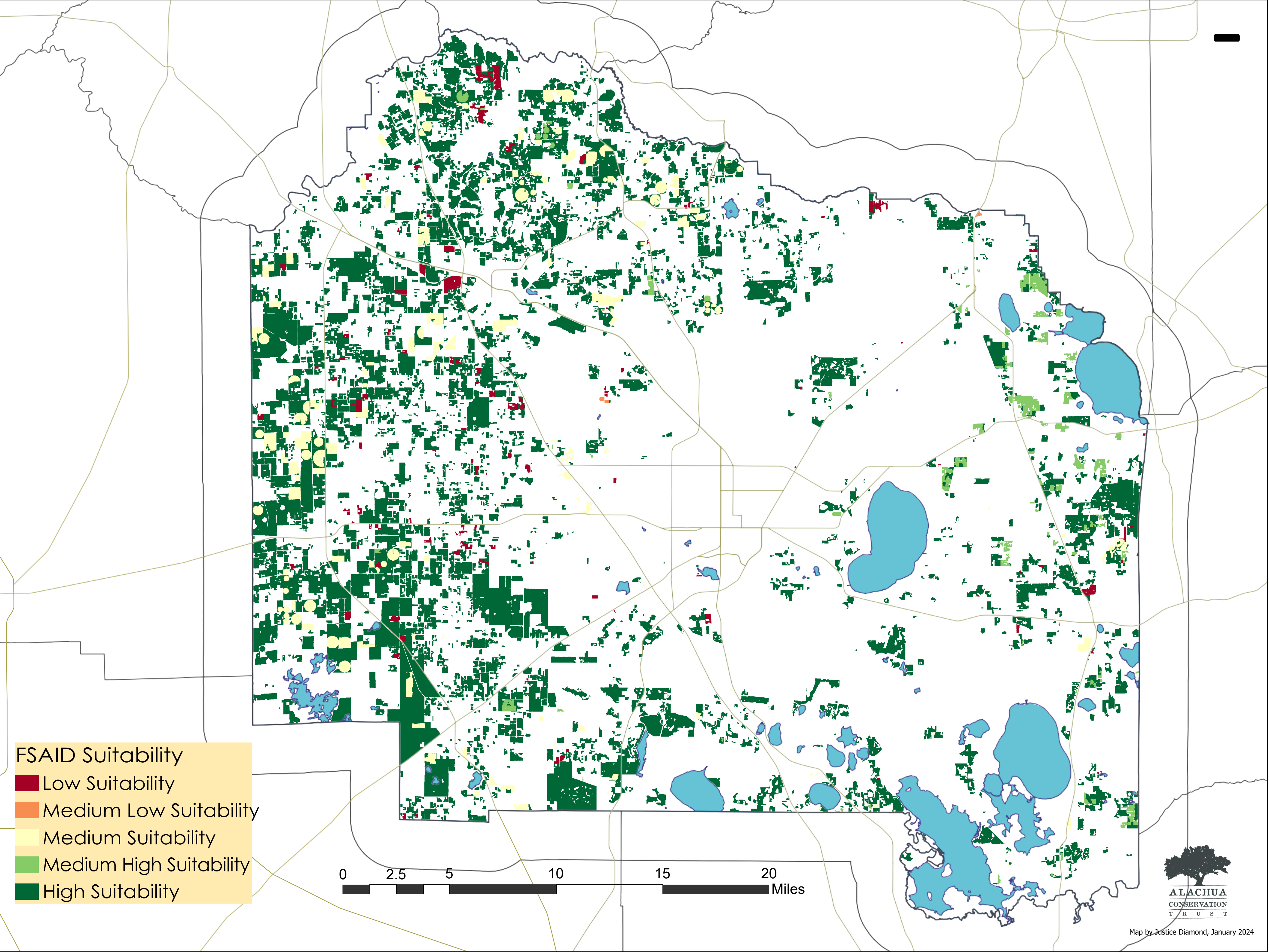
Class	Category
6	FALLOW
7	OTHER
8	AQUACULTURE
9	VEGETABLES (FRESH MARKET)
10	GREENHOUSE/NURSERY
11	CITRUS

Save to MFO (med dataset when model is run)

med _SAIDCONSERVATIONLANDSREMOVED

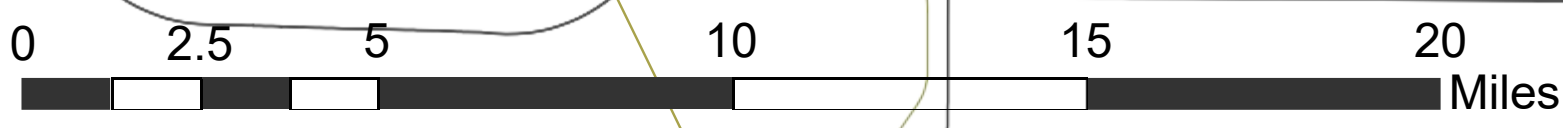
Transformation of FSAIDCONSERVATIONLANDSREMOVED





FSAID Suitability

- Low Suitability
- Medium Low Suitability
- Medium Suitability
- Medium High Suitability
- High Suitability



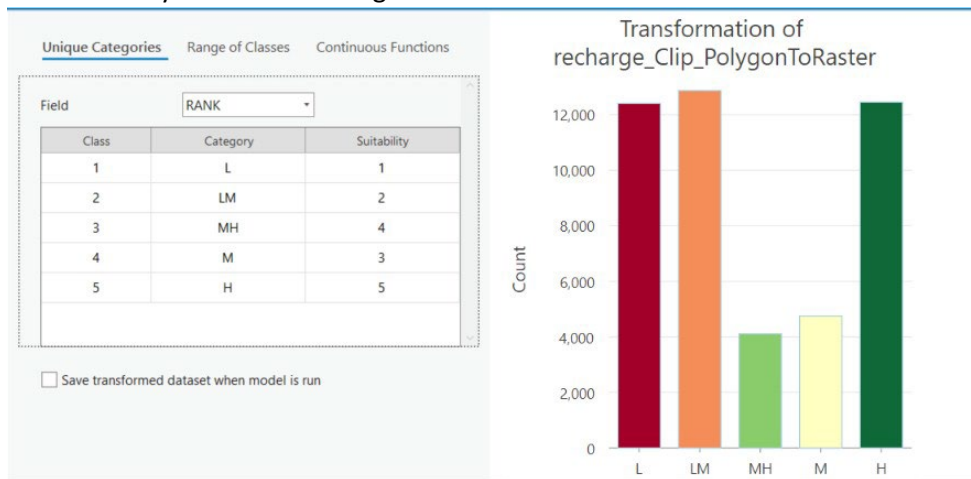
2. Aquifer Recharge

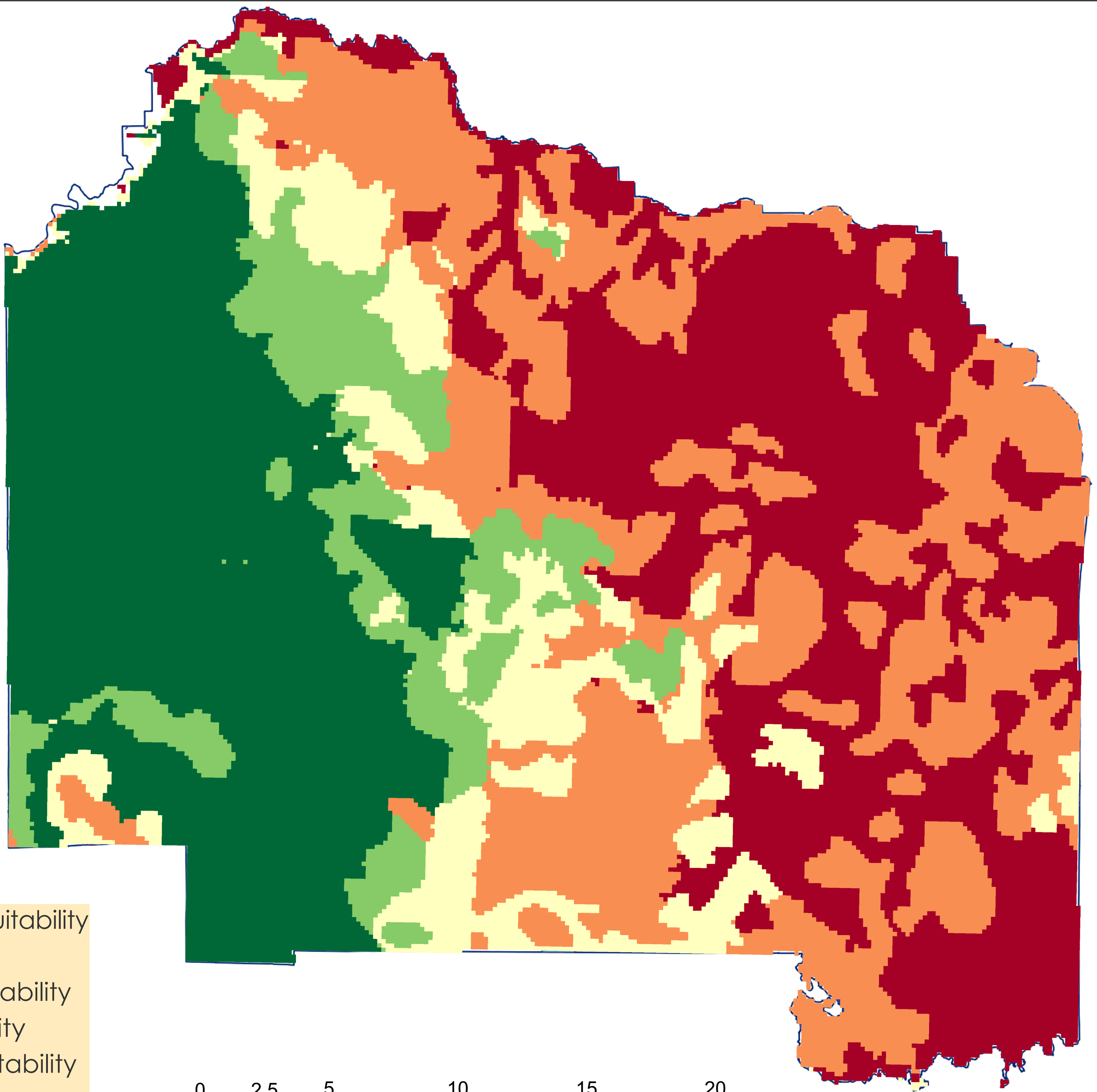
Data Source: - SRWMD

Data Use Reasoning: Protecting land in areas that promote aquifer recharge is critical to ensuring our water source is continually replenished. Impervious surfaces can delay and prevent recharge to the Upper Floridan Aquifer. As uncertainty in freshwater availability due to climate change increases, it is essential that we preserve these critical recharge areas to ensure our water source is replenished into the future.

Workflow Description:

- Recharge data was clipped to Alachua County
- Data was added into the Suitability Modeler in ArcPro
- Suitability scores were assigned as follows:





Aquifer Recharge Suitability

- Low Suitability
- Medium Low Suitability
- Medium Suitability
- Medium High Suitability
- High Suitability

0 2.5 5 10 15 20 Miles



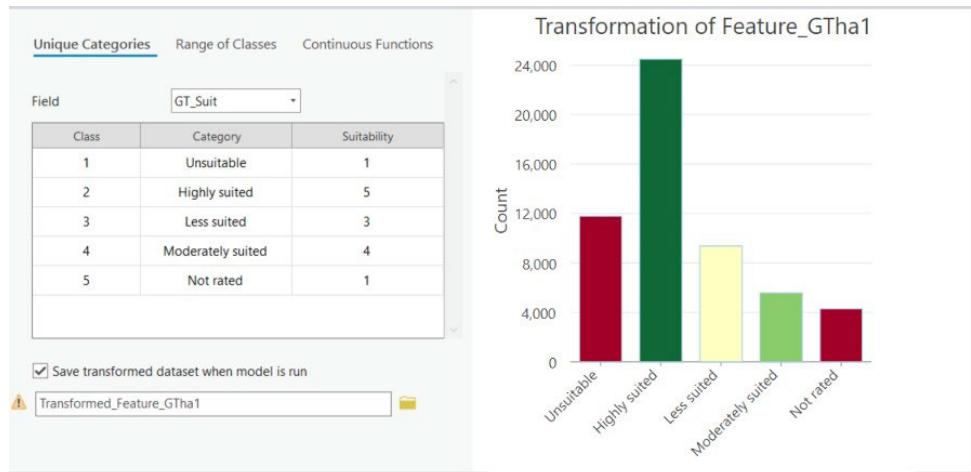
3. Gopher Tortoise Habitat Suitability Model

Data Source: NRCS

Data Use Reasoning: Gopher Tortoise's are a federally threatened keystone species. Their burrows are utilized by 360 to 420 other species. Additionally, protecting gopher tortoise aligns with NRCS Working Lands for Wildlife goals of protecting gopher tortoise and bobwhite quail habitat, which can qualify the property for easement acquisition cost share funding through various USDA NRCS programs. The gopher tortoise habitat suitability model takes into account depth to water table, soil temperature, soil type, water deficits between rainfall and evapotranspiration, and "Major Land Resource Areas" adjusted for climate factors.

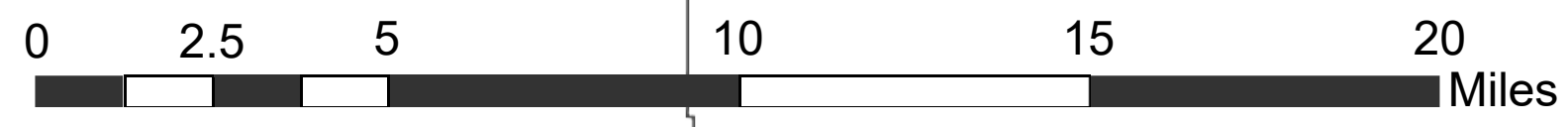
Workflow Description:

- Gopher Tortoise suitability data was clipped to Alachua County
- Data was added into the Suitability Modeler
- Suitability Scores were assigned according to their unique categories



NRCS Gopher Tortoise Suitability Model

- Low Suitability
- Medium Low Suitability
- Medium Suitability
- Medium High Suitability
- Highly Suitable

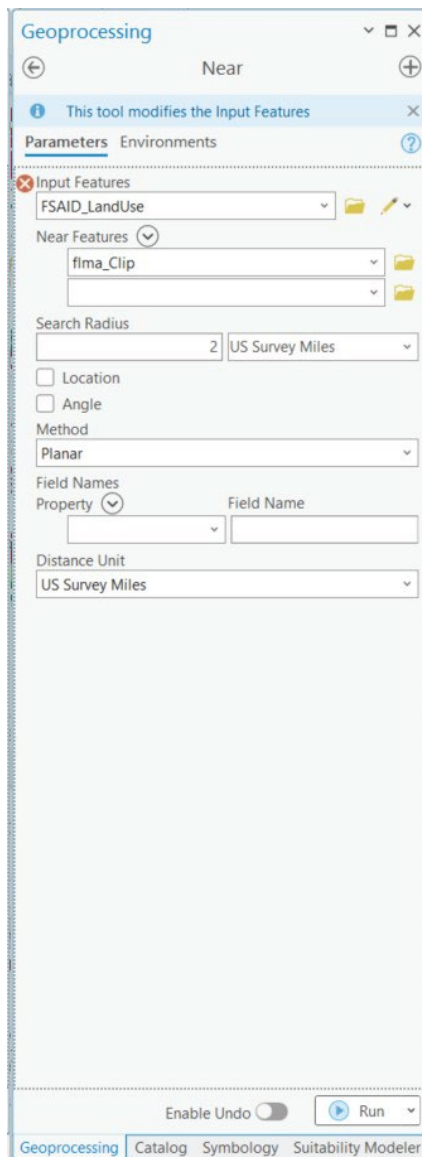


4. Proximity to Conservation Lands

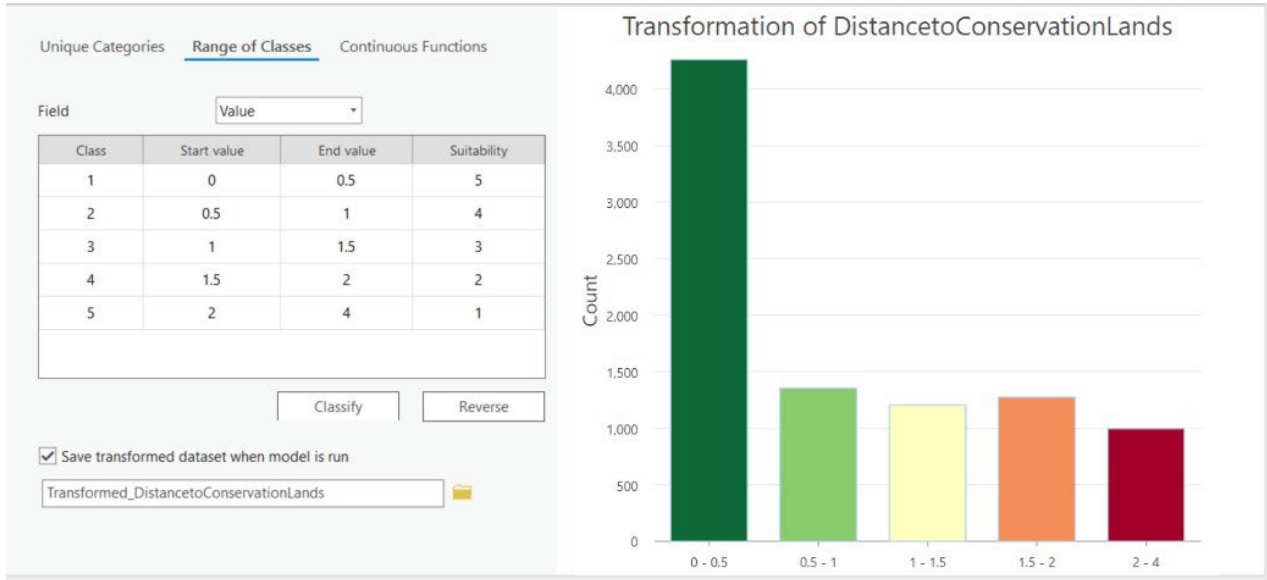
Data Source – FSAID 2021 Agricultural Parcels and FLMA Conservation Lands

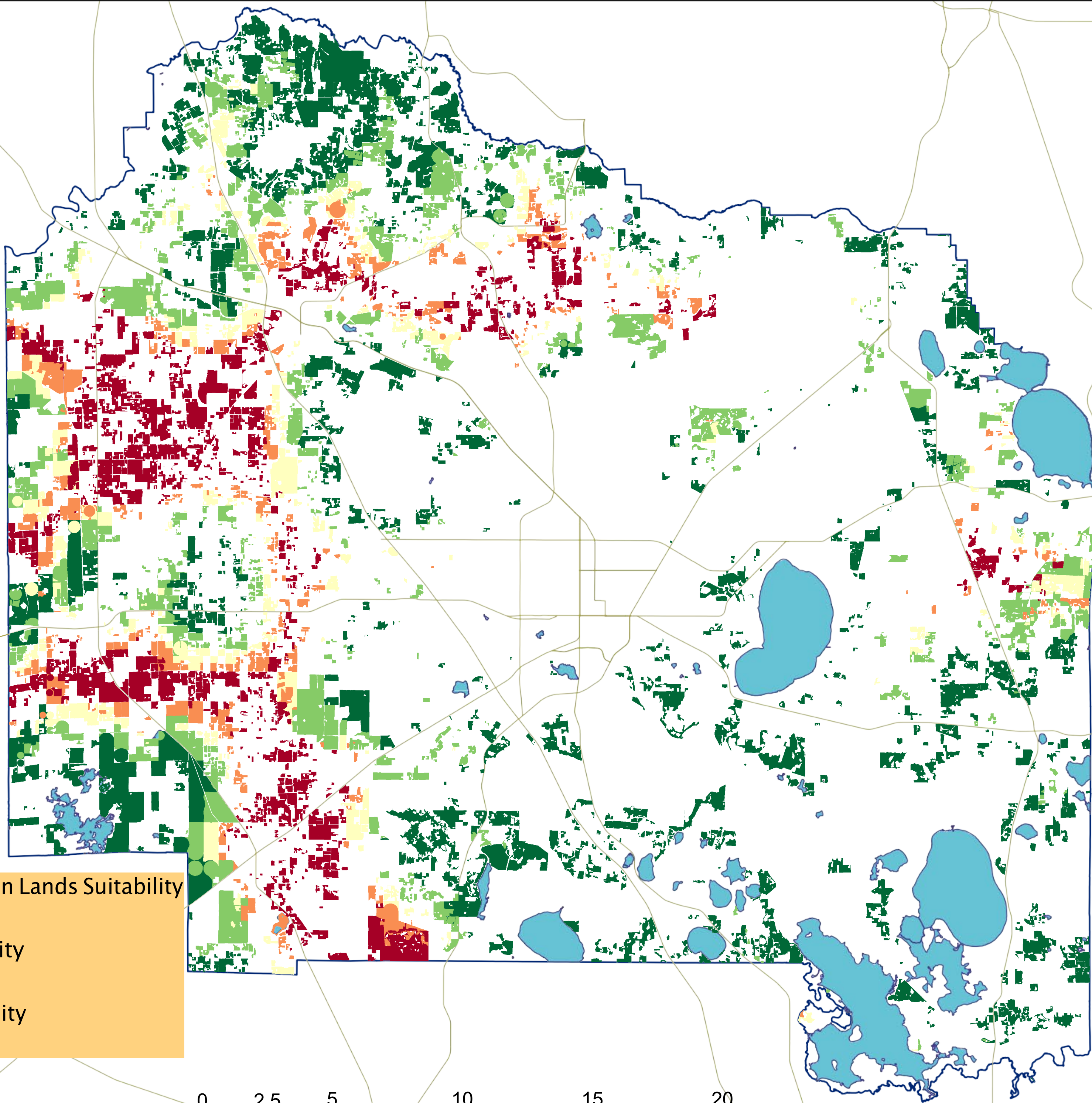
Data Use Reasoning: Expanding protected lands is often a goal for most easement acquisition programs. This analysis helps identify and give preference to agricultural lands adjacent or in close proximity to existing conservation lands.

Workflow description – Using the “Near Tool,” distance to the FLMA Conservation Lands from the FSAID 2021 Agricultural Parcels was calculated for a distance of up to 2 miles. A 2 mile buffer was generated surrounding Alachua County. FLMA Conservation Lands were clipped to the Alachua County shapefile with a 2 mile buffer extending outside the county.



An additional field was generated in the FSAID 2021 dataset showing the distance to conservation lands up to 2 miles. Agricultural parcels greater than 2 miles away from existing conservation lands were assigned a value of 4 miles. Suitability values were assigned as follows





Distance To Conservation Lands Suitability

- Low Suitability
- Medium Low Suitability
- Medium Suitability
- Medium High Suitability
- High Suitability

0 2.5 5 10 15 20 Miles



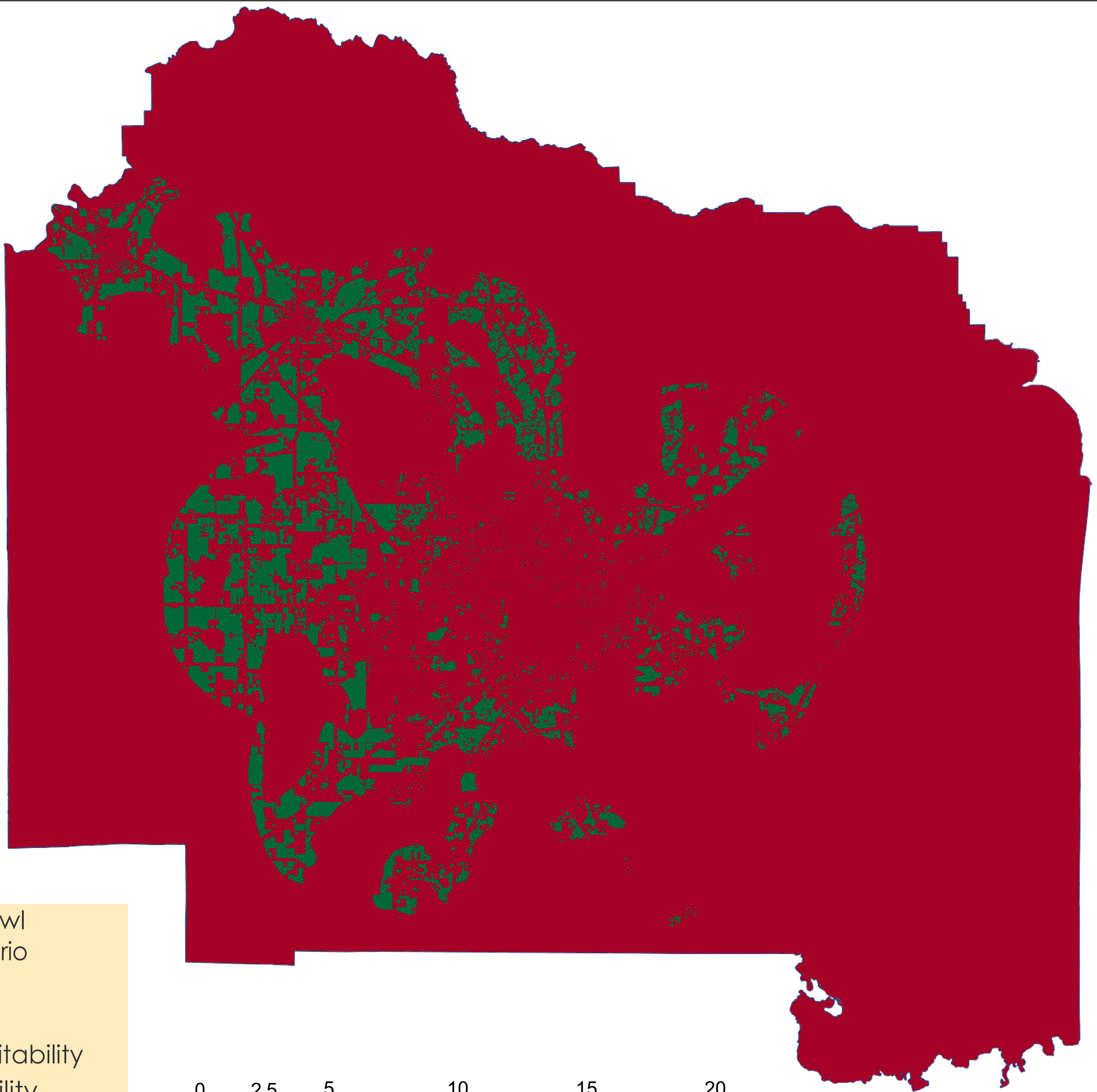
5. Threat of Development

Data Source: SL 2070 Runaway Sprawl Scenario

Data Use Reasoning: This dataset contains a representation of developed lands projected to occur in Florida in the Conservation 2070 scenario from the Sea Level 2040/2070 project. Sea Level 2040/2070 is a joint effort of the University of Florida's Center for Landscape Conservation Planning, 1000 Friends of Florida, and the Florida Department of Agriculture and Consumer Services. Sea Level 2040/2070 produced five land use/population distribution scenarios for 2040/2070, Baseline, Sprawl 2040/2070, and Conservation 2040/2070. The two 2070 scenarios are based on a population projection derived from data produced by the Florida Bureau of Economic and Business Research. Sprawl 2070 captures a potential pattern of land use and associated population distribution for 2070, should all new development occur in greenfields at the same gross development density as was present in each county in 2010. The Sprawl 2070 scenario was used for this analysis as it captures a likely scenario reflected by current development patterns in the county and state.

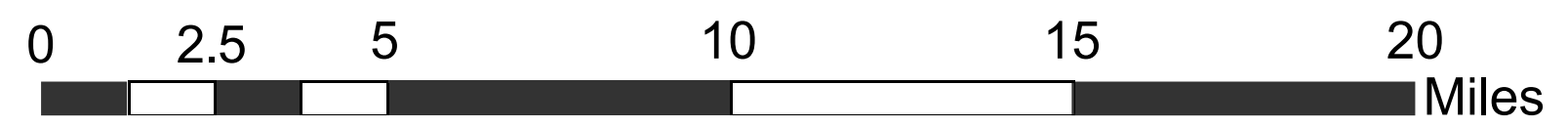
Workflow Description:

- 2070 Runaway Sprawl was clipped to Alachua County.
- The 2070 Runaway Sprawl feature layer was then merged with the Alachua County feature layer.
- The feature to raster tool was then used on the merged layer using the shape area field.
- The new raster layer was loaded into the suitability model.
- Land within the runaway sprawl was assigned a value of 5 and outside was assigned a value of 1.



2070 Runaway Sprawl
Development Scenario
Suitability

- Low Suitability
- Medium Low Suitability
- Medium Suitability
- Medium High Suitability
- High Suitability



6. Springs Priority Focus Areas

Data Source: FDEP – Springs Priority Focus Areas

Data Use Reasoning: Land within the State of Florida and Alachua County designated Springs Priority Focus Areas (SPFA) can qualify for competitive DEP “Springs Restoration Funding” as cost share for easement acquisition. There are three SPFA’s in Alachua County, the “Columbia Hornsby Treehouse,” “Poe” and “Devil’s Ear” SPFA’s.

Workflow Description:

- The FDEP SPFA shapefile was clipped to Alachua County
- The clipped SPFA layer was then merged with the Alachua County layer based on the area
- The feature to raster tool was then used on the merged layer using the shape area field.
- The new raster layer was loaded into the suitability model
- Suitability values were assigned as follows

Unique Categories Range of Classes Continuous Functions

Field: Value

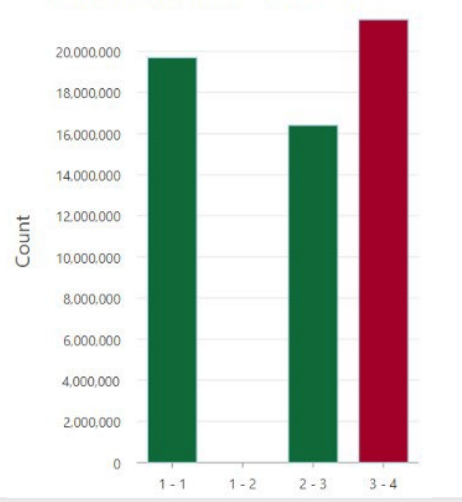
Class	Start value	End value	Suitability
1	1	1	5
2	1	2	5
3	2	3	5
4	3	4	1

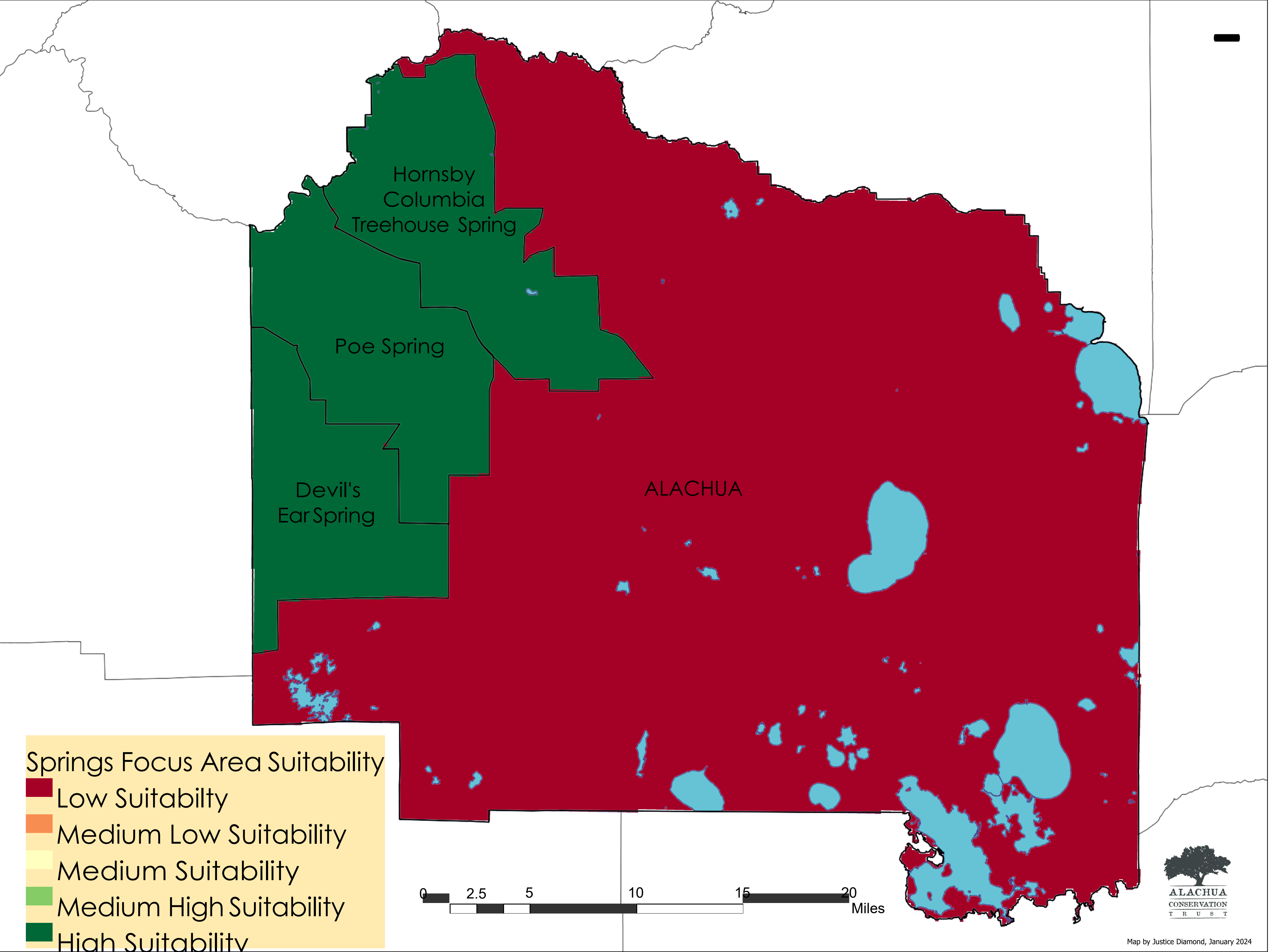
Classify Reverse

Save transformed dataset when model is run

Transformed_SPFAs_w_POE

Transformation of SPFAs_w_POE





Hornsby
Columbia
Treehouse Spring

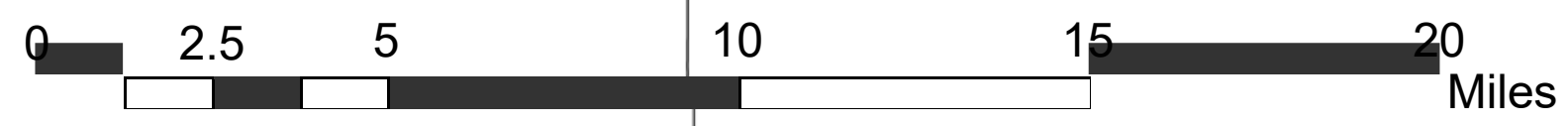
Poe Spring

Devil's
Ear Spring

ALACHUA

Springs Focus Area Suitability

- Low Suitability
- Medium Low Suitability
- Medium Suitability
- Medium High Suitability
- High Suitability



7. Soil Crop Productivity

Data Source: SSURGO Geodatabase

Data Use Reasoning: Crop productivity for a given soil type assigns a value for that soils ability to grow food. This is an important consideration to prioritize when protecting agricultural land for the future of food production.

Workflow Description:

- The cocropyld (Crop Yield) table was joined to the MUPOLYGON layer using the shared Mapunit Key.
- Maximum values were determined for the “Nonirrigated Yield – Representative Value” and “Irrigated Yield – Representative Value” for Bahiagrass, improved Bermudagrass, Pasture, Corn, Peanuts, Soybeans, Oats, and Watermelons.
- An additional column was generated in the table to store generated crop productivity index values.
- An index was calculated by dividing the respective non-irrigated and irrigated yields columns by the maximum value for that particular crop
- The MUPOLYGON symbology was changed to display the newly generated crop yield index values and converted to a raster file.
- The raster layer was loaded into the suitability model and ranked according to productivity

Unique Categories Range of Classes Continuous Functions

Field	Value		
	Start Value	End Value	Stability
	0	0.1	
	0.1	0.2	
	0.2	0.3	
	0.3	0.4	
	0.4	0.5	
	0.5	0.6	

Classify Reverse

Save transformed data set when model is run

Transformed Feature_MUP02

Unique Categories Range of Classes Continuous Functions

Field	Value			
	Start Value	End Value	Stability	
Class	0.4	0.5		
5	0.4	0.5		
6	0.5	0.6	4	
7	0.6	0.7		
8	0.7	0.8		
9	0.8	0.9		

Classify Reverse

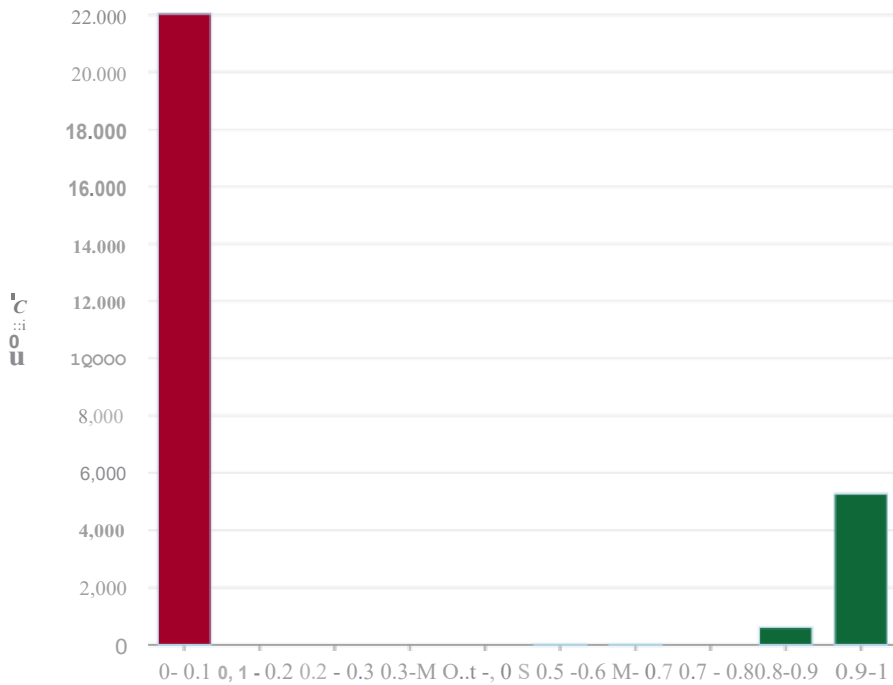
Save transformed dataset when model is run

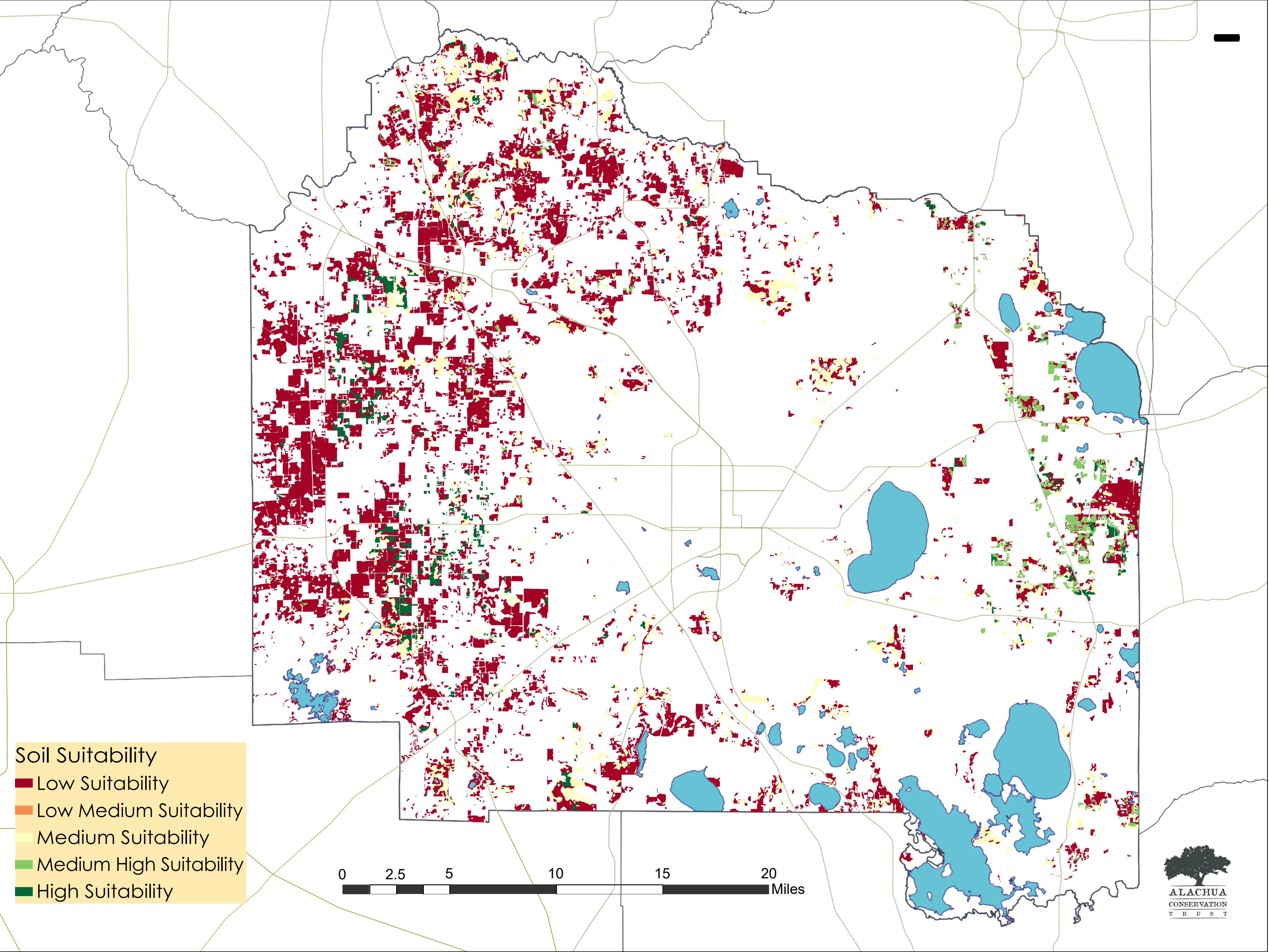
Transformed Feature_MUP02

ISw,tch

Rows: Insert ...

Transformation of Feature_MUP02





Soil Suitability

- Low Suitability
- Low Medium Suitability
- Medium Suitability
- Medium High Suitability
- High Suitability

0 2.5 5 10 15 20 Miles

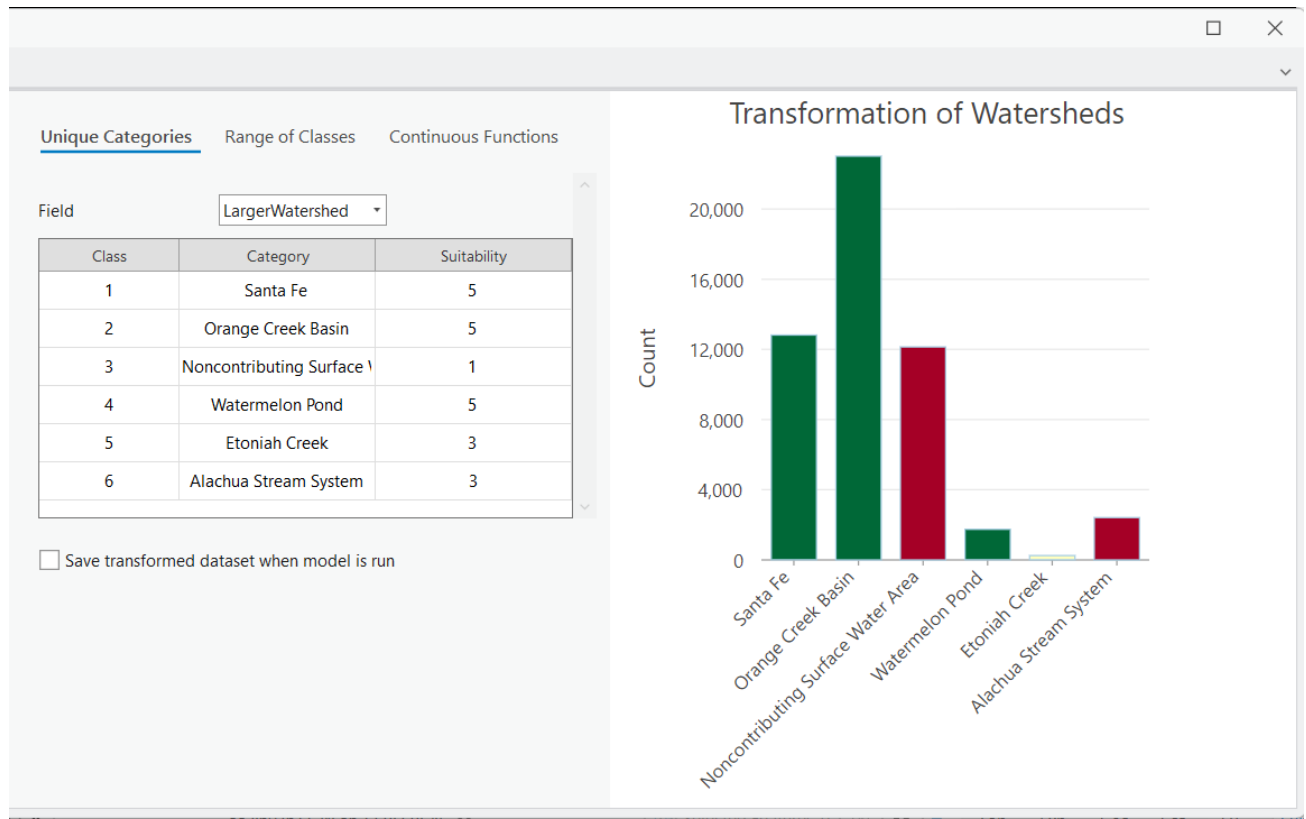


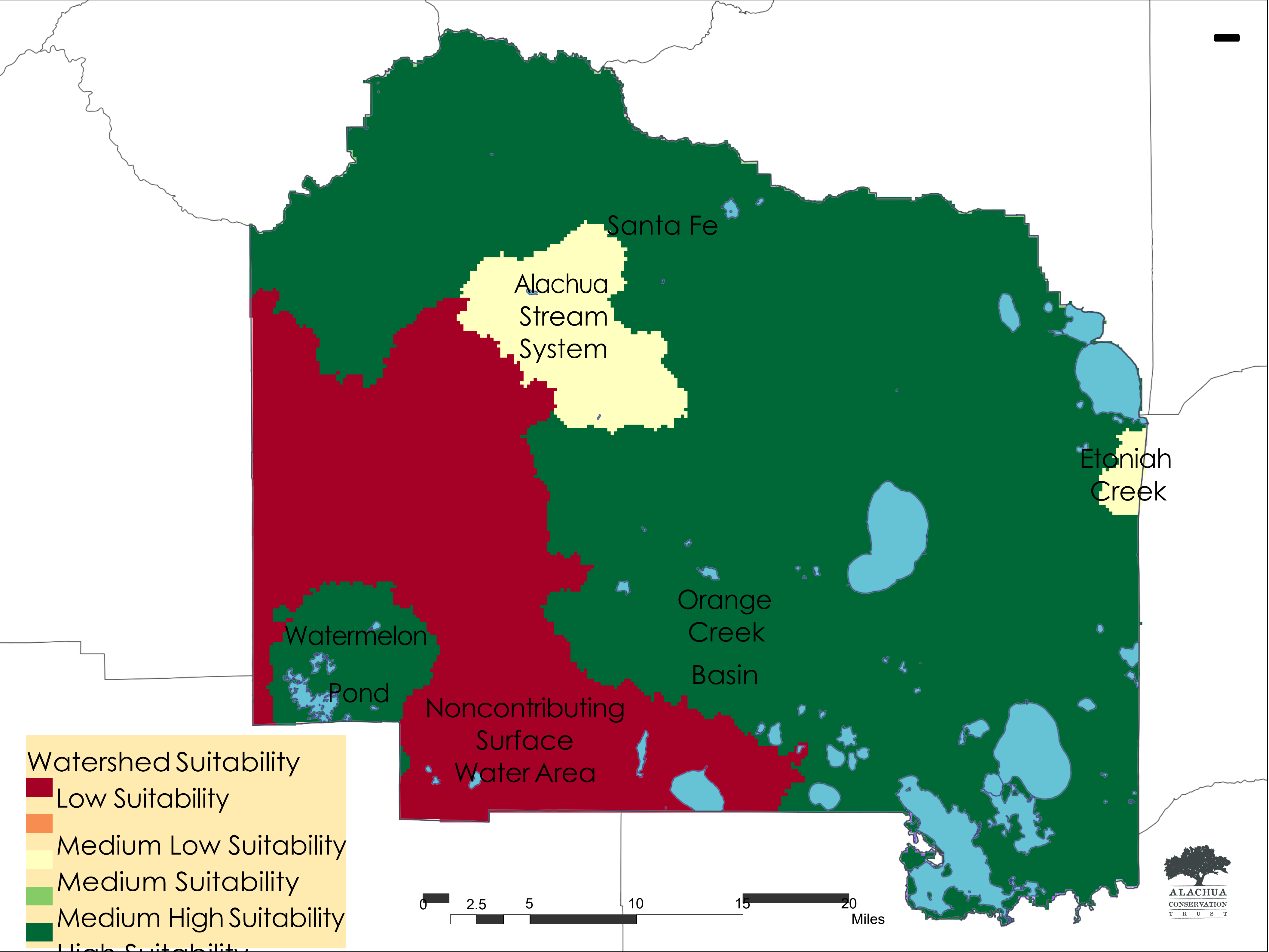
8. Watersheds

Data Source: USGS HUC 12 Watersheds

Data Use Reasoning: Surface water is an important consideration for floodplain protection and land conservation in important watersheds.

Workflow Description: HUC 12 watersheds were grouped together based on the larger water basin they belong to. Suitability values were assigned as follows:



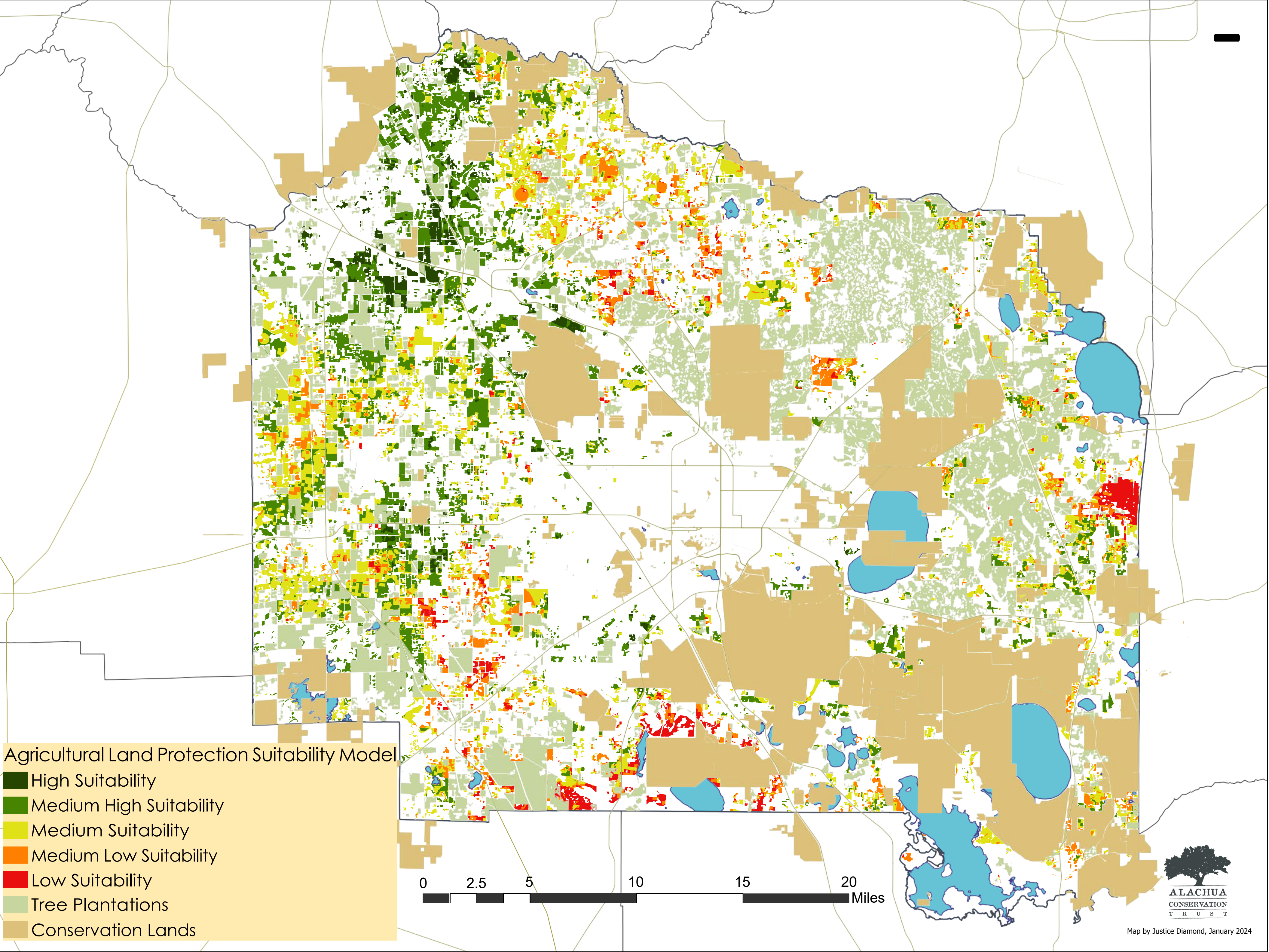


Watershed Suitability

- Low Suitability
- Medium Low Suitability
- Medium Suitability
- Medium High Suitability
- High Suitability

0 2.5 5 10 15 20 Miles





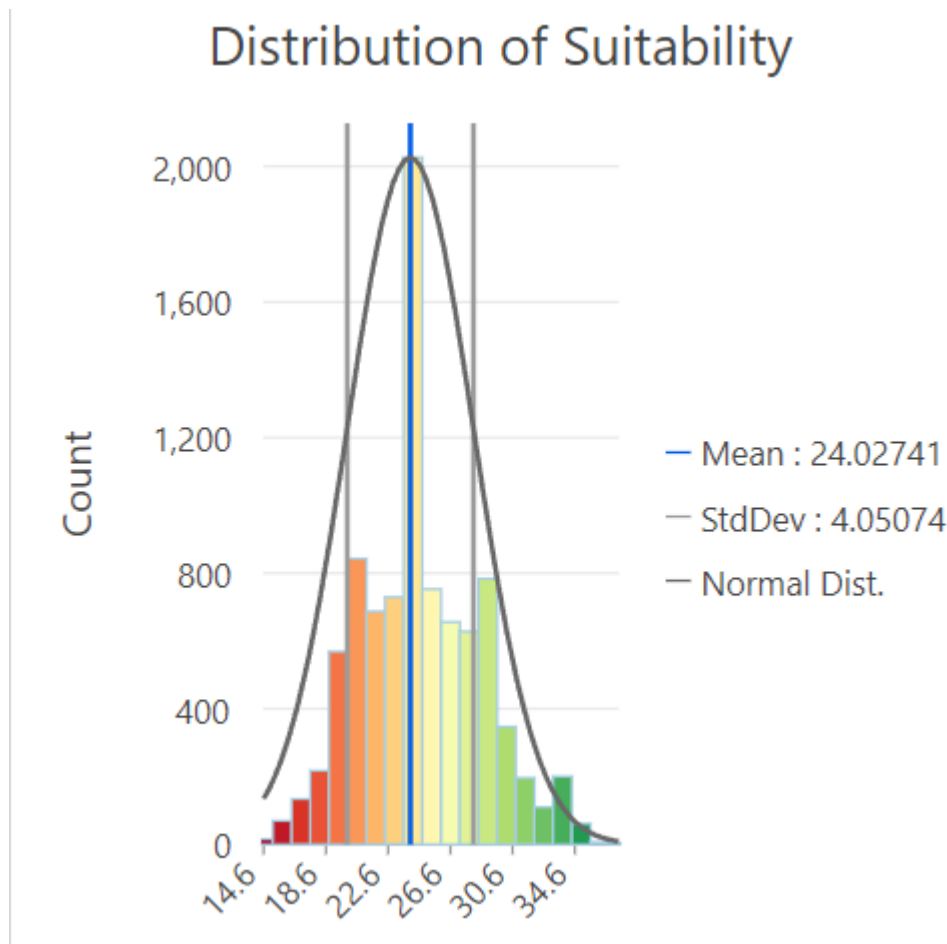
Agricultural Land Protection Suitability Model

- High Suitability
- Medium High Suitability
- Medium Suitability
- Medium Low Suitability
- Low Suitability
- Tree Plantations
- Conservation Lands

0 2.5 5 10 15 20 Miles



Model Summary



Highest possible score: 40

Lowest Score: 14

Highest Score: 38