



CANOPY COMPASS



Example Farm

327.8 acres
Sauk County, WI

[43.21335, -89.96995](#)

June 10, 2024

Generated by CanopyCompass.com

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About this Report

What is a Compass Report?

The [Canopy Compass website](#) and this Compass Report support data-driven decisions for your land. Regenerative agriculture, especially permanent crops and agroforestry, has great potential to enhance the economic and environmental outcomes of agriculture.

Many crops and practices are available, but it is difficult to know which are best suited for specific contexts. The comprehensive data provided in this report can help remove the guesswork, improve outcomes, and avoid pitfalls.

Who is this report for?

- **Farmers** considering adding regenerative practices to their portfolio
- **Landowners** exploring regenerative options for their land
- **Investors** scouting fields for investments in regenerative agriculture
- **Lenders** evaluating the risk of a particular crop in a field
- **Consultants** and **Land Managers** gathering information for their clients

Can I update my report?

Yes! As new crops and other data are added to the Canopy Compass website, you can update your report to include this new information for **free**.

Can I talk to an expert?

Yes! Click the 'Ask an Expert' button below. We'll set you up with a **free** intake call and then connect you with one of our regional experts to help you interpret this report, evaluate options, validate soil data, and source plants.



Disclaimer

The analysis in this report is not a recommendation by Canopy. The analysis is provided without representation or warranty of any kind. The accuracy of the analysis varies by location. Validation with real soil samples is recommended.



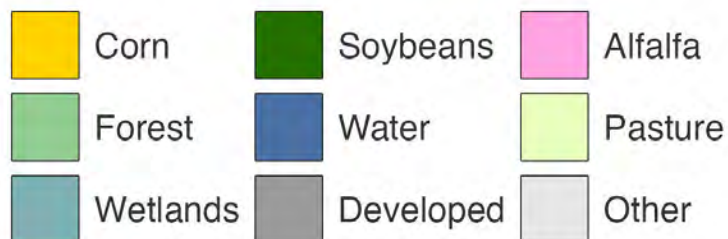
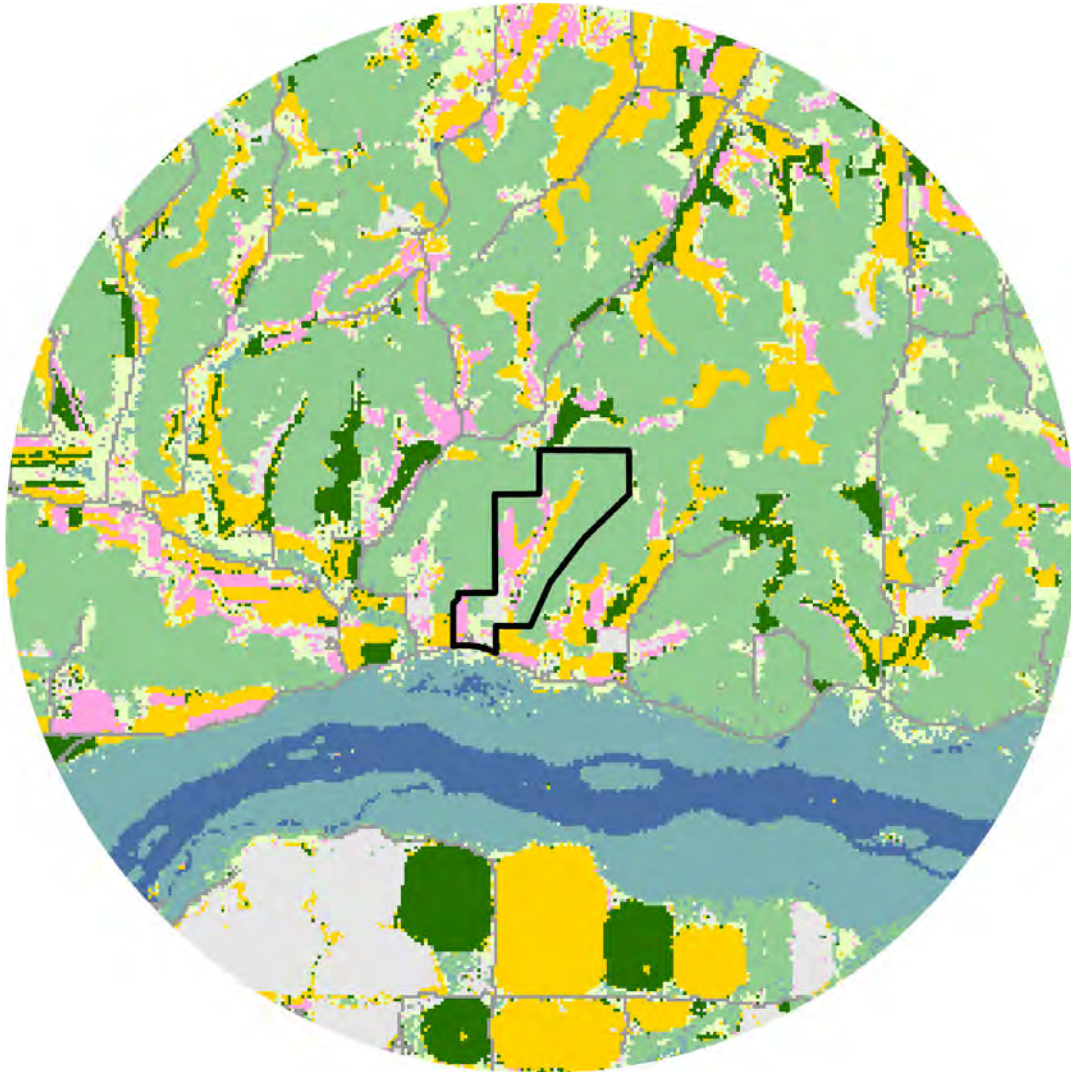
Current Context

Where are you starting from? What is in and surrounding this field now?



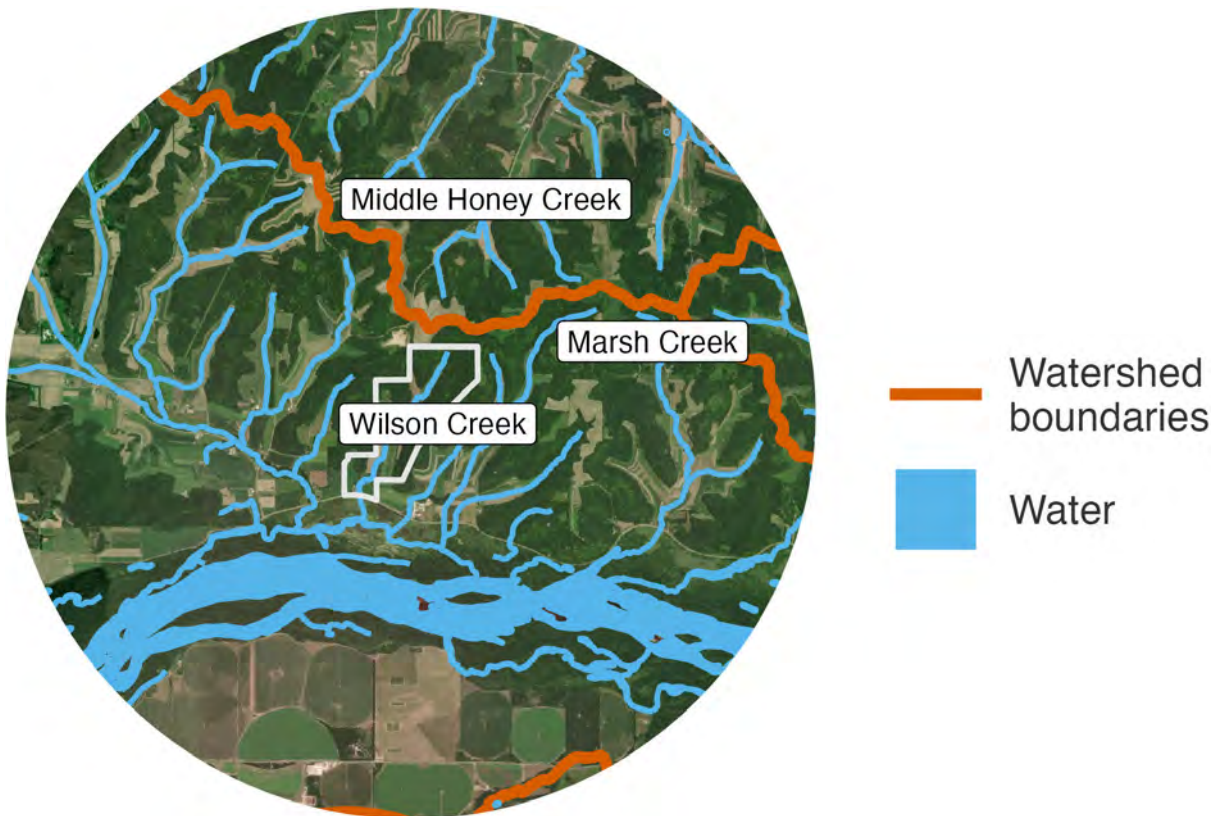
Existing Land Cover

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Hydrology

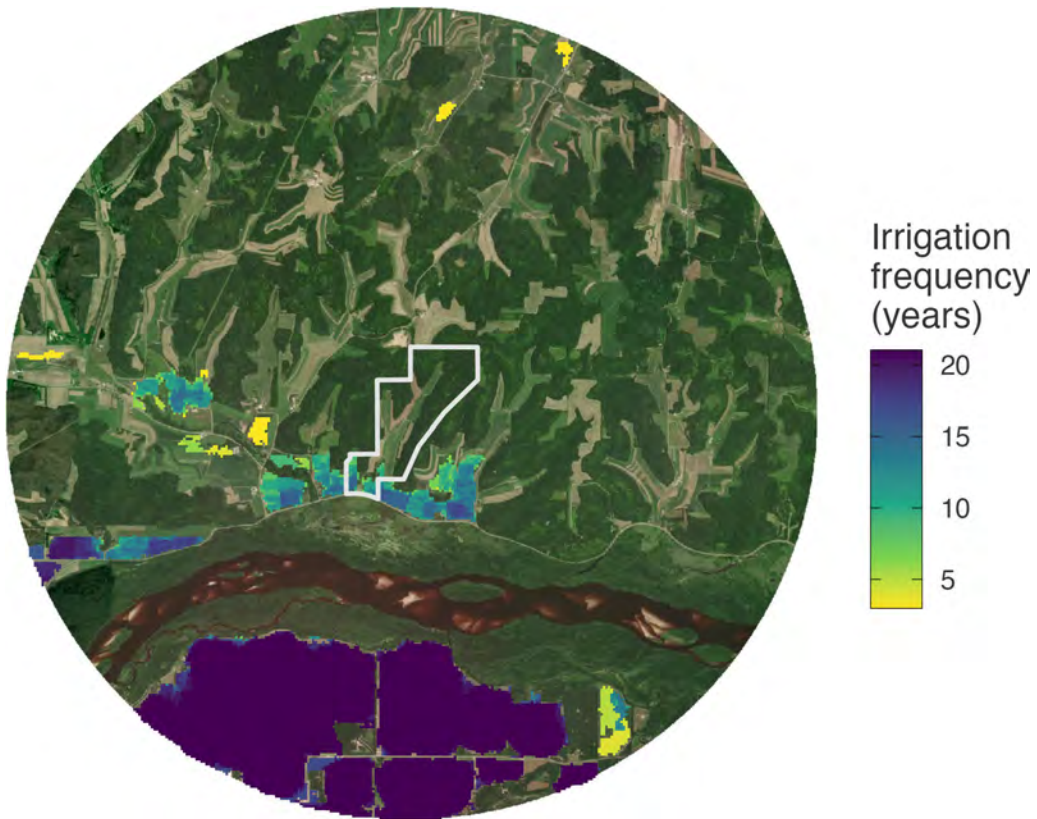
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Category	Name	Hydrologic Unit Code
Subwatershed	Wilson Creek	070700051202
Watershed	City of Spring Green	0707000512
Subbasin	Lower Wisconsin	07070005
Basin	Wisconsin	070700
Subregion	Wisconsin	0707
Region	Upper Mississippi	07

Irrigation

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Tile Drainage

Background Tile drainage is a common agricultural practice used to remove excess water and nutrients from the soil. It is typically installed in fields with high water tables or heavy clay soils. The drainage system consists of a network of underground pipes (tiles) that collect water and transport it to a surface outlet, such as a ditch or stream. This process helps improve soil aeration, root growth, and crop yields while reducing the risk of waterlogging and nutrient runoff.


Location The tile drainage system is located in the central portion of the farm, specifically in the area outlined in white on the map. This area is characterized by a high water table and heavy clay soils, which are ideal conditions for tile drainage.

Installation The tile drainage system was installed in the late 1990s/early 2000s. The system consists of a network of underground pipes (tiles) that collect water and transport it to a surface outlet, such as a ditch or stream. The tiles are typically made of plastic or metal and are spaced at regular intervals.

Management The tile drainage system is managed by the farm owner, who monitors the system for any signs of blockage or damage. The system is typically cleaned out once or twice a year to ensure proper functioning. The farm owner also monitors the water table level and soil moisture to determine when the system is needed.

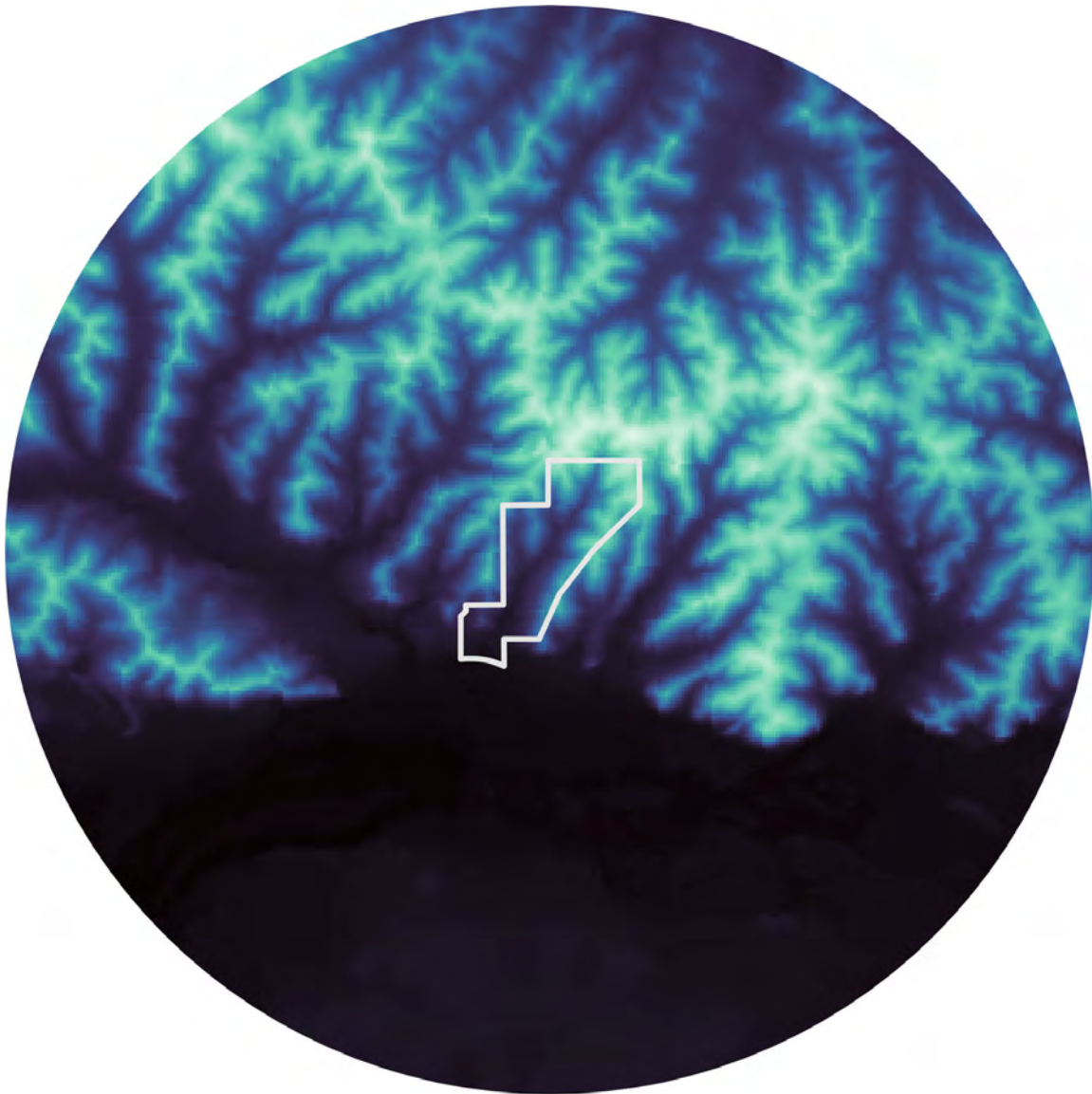
Impact The tile drainage system has a significant impact on the farm's productivity and sustainability. It helps improve soil aeration, root growth, and crop yields while reducing the risk of waterlogging and nutrient runoff. This results in higher crop yields and improved soil health, which are essential for long-term farm sustainability.



Tile Drainage
 Likely present

Regional Topography

The topography of the region is characterized by a complex network of ridges and valleys. The terrain is generally hilly, with elevations ranging from 710 to 1130 feet. The topography is highly variable, with significant changes in elevation over short distances. This variability is reflected in the color gradient of the map, where darker colors represent lower elevations and lighter colors represent higher elevations.



Elevation (ft)

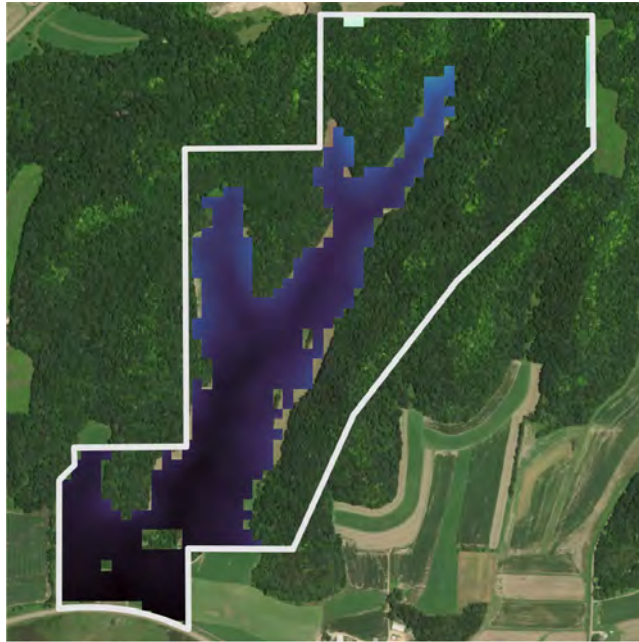


710

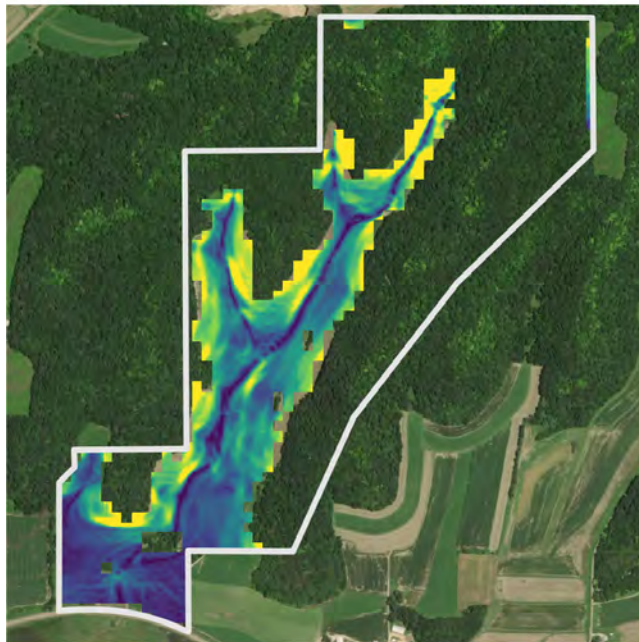
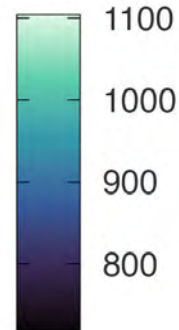
1130

Local Topography

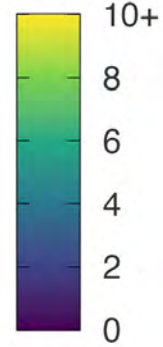
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Elevation (ft)

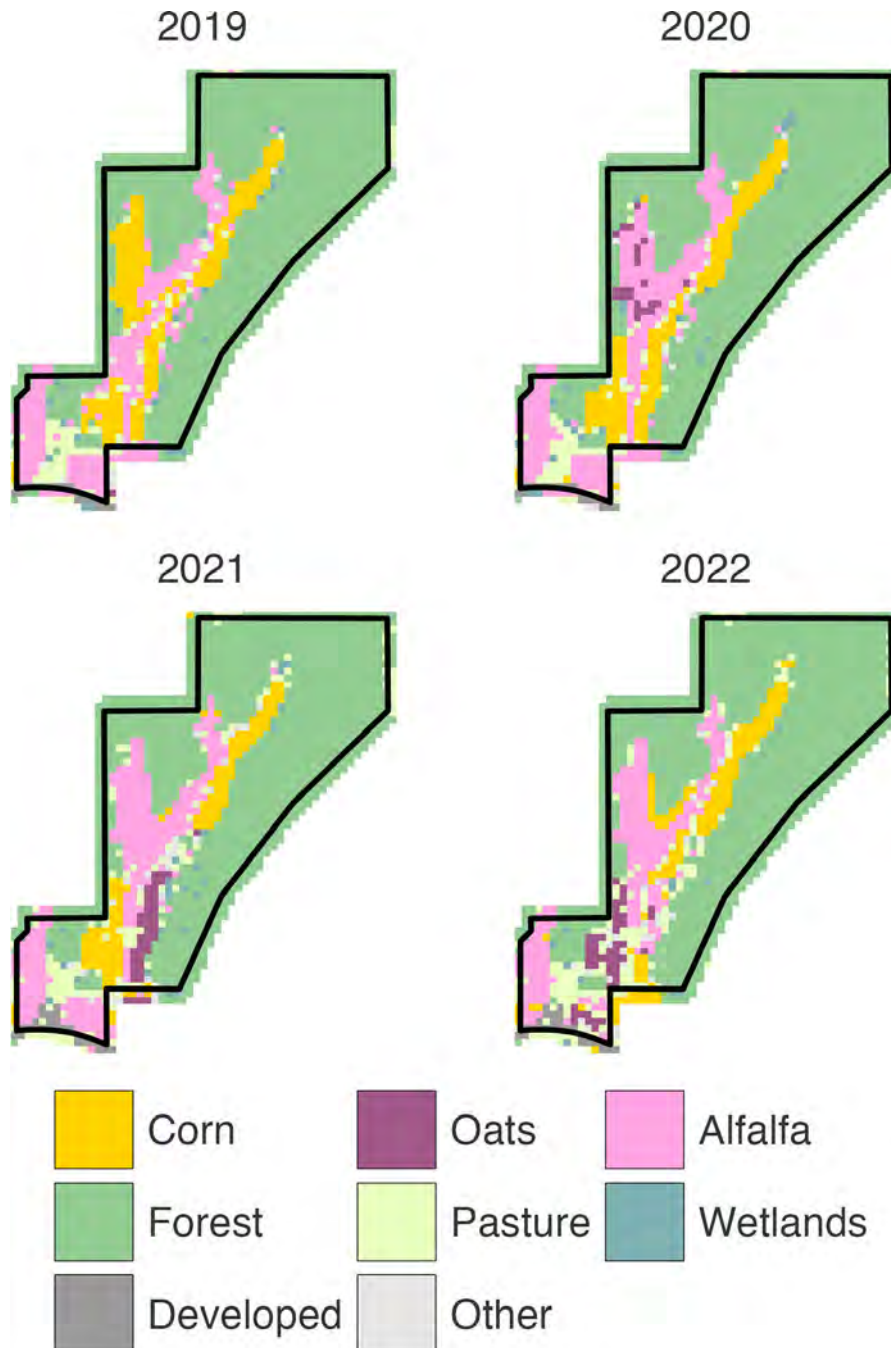


Slope (degrees)



Crop History

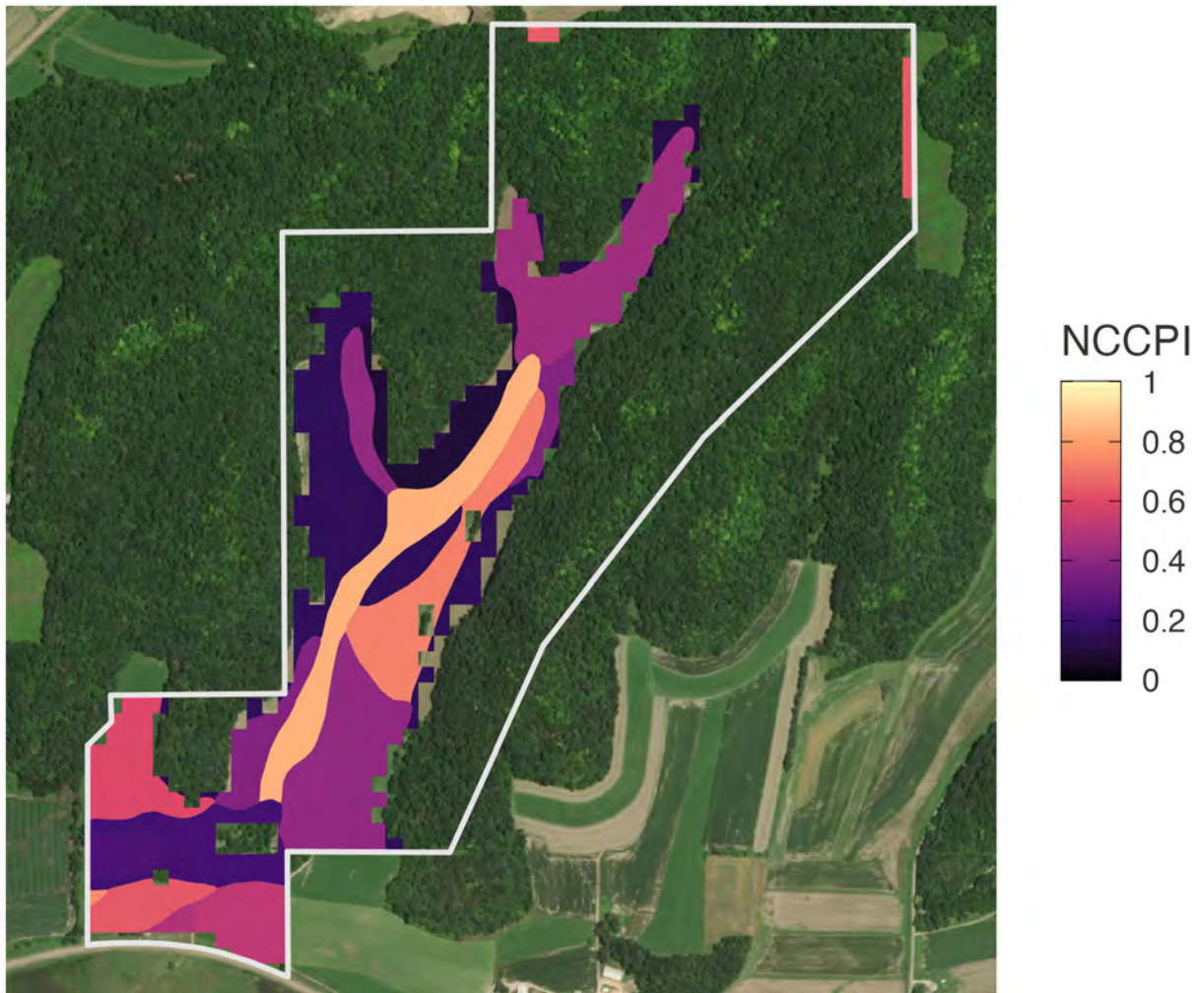
The following maps show the crop history for the farm from 2019 to 2022. The maps are color-coded to show the different crops and land uses on the farm. The legend below the maps provides a key for the colors used.



Row Crop Productivity

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Environmental Concerns

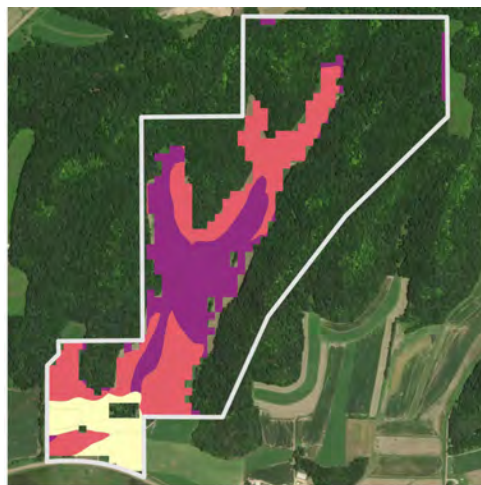
What are the primary concerns in the field or region? What concerns could you work to address?



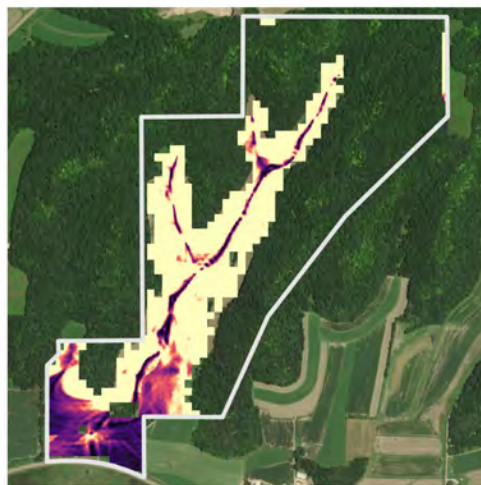
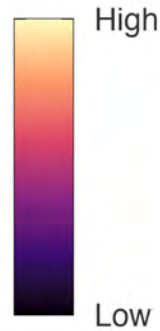
Soil Erosion

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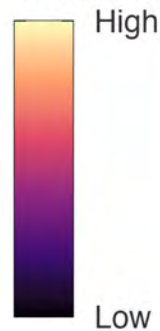
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Wind erosion risk



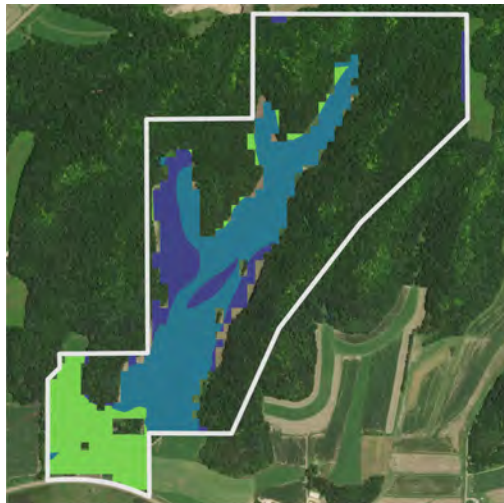
Water erosion risk



Water Runoff & Flooding

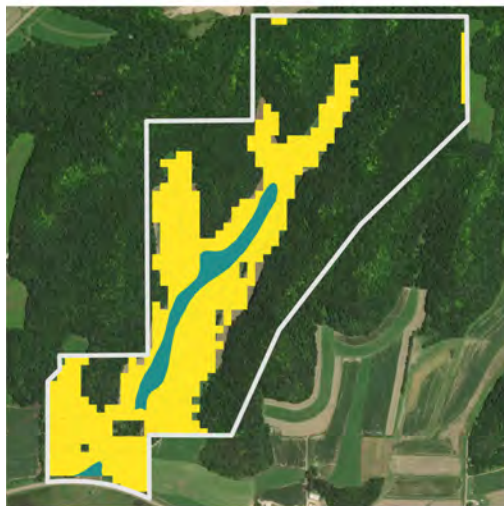
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Water runoff potential

- Very High
- High
- Moderate
- Moderate if drained
- Low
- Low if drained



Flood frequency

- Very Frequent
- Frequent
- Common
- Occasional
- Rare
- Very rare
- None

Species Richness

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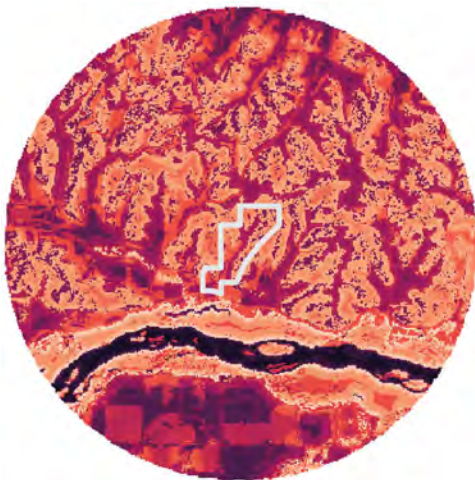
Amphibian



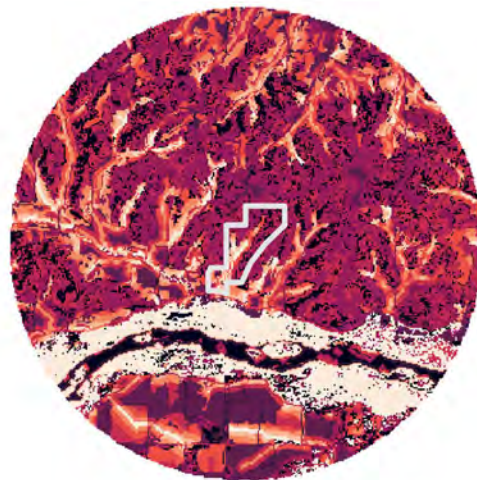
Bird



Mammal

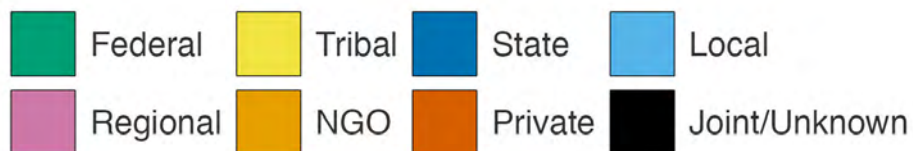
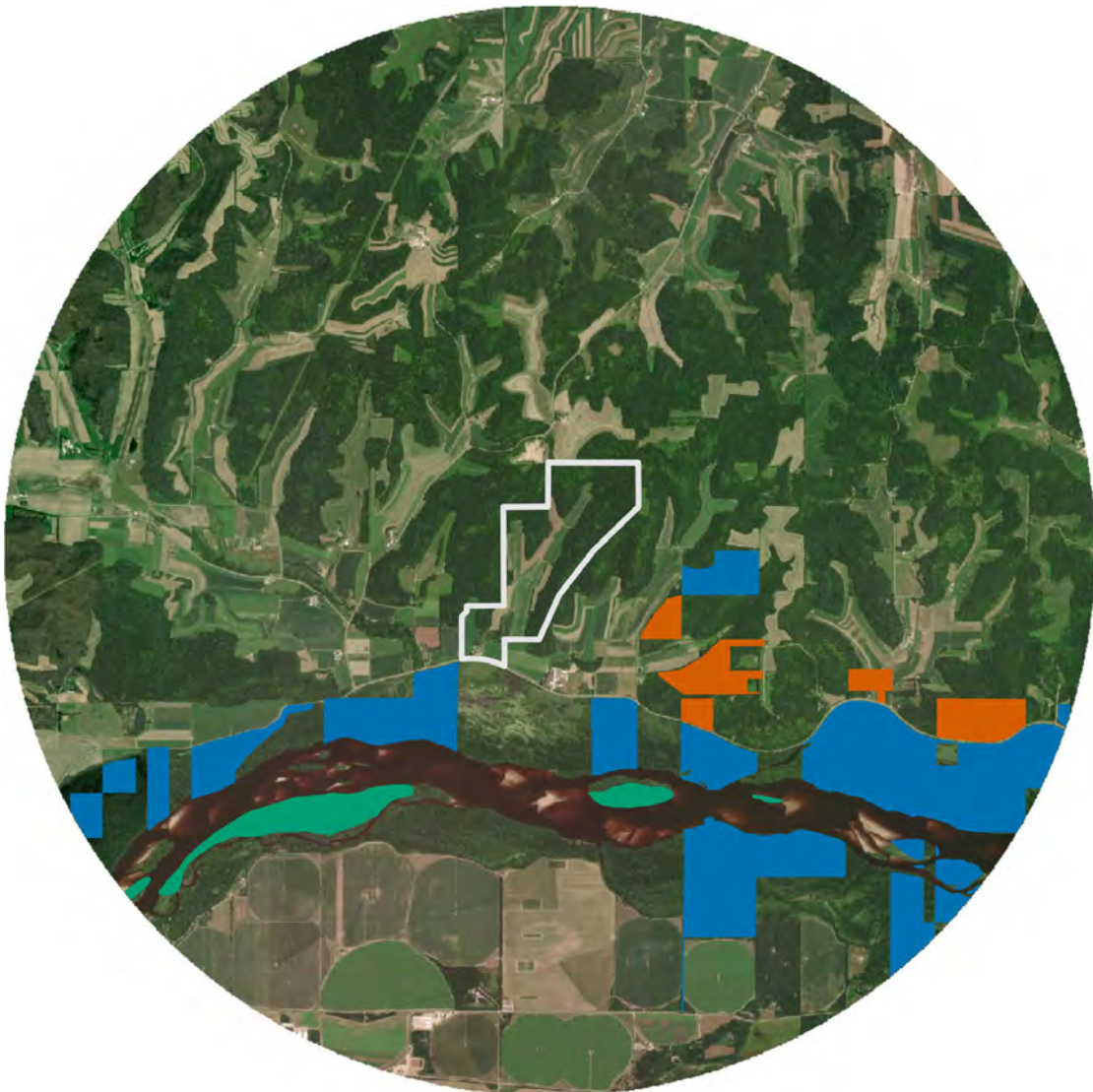


Reptile



Protected Areas

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Crop Suitability

This section evaluates the field against the preferences of specific crops. Evaluating crop suitability is especially critical for permanent crops due to their deep roots and long lifespan. Crops can vary substantially in their soil and climate preferences. For example, some crops cannot tolerate cold winters while others require a long winter period in order to produce fruit. Some crops prefer deep, well-drained soil while others like having 'wet feet' with roots accessing the water table. Some crops require a specific soil texture and pH range, while others are more adaptable. Collectively, these preferences are called crop suitability criteria.



Included Crops

These are the crops you selected to include in this report. You can recreate this report with different or additional species, including any new species added to the Canopy Compass website, for ****free**** at any time.

Tree fruits

- Apple
- Cherry
- Mulberry
- Pawpaw
- Peach
- Pear
- Persimmon
- Plum
- Quince

Small fruits

- Aronia

- Black currant
- Blueberry
- Elderberry
- Hardy kiwi
- Honeyberry
- Serviceberry

Timber & fodder

- Black locust
- Black walnut
- Eastern white pine
- Honeylocust
- Norway spruce

- Poplar
- Swamp white oak
- White oak
- Willow

Nuts

- Chestnut
- Heartnut
- Hybrid hazelnut
- Pecan

Other

- Sugar maple



FAQ - Crop Suitability

How are the crop suitability maps generated?

The crop suitability maps on the [Canopy Compass website](#) and in this section are based on the [Savanna Institute's](#) peer-reviewed crop suitability algorithm (Shea & Wolz, *in review*). In this methodology, data on a crop's soil and climate preferences are first gathered from scientific literature, extension publications, and expert insights. Then, these preferences are used, in conjunction with soil and climate data, to predict how suitable a field is for a given crop.

Your field is divided into zones of common soil and climate traits. For each soil/climate variable, each zone is classified as ideal, suitable, or unsuitable. If any single variable is **unsuitable** in a zone, that zone is deemed unsuitable as a whole, regardless of the suitability of other variables. If no variables are unsuitable, the relative proportion of **ideal** vs. **suitable** variables in a zone generates a 'suitability index', which is displayed on the main maps in this section.



What about different varieties, cultivars or genetics?

The crop suitability algorithm is meant to be *inclusive of all varieties, cultivars, and genetics within a given crop*. In other words, the analysis asks: 'Can at least one variety of this crop grow here?' This is the first step in evaluating crop suitability. If this analysis deems an area suitable, the varieties that work best for your field must then be identified. Ask our experts for help with that!

How should the suitability index (from suitable to ideal) be interpreted?

The suitability index mapped for each species indicates the relative proportion of factors that are either 'suitable' or 'ideal' for that crop. The suitability index should *not* be interpreted as directly proportional to growth rate or yield.

Will the suitability analysis change over time?

Yes! Many alternative crops are just now developing robust data on soil and climate preferences. We are constantly working to improve our suitability algorithm as new research is published and more data becomes available. As crops are added or updated on the Canopy Compass website, you can update this Compass Report to include this new information for **free**.

What factors are considered or not considered?

The factors considered in the suitability analysis vary across crops. The specific factors considered for each crop are shown on the pages titled "Criteria Breakdown". Factors can include:

CLIMATE

- **Minimum winter temperature** - Cold hardiness often limits crops at the northern end of their range.
- **Maximum summer temperature** - Heat tolerance often limits crops at the southern end of their range.
- **Precipitation** - On existing agricultural land, precipitation criteria are ignored - we assume that installation of irrigation is feasible if necessary. On non-agricultural land, precipitation criteria are enforced.
- **Chilling hours** - Some crops need enough winter chill time to trigger flower or fruit production.
- **Growing degree days** - This is a metric of growing season length. Some crops need longer growing seasons to fully ripen their crop.

SOIL

- **Soil depth** - Too shallow of bedrock or restrictive layer can restrict roots.
- **Water table depth** - Plant roots generally cannot survive for long if submerged in the water table, but some crops prefer having intermittent access to the water table.
- **Soil texture** - The soil's sand, silt, and clay composition.
- **Soil drainage** - Some crops are more tolerant of soggy soils than others.
- **Flood frequency** - Some crops are more tolerant of flooding than others.
- **Soil pH** - Nutrient availability is strongly influenced by soil pH - how acidic or alkaline the soil is.

NOT INCLUDED

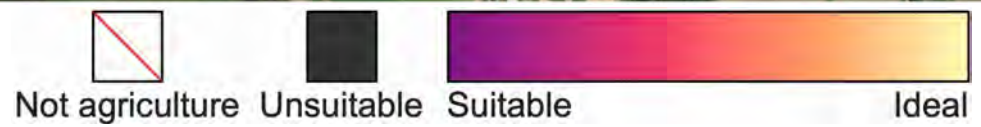
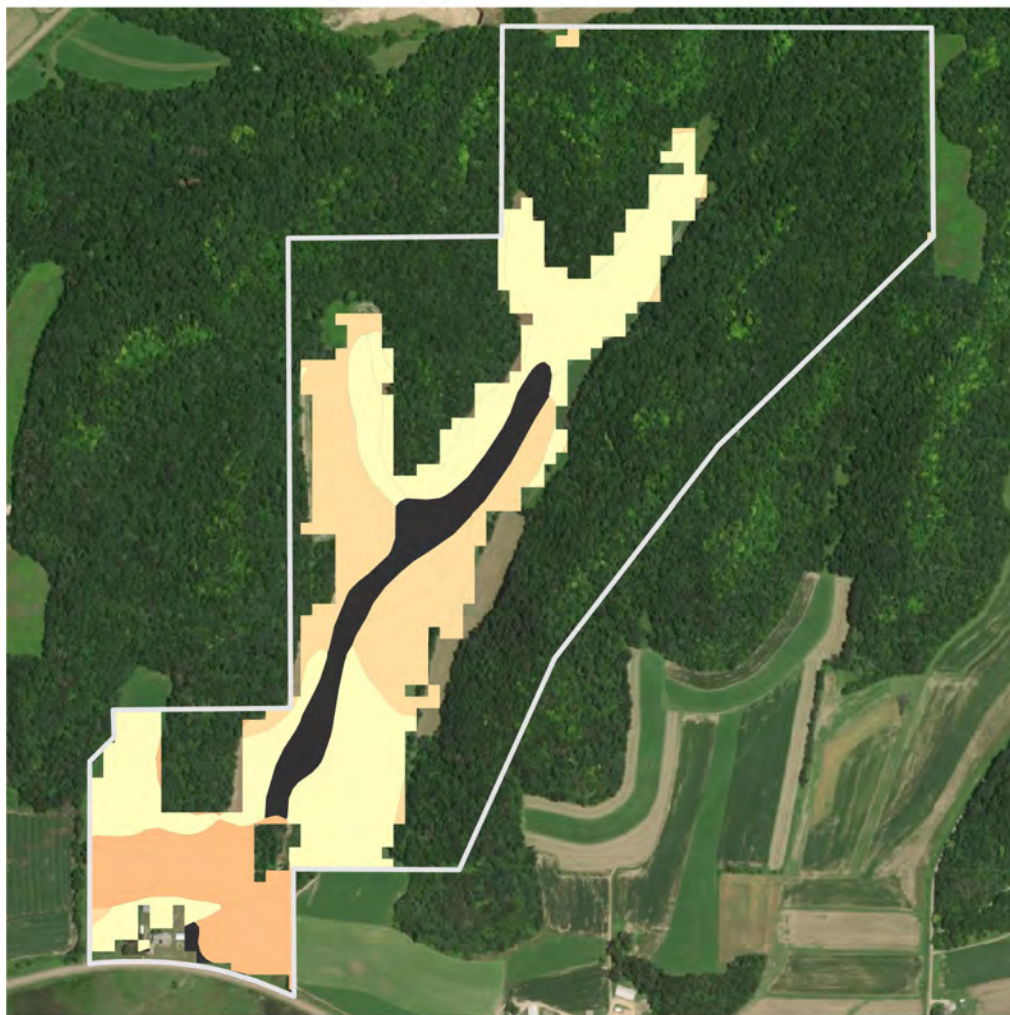
- **Microclimate effects** - You can't beat on-the-ground observations for this!
- **Future climate change** - Analyses utilize present-day climate data.
- **Slope** - This can be important for some types of mechanical harvesters.
- **Management-related variables** - e.g., if a certain soil texture is necessary for a specific management practice, rather than just for crop growth.

Apple



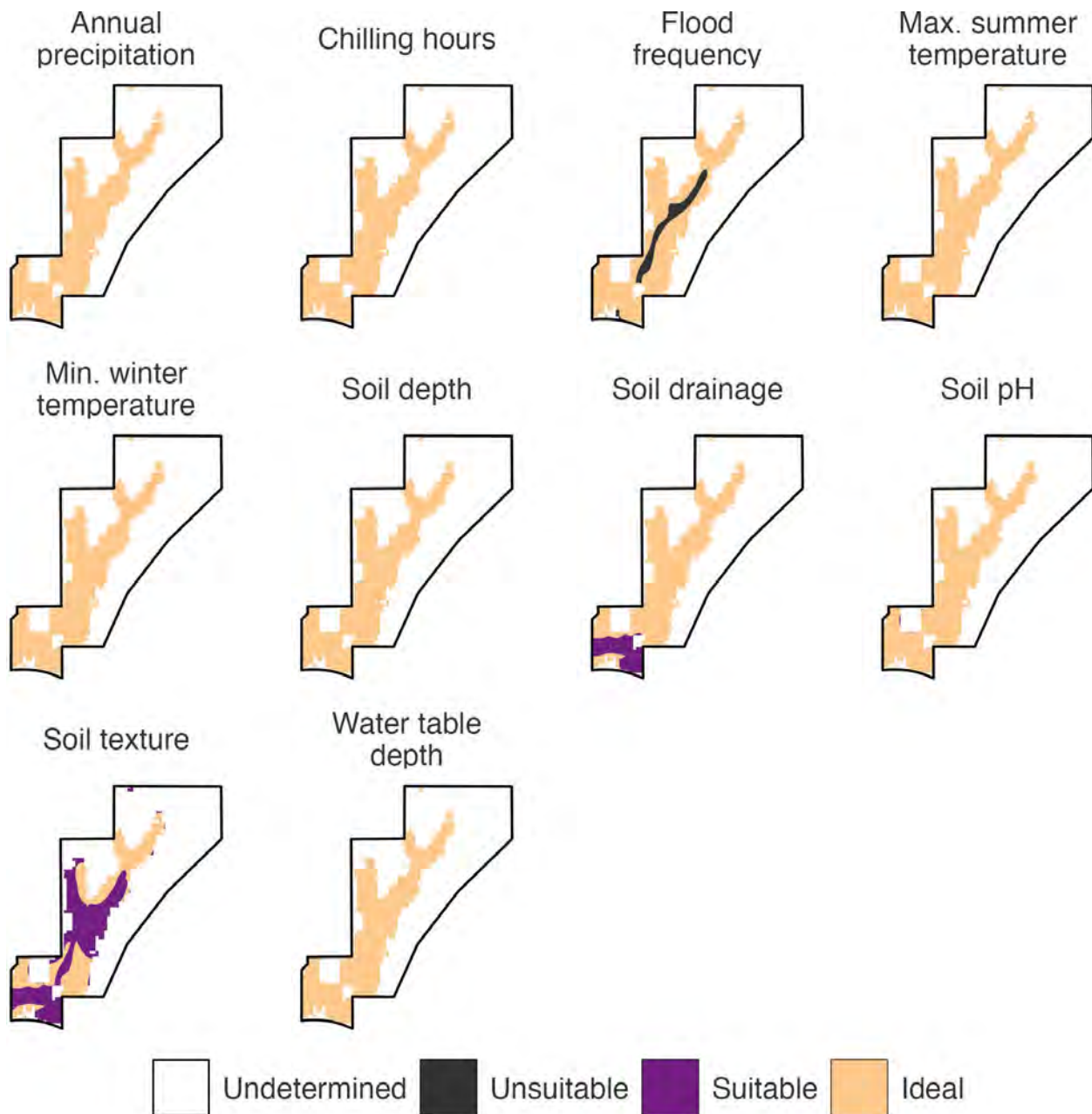
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119 suitable acres



Apple - Criteria Breakdown

Why does the map on the previous page identify specific areas of the field as suitable, ideal, or unsuitable? Each crop has its own preferences! The maps below provide a breakdown of how the soil and climate variables in our suitability analysis were evaluated against the preferences of this specific crop.

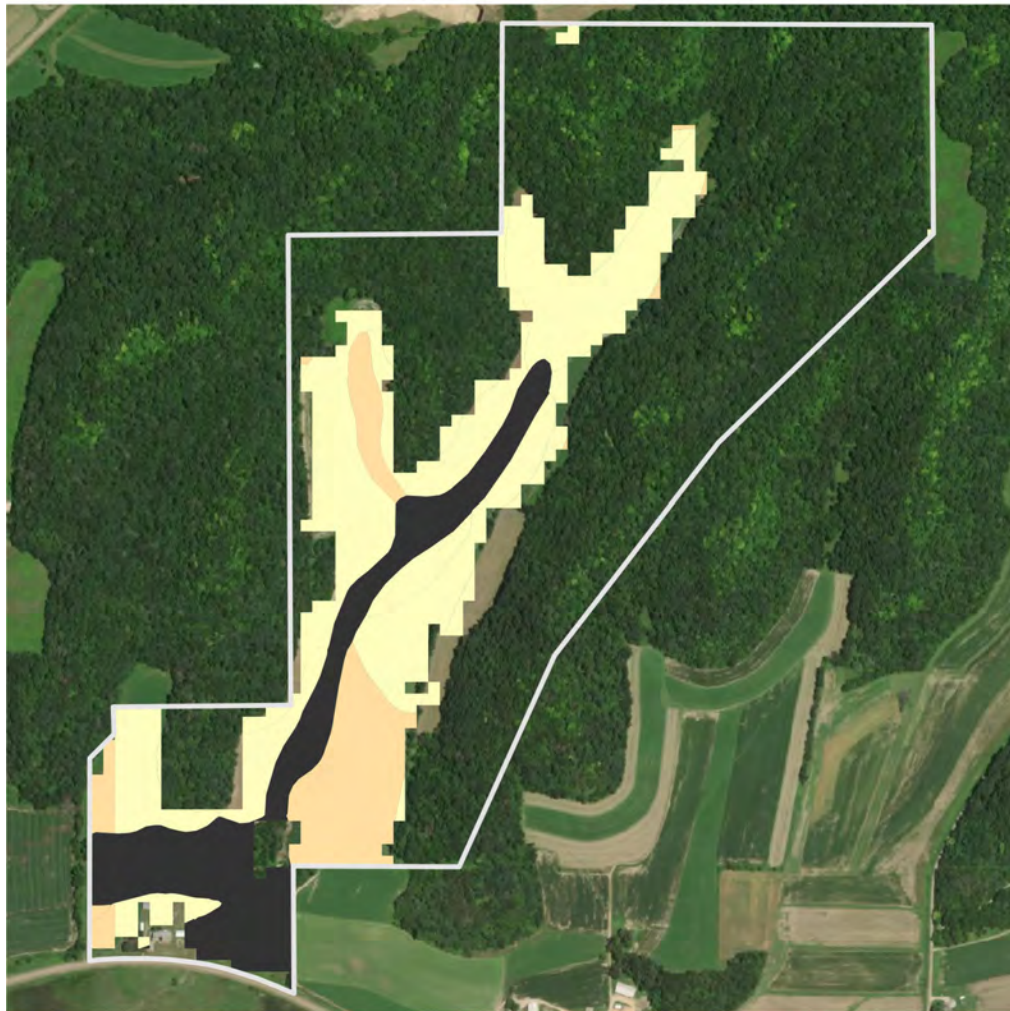


Black Currant



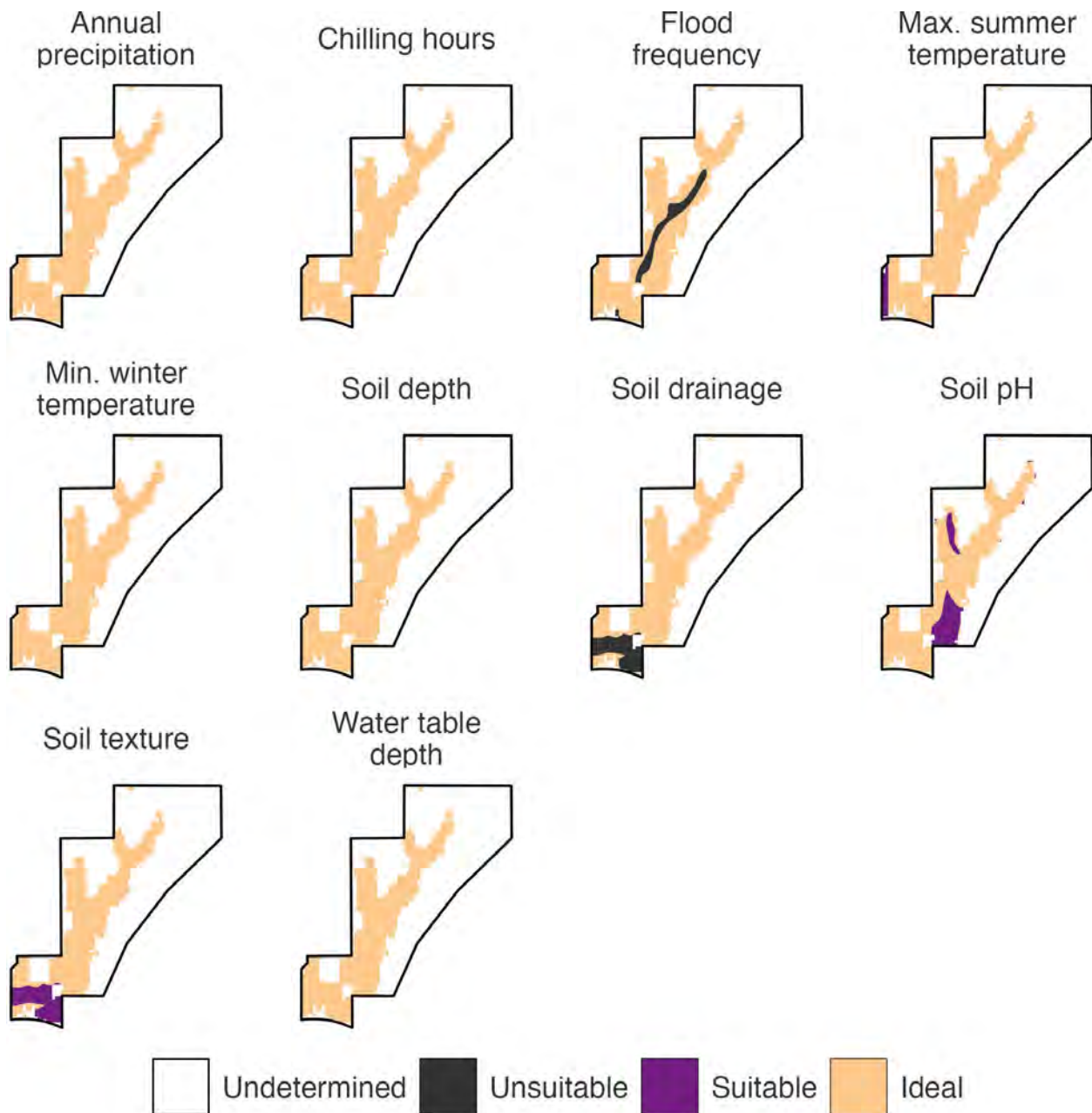
[Blurred text describing the crop and its suitability analysis]

87 suitable acres



Black Currant - Criteria Breakdown

Why does the map on the previous page identify specific areas of the field as suitable, ideal, or unsuitable? Each crop has its own preferences! The maps below provide a breakdown of how the soil and climate variables in our suitability analysis were evaluated against the preferences of this specific crop.

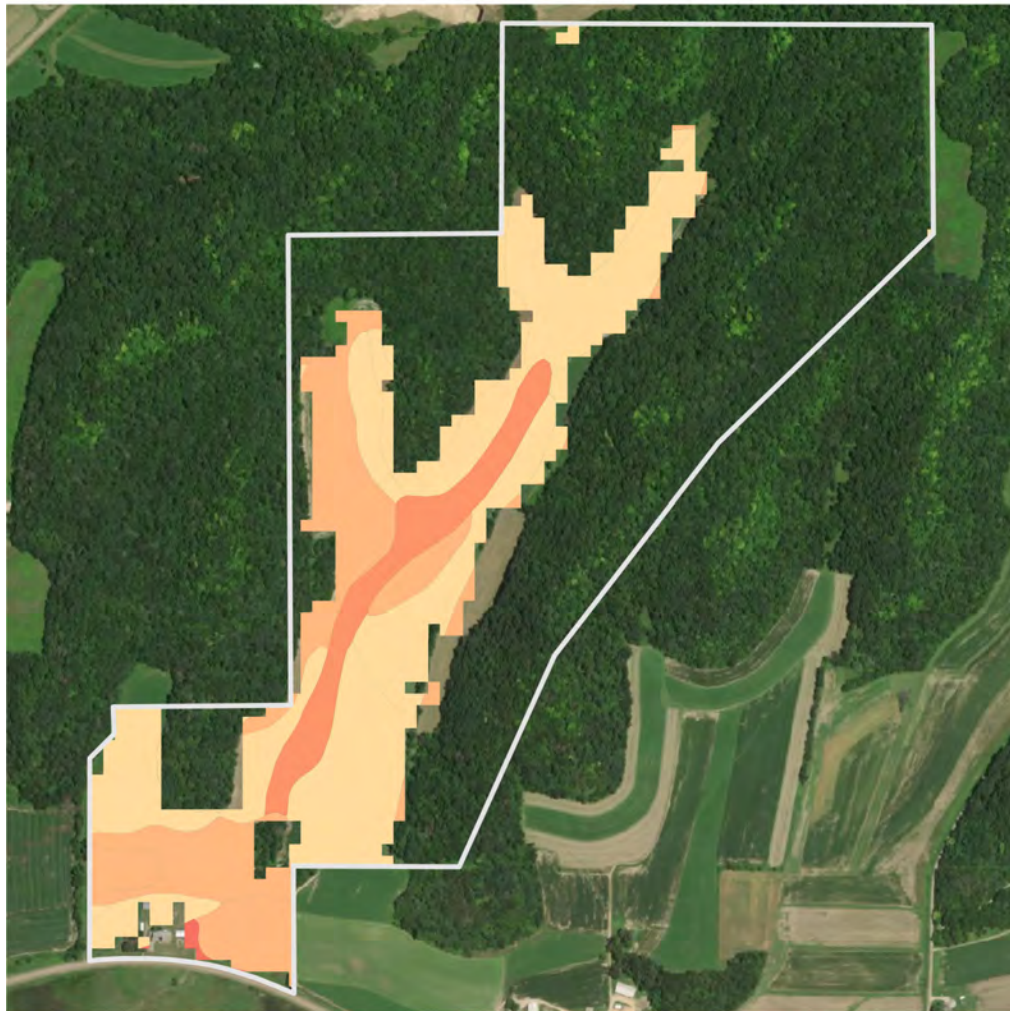


Black Locust



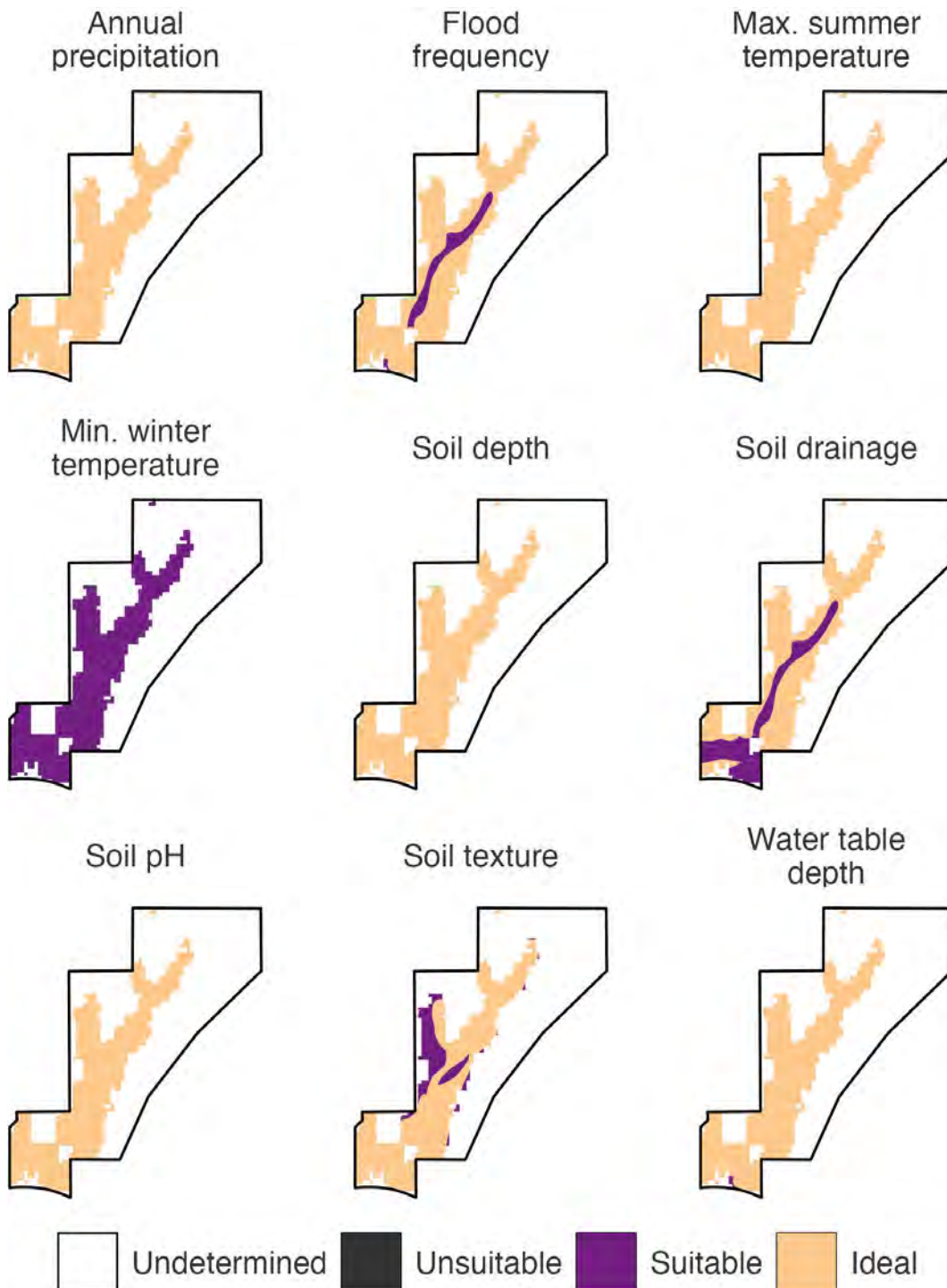
Black locust (Robinia pseudoacacia) is a species of flowering tree in the legume family, native to the eastern United States. It is a hardy, drought-tolerant tree that grows well in a variety of soil conditions. The tree is known for its dense, thorny canopy and its ability to fix nitrogen in the soil. It is commonly used for timber production and as a shade tree. The tree is also a popular choice for reforestation and afforestation projects. The tree is a member of the subgenus Rhus and is closely related to the honey locust (Gleditsia triacanthos). The tree is a member of the subgenus Rhus and is closely related to the honey locust (Gleditsia triacanthos). The tree is a member of the subgenus Rhus and is closely related to the honey locust (Gleditsia triacanthos).

120 suitable acres



Black Locust - Criteria Breakdown

Why does the map on the previous page identify specific areas of the field as suitable, ideal, or unsuitable? Each crop has its own preferences! The maps below provide a breakdown of how the soil and climate variables in our suitability analysis were evaluated against the preferences of this specific crop.

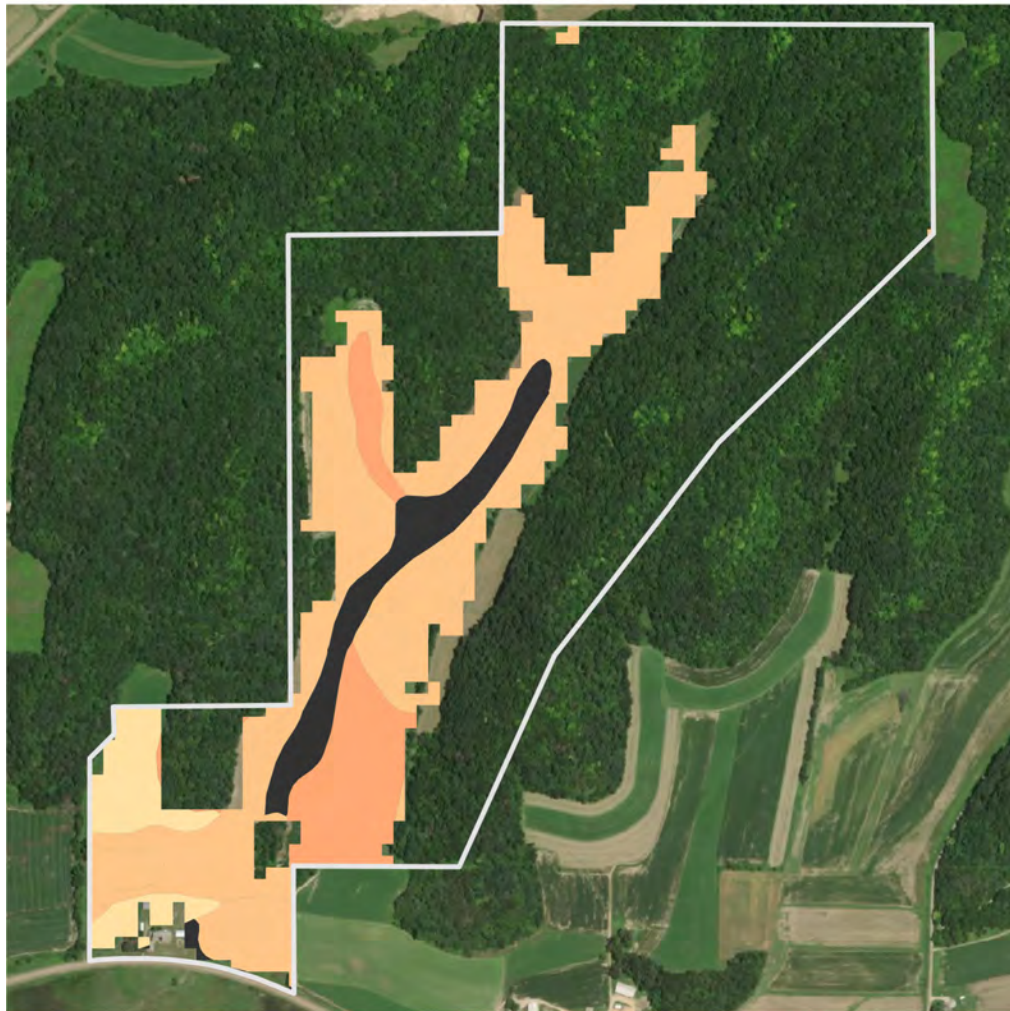


Chestnut



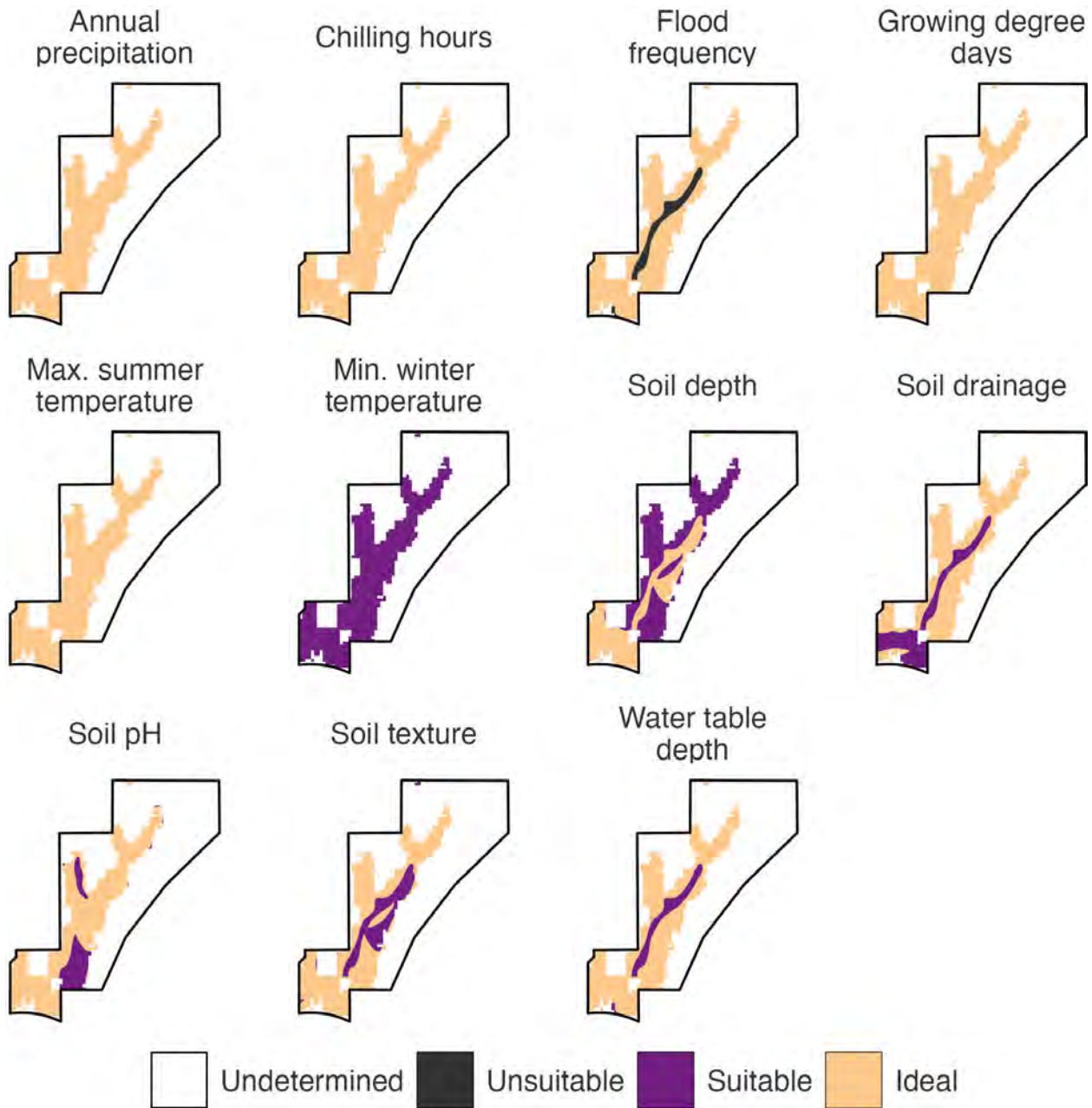
[Blurred text describing chestnut cultivation and suitability analysis]

119 suitable acres



Chestnut - Criteria Breakdown

Why does the map on the previous page identify specific areas of the field as suitable, ideal, or unsuitable? Each crop has its own preferences! The maps below provide a breakdown of how the soil and climate variables in our suitability analysis were evaluated against the preferences of this specific crop.

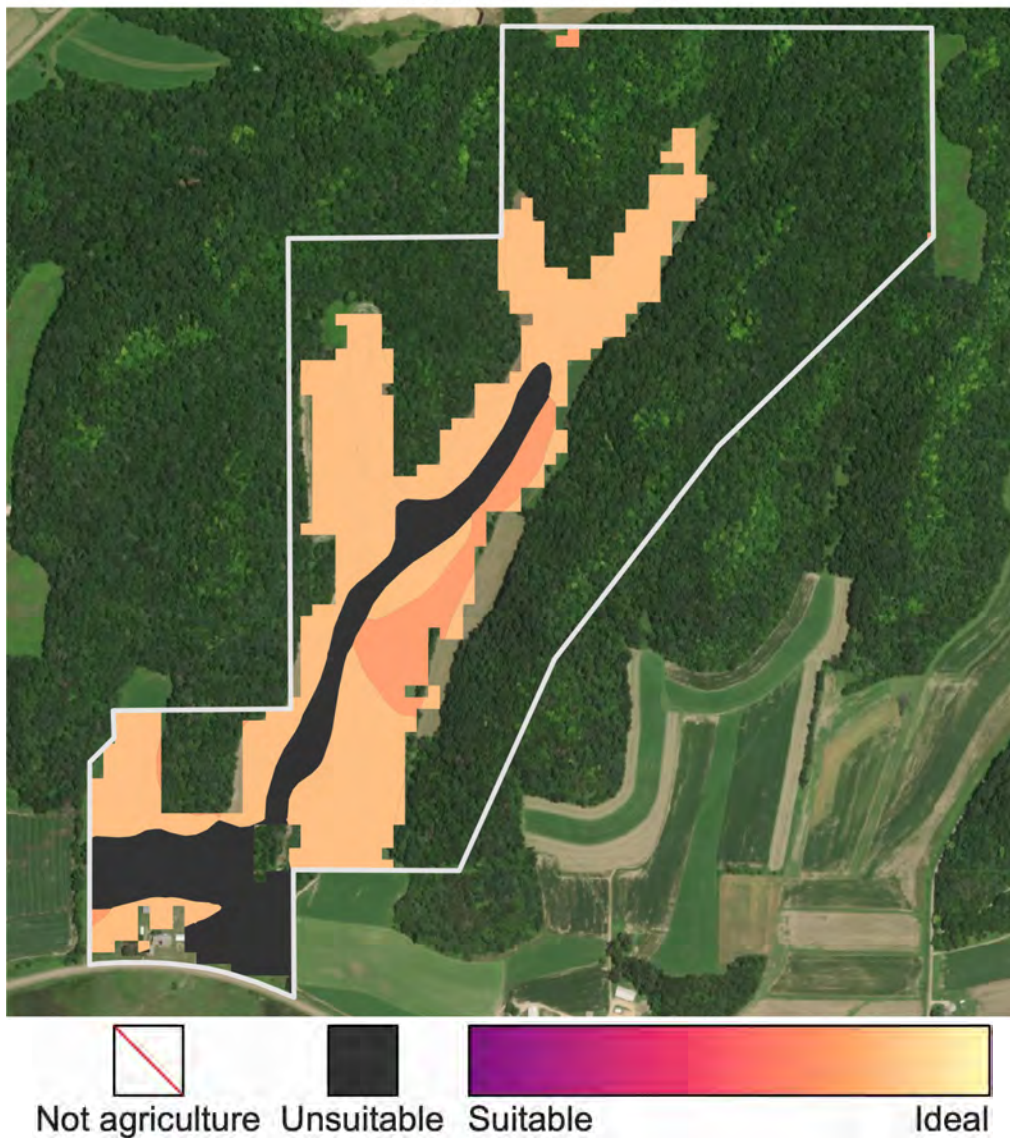


Sugar Maple



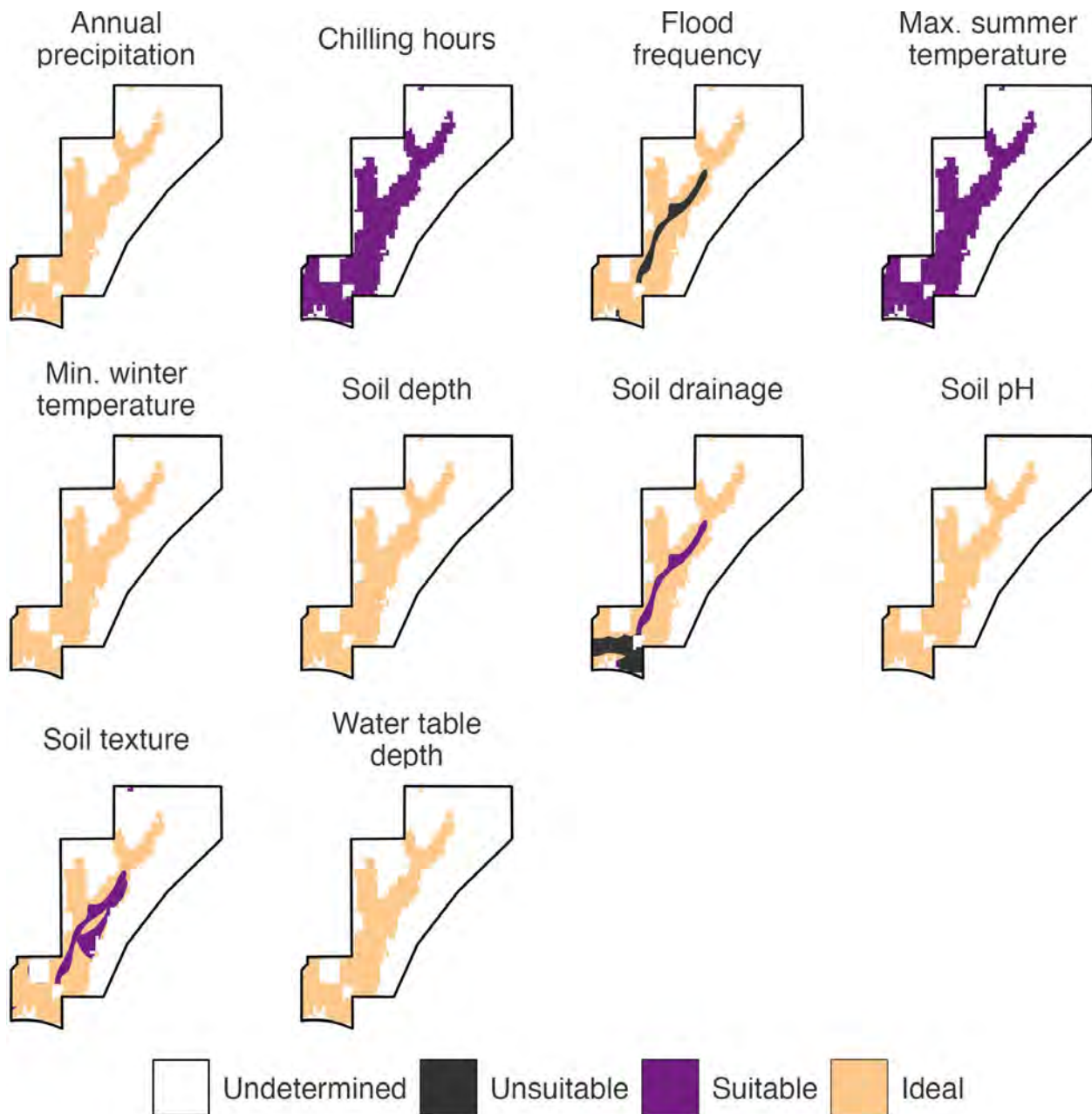
[Blurred text describing the sugar maple tree and its characteristics.]

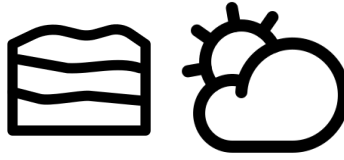
87 suitable acres



Sugar Maple - Criteria Breakdown

Why does the map on the previous page identify specific areas of the field as suitable, ideal, or unsuitable? Each crop has its own preferences! The maps below provide a breakdown of how the soil and climate variables in our suitability analysis were evaluated against the preferences of this specific crop.





Soil & Climate

This section provides a snapshot of a wide range of soil and climate data for the field. There are no 'right' or 'wrong' answers in this section. This data is intended to inform decision making around the topics in this report and beyond. Unmapped areas have no data or are non-agricultural land.



FAQ - Soil & Climate

Is the soil data trustworthy? Did someone take soil samples in *this* field?

The USDA SSURGO soil database contains information collected by the National Cooperative Soil Survey over *more than a century*. The data was gathered by USDA scientists who walked over the land, observed the soil, and took many deep cores for laboratory analysis.

While they may not have taken soil cores in *your* field, they did take soil cores in the same soil types in a similar landscape context nearby.

Soils vary across the landscape in a repeatable pattern influenced by steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many other characteristics. Using these patterns, in conjunction with the soil cores that were taken, soil scientists can predict soil types and characteristics across the broader landscape. Accurately drawing the soil maps was greatly aided by aerial imagery, initially by planes, and now satellites.

Should I take my own soil samples?

This soil database is evidence-based and robust. Nevertheless, errors and variability do exist. In addition, while many soil traits are stable over time, others can vary with time and under agricultural management (e.g. organic matter, pH).

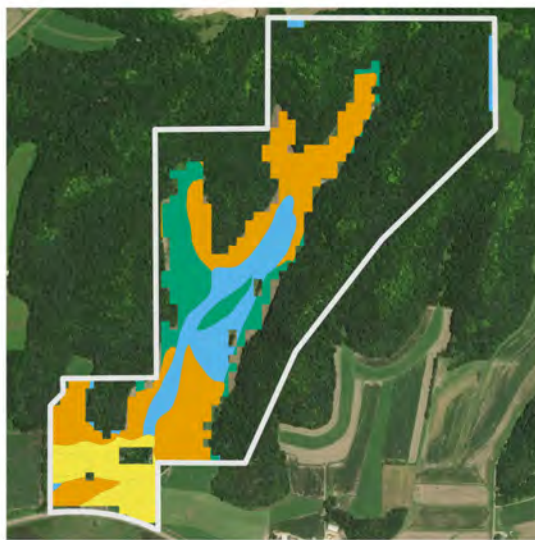
It is highly recommended to validate this analysis with real soil samples collected from your field, especially prior to making an investment in permanent crops.

To get in touch with one of our regional experts for help interpreting and validating the soil data in this report, see the instructions on the 'What's Next?' page at the back of this report.

Soil Texture

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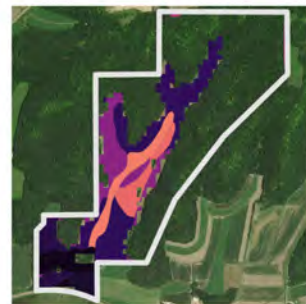
Surface texture



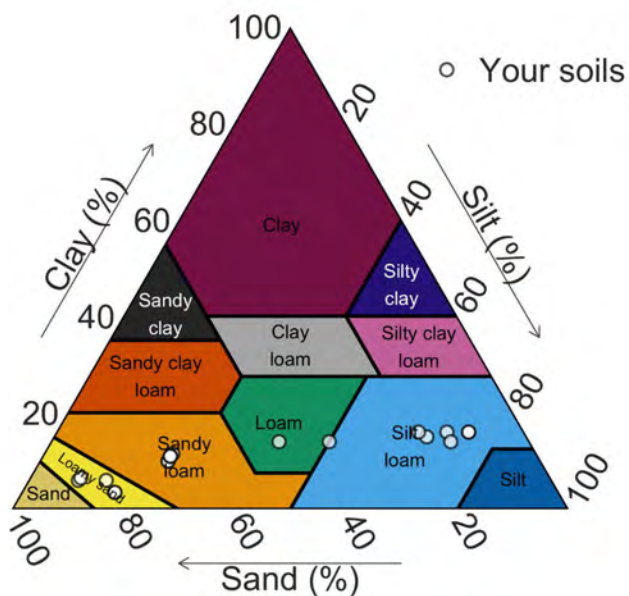
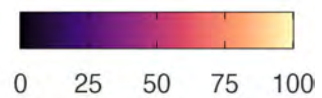
% Sand



% Silt

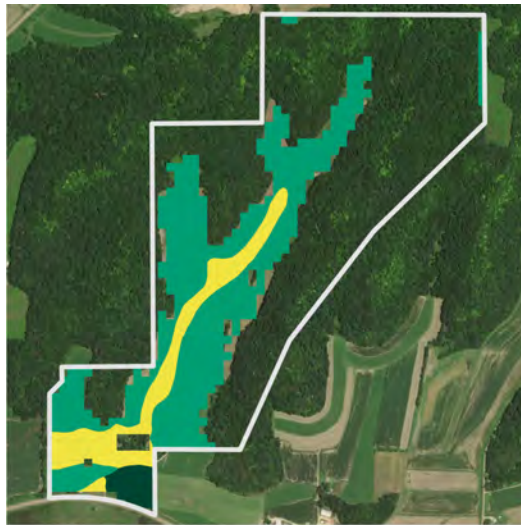


% Clay

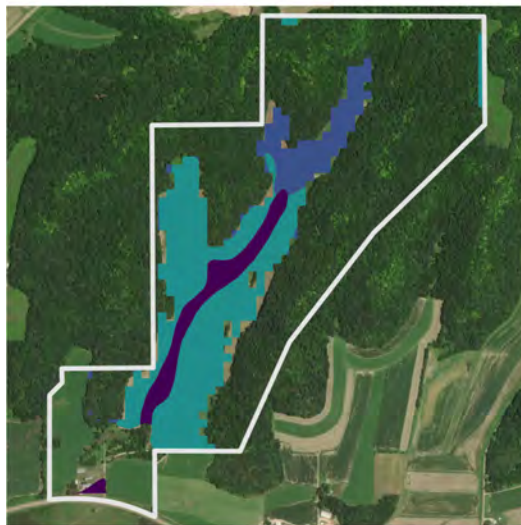


Soil Formation & Loss

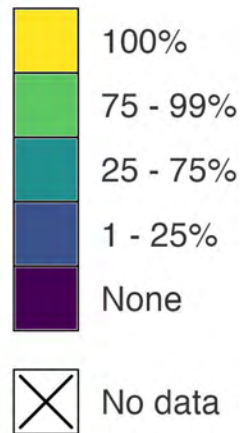
[Blurred text, likely describing the farm's location and the purpose of the soil analysis.]



Soil order



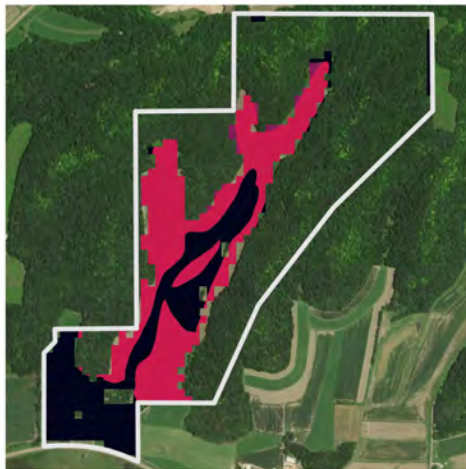
Soil lost to erosion



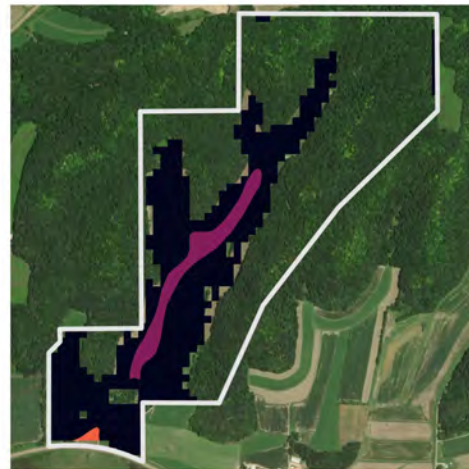
Depth Constraints

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Bedrock



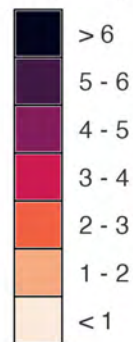
Water table



Restrictive layer



Depth (ft)



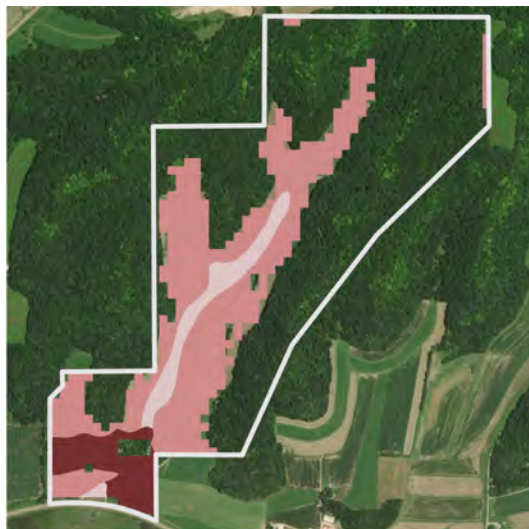
 No restrictive layer

Water Retention

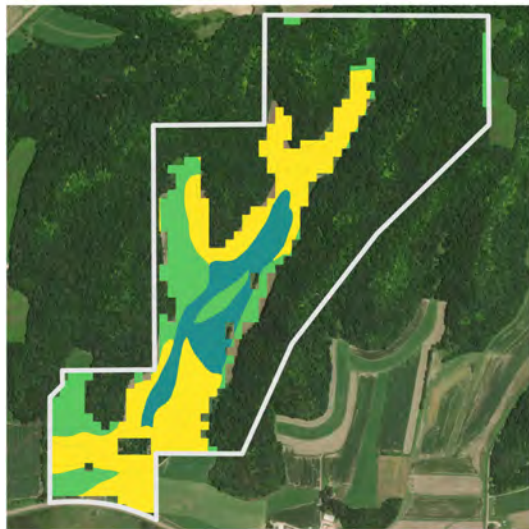
Water retention is the ability of soil to hold water. It is determined by soil texture, structure, and organic matter content. Water retention is a key factor in determining soil fertility and crop yield. High water retention is generally desirable for crops that require consistent moisture, while low water retention is desirable for crops that require well-drained soil.

Water retention is a key factor in determining soil fertility and crop yield. High water retention is generally desirable for crops that require consistent moisture, while low water retention is desirable for crops that require well-drained soil.

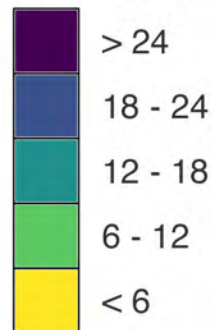
Water retention is a key factor in determining soil fertility and crop yield. High water retention is generally desirable for crops that require consistent moisture, while low water retention is desirable for crops that require well-drained soil.



Drainage class

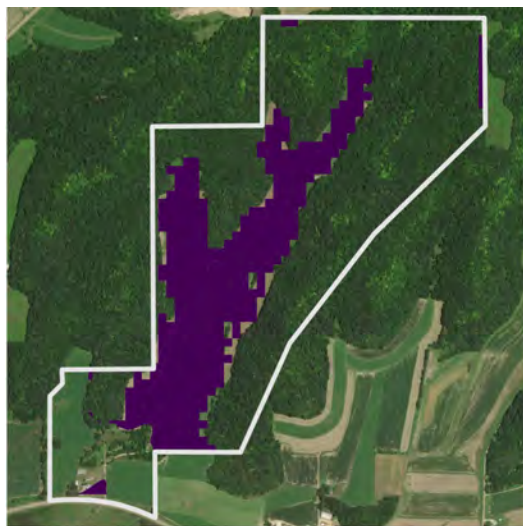


Available water storage (in)

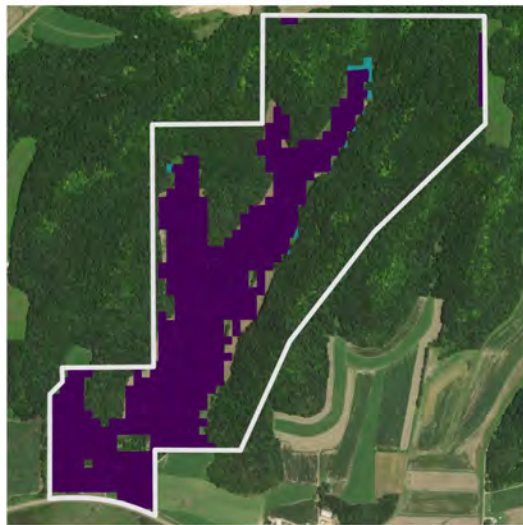
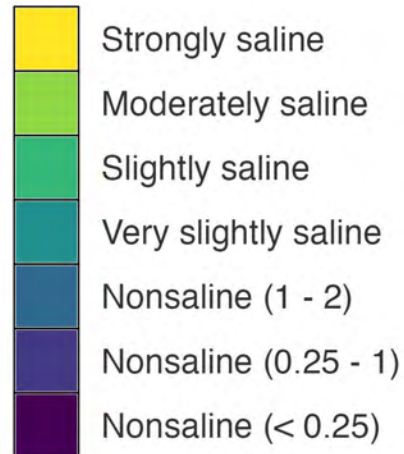


Soil Chemistry

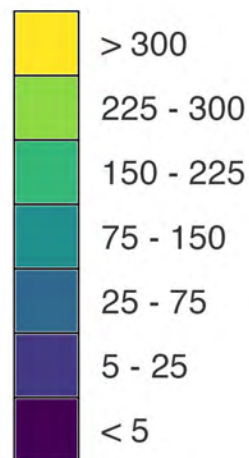
[Blurred text area]



EC (dS/m)



Carbonates (kg/m³)



Soil pH

[Blurred text area]

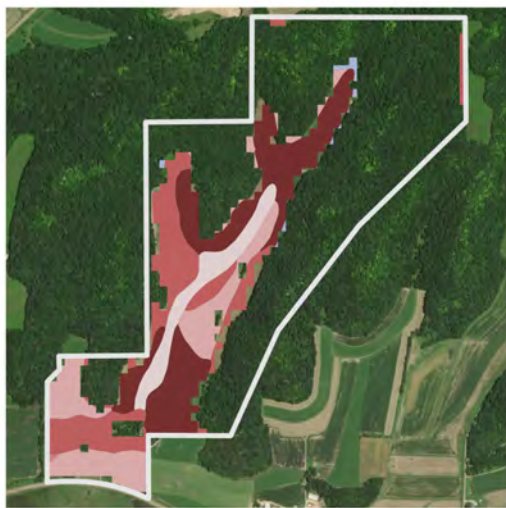
Surface



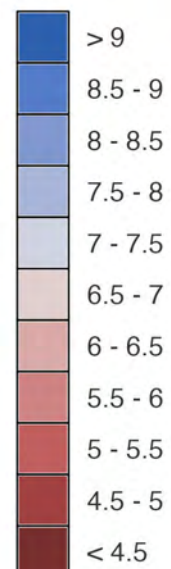
Average



At max depth

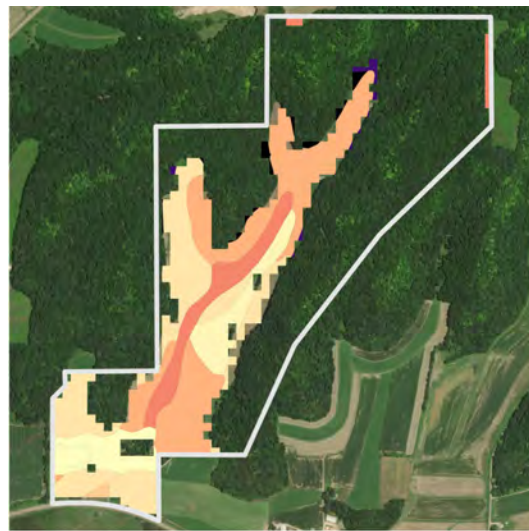


pH

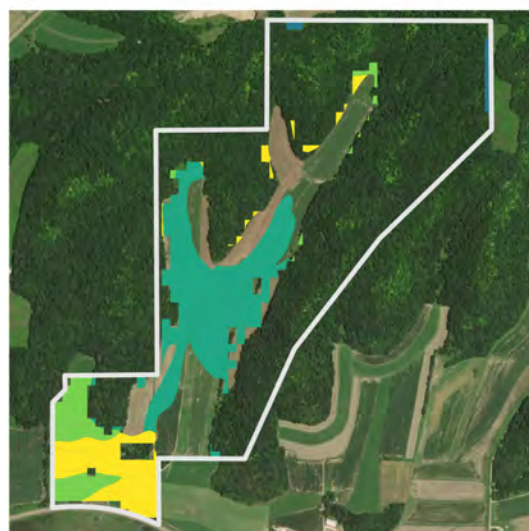
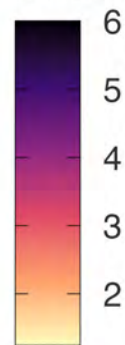


Soil Fertility

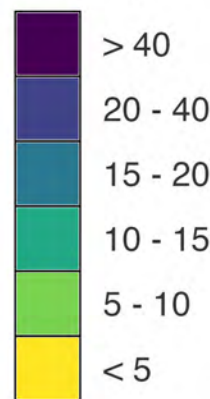
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Organic matter at surface (%)

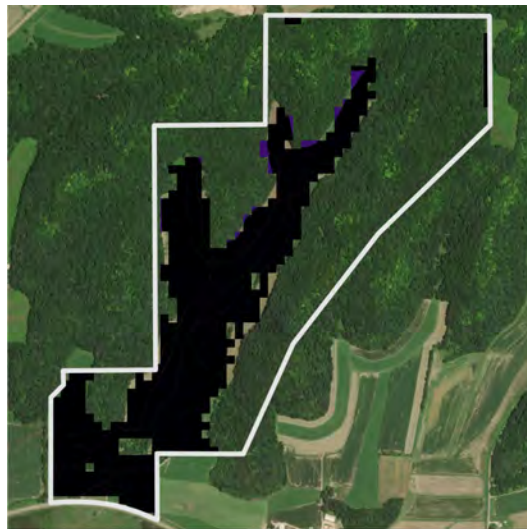


CEC (cmol/kg)

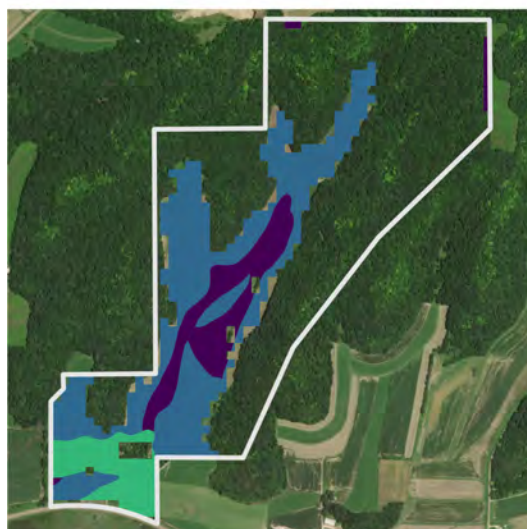
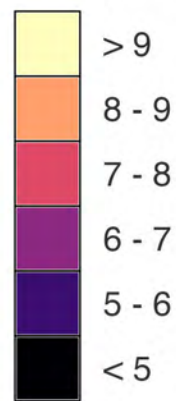


Tree Planting Considerations

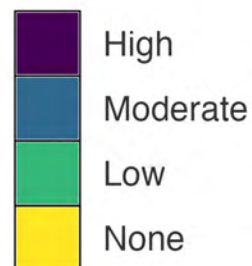
[Blurred text, likely introductory or disclaimer text]



Rock fragments
in top 1 foot (%)



Frost heave
potential



Climate Statistics

Below are high-level climate statistics for the field based on the last 30 years.

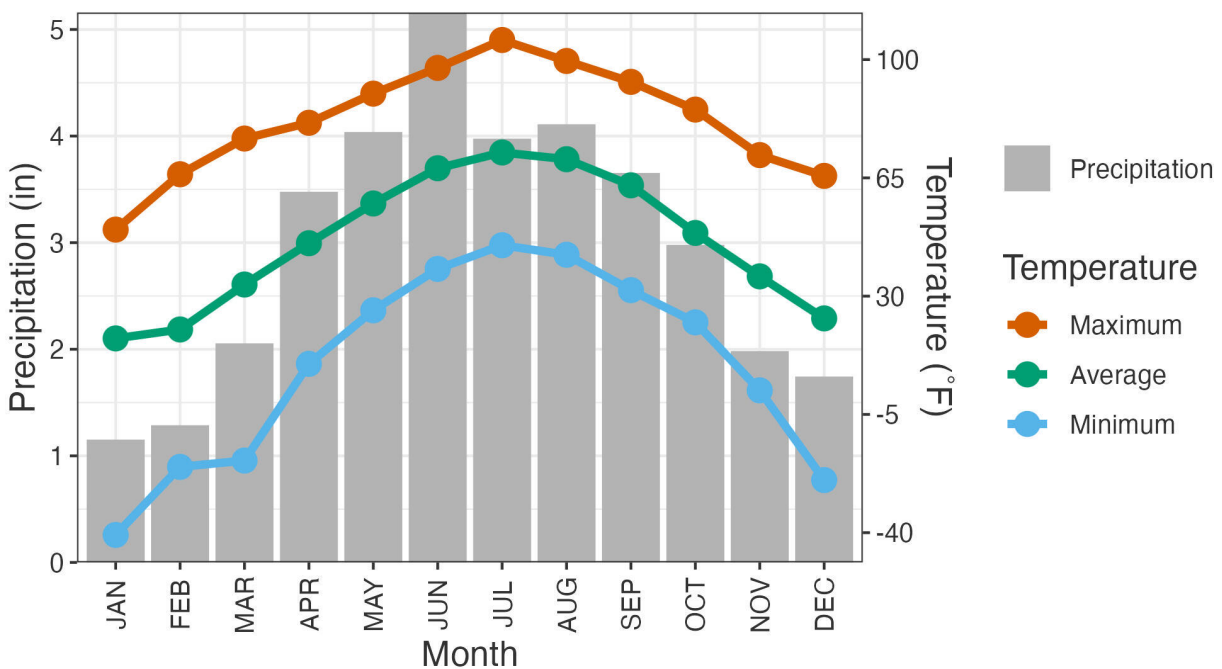
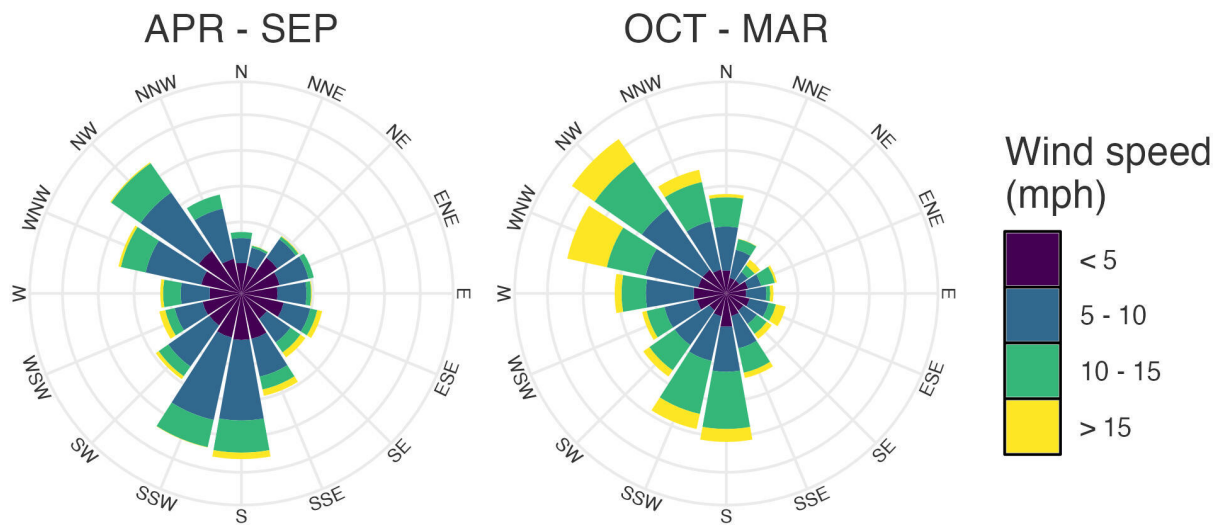
Average minimum winter temperature: -18 °F

USDA plant hardiness zone: 5a

Average winter chill time: 1,785 hours

Average growing degree days (GDD): 2,553 °F-days

Average annual precipitation: 37 in



FAQ - General

Where does the data in this report come from?

- Land cover & crop history: [USDA Cropland Data Layer \(CDL\)](#)
- Hydrology: [USGS National Hydrography Dataset \(NHD\)](#)
- Topography: [USGS 3D Elevation Program \(3DEP\)](#)
- Row Crop Productivity: [USDA NCCPI v3.0](#)
- Species Richness: [USGS Gap Analysis Project \(GAP\)](#)
- Protected Areas: [USGS Protected Areas Database \(PAD-US\)](#)
- Crop Suitability: [Savanna Institute](#)
- Agroforestry Opportunities: [Savanna Institute](#)
- Soils: [USDA National Soil Survey Geographic Database \(gNATSGO\)](#)
- Climate: [PRISM Climate Group](#); [NASA POWER](#); [IL State Climatologist](#)
- Irrigation Frequency: [Xie and Lark 2021](#)
- Tile Drainage: [Valayamkunnath et al. 2020](#)

How do I utilize the included supplementary data files?

This report comes with two supplementary data files, which are available in your account on [CanopyCompass.com](#).

The included KML file contains basic spatial data shown in this report, such as the outline of your field and crop suitability zones. This file can be opened on your computer using Google Earth Pro, which can be downloaded [HERE](#).

The included ZIP file holds an array of advanced data files (e.g. TIF, GPKG) that contain comprehensive spatial data shown in this report. These files are most often provided to technical consultants for use in GIS software.

Where can I purchase plants for the crops evaluated in this report?

Canopy's [in-house nursery](#) is a great place to start. We produce the highest quality genetics across a range of permanent crops. Our bare-root trees and shrubs can be shipped across the US. If we don't grow a particular crop, we will connect you with a trusted partner that does!

About Canopy

Canopy plants and manages tree crops, timber plantings, conservation practices, and integrated agroforestry systems. In addition to our home offices in the Midwest, we are connected to regional experts across the US.

We help farmers and landowners via:

- **Our expert team** of agronomists, scientists, and business specialists
- **Thoughtful design** using state-of-the-art spatial analysis and mapping
- **Top tree genetics** across a range of species, from our [in-house nursery](#)
- **Precision tree establishment** enabling trees to survive and thrive
- **A mobile equipment fleet**, custom-engineered for precision management
- **Opportunity and impact mapping** at any scale across the US



What's Next?

Have you identified promising new crops or practices for your land? Are you ready to dig deeper? Do you have more questions? No problem! Click the 'Ask an Expert' button below.

We'll set you up with a **free** intake call and then connect you with one of our regional experts to help you interpret this report, evaluate options, validate soil data, and source plants. We may even be able to help you design, establish, and manage your project.

Do you have other fields that you would like to analyze? Go back to [Canopy Compass](#) to draw new fields and generate additional reports.



This report was created using Canopy Compass version 0.5.0-0.4.1-0.4.8.



Give your farm
a second story.