Parcel-Scale Wildlife Habitat Suitability & Connectivity Assessment

Multi-Species Screening Analysis

Prepared by: **Touch of Green Environmental GIS**, **2026**
Location: **Leased 11-acre Parcel near La Plata, Missouri**
Scale: **Parcel-level, ecological screening analysis**

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1. Purpose of Analysis

This analysis evaluates relative wildlife habitat suitability and movement potential across a leased 11-acre parcel in northern Missouri using raster-based spatial modeling techniques. The objective is to identify areas most suitable for:

- Pollinator habitat

- Ground-nesting bird habitat

- Small mammal movement and connectivity

The analysis is intended as a screening-level ecological assessment to support land management planning, habitat enhancement decisions, and conservation prioritization at the parcel scale.

This assessment does not replace formal wildlife surveys, species-specific habitat studies, or regulatory biological assessments.

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2. Study Area & Data Overview

2.1 Study Area Definition

The study area consists of an approximately 11-acre leased parcel adjacent to mixed woodland, pasture, and low-intensity development. The parcel boundary was digitized manually based on lease extents and aerial imagery. The leased area does not follow a simple rectangular geometry.

All analyses were constrained to this leased area to ensure results reflect conditions relevant to management decisions.

Figure 1. Digitized leased parcel boundary (AOI) overlaid on high-resolution aerial imagery near La Plata, Missouri.

2.2 Data Sources

Primary datasets used in this analysis include:

- **NLCD 2021 Land Cover Raster**

    o   Spatial resolution: 30 meters

    o   Used for habitat classification and cost surface development

- **USGS 3DEP Digital Elevation Model**

    o   Spatial resolution: 30 meters

    o   Used for slope-based planting and habitat suitability screening

- **OpenStreetMap Roads**

- o Used to model human disturbance proximity

- **Derived layers**

  - o Distance to forest edge

  - o Distance to roads

  - o Slope raster

  - o Species-specific suitability and cost surfaces

All datasets were projected into a common UTM coordinate system and aligned using consistent raster snapping and cell size to ensure analytical integrity.

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3. Analytical Approach

3.1 Pollinator Habitat Suitability Modeling

Pollinator suitability was modeled using a multi-factor raster approach incorporating:

- Land cover–based suitability

- Proximity to forest edges (edge habitat bonus)

- Slope-derived planting suitability

Land cover classes were reclassified into a relative suitability scale, emphasizing grassland and pasture as preferred habitat and forest as lower suitability. Distance to forest edges was calculated using Euclidean Distance to represent transitional habitat favored by many pollinator species.

Slope was derived from the USGS DEM and reclassified to represent practical planting feasibility rather than strict ecological limitation.

These components were combined using a weighted raster overlay to produce a continuous pollinator suitability surface.
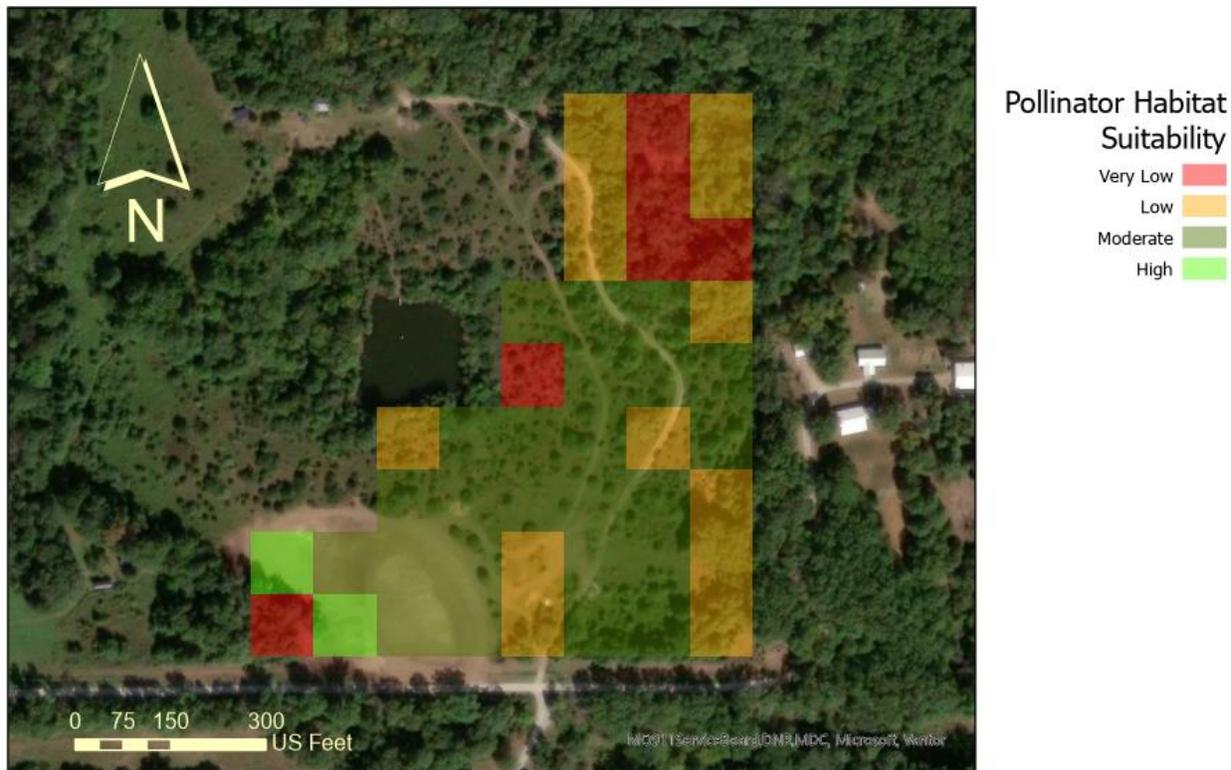
Figure 2. Pollinator habitat suitability surface derived from land cover, forest-edge proximity, and slope-based planting suitability.

3.2 Ground-Nesting Bird Habitat Suitability

Ground-nesting bird suitability was modeled with an emphasis on minimizing predation and disturbance risk. The analysis incorporated:

- Land cover suitability favoring open grassland and pasture

- Distance from forest edges to reduce predator access

- Distance from nearby roads to account for human disturbance

Because no major roads intersect the parcel, a 10-meter contextual buffer was applied around the AOI to capture adjacent road influence without introducing unrelated infrastructure.

Each factor was reclassified into a standardized suitability scale and combined using weighted raster overlay to generate a final ground-nesting bird suitability surface.
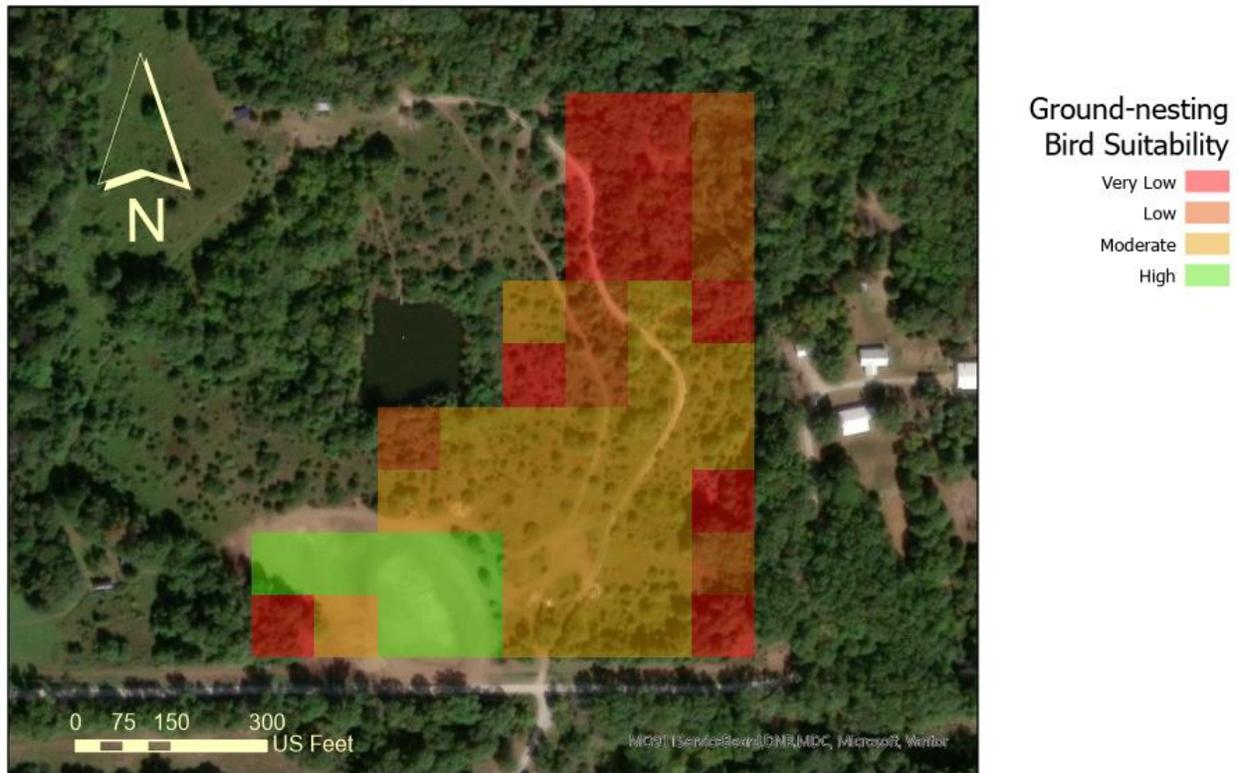
Figure 3. Ground-nesting bird suitability classification highlighting interior open areas farther from forest edges and adjacent road disturbance.

3.3 Small Mammal Corridor & Connectivity Analysis

Small mammal movement potential was assessed using a least-cost corridor approach. A land-cover-based cost surface was developed, assigning low movement cost to forested areas and higher cost to open or managed land covers.

Source and destination points were placed on opposite sides of the parcel within low-cost habitat to represent potential entry and exit zones for movement across the property. Cost Distance and Cost Path tools were used to identify the least-cost movement route.

The resulting least-cost path was converted to a polyline and buffered to represent a functional movement corridor rather than a single-pixel path.

Figure 4. Least-cost movement corridor for small mammals derived from land-cover-based cost surface and source–destination modeling.

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4. Integrated Interpretation

The three analyses reveal complementary spatial patterns:

- Pollinator suitability is highest in gently sloped open areas adjacent to forest edges

- Ground-nesting bird suitability favors interior open areas farther from forest and road influence

- Small mammal movement is concentrated along forested corridors that minimize exposure across open land

While overlap exists among suitable areas, each species group exhibits distinct spatial preferences.

5. Summary of Findings

- The parcel contains multiple areas suitable for pollinator habitat enhancement

- Ground-nesting bird habitat is limited but present in interior open zones

- A clear low-cost movement corridor for small mammals is present on the parcel

- Habitat value varies spatially depending on species-specific requirements

At a screening level, the parcel supports notable habitat potential across multiple wildlife groups.

6. Limitations & Data Resolution Considerations

6.1 Raster Resolution

All raster analyses were conducted using 30-meter resolution data. As a result:

- Fine-scale habitat features (hedgerows, small plantings, narrow trails) are not resolved

- Suitability patterns should be interpreted comparatively, not absolutely

6.2 Species Generalization

This analysis models generalized habitat preferences for broad wildlife groups. It does not represent:

- Individual species requirements

- Seasonal habitat variation

- Behavioral responses to short-term land management changes

6.3 Intended Use

Results are intended to support planning, prioritization, and communication. They are not a substitute for field-based ecological surveys or regulatory biological assessments.

7. Conclusion

This parcel-scale wildlife habitat analysis demonstrates that the 11-acre parcel supports diverse ecological functions, including pollinator habitat, ground-nesting bird potential, and small mammal connectivity.