

Badger Wind Farm Impacts Analysis and Offset Estimates

North Dakota Game and Fish Department

- Final turbine layout emailed from Sarah Aftergood, Orsetd, to Elisha Mueller, NDGF, on 2/21/2022
- 74 primary turbines, 5 alternate turbines
- Two analyses conducted by NDGF:
 - 1) NDGF assigned metrics for unbroken grassland
 - 2) the Avian Impact Offset Method for grassland birds and waterfowl

NDGF Local Grassland Assessment Desktop Product (using assigned metrics)

- Identified grassland following guidelines in *A Desktop Approach to Avoid and Minimize Development Impacts to Grassland Habitat and Wildlife in North Dakota, May 2021*.
- Created 300-meter dissolved buffer for primary turbines and separate 300-meter dissolved buffer for alternate turbines. Only land within the buffers was examined.
- GIS layers utilized for Local Scale Assessment:
 - NDGF Base Raster Grassland (2008 and 2014 products)
 - NLCD 2019
 - USDA National Cultivated Layer 2020
 - FSA Common Land Units
 - CRP 2008, 2012 and 2019
 - Aerial Imagery 2020, 2019, 2003, 1995/1998, 1957/1962
 - LiDAR Shaded Relief 1m
- 3 types of grassland were delineated:
 1. *Unbroken Grassland* – also referred to as “native prairie.” This is grassland that, according to best available spatial information, has not been converted to another land type or land cover (e.g. cropland, developed, roads).
 2. *Restored Grassland* – planted or reconstructed grassland. This typically occurs on previously cultivated land (broken prairie that was then used for crop production for several years). The most common type of restored grassland is CRP but other natural resource agencies operate grassland restoration programs.
 3. *Unspecified or Inconclusive Grassland* – may be unbroken or restored grassland, but spatial layers do not present a definitive answer.
- Results for Primary Turbines
 - **Acres of unbroken grassland impacted = 758.8**
 - **Offset acres = 402.2** (total unbroken X 53% displacement)
 - Additional acres of restored grassland impacted = 43.4 (offset = 23.0 acres)
 - Additional acres of unspecified grassland impacted = 123.5 (offset = 65.5 acres)
 - 1 turbine sited on unbroken grassland
 - 2 additional turbines sited on restored or unspecified grassland
 - 2 additional turbines within 50 feet of grassland
- Results for Alternate Turbines

- **Acres of unbroken grassland impacted = 113.2**
 - **Offset acres = 60** (total unbroken X 53% displacement)
- Additional acres of unspecified grassland impact = 39.0 (offset = 20.7)
- 1 turbine sited on unspecified grassland
- 2 additional turbines sited within 50 feet of grassland

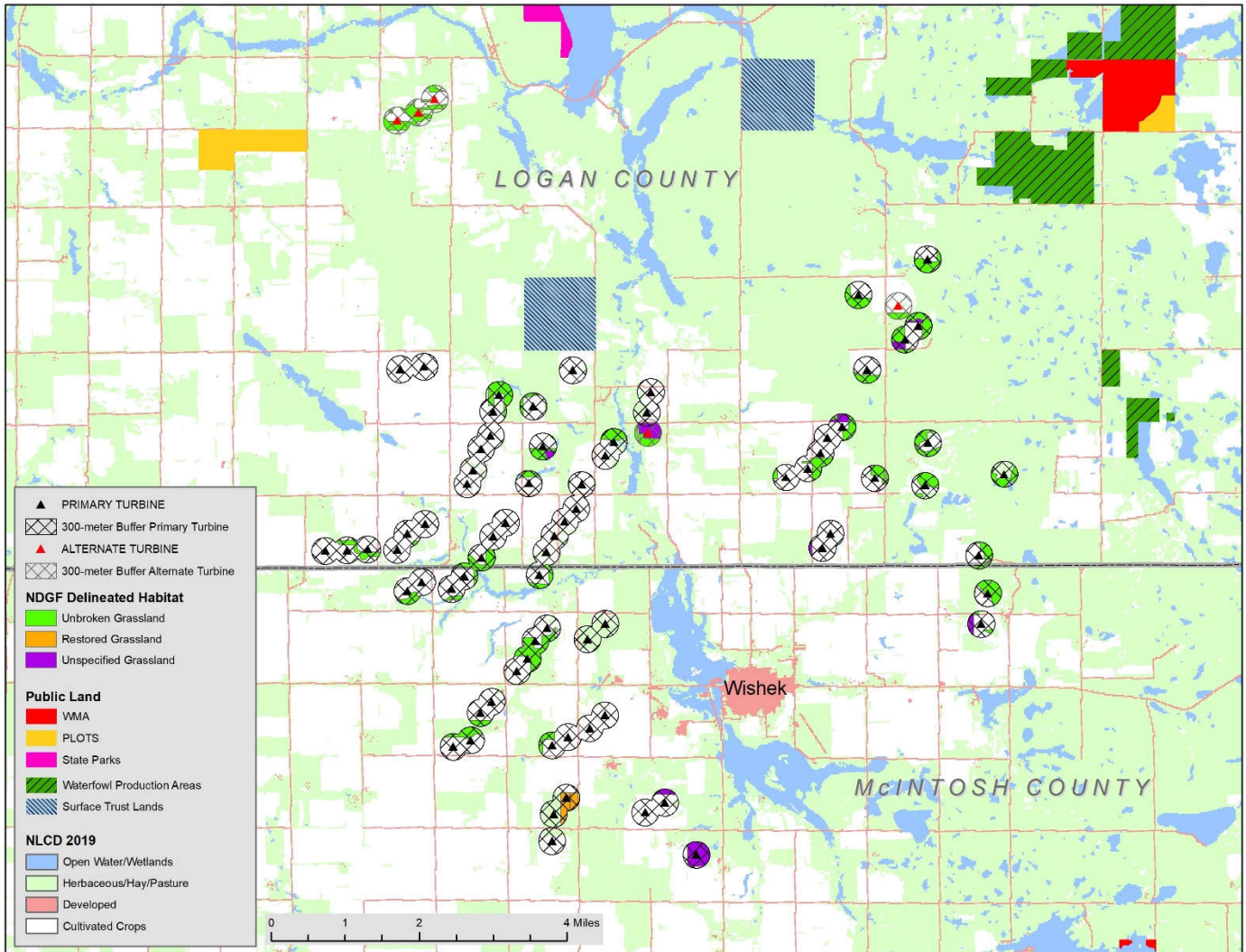


Figure 1. Results of NDGF local grassland assessment.

Avian Impact Offset Method (Shaffer et al. 2019)

Grassland Birds

- This method enables the user to estimate the amount of grassland area needed to offset breeding grassland bird avoidance.
- GIS layers and parameters utilized for Breeding Grassland Birds
 - Primary and alternate turbine locations
 - 300-meter buffer
 - Percent displacement = 53%
 - Type III GBCA (includes all grassland types)
- Results for all turbines:
 - **Acres of grassland impacted = 1,316.2**
 - **Offset acres = 697.6**

Waterfowl

- This method enables the user to estimate the number of wetland basins needed to offset breeding waterfowl avoidance.
- GIS layers and parameters utilized for Breeding Duck Pairs
 - Primary and alternate turbine locations
 - 804.5-meter buffer
 - Percent displacement = 18%
 - Breeding Duck Pair Abundance
- Results for all turbines:
 - SUM_DuckPairs5Species = 891.2
 - SUM_DuckPairsDisplaced = 160.4
 - MEAN_CountyAveragePairs2_203AcreSeasonalWetland = 4.6
 - **NumOfSeasonalWetlandsToRestore = 35**