

2017 Grassland Assessment
Emmons-Logan Wind Energy Center and 230 kV
Transmission Line
Emmons and Logan Counties, North Dakota

Final Report



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Emmons-Logan Wind, LLC

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INTRODUCTION

Emmons-Logan Wind, LLC (Emmons-Logan Wind), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC, is developing the Emmons-Logan Wind Energy Center and 230 kV Transmission Line (Project), in Emmons and Logan counties, North Dakota (Figure 1). Emmons-Logan Wind tasked Western EcoSystems Technology, Inc. (WEST) to conduct a grassland assessment, identifying unbroken (native prairie) and previously broken grasslands, to inform siting within the Project area.

PROJECT AREA

The Project area, located in Emmons and Logan counties, approximately 8 miles (mi; 13 kilometers [km]) north of the town of Linton, North Dakota (Figure 1), encompasses approximately 75,375 acres (ac; 30,503 hectares [ha]). The Project topography is flat to rolling and is within the Northwestern Glaciated Plains Level III Ecoregion, a region dominated by agricultural cropland followed closely by grassland (both unbroken and broken, including hay land; US Environmental Protection Agency 2016). Ownership within the Project area is largely private, but three areas of North Dakota State School Land are found within the Project (US Geological Survey [USGS] 2013).

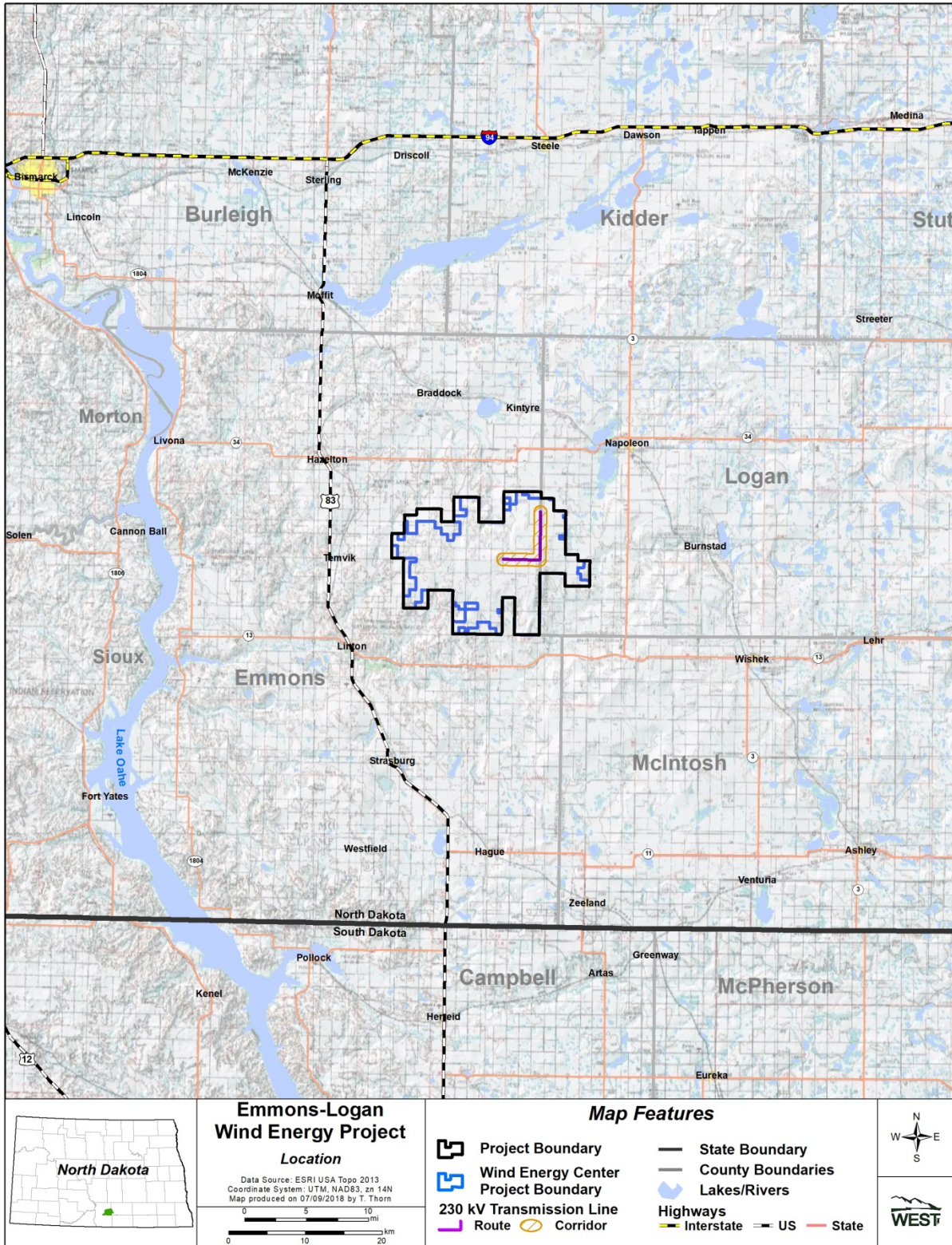


Figure 1. Location of the Emmons-Logan Wind Energy Center and 230 kV Transmission Line in Emmons and Logan counties, North Dakota.

METHODS

WEST completed a desktop review of existing land use/land cover features within the Project area using current aerial photography (US Department of Agriculture [USDA] National Agriculture Imagery Program [NAIP] 2016), existing land cover and wetland data (USGS National Land Cover Database 2011, USFWS NWI 2017), and North Dakota Game and Fish Department's (NDGFD) "Native Prairie" layer (NDGFD 2014), resulting in a digital data layer of polygons delineating grassland cover.

Once all grassland areas were identified, each grassland polygon was examined through a series of historical USDA NAIP aerial photography, ESRI imagery (larger scale/higher resolution; ESRI 2018), and North Dakota statewide historical imagery from 1957 – 1962 (USDA 2017) to determine the grassland sod type (broken or unbroken). Broken sod was identified based on features such as rock piles indicating extensive mechanized rock clearing; presence and amount or height of trees and shrubs; field edge changes; absence of scattered rocks; straight line features indicating plowing, disking, harvesting, or planting; or any other features indicating human disturbance.

Field surveys were completed to further evaluate if tracts of grassland were broken or unbroken. Grassland areas were assessed on foot where access was permitted, from roadsides where access was not permitted, or a combination of both if a grassland included areas with and without access. Sod was considered broken if rock piles or tillage lines were present. Areas within grasslands that appeared different than the surrounding area were delineated on a map, identified as broken or unbroken sod, and digitized by a GIS specialist at a later date. At each grassland area, notes were taken on the dominant grass type (native versus introduced), forb species present, and grazing status. Multiple photographs were taken to document the condition of the grassland area. The priority for the field surveys was larger blocks of continuous grassland and fine scale mapping was not completed during the field survey.

Upon completion of field surveys, field survey data were again compared to the NDGFD's "Native Prairie" layer, and those digitized grasslands with sod type not matching NDGFD's determination were re-examined to further evaluate sod type. WEST also coordinated with consultants from AECOM to agree upon grassland sod type where AECOM's turbine micro-siting assessment and WEST's assessment were inconsistent. Figures and tables included herein reflect these small micro-siting assessments.

RESULTS

The Project consists of approximately 30,479.7 ac (12,334.7 ha; 40.4%) of potential grassland, of which field survey types varied based on survey permission, accessibility, etc. (Table 1; Figure 2). Table 2 categorizes grassland sod type by percentage of total grassland (Figure 3) and by percentage in the Project.

Table 1. Summary of grassland acres by field survey type during surveys conducted by WEST with micro-siting adjustments from AECOM in 2017 at the Emmons-Logan Wind Energy Center and 230 kV Transmission Line, in Emmons and Logan counties, North Dakota.

Survey Type	Acres of Grassland	% of Total
Walk-in	21,611.5	70.9
Roadside	5,378.8	17.6
No survey	2,731.6	9.0
Walk-in and roadside	757.9	2.5
Total	30,479.7	100

Table 2. Summary of grassland acres by sod type during surveys conducted by WEST with micro-siting adjustments from AECOM in 2017 at the Emmons-Logan Wind Energy Center and 230 kV Transmission Line, in Emmons and Logan counties, North Dakota.

Sod Type	Acres of Grassland	% of Total Grassland	% of Project
Unbroken	22,340.5	73.3	29.6
Broken	8,139.2	26.7	10.8
Total	30,479.7	100	40.4

Geospatial Data

Two shapefiles were created as a result of the grassland assessment to describe grassland polygons that were surveyed and polygons that were not field surveyed (Table 3). Attribute data associated with each polygon are described in Table 2.

Table 3. Titles and definitions of column attributes on shapefiles created for fields surveyed and not surveyed. Shapefiles were based on desktop review and field surveys conducted in 2017 at the Emmons-Logan Wind Energy Center and 230 kV Transmission Line, in Emmons and Logan Counties, North Dakota.

Attribute Column Name	Definition
Field Surveyed File: EL_WEST_Ic_grassland_12152017	
Type	Polygon land use/cover type; all areas labeled grassland
Acres	Total acres included in the grassland polygon
Sod_Type	Grassland sod type (unbroken or broken) identified during field surveys and desktop analysis
ImpactType	Grassland disturbance type identified as tilled (farmed) or untilled during desktop analysis
Not Surveyed File: EL_grassland_NOTfieldsurveyed_08152017	
Acres	Total acres included in the grassland polygon
Tillage	Grassland disturbance type identified as tilled (farmed) or untilled during desktop analysis
Habtype	Polygon land cover type; all areas labeled unknown after desktop analysis

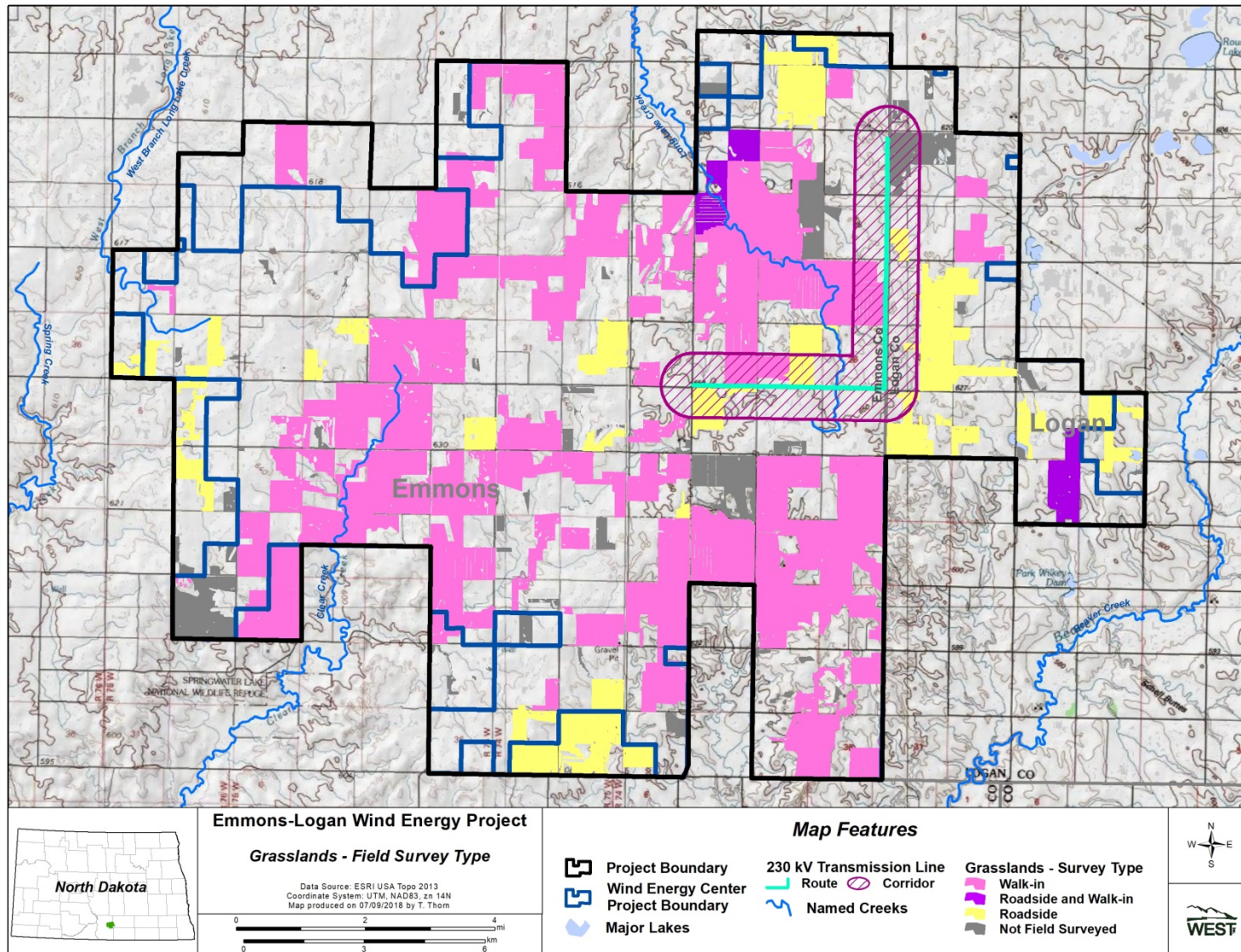


Figure 2. Survey types for grassland areas at the Emmons-Logan Wind Energy Center and 230 kV Transmission Line in Emmons and Logan counties, North Dakota.

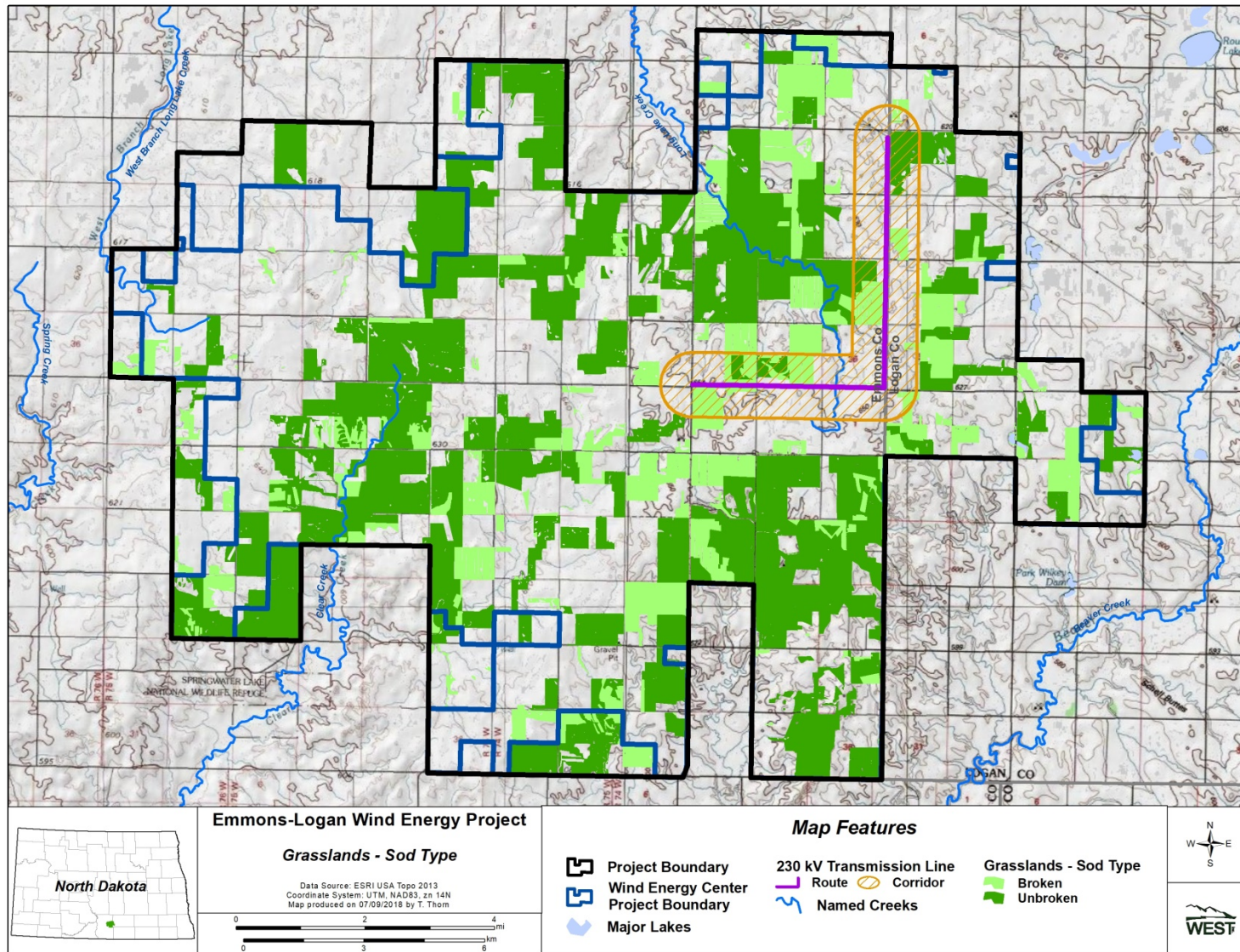


Figure 3. Grassland sod type within grassland areas at the Emmons-Logan Wind Energy Center and 230 kV Transmission Line in Emmons and Logan counties, North Dakota.

REFERENCES

- ESRI. 2018. World Imagery and Aerial Photos. ArcGIS Resource Center. ESRI, producers of ArcGIS software. Redlands, California. Information online: <http://www.arcgis.com/home/webmap/viewer.html?useExisting=1>
- North American Datum (NAD). 1983. Nad83 Geodetic Datum.
- North Dakota Game and Fish Department (NDGFD). 2014. Native Grassland Conservation Areas. April 4, 2014. Available online: http://ndgishub.nd.gov/ArcGIS/rest/services/Applications/GNF_SpeciesRangeAndHabitats/MapServer
- US Department of Agriculture (USDA) National Agriculture Imagery Program (NAIP). 2016. Arcgis Naip Imagery Digital Orthophoto Quarter Quads (Doqq): North Dakota. Updated February 1, 2017. Available online: <https://nracs.app.box.com/v/naip/folder/18145523608>; Information online: <http://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/naip-imagery/>
- US Department of Agriculture (USDA). 2017. North Dakota GIS Hub Data Portal. FSA Aerial Photography 1957-1962. December 12, 2017. Information Online: <https://gishubdata.nd.gov/dataset/fsa-aerial-photography-1957-1962>
- US Environmental Protection Agency (USEPA). 2016. Level Iii and Level Iv Ecoregions of the Continental United States. Last updated on March 22, 2016. Available online at: <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>
- US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI). 2017. Seamless Wetlands Data by State. Geodatabase and Shapefile data. National Wetlands Inventory website, Washington, D. C. Last updated September 2017. Information online: <http://www.fws.gov/wetlands/data/State-Downloads.html>
- US Geological Survey (USGS). 2013. Protected Areas Database of the United States (Pad-Us) Data Download. USGS Gap Analysis Program Protected Areas Viewer. Webpage last modified January 30, 2013. Download available online at: <http://gapanalysis.usgs.gov/padus/download/>
- US Geological Survey (USGS) National Land Cover Database (NLCD). 2011. National Land Cover Database 2011 (Nlcd 2011). Multi-Resolution Land Characteristics Consortium (MRLC), National Land Cover Database (NLCD). USGS Earth Resources Observation and Science (EROS) Center, Sioux Falls, South Dakota. Available online: <http://www.mrlc.gov/nlcd2011.php>; Legend: http://www.mrlc.gov/nlcd11_leg.php
- USA Topo. 2013. USA Topo Maps. US Geological Survey (USGS) topographical maps for the United States. ArcGIS. ESRI, producers of ArcGIS software. Redlands, California.