Woodland Stewardship Plan
Long Term Management for Habitat
Little Sioux Wildlife Management Unit

Prepared for:
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Edit: May 31, 2017
Edit: November 22, 2017
Edit: January 26, 2018
Edit: February 12, 2018
Edit: March 15, 2018

NRCS Natural Resources Conservation Service

LEGAL LOCATION: T95N, R36W, Gillett Grove township, Clay County, portions of Sections 1, 2, 11, 12, 13, 14, 23, and 24.

TOTAL ACRES OF PLAN: 662
TOTAL FORESTED ACRES: about 295

Which watershed is the property located in: Little Sioux River.

LANDOWNER'S OBJECTIVES: Wildlife Habitat
FIRST PRIORITY: Increasing native prairie and restoring upland oak savanna/open oak woodland
SECOND PRIORITY: Restore diverse herbaceous layers to promote wildlife diversity and health
THIRD PRIORITY: Promote bur oak regeneration
FOURTH PRIORITY: Improve mast production
FIFTH PRIORITY: Reduce invasive species

DESCRIPTION OF WOODLAND, LAND FEATURES, RARE, THREATENED, AND ENDANGERED SPECIES:

Woodland:
Woodlands on the east and west facing slopes of the area tend to be relatively divergent in their species composition. West facing slopes are dominated by a prairie and savanna complex, with open grown "wolf" bur oak trees being the dominant canopy. East facing slopes are cooler and more moist, tending to have converted to closed canopy oak woodlands with the typical associated tree species. With the reintroduction of sunlight and fire to both aspects, a healthy and robust herbaceous layer can be revitalized. Woodlands along the floodplain are typical of floodplain timber. The dominant tree species is silver maple, with associated cottonwood, green ash, willow, hackberry, and others. A few "wolf" bur oak trees are still found on the floodplain on small ridges. Herbaceous cover, if any, is limited to reed canary grass with small areas of prairie cordgrass and other floodplain prairie/sedge meadow species.

Land Features:
This property is located along the Little Sioux River in Clay County. The river valley is steeply dissected, cutting very abruptly from the flat to gently rolling plains above. Soils are poor to very poor on the slopes, with the parent material generally consisting of a combination of loess and glacial till. With the steep topography and variation in aspect, many microclimates exist along the valley. With that, also comes erosion issues from past land uses and abuse. The river itself is meandered, and deeply entrenched within the floodplain. There are several shelves within the floodplain, allowing for variation in the species of trees that are supported. Flooding is frequent on the river, with significant events happening regularly. Historically, the valley would have been dominated by prairie and savanna ecosystems, with small areas of true forest hanging on in fire shadow areas and on steep north facing slopes.

T&E/SGCN:
For a complete list of State and Federally-listed Threatened and Endangered Species that may be impacted by activity on this WMA, please see Appendix C. There are two documented upland T/E species and one species proposed for listing found within the vicinity of the Little Sioux WMA.

Lespedeza leptostachya (prairie bush clover) is found in several small populations on two tracts within the WMA. This species is typical of north facing, very rocky prairies with little historical disturbance.

Speyeria idalia (regal fritillary) is also found in the area, though on private land near the WMA. This species is dependent on Viola petatifida (prairie violet) as a larval host plant. Regal fritillaries are reliant on high-quality native prairies with adequate nectar resources. Prescribed fire can reduce site-level abundance in the first year after a fire but that impact is short-lived. Prescribed fire has been demonstrated to maintain beneficial Regal fritillary habitat and invigorate hostplant and nectar resources.

Myotis septentrionalis (northern long-eared bat) is also a potential inhabitant of the forested portions of the WMA along the river system. Requirements are now in place regarding timber harvest activities in areas that potentially host nursery

trees for this species. For complete requirements, see Appendix D. All precautions should be taken to ensure that these species are not detrimentally affected by timber management on the WMA.

Before implementation, the forest management activities described here will be reviewed internally to determine potential impacts to both State and Federal threatened or endangered species. Project descriptions accompanied by aerial photos will be provided to the Natural Areas Inventory Program staff for T&E review and comment. Management activities will not be initiated until this review has been completed and all T&E comments/concerns have been addressed.

For a list of SGCN that may be affected by activity on this WMA, please see Appendix J. There are no regulatory requirements associated with the presence of these species; the information is provided as it might be useful in understanding which species may benefit from woodland management activities and which might warrant consideration to avoid negative impacts from management.

Enhancement and Protection
Adjacent stand or ownerships: all surrounding land is privately owned.
Recreation: this is a public hunting area and fishing access.
Access: two county roads give access on the east and west sides, and at the north end.
Soil protection: while in private ownership, hillside woodlands were overgrazed by cattle, resulting in high amounts of soil loss exposing oak root systems.
Streams, wetlands, ponds, and lake shore: the Little Sioux River cuts the management unit in half.
Effects of natural disasters: only annual flooding is known, resulting in deep deposits of river silt and sand over the channeled clay soil type.
Fish and wildlife: public access for both.
Protection from pests: unknown history.
Prescribed Fire/Burns: prescribed fire has been carried out by DNR staff to maintain prairie remnants, and has recently been reintroduced to the savanna restoration areas.
Constraints: available work time and money.
SITE/STAND DESCRIPTIONS AND RECOMMENDATIONS: (See attached photo-map for site locations)

STAND ONE 185 Acres
Current conditions:
Smaller sites within Stand 1 include flood plain, abandoned railroad right of way, and remnant native prairie hillsides facing due west.

Objective:
The area will be managed as an open grassland community using a combination of remnant prairie restoration, diverse prairie reconstruction, and green browse/crop food plots.

Recommendations. None given.

STAND TWO 48.7 Acres
Current conditions:
A river flood plain with mature and over-mature Silver maples and associated hardwood tree species. The site floods almost annually bringing in new deposits of river silts and sand. The major soil type is Colo Silty Clay loam 133 or 1133. Current ground cover is reed canary grass with some smooth brome grass, native rye grass, weeds, and some bare ground. Old river oxbows and river channels run throughout the site. Maple trees provide a limited food source because not all trees flower and set seeds, annually. The maple trees do provide den space for mammals and songbirds. Crown closure for the most part is complete, letting in limited sunlight. Where over-mature trees die out, small openings are formed permitting sunlight to directly reach the ground.

Objective:
Since the site is NOT flat, high areas may be good sites for converting parts of the bottomland to swamp white or bur oak and mast production. Periodic timber harvests, removing silver maple, green ash, cottonwood, and willow will provide openings for tree planting. Planted trees must have well-developed root systems because they are required to compete with the reed canary grass, weeds and annual flooding. Plant stock must also be tall enough to keep its crown above annual flood water. Stock with minimum 3/8" caliper, minimum 24" height, and minimum 3 large lateral roots are recommended.

Recommendations:
Start uneven aged management on this unit, in conjunction with stand 3. Up to 25% of the total area in stands 2 and 3 (37.5 acres) are to be harvested every 5 years, giving a stand rotation of 20 years. Begin in 2014 to 2016 by carrying out a salvage timber harvest of the mature and over-mature silver maple trees, 18 inches diameter and larger. 16-inch diameter maples may be ready for harvest in five years. Also, harvest any declining green ash if a wood market exists for ash. If a winter harvest is held, plant trees the next spring with minimal site preparation, if any at all. Ideal planting rate for swamp white and bur oak is 20 per acre, with 35 per acre at the most. Plant oaks in tops of logged trees to reduce deer browse and to reduce maintenance by staff. Monitor oaks every other year and remove competing woody regrowth within an area twice the height of the tree away. Use girdle and treat or drop and treat methods.

STAND THREE 92.3 Acres
Current conditions:
A river flood plain with mature and over-mature silver maples and associated hardwood tree species. The site floods almost annually bringing in new deposits of river silts and sand. The major soil type is Colo Silty Clay loam 133 or 1133. Current ground cover is reed canary grass with some smooth brome grass, native rye grass, weeds, and some bare ground. Old river oxbows and river channels run throughout the site. Maple trees provide a limited food source because not all trees flower and set seeds, annually. The maple trees do provide den space for mammals and songbirds. Crown closure for the most part is complete, letting in limited sunlight. Where over-mature trees die out, small openings are formed permitting sunlight to directly reach the ground.

Objective:
Since the site is NOT flat, high areas may be good sites for converting parts of the bottomland to swamp white or bur oak and mast production. Periodic timber harvests, removing silver maple, green ash, and willow will provide openings for tree planting. Planted trees must have well-developed root systems because they are required to compete with the reed canary grass, weeds and annual flooding. Plant stock must also be tall enough to keep its crown above annual flood water. Stock with minimum 3/8" caliper, minimum 24" height, and minimum 3 large lateral roots are recommended

Recommendations:
Start uneven aged management on this unit, in conjunction with stand 2. Up to 25% of the total area in stands 2 and 3 (37.5 acres) are to be harvested every 5 years, giving a stand rotation of 20 years. Begin in 2014 to 2016 by carrying out a salvage timber harvest of the mature and over-mature silver maple trees, 18 inches diameter and larger. 16-inch diameter maples may be ready for harvest in five years. Also, harvest any declining green ash if a wood market exists for ash. If a winter harvest is held, plant trees the next spring with minimal site preparation, if any at all. Ideal planting rate for swamp white and bur oak is 20 per acre, with 35 per acre at the most. Plant oaks in tops of logged trees to reduce deer browse and to reduce maintenance by staff. Monitor oaks every other year and remove competing woody regrowth within an area twice the height of the tree away. Use girdle and treat or drop and treat methods.

STAND FOUR 21.2 Acres
Current conditions:
Stand four is two separate parcels which touch in one corner. They are above Stand 9. The north parcel is 6.7 acres and includes an upland food plot of an annual crop. The south parcel is 14.5 acres of remnant native prairie, weeds, and other grasses.

Objective:
Replant the food plot annually regardless of other food sources nearby. Restore the remnant prairie using prescribed fire.

Recommendations:
Planning and work is carried out by unit staff.

STAND FIVE 158.4 Acres
Current conditions:
50% of the bottomland site is open grassland which is harvested annually in one cutting. Scattered trees, old-growth bur oak wolf trees, and over-mature silver maple and green ash compete with the grasses. There are groups of younger silver maple trees the size of telephone poles which are not ready for harvest (for the most part). The entire stand is flooded during high water events, with seasonal wetlands/oxbows holding water into the summer. The lowest portions of the floodplain are flooded more often and for longer duration than higher shelves and ridges.

Objective:
Maintain and expand the riverine grassland community using thinning, logging, haying, and fire.

Recommendations:
Current grass contracts are handled by the resident biologist. Wolf trees are left in place unless they become hazardous to people and machinery. The large pockets of pole-size silver maple trees can be thinned to promote grass browse for wildlife. Or, the maple pockets can be thinned and managed as future timber crops. This decision is left with the biologist.

STAND SIX 13.3 Acres
Current conditions:
An old crop field and adjacent pasture that were planted to wildlife cover and abandoned. Rows of cedar trees and brush, and a switchgrass cultivar were established, allowed to spread unchecked, and invaded adjacent timber and pasture areas. Ash, elm, mulberry, and cedar are the most prevalent main canopy species with thick areas of honeysuckle and buckthorn composing the 'mid' and 'under' stories. There are a few bur oak and black walnut saplings present, though not in great numbers. Lack of normal maintenance and fire has produced the existing conditions.

Objective:
Remove invasive species. Remove cedar rows and brush rows. Use common prairie reconstruction practices to reconstruct a diverse prairie on the old crop areas. Use prairie restoration practices on the abandoned pasture ground to restore any remnant prairie still present in the area.

Recommendations:
Identify all bur oak seedlings present in the area, and protect them. Start removal of tree/shrub rows, and remove all invasive species present. Utilize a contractor to remove all non-oak woody material from the former pasture ground. Reintroduce fire to the pasture portion as soon as possible, and use often to maintain an open prairie habitat. After cedar/brush removal is completed on the crop portion, utilize a farm lease to prep the site for prairie reconstruction.

STAND SEVEN 55.5 Acres
Current conditions:
A current Timber Stand Improvement contract is in place for 14 acres of this stand in the north portion, north of the access road. The site faces due east. It is classic oak/hickory with other hardwood trees including black walnut, elms, and ironwood. Many of the elm trees have regrown since the 1960's when Dutch Elm Disease was very common in Iowa. The middle portion is a recent acquisition (2013) and has a recent grazing history. With grazing, an understory of undesirable trees was not allowed to develop, leaving the area relatively open and grassy. Fire was reintroduced to the site in the spring of 2013. The south portion is mature oak/hickory timber which contains several mature black walnut trees.

Objective:
Manage for oak savanna/open oak woodland.

Recommendations:
Nearly the entire understory of brush and trees are to be removed because the site can be managed as oak/hickory savanna/woodland**.** The following tree species are being removed or fallen on site: mulberry, ironwood, all elms, basswood, hackberry, honey locust, and poor quality bur oak. Also remove or cut-down, buckthorn and all exotic honeysuckles. Leave black walnut in low/wet areas, and black cherry when present. Use timber harvest to remove undesirable but marketable timber.

This stand is divided into three segments, north, middle and south. Details are covered in Appendix G.

STAND EIGHT 21.9 Acres
Current conditions:
Cropland and small food plot away from adjacent homes.

Objective:
To stay cropland and small food plot or convert into a diverse prairie or oak savanna reconstruction.

Recommendations:
Managed by Unit staff

STAND NINE 53.1 Acres
Current conditions:
The west-facing site is deeply cut by side drainages formed by water. Native vegetation was tall grass prairie and Bur oak trees. Glacial till parent material can be seen on the soil surface as large rocks or boulders. Erosion exposed these rocks over many years when used as livestock pasture.

Objective:
Restore oak savanna with native prairie.

Recommendations:
This site is actively managed by the unit biologist using a plan written in October 25, 2012. See Appendix H for Stand details. See Appendix I for a species inventory for the site.

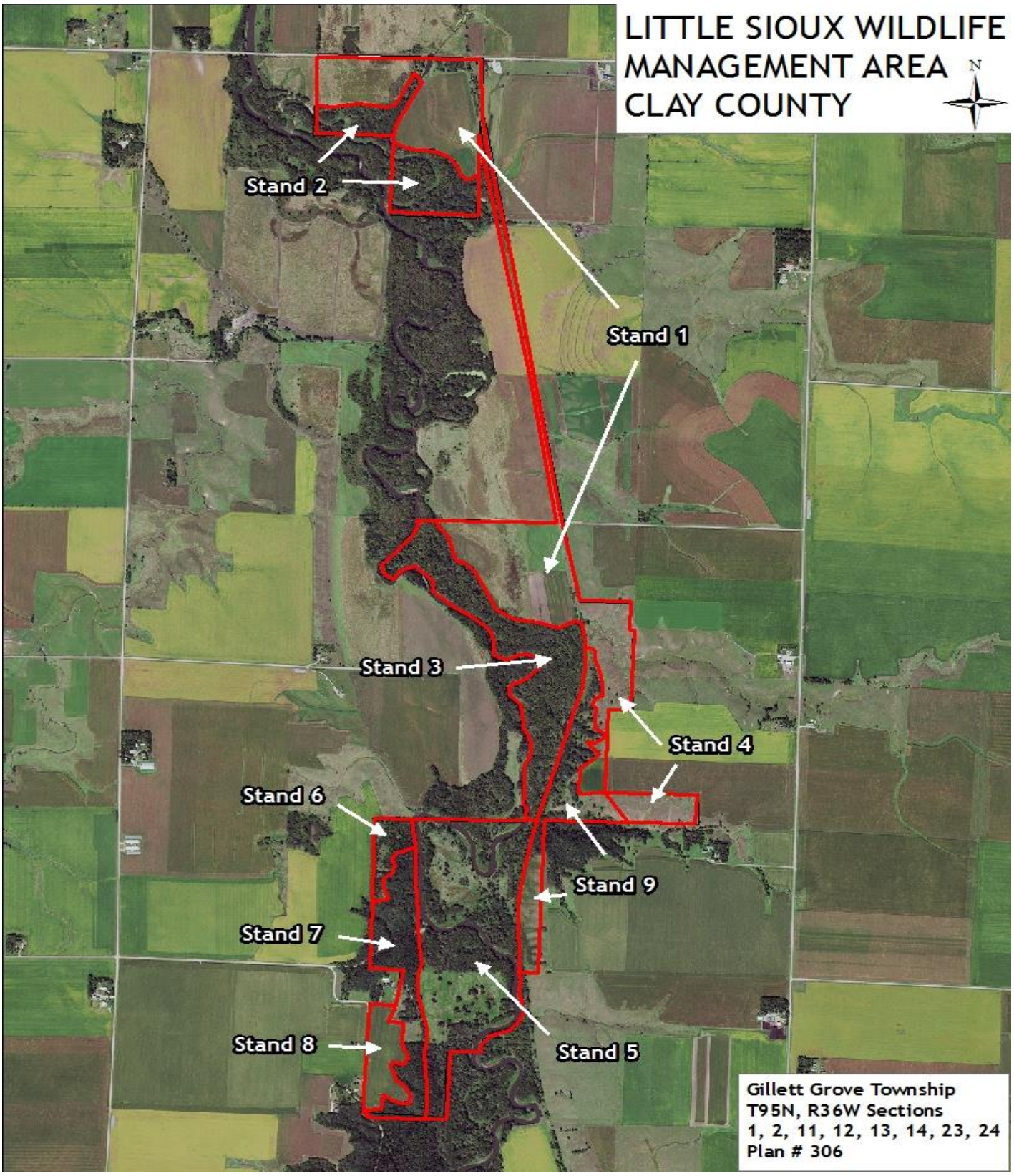
ADDITIONAL CONSIDERATIONS

FIRE PROTECTION:
None needed. On all stands, fire will be an integral part of managing and maintaining the prairie, savanna, and woodland ecosystems. Oaks, and to some degree hickories, are tolerant of fire. Oaks are even considered fire dependent species, requiring the thinning effects of fire to allow enough sunlight to reach the ground for seedlings to grow. Fire return intervals for the upland sites will be a 2 to 5 year rotation, depending on fuel conditions and fire objectives. Fire return intervals on the bottomland timber will be 2 to 10 years, as fuel loading and conditions allow. The objective of the fire program on this Complex will be to maintain diverse and healthy herbaceous cover, as well as to promote oak regeneration while suppressing undesirable woody vegetation. Protection of select oak saplings may be required to ensure sufficient recruitment.

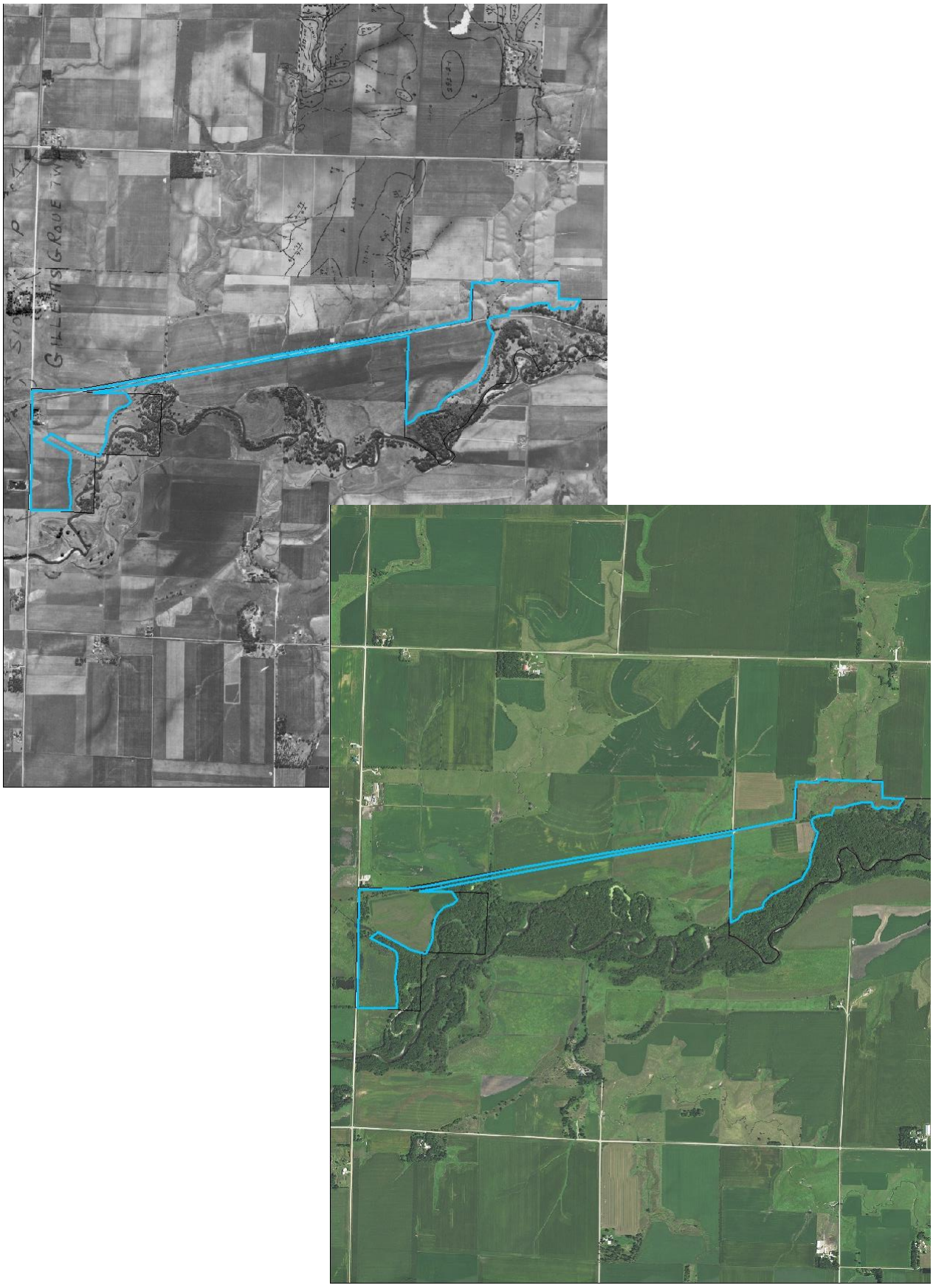
ANIMAL PROTECTION:
Conservation grazing on this property is ongoing. Prescribed goat grazing has been used, and will continue to be used in the future to aide in undesirable brush control on areas too steep for mechanical or manual control, as well as in areas where fire is insufficient and chemical would be a detriment to the native desirable flora. In the future, in response to vegetation diversity and habitat conditions, and the desired response by wildlife, the Prairie Lakes Wildlife Unit Staff reserves the right to use conservation grazing utilizing cattle. A grazing plan will be written at that time to specify AU's

that are acceptable and will reach desired objectives, without adversely affecting the existing tree cover, whether through compaction, tree base damage, erosion, etc. Conservation grazing, when done correctly, is an integral tool to maintain diverse and healthy prairie and savanna ecosystems. This subject will be revisited in 5 years.

APPENDIX A: STAND MAP OF LITTLE SIOUX WMA



APPENDIX B-1: STAND 1 - HISTORICAL (1930'S) AND PRESENT (2015)



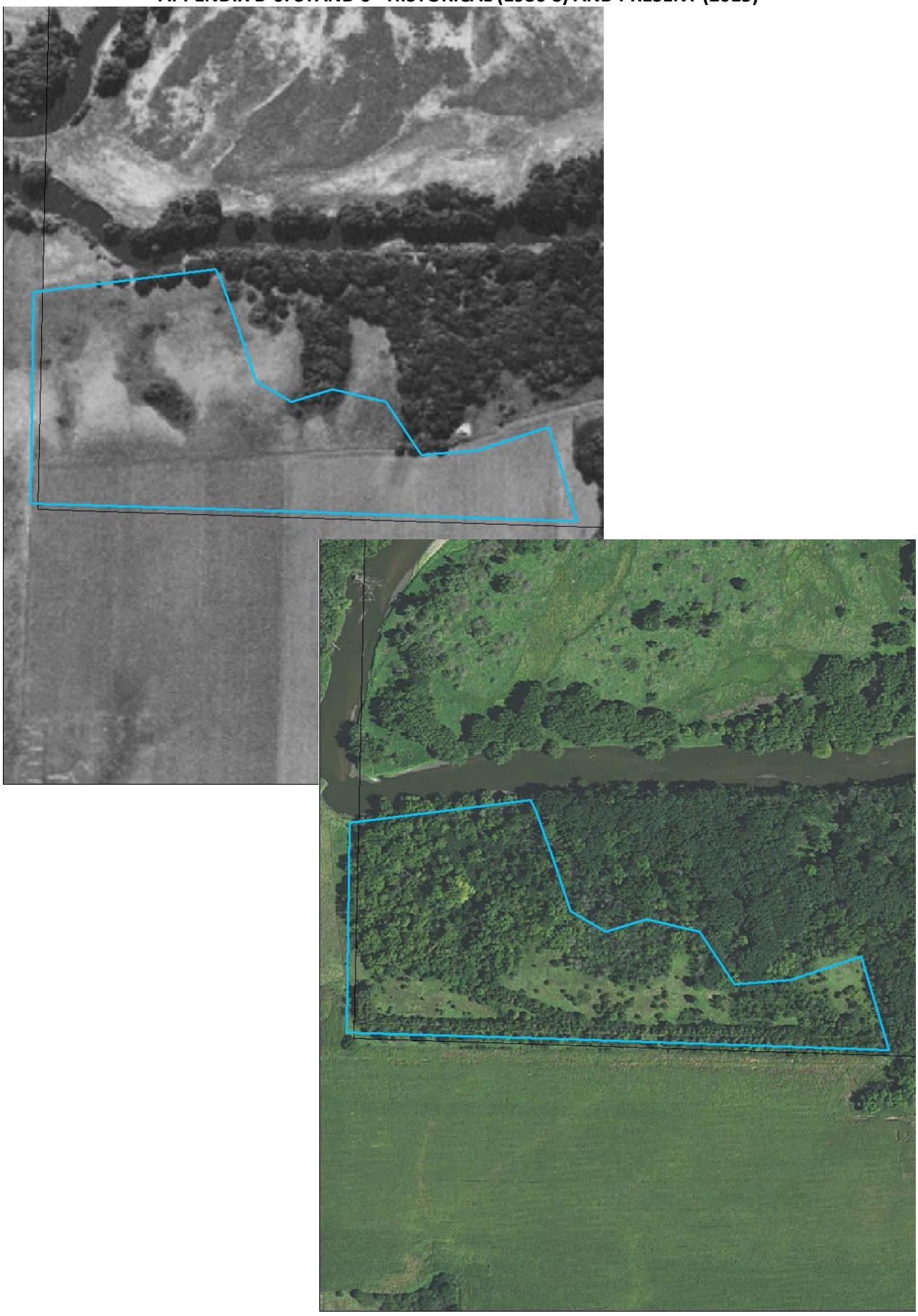
APPENDIX B-2: STAND 2 - HISTORICAL (1930'S) AND PRESENT (2015)

APPENDIX B-3: STAND 3 - HISTORICAL (1930'S) AND PRESENT (2015)

APPENDIX B-4: STAND 4 - HISTORICAL (1930'S) AND PRESENT (2015)

APPENDIX B-5: STAND 5 - HISTORICAL (1930'S) AND PRESENT (2015)

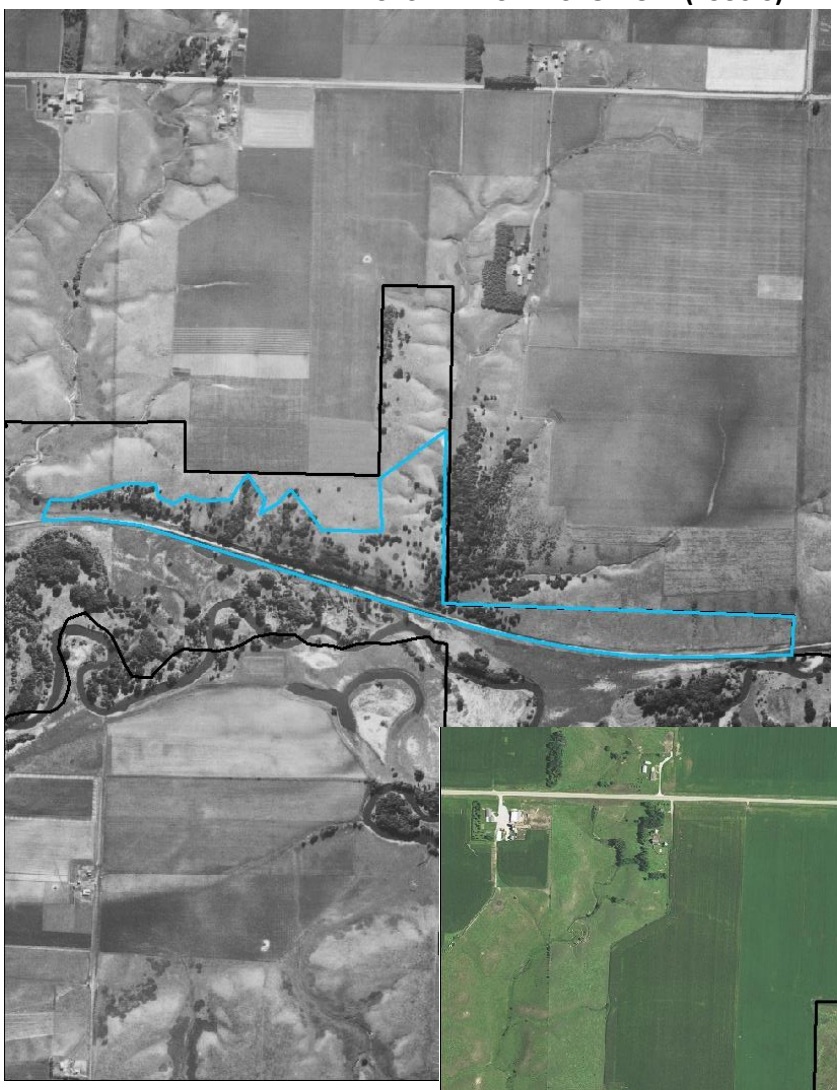
APPENDIX B-6: STAND 6 - HISTORICAL (1930'S) AND PRESENT (2015)

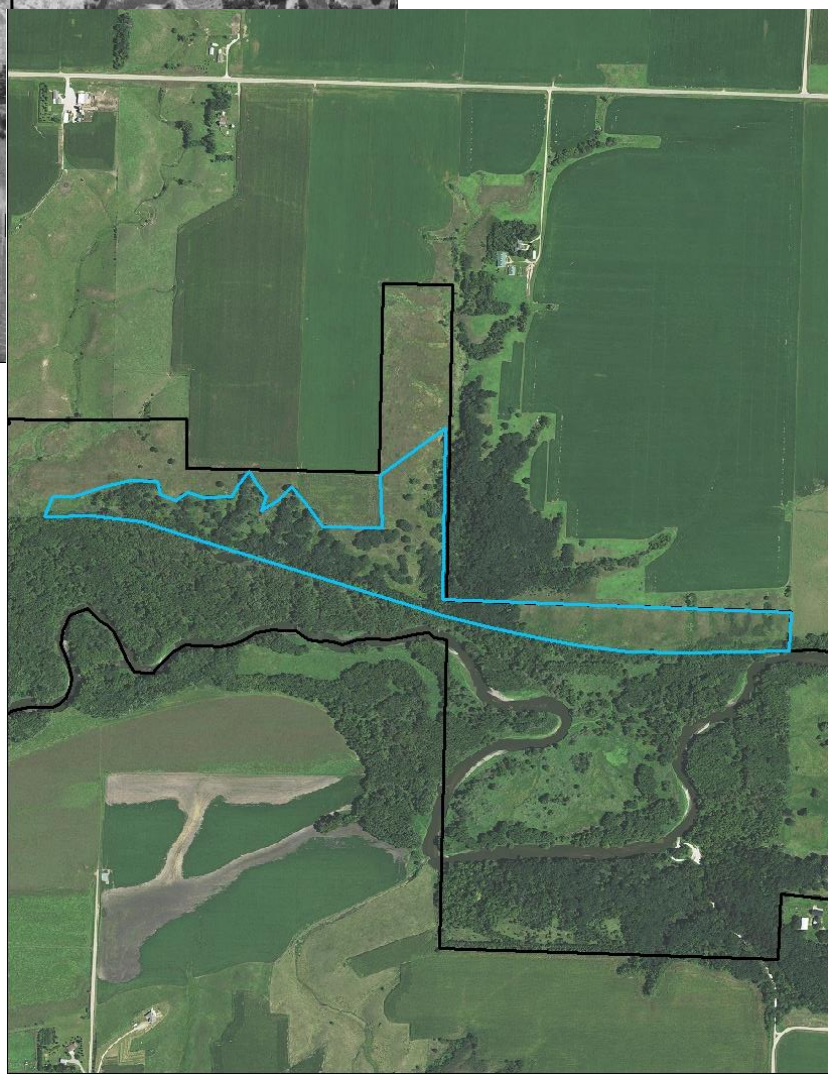


APPENDIX B-7: STAND 7 - HISTORICAL (1930'S) AND PRESENT (2015)

APPENDIX B-8: STAND 8 - HISTORICAL (1930'S) AND PRESENT (2015)

APPENDIX B-9: STAND 9 - HISTORICAL (1930'S) AND PRESENT (2015)





APPENDIX C: ENDANGERED, THREATENED, AND SPECIAL CONCERN SPECIES FROM CLAY COUNTY IOWA AS OF 2/12/2018

Common Name	Scientific Name	Class	State Status	Federal Status
Northern Long-eared bat	Myotis septentrionalis	Mammals	S	T
Bald Eagle	Haliaeetus leucocephalus	Birds	S	
Black Tern	Chlidonias niger	Birds	S	
Forster's Tern	Sterna forsteri	Birds	S	
King Rail	Rallus elegans	Birds	E	
Northern Harrier	Circus cyaneus	Birds	E	
Blacknose Shiner	Notropis heterolepis	Fish	T	
Cylindrical Papershell	Anodontoides ferussacianus	Freshwater Mussels	T	
Arogos Skipper	Atrytone arogos	Insects	S	
Broad-winged Skipper	Poanes viator	Insects	S	
Mulberry Wing	Poanes massasoit	Insects	T	
Regal Fritillary	Speyeria idalia	Insects	S	
Blue Giant Hyssop	Agastache foeniculum	Plants (Dicots)	E	
Broadleaf Water-milfoil	Myriophyllum heterophyllum	Plants (Dicots)	S	
Brook Lobelia	Lobelia kalmii	Plants (Dicots)	S	
Buckbean	Menyanthes trifoliata	Plants (Dicots)	T	
Coast-blite Goosefoot	Chenopodium rubrum	Plants (Dicots)	S	
Common Mare's-tail	Hippuris vulgaris	Plants (Dicots)	S	
Earleaf Foxglove	Tomanthera auriculata	Plants (Dicots)	S	
Fineberry Hawthorn	Crataegus chrysocarpa	Plants (Dicots)	S	
Flat Top White Aster	Aster pubentior	Plants (Dicots)	S	
Flatleaf Bladderwort	Utricularia intermedia	Plants (Dicots)	S	
Fragrant False Indigo	Amorpha nana	Plants (Dicots)	T	
Lesser Bladderwort	Utricularia minor	Plants (Dicots)	S	
Prairie Bush Clover	Lespedeza leptostachya	Plants (Dicots)	T	T
Ragwort	Senecio pseudaureus	Plants (Dicots)	S	
Shadbush	Amelanchier sanguinea	Plants (Dicots)	S	
Shining Willow	Salix lucida	Plants (Dicots)	T	
Showy Milkweed	Asclepias speciosa	Plants (Dicots)	T	
Small Fringed Gentian	Gentianopsis procera	Plants (Dicots)	S	
Water Parsnip	Berula erecta	Plants (Dicots)	T	
Western Parsley	Lomatium orientale	Plants (Dicots)	T	
White Prairie Aster	Aster falcatus	Plants (Dicots)	S	
White Water Crowfoot	Ranunculus aquatilis	Plants (Dicots)	S	
Wooly Milkweed	Asclepias lanuginosa	Plants (Dicots)	T	
Alkali Muhly	Muhlenbergia asperifolia	Plants (Monocots)	S	
Arrow Grass	Triglochin maritimum	Plants (Monocots)	T	
Beakrush	Rhynchospora capillacea	Plants (Monocots)	T	
Crawe Sedge	Carex crawei	Plants (Monocots)	S	
Dry-spike Sedge	Carex foenea	Plants (Monocots)	S	

Great Plains Ladies'-tresses	Spiranthes magnicamporum	Plants (Monocots)	S	
Leafy Northern Green Orchid	Platanthera hyperborea	Plants (Monocots)	T	
Low Nut Rush	Scleria verticillata	Plants (Monocots)	T	
Panic-grass	Panicum gattingeri	Plants (Monocots)	S	
Philadelphia Panic Grass	Panicum philadelphicum	Plants (Monocots)	T	
Slender Arrow Grass	Triglochin palustris	Plants (Monocots)	T	
Small Spikerush	Eleocharis parvula	Plants (Monocots)	S	
Small White Lady's Slipper	Cypripedium candidum	Plants (Monocots)	S	
Straight-leaf Pondweed	Potamogeton strictifolius	Plants (Monocots)	S	
Tall Cotton Grass	Eriophorum angustifolium	Plants (Monocots)	S	
Toad Rush	Juncus bufonius	Plants (Monocots)	S	
Western Prairie Fringed Orchid	Platanthera praeclara	Plants (Monocots)	T	T
Blanding's Turtle	Emydoidea blandingii	Reptiles	T	
Smooth Green Snake	Liochlorophis vernalis	Reptiles	S	

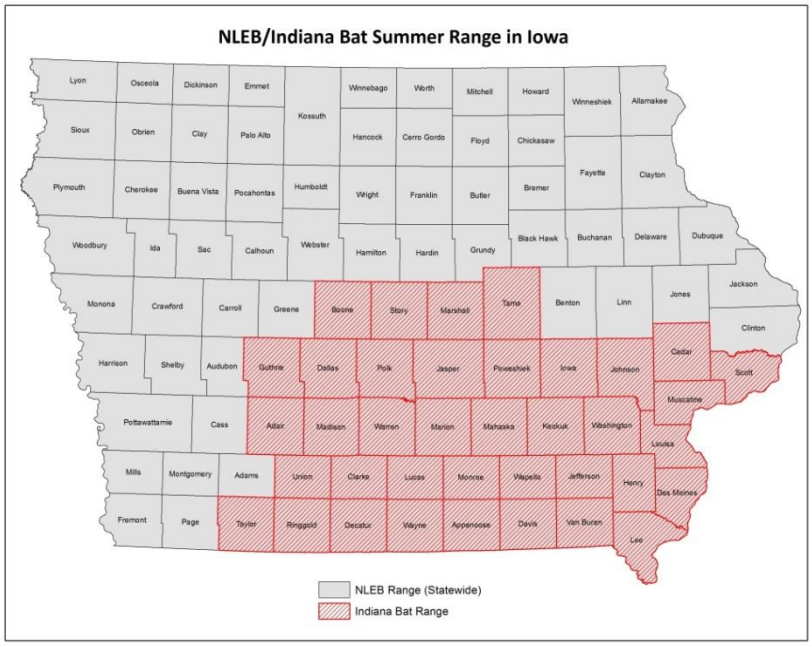
APPENDIX D: NLEB MANAGEMENT RECOMMENDATIONS

Northern Long-Eared Bat (NLEB) Guidance for WSFR Wildlife Management Projects

Suitable summer habitat for NLEB consists of a wide variety of forested/woodland habitats and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat. NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat. NLEBs typically occupy their summer habitat from mid-May through mid-August each year. The spring migration period likely runs from mid-March to mid-May each year and fall migration likely occurs between mid-August and mid-October.

Examples of unsuitable habitat:

- Individual trees that are greater than 1,000 feet from forested/wooded areas;
- Trees found in highly-developed urban areas;
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees;
- Living cedar trees encroaching into prairie ecosystems.



Step 1 – Evaluate if there are potential roost trees that will be impacted with a DBH of at least 3".

- ☐ If project will only require removal of trees or shrubs with a DBH of less than 3 inches, proceed to Step 2.
- ☐ If project will impact trees but does not include potential roosts, i.e., live trees and/or snags ≥3 inch DBH having exfoliating bark, cracks, and crevices or other cavities, proceed to Step 2.
- ☐ If project will require removal of trees with a DBH of at least 3 inches that exhibit cracks, crevices or peeling bark, proceed to Step 3. Isolated trees may be considered suitable habitat when they exhibit characteristics of a suitable roost, and are within 1,000 feet of other forested/wooded habitat.

Step 2 – No further action is necessary. Management actions can proceed.

Step 3 – Conservation Measures for Tree Removals

You are "Not Likely to Adversely Affect" the NLEB if you conduct tree removal activities or woodland burns according to the following:

- ☐ Conduct woodland burns after September 30 and before April 1.
- ☐ Conduct tree removals after September 30 and before April 1

If your project is located outside of the Indiana Bat summer range, and you are not able to conduct it after September 30 and before April 1, the project is "Likely to Adversely Affect" the NLEB. **NOTE: If project falls within the Indiana Bat summer range, you must conduct tree removal activities between Sept 30 – April 1 and woodland burns outside of the maternity season (May 15-Aug 15).**

- ☐ If project will need to occur between April 1-May 15 or August 15-September 30, proceed to Step 4.

Step 4 – Solicit Additional Review

USFWS is required to track all activities that are "Likely to Adversely Affect" the NLEB, even if they are not prohibited take under the 4D rule. In order to meet their reporting requirement, you will need to:

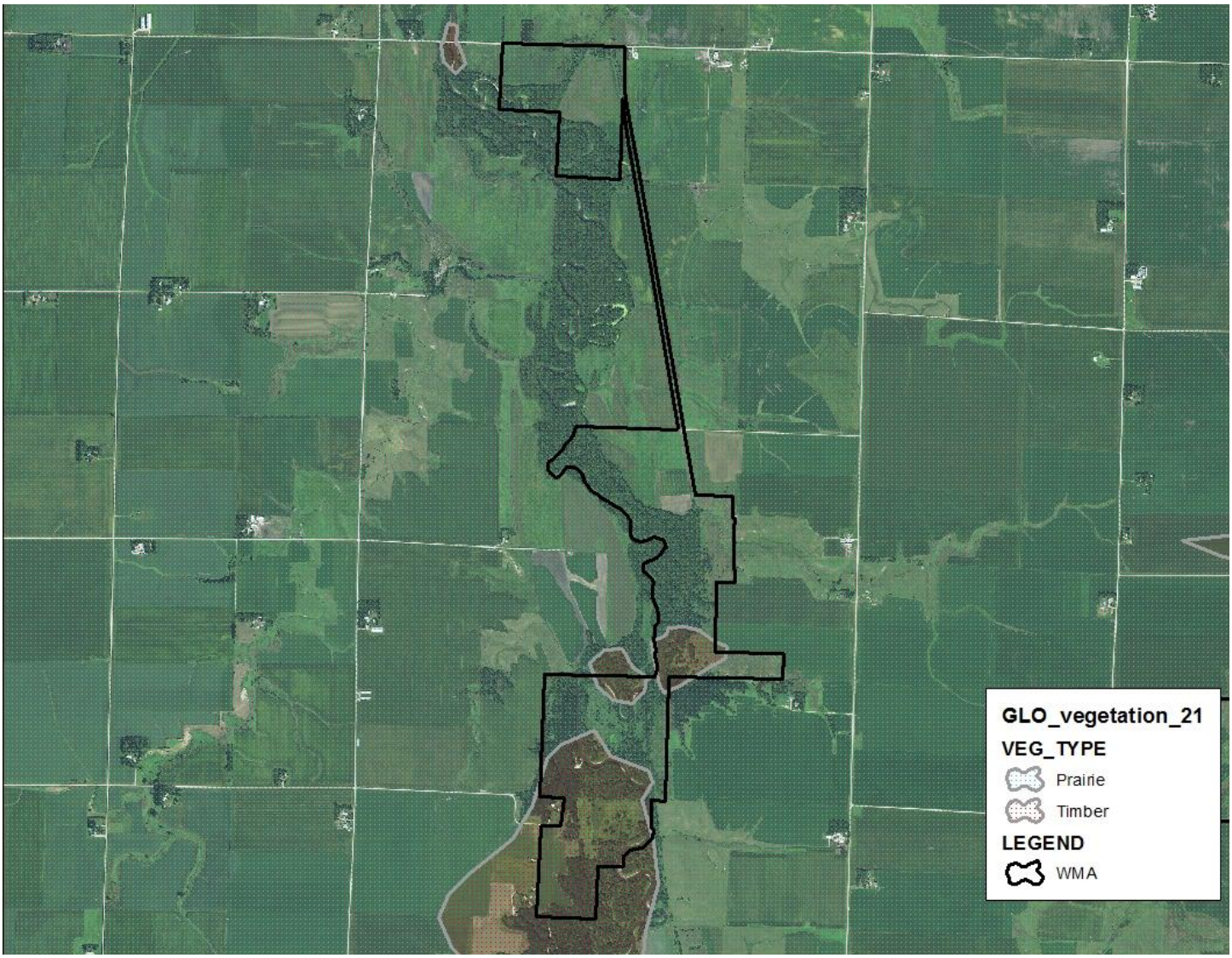
- ☐ Prepare and submit a map and description of activity and timing to Monica.
- ☐ If project cannot be covered under existing acres approved in our grant's Section 7, the project will proceed to Step 5.

Step 5 – Additional FWS Review

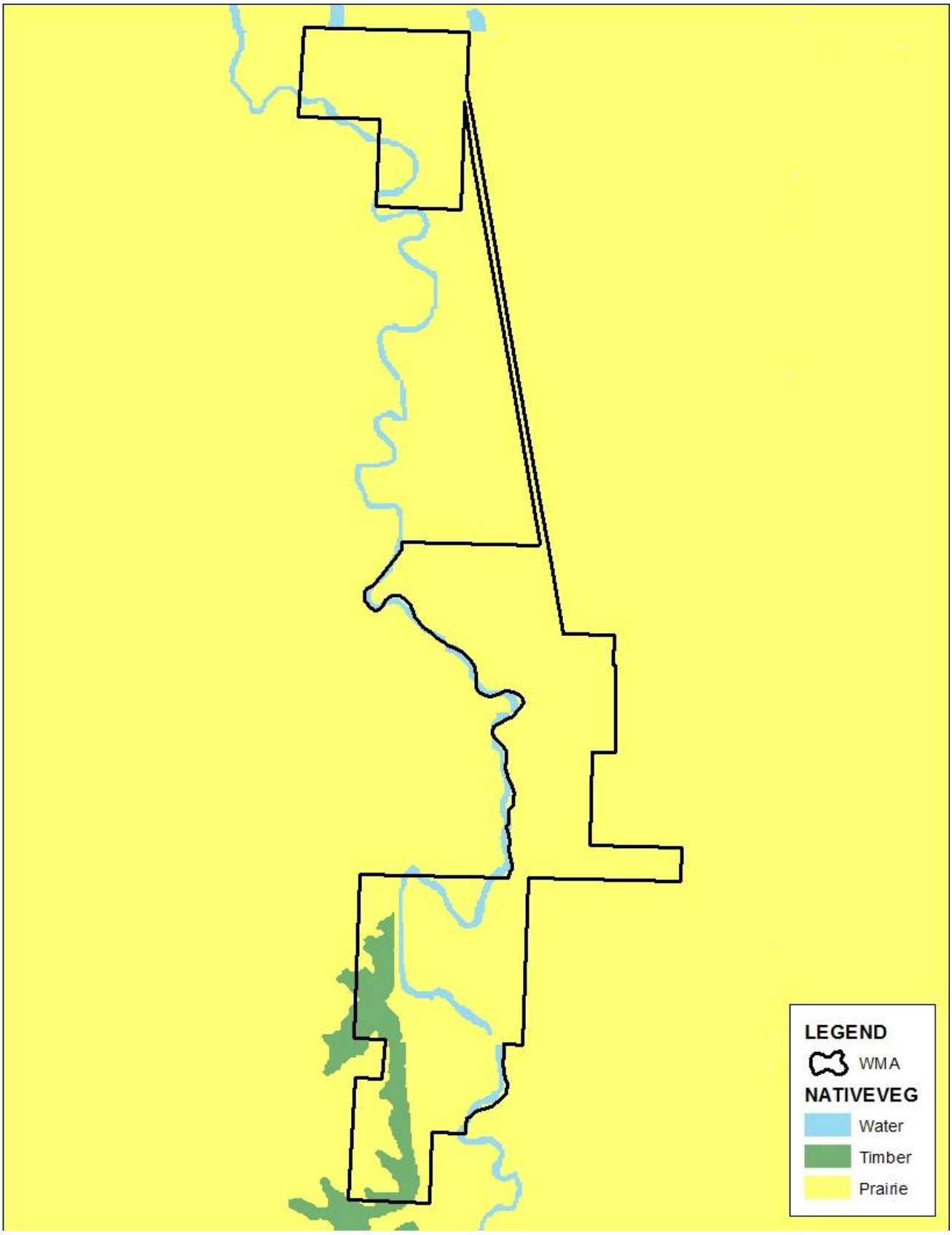
- ☐ Information about the project will be submitted to USFWS by the DNR's Endangered Species Coordinator for an up to 30-day review and comment period using the Streamlined Consultation Form.

Species	November	December	January	February	March	April	May	June	July	August	September	October
NLEB			NLAA			LAA*		PROHIBITED		LAA*		NLAA
INDIANA			NLAA					PROHIBITED				

APPENDIX E: LITTLE SIOUX WMA HISTORICAL GLO VEGETATION MAP



APPENDIX F: NATIVE VEGETATION FROM SOILS INFORMATION



APPENDIX G: STAND 7 DETAILS

Little Sioux Wildlife Management Unit
Stand 7 55.5 acres
Bur Oak / Hickory Savanna Restoration Plan

Date: March 5, 2014
LANDOWNER: Iowa Department of Natural Resources (www.iowadnr.gov/forestry)
ADDRESS: 3120 330th Ave, Ruthven IA 51358
PHONE: unit headquarters 712-837-4850, biologist 712-330-2563

LOCATION: Sections 14 and 23 or Gillett Grove Township.

ACRES: 55.5

LANDOWNER'S OBJECTIVES:
FIRST: Restore oak savanna on east facing slope.
SECOND: Restore diverse herbaceous layers to promote wildlife diversity and health
THIRD: Improve mast production
FOURTH: Reduce invasive shrubs and trees
FIFTH: Timber production, needed habitat, aesthetics, and soil erosion control are acceptable reasons or goals for this woodland.

PREPARED BY:

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SOIL TYPE(S) AND SITE INDEX(S): Cornell Silty Clay loam 376F with slope ranging from 25 to 40 percent. Estimated site index is 60 feet of height after 50 years of growth. The entire site has an east aspect.

STAND DESCRIPTIONS AND RECOMMENDATIONS:

STAND 1 - 55.5 acres total.
DESCRIPTION: Please see the color map showing short red lines which divide the stand into 3 sections.

NORTH SECTION: Within the 20 acres are 14 acres that will be thinned using Timber Stand Improvement (TSI) guidelines laid out in this project plan. The contract with the consulting forester has already been prepared. Apply these guidelines to the entire north portion. The north portion is broken up by deep drainages running generally north to south. Steep side slopes face east and west. The main canopy is made up of Bur oak, Bitternut hickory, Basswood, Hackberry, elm, and Black walnut. The east facing slope above the river has the fewest number of mature Bur oak trees. The amount of Bur oak generally increases to the west. However, the amount of Bur oak does vary by aspects within the drainages. You will find several dense groups of Bur oak that will need further thinning based on crown density and the quality of the crowns and base logs. Since one of the goals is more acorn production, Bur oak trees with dominant and co-dominant crowns are favored for acorn production. Beneath these large oak crowns are smaller Bur oaks in the shade. They are called 'suppressed' and 'over-topped' and will compete with the dominant oaks for water, growing space, and soil nutrients. These oaks should be girdled by chainsaw for a slow death while offering sites for woodpecker food sites and

dens trees. Main canopy trees that are mature, ready for harvest and loggable, including walnut, will be removed utilizing a mixed hardwood timber sale. Other non-loggable undesirable trees, including walnuts, will be removed utilizing a contractor. After the initial TSI thinning, another ground check is needed to see if enough sunlight is reaching the ground. Repeat the TSI process every 8 to 10 years to remove invading trees and brush (if prescribed fire is not successful) to admit ample sunlight.

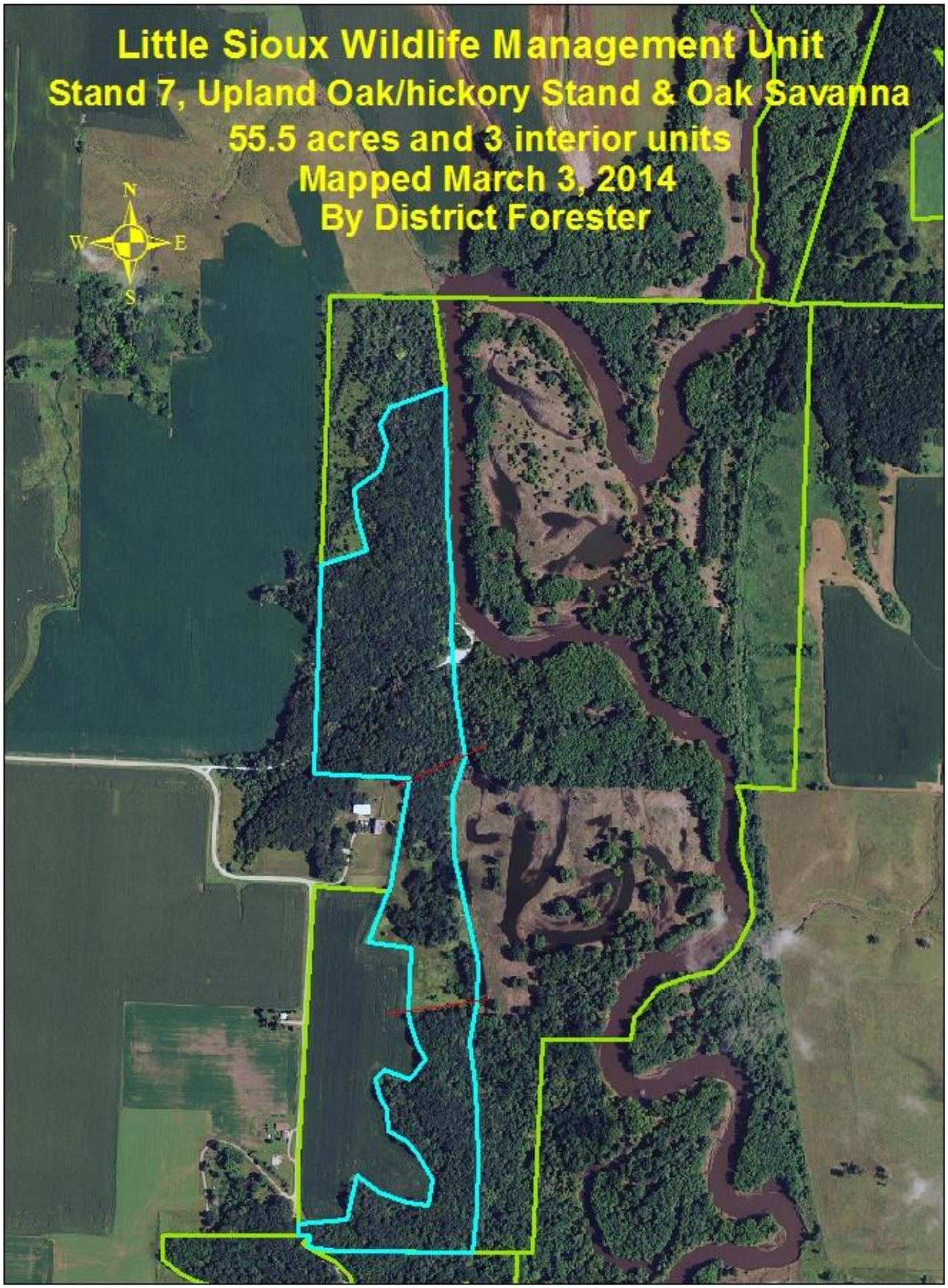
The understory is made up of (scattered) Ironwood, Red elm, American elm, Hackberry, mulberry, some Green ash, Bur oak, scattered Black cherry, Bitternut hickory, and many Basswoods from 2 to 10 inches in trunk diameter. The amount of understory varies by the hillside aspect and the density of the Bur oak canopy. Remove the entire understory with the exceptions of the best Bur oak seedlings or saplings and every Black cherry, regardless of size. Note: parts of the north section have been harvested in past years. Some the Bur oak trees are sprouted from the old stumps which may be 120 to 140 years old. If one of these sprouts is large enough to compete with a better Bur oak a field decision must be made. If any sprouts are on opposite sides of an old stump, they might have separate root systems. If the sprouts are opposite then girdle the interfering Bur oak sprout. But, if the sprouts are next to each other, they probably have a common root system. If this applies, girdle all of the sprouts. As a further check on the tree's position in the crown canopy, decide if it's over-topped (very low to the ground), or suppressed (just below the main canopy), or co-dominant, or dominant. If you decide its position is over-topped or suppressed then the decision for removal is better.

MIDDLE SECTION: Understory trees and shrubs in this section have been kept at bay by the historical land-use, grazing, on this portion. After purchase by DNR, the cattle were removed to allow for native herbaceous recovery. This section was burned in the spring of 2013. The burn pattern appears to be patchy, so its effects will be patchy. Fire effects should improve over the next 5 years because sunlight is now reaching the ground. More grasses and forbs should respond to the direct sunlight.
This section is about 6 acres.

SOUTH SECTION: The woodlands are classic oak/hickory with mature Bur oak and Bitternut hickory in various ages and sizes. The Bur oak was first on the site followed by shade-tolerant elms, hickory, and Basswood. Each of these species will grow in the shade of other tree species. Additional tree species are Black walnut, Hackberry, and Black cherry. Sugar maple should be common, as it is with the adjacent neighbor to the south but none were found. The same tree species are found as understory species with the addition of Ironwood. Prior to purchase by the State, the landowner had marked a walnut timber sale. Several uncut and numbered Black walnut trees were found. A search of the purchase agreement, land abstract or other documents may reveal more information about these uncut walnut trees. The original owner may still retain property rights with them. The middle section is about 10 acres.

To convert this section to oak savanna, remove the small understory trees to the foot of the slope. Be especially diligent with the elms, hickory, Ironwood, Hackberry, and low-quality Basswood. If the trees are small enough to fall to the ground, cut them completely. If any tree will 'hang up' in a larger tree, girdle them being careful to connect the chainsaw cuts.

GENERAL COMMENTS:
When TSI and brush work have been completed, fire will be an integral part of maintaining the herbaceous layer, and keeping undesirable trees and brush at bay. A rotational system of burning should be established, including varying duration between burns, and variation in seasonality of burns. Grazing, when done with conservation in mind, could also be used to increase the diversity of the savanna, especially the structural diversity in the herbaceous layer. Grazing rates must be light enough and for an appropriate duration as to not cause damage to desired trees or to cause erosion.



T95N, R36W, Gillett Grove Twp., Sections 14 and 23, Clay County. Plan number is 307.

APPENDIX H: STAND 9 DETAILS

Little Sioux Wildlife Management Unit
Stand 9, Bur Oak Savanna
Side Hill Site, 53.1 acres
Thinning and weed tree removal, herbaceous recovery

Prepared for:

Prairie Lakes Wildlife Unit – Ruthven HQ
Little Sioux River WMA
Salton II Tract
Bryan Hellyer – Unit Biologist

Date of Original Plan Completion: October 25, 2012

Revision date(s)
March 13, 2014 – Updated to fit into WMA Forest Stewardship Plan prepared by Joe Schwartz, District Forester
March 15, 2018 – Updated to fit addition of remnant prairie/savanna hillside from Stand 5 into Stand 9 to better reflect management goals

Property Description
The Little Sioux Wildlife Management Area (WMA) is located along the Little Sioux River just north of Gillette Grove. This area consists of flat river floodplain, as well as steep side slopes leading from the flat uplands above to the river below. Most areas of the floodplain are dominated by riverine forest, including silver maple, box elder, and cottonwood. There are also portions of the river bottom that have grasses and forbs, including rye, reed canary grass, sunflowers, and other various grasses and forbs. Slopes on this WMA are generally south and west facing. Plant communities range from open prairie and savanna to oak – basswood woodland/savanna. Historical land cover for this tract would have been prairie with scattered bur oak trees. The majority of this tract was historically used for cattle pasture. A small area of upland was used historically for crop.

Legal property description
T95N, R36W, Portions of W 1/2 of Section 13 and portion of SW ¼ Section 12

Total acreage covered by this plan
Approximately 53.1 acres

Number of unique stands of trees
1

Basic topography
Steeply dissected topography along the Little Sioux River.

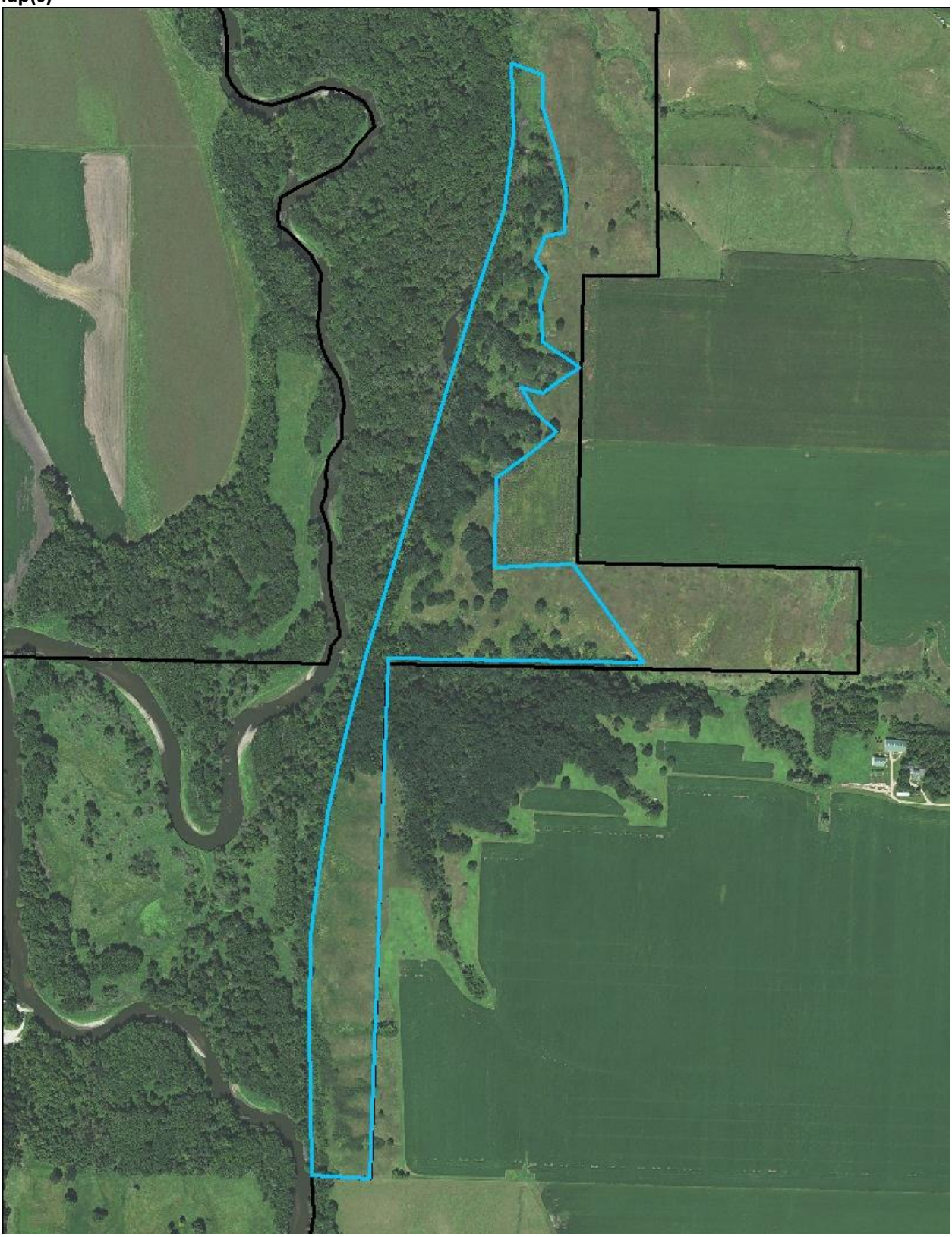
DESCRIPTION OF WOODLAND; LAND FEATURES; RARE, THREATENED & ENDANGERED SPECIES:
This property is located along the Little Sioux River in Clay County. This river valley is known to have the second largest concentration of native prairie and savanna complexes left in the state. This property contains very high potential for both prairie and savanna restoration. The woodlands range from open grown bur oak trees along the south property line, to more oak dominated woodland areas to the north. There are also areas of floodplain forest along the bottoms of the slopes in the floodplain. The property is dominated by south and west facing aspects, with small areas of north facing slopes.

Endangered/Threatened/Special Concern Species:

Scientific Name	Common Name	Relative Abundance
Lespedeza leptostachya	Prairie Bush Clover	One small population ~20 individuals

Property History
The majority of the property was used historically for cattle pasture. A small area of upland on top of the valley was cultivated, and continues to be today.

Stand Map(s)



Forest Natural Resources Enhancement and Protection

Protect Special Sites & Social Considerations (Special sites (Historical, Cultural, etc.))
N/A

Recreational Uses
This area is heavily used for both deer and turkey hunting. Access is walk in only, utilizing the railroad ROW owned by the DNR coming from the north. Limited other uses are present, including wildlife viewing, hiking, and various small game hunting.

Fish, Wildlife and Biodiversity (Describe the resources on the property and the activities you are planning to accommodate your goals.)

Fish &Wildlife
Common large and small game are abundant on the property. Along with these game species, numerous non-game species are also present on site, utilizing the remnant prairie and savanna that have been allowed to persist. Management will be done to improve the abundance and diversity of non-game species by restoring the integrity of the native ecosystems present on site, while not interfering with the hunting opportunities currently present on site.

State and Federal threatened or endangered species - plants or animals
One population of *Lespedeza leptostachya* (Prairie Bushclover) has been located on this property within this Stand.

Stand Level Information

Stand 9 Objectives

Stand 9: 53.1 Acres

Objectives:
Restore the area to oak savanna.
Stand 9 Current Conditions

General description:
This area is dominated by large, open grown bur oak trees, with a multitude of other, fire intolerant trees growing up through and around them. Most mature trees are spread widely apart, with some areas of thicker canopy.

Current forest type:
Over-grown oak savanna, transitioning to upland forest species

Bird's-eye view of current stand condition
Current Stand Canopy Density: 70-80% closed canopy

Current structure:
Mature open grown oak trees, with encroachment by elm, ash, walnut, and other fire intolerant trees. Most non-oaks are 35 years or younger, while the oaks most likely range from 50 to 200 years old.

Stand 9 Desired Future Stand Condition

Desired forest/woodland type
Oak savanna

Desired species to naturally regenerate
Bur oak (Quercus macrocarpa)

Bird's-eye view of desired future stand condition

Future Stand Canopy Density:
25% canopy

Future stand structure:
Large, open grown oak trees with grass and forb understory. Some brush patches will be tolerated in this area

Desired spacing (Trees per Acre): 1-10 Trees/acre

Size and shape of openings:
Various size openings to allow for the spread and diversification of the herbaceous understory. Shape is irrelevant.

Other Desired Stand Descriptions:
None

Stand 9 Forest Management Activities

Harvesting/Thinning
Complete removal of non-oak trees from the site. All stumps should be treated to reduce re-sprout.
Brushy areas will be ground down to reduce vigor, and allow for herbaceous growth underneath.

Slash management
All slash will be removed and piled on site to be burned at a later time.

Post harvest activities
Prescribed fire will be used to reduce and remove any fire-intolerant trees that try to regain a foothold on the site. Future cutting will be limited to any non-oaks that do regenerate and are not killed by fire, and potential thinning of oaks as deemed necessary to allow for regeneration and herbaceous spread.

Monitoring
Yearly monitoring will be done to determine any future cutting that needs to be done, as well as to document the diversity and abundance of herbaceous ground layer growth, and the fauna that uses the area.

APPENDIX I: STAND 9 SPECIES INVENTORY

Little Sioux WMA-- Savanna Restoration, Gillett Grove, Clay County, Iowa

Conservatism-Based Metrics:		
Total Mean C:	3.7	
Native Mean C:	4.5	
Total FQI:	34.9	
Native FQI:	38.7	
Adjusted FQI:	41	
% C value 0:	27	
% C value 1-3:	16.9	
% C value 4-6:	37.1	
% C value 7-10:	19.1	
Native Tree Mean C:	4.3	
Native Shrub Mean C:	2.8	
Native Herbaceous Mean C:	4.6	
Species Richness:		
Total Species:	89	
Native Species:	74	83.10%
Non-native Species:	15	16.90%
Species Wetness:		
Mean Wetness:	2.1	
Native Mean Wetness:	2.1	
Physiognomy Metrics:		
Tree:	3	3.40%
Shrub:	5	5.60%
Vine:	4	4.50%
Forb:	61	68.50%
Grass:	15	16.90%
Sedge:	1	1.10%
Rush:	0	0%
Fern:	0	0%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	10	11.20%
Perennial:	73	82%
Biennial:	6	6.70%
Native Annual:	6	6.70%
Native Perennial:	68	76.40%
Native Biennial:	0	0%

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Actaea rubra	Ranunculaceae	ACTRUB	native	7	5	forb	perennial	red baneberry
Agropyron trachycaulum	Poaceae	AGRTRT	native	5	0	grass	perennial	slender wheatgrass
Allium stellatum	Liliaceae	ALLSTE	native	10	5	forb	perennial	wild prairie onion
Ambrosia artemisiifolia	Asteraceae	AMBART	native	0	3	forb	annual	common ragweed
Ambrosia trifida	Asteraceae	AMBTRI	native	0	-1	forb	annual	giant ragweed
Amorpha fruticosa	Fabaceae	AMOFRF	native	5	-4	shrub	perennial	indigo bush; false indigo
Amphicarpaea bracteata	Fabaceae	AMPBRB	native	4	0	vine	perennial	hog peanut
Andropogon gerardii	Poaceae	ANDGER	native	4	1	grass	perennial	big bluestem
Anemone canadensis	Ranunculaceae	ANECAN	native	2	-3	forb	perennial	canada anemone
Anemone cylindrica	Ranunculaceae	ANECYL	native	7	5	forb	perennial	windflower; thimbleweed
Apocynum androsaemifolium	Apocynaceae	APOAND	native	3	5	forb	perennial	spreading dogbane
Aquilegia canadensis	Ranunculaceae	AQUCAN	native	6	1	forb	perennial	columbine
Arctium minus	Asteraceae	ARCMIN	non-native	0	5	forb	biennial	common burdock
Asclepias tuberosa	Asclepiadaceae	ASCTUB	native	6	5	forb	perennial	butterfly weed
Asclepias verticillata	Asclepiadaceae	ASCVER	native	0	5	forb	perennial	whorled milkweed
Aster sericeus	Asteraceae	ASTSER	native	10	5	forb	perennial	silky aster
Bouteloua curtipendula	Poaceae	BOUCUR	native	6	5	grass	perennial	side-oats grama
Brickellia eupatorioides	Asteraceae	BRIEUP	native	5	5	forb	perennial	false boneset
Bromus inermis	Poaceae	BROINE	non-native	0	5	grass	perennial	smooth brome
Cacalia plantaginea	Asteraceae	CACPLA	native	7	0	forb	perennial	prairie indian plaintain
Campanula americana	Campanulaceae	CAMAME	native	4	0	forb	annual	tall bellflower
Cannabis sativa	Moraceae	CANSAT	non-native	0	0	forb	annual	hemp; marijuana
Carduus acanthoides	Asteraceae	CARACA	non-native	0	5	forb	biennial	plumeless thistle
Carex blanda	Cyperaceae	CXBLAN	native	2	0	sedge	perennial	common wood sedge
Chenopodium album	Chenopodiaceae	CHEALB	non-native	0	1	forb	annual	lambs quarters
Cirsium flodmanii	Asteraceae	CIRFLO	native	5	n/a	forb	perennial	flodmans thistle
Comandra umbellata	Santalaceae	COMUMB	native	6	3	forb	perennial	bastard toadflax
Conyza canadensis	Asteraceae	CONCAN	native	0	1	forb	annual	horseweed; mule tail
Corylus americana	Betulaceae	CORAME	native	3	0	shrub	perennial	hazelnut

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Dalea purpurea	Fabaceae	DALPUR	native	8	5	forb	perennial	purple prairie clover
Delphinium virescens	Ranunculaceae	DELVIR	native	7	5	forb	perennial	prairie larkspur
Echinacea angustifolia	Asteraceae	ECHANG	native	8	5	forb	perennial	purple coneflower
Echium vulgare	Boraginaceae	ECHVUL	non-native	0	5	forb	biennial	blueweed
Elymus villosus	Poaceae	ELYVIL	native	5	3	grass	perennial	slender wild rye
Elymus virginicus	Poaceae	ELYVIR	native	3	-2	grass	perennial	virginia wild rye
Eriochloa villosa	Poaceae	ERIVIL	non-native	0	0	grass	annual	cup grass
Eupatorium altissimum	Asteraceae	EUPALT	native	2	3	forb	perennial	tall thoroughwort
Festuca obtusa	Poaceae	FESOBT	native	7	2	grass	perennial	nodding fescue
Gentiana puberulenta	Gentianaceae	GENPUB	native	9	3	forb	perennial	downy gentian
Geum canadense	Rosaceae	GEUCAN	native	2	0	forb	perennial	white avens
Hackelia virginiana	Boraginaceae	HACVIR	native	0	1	forb	perennial	stickseed
Heuchera richardsonii	Saxifragaceae	HEURIC	native	8	1	forb	perennial	alumroot
Hydrophyllum virginianum	Hydrophyllacea	HYDVIR	native	3	-2	forb	perennial	virginia waterleaf
Juglans nigra	Juglandaceae	JUGNIG	native	4	3	tree	perennial	black walnut
Leersia virginica	Poaceae	LEEVIR	native	6	-3	grass	perennial	whitegrass
Linum sulcatum	Linaceae	LINSUL	native	7	5	forb	perennial	wild flax
Medicago lupulina	Fabaceae	MEDLUP	non-native	0	1	forb	annual	black medic
Melilotus alba	Fabaceae	MELALB	non-native	0	3	forb	biennial	white sweet clover
Melilotus officinalis	Fabaceae	MELOFC	non-native	0	3	forb	biennial	yellow sweet clover
Menispermum canadense	Menispermaceae	MENCAN	native	5	-1	vine	perennial	moonseed
Muhlenbergia cuspidata	Poaceae	MUHCUS	native	10	5	grass	perennial	plains muhly
Onosmodium molle	Boraginaceae	ONOMOO	native	4	5	forb	perennial	false gromwell
Parietaria pensylvanica	Urticaceae	PARPEN	native	3	3	forb	annual	pellitory
Pastinaca sativa	Apiaceae	PASSAT	non-native	0	5	forb	biennial	wild parsnip
Pediomelum argophyllum	Fabaceae	PEDARG	native	5	n/a	forb	perennial	silvery scurf-pea
Pediomelum esculentum	Fabaceae	PEDESC	native	8	n/a	forb	perennial	prairie turnip
Phalaris arundinacea	Poaceae	PHAARU	non-native	0	-4	grass	perennial	reed canary grass
Phryma leptostachya	Phrymaceae	PHRLEP	native	4	5	forb	perennial	lopseed
Poa compressa	Poaceae	POACOM	non-native	0	2	grass	perennial	canadian bluegrass

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Potentilla recta	Rosaceae	POTREC	non-native	0	5	forb	perennial	sulphur cinquefoil
Pulsatilla patens multifida	Ranunculaceae	PULPAT	native	8	5	forb	perennial	pasque flower
Quercus macrocarpa	Fagaceae	QUEMAC	native	4	1	tree	perennial	bur oak
Ranunculus abortivus	Ranunculaceae	RANABO	native	0	-4	forb	annual	small-flowered crowfoot
Ratibida pinnata	Asteraceae	RATPIN	native	4	5	forb	perennial	gray-headed coneflower
Rhamnus cathartica	Rhamnaceae	RHACAT	non-native	0	3	shrub	perennial	common buckthorn
Rubus idaeus strigosus	Rosaceae	RUBIDS	native	3	n/a	forb	perennial	n/a
Schizachyrium scoparium	Poaceae	SCHSCO	native	5	4	grass	perennial	little bluestem
Silene stellata	Caryophyllaceae	SILSTE	native	4	5	forb	perennial	starry campion
Silphium perfoliatum	Asteraceae	SILPER	native	1	-2	forb	perennial	cup plant
Smilacina stellata	Liliaceae	SMISTE	native	5	1	forb	perennial	starry false solomons seal
Smilax herbacea	Liliaceae	SMIHER	native	5	0	vine	perennial	carrion flower
Solidago gigantea	Asteraceae	SOLGIG	native	3	-3	forb	perennial	smooth goldenrod
Solidago rigida	Asteraceae	SOLRIG	native	4	4	forb	perennial	stiff goldenrod
Sporobolus heterolepis	Poaceae	SPOHET	native	9	4	grass	perennial	prairie dropseed
Stipa spartea	Poaceae	STISPA	native	6	5	grass	perennial	porcupine grass
Symphoricarpos occidentalis	Caprifoliaceae	SYMOCC	native	0	5	shrub	perennial	wolfberry; buckbrush
Teucrium canadense	Lamiaceae	TEUCAN	native	4	-2	forb	perennial	american germander
Thalictrum thalictroides	Ranunculaceae	THATHA	native	7	5	forb	perennial	rue anemone
Tilia americana	Tiliaceae	TILAME	native	5	3	tree	perennial	basswood; american linden
Tradescantia bracteata	Commelinaceae	TRABRA	native	4	4	forb	perennial	long-bracted spiderwort
Triosteum aurantiacum	Caprifoliaceae	TRIAUT	native	4	5	forb	perennial	early horse gentian
Urtica dioica	Urticaceae	URTDIO	native	0	-1	forb	perennial	stinging nettle
Verbena simplex	Verbenaceae	VERSIM	native	5	5	forb	perennial	narrow-leaved vervain
Verbena stricta	Verbenaceae	VERSTR	native	1	5	forb	perennial	hoary vervain
Viola pratincola	Violaceae	VIOPRT	native	0	0	forb	perennial	common blue violet
Viola pubescens	Violaceae	VIOPUP	native	5	4	forb	perennial	downy yellow violet
Vitis riparia	Vitaceae	VITRIP	native	1	-2	vine	perennial	riverbank grape
Zanthoxylum americanum	Rutaceae	ZANAME	native	3	5	shrub	perennial	prickly ash
Zizea aurea	Apiaceae	ZIZAUR	native	6	-1	forb	perennial	golden alexanders

APPENDIX J: SPECIES OF GREATEST CONSERVATION NEED DOCUMENTED ON THE LITTLE SIOUX WMA BY THE MULTIPLE SPECIES INVENTORY AND MONITORING PROJECT AS OF 2017

Taxonomic Group	Scientific Name	Common Name
Amphibians	Lithobates pipiens	Northern leopard frog
Breeding Bird	Grasshopper sparrow	Ammodramus savannarum
Breeding Bird	Belted kingfisher	Ceryle alcyon
Breeding Bird	Northern harrier	Circus cyaneus
Breeding Bird	Sedge wren	Cistothorus platensis
Breeding Bird	Yellow-billed cuckoo	Coccyzus americanus
Breeding Bird	Black-billed cuckoo	Coccyzus erythropthalmus
Breeding Bird	Northern flicker	Colaptes auratus
Breeding Bird	Eastern wood-pewee	Contopus virens
Non-breeding Bird	Bay-breasted warbler	Dendroica castanea
Breeding Bird	Bobolink	Dolichonyx oryzivorus
Breeding Bird	American kestrel	Falco sparverius
Breeding Bird	Common yellowthroat	Geothlypis trichas
Breeding Bird	Bald eagle	Haliaeetus leucocephalus