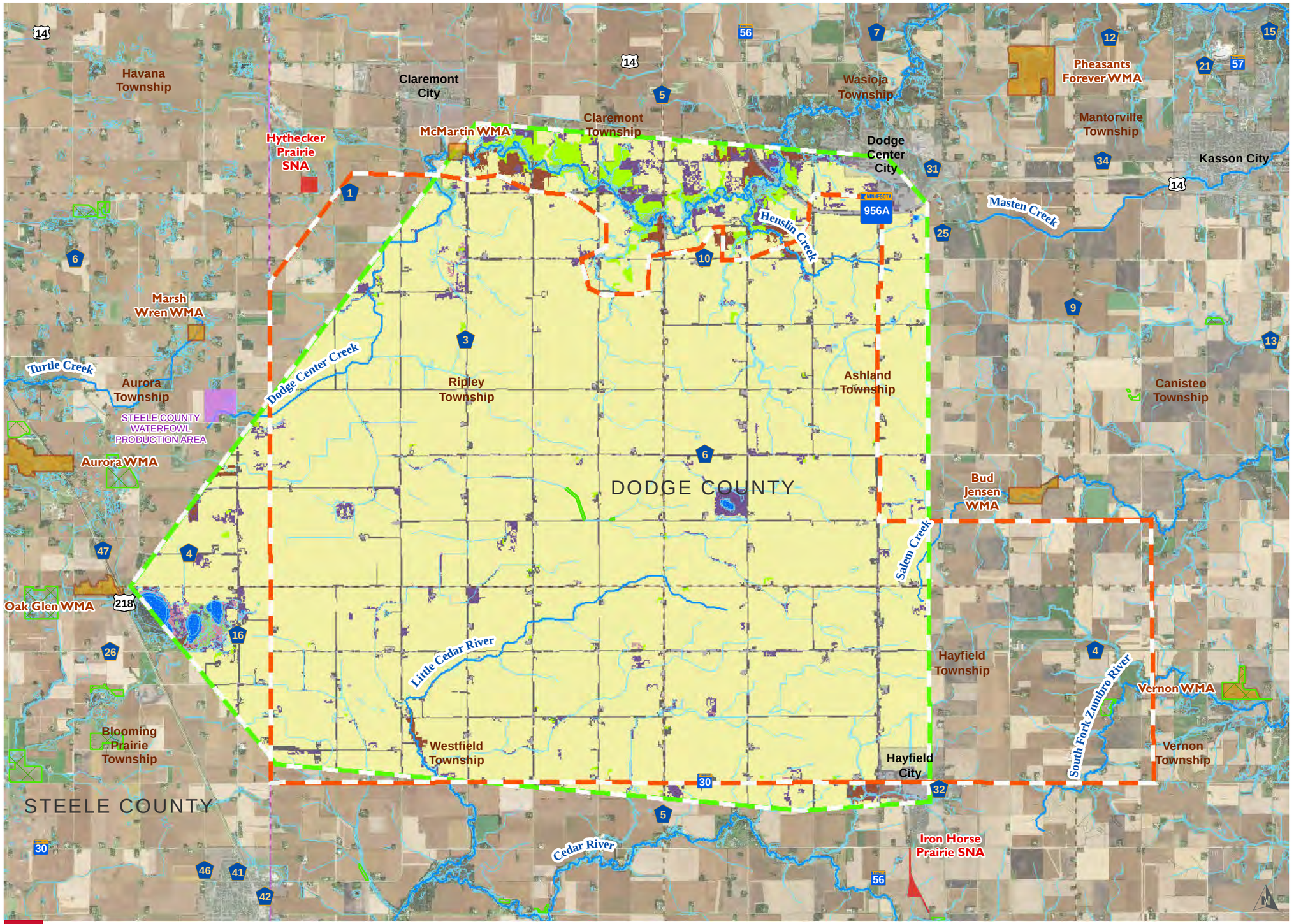
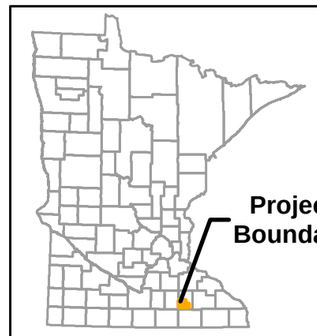




- Project Boundary
- Study Area
- US Fish & Wildlife Conservation Easement
- NWI Wetlands (2015)
- Waterfowl Production Areas
- Scientific Natural Area
- Wildlife Management Area

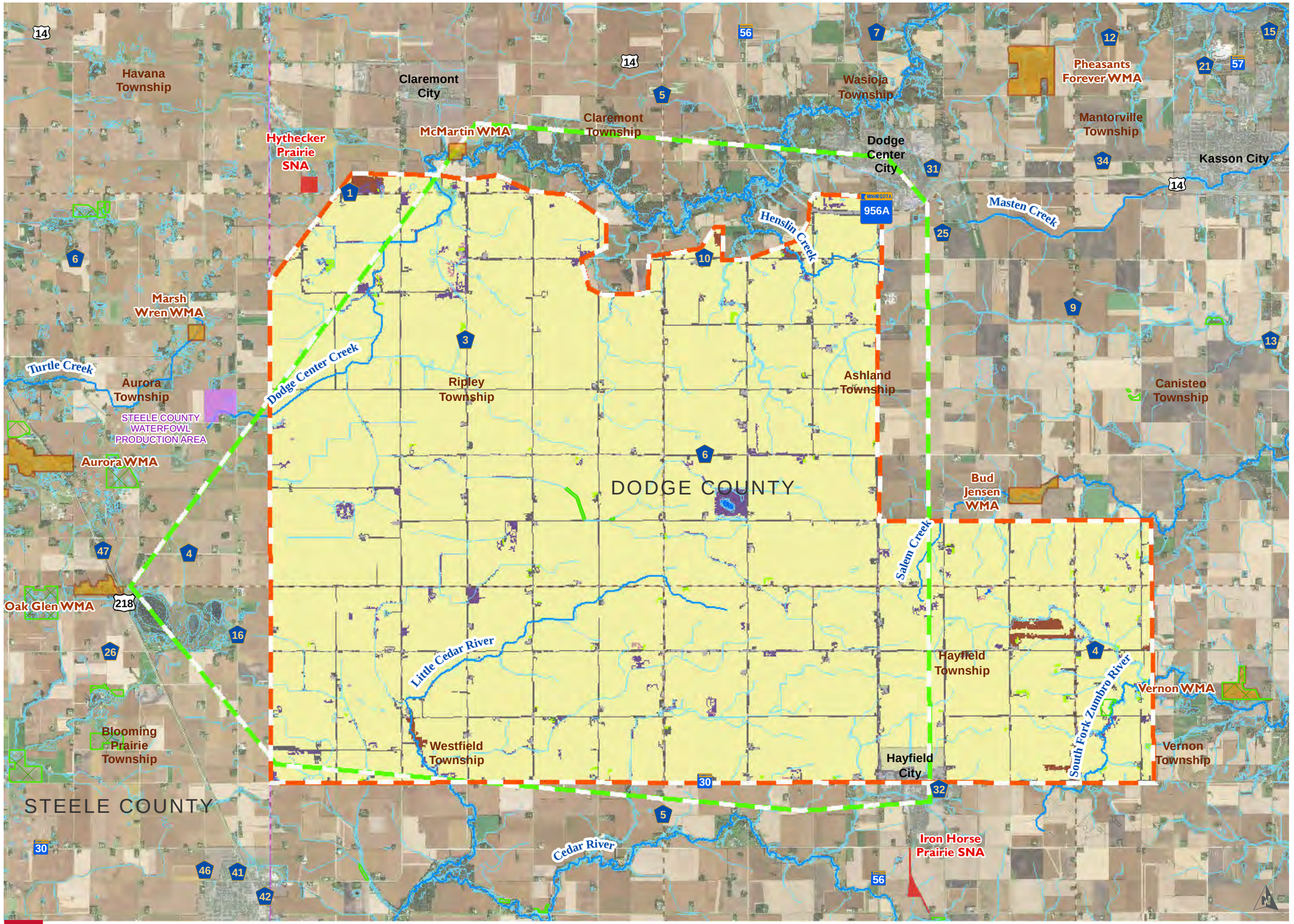
National Land Cover Data (2011)

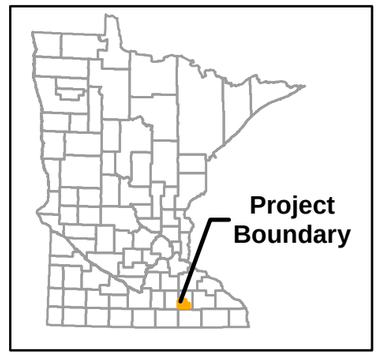
- Open Water
- Dev. Open Space
- Developed or Barren Land
- Deciduous Forest
- Evergreen Forest
- Grassland
- Hay/Pasture
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Vegetation
- City
- Township
- County Boundary

0 1 Miles 0 1 2 Kilometers

N

FIGURE 2
STUDY AREA LAND COVER
DODGE AND STEELE COUNTIES, MINNESOTA





- Project Boundary
- Study Area
- US Fish & Wildlife Conservation Easement
- NWI Wetlands (2015)
- Waterfowl Production Areas
- Scientific Natural Area
- Wildlife Management Area

National Land Cover Data (2011)

- Open Water
- Dev. Open Space
- Developed or Barren Land
- Deciduous Forest
- Evergreen Forest
- Grassland
- Hay/Pasture
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Vegetation
- City
- Township
- County Boundary

0 1 Miles 0 1 2 Kilometers

FIGURE 3
PROJECT BOUNDARY LAND COVER
DODGE AND STEELE COUNTIES, MINNESOTA

PATH: \\MSPE-GIS-FILE\GISPROJ\NEXTERA\229065\MAP_DOCS\REPORT\REPORT_FIGURE_3.MXD - USER: JWALTER - DATE: 3/13/2017

DODGE COUNTY WIND PROJECT

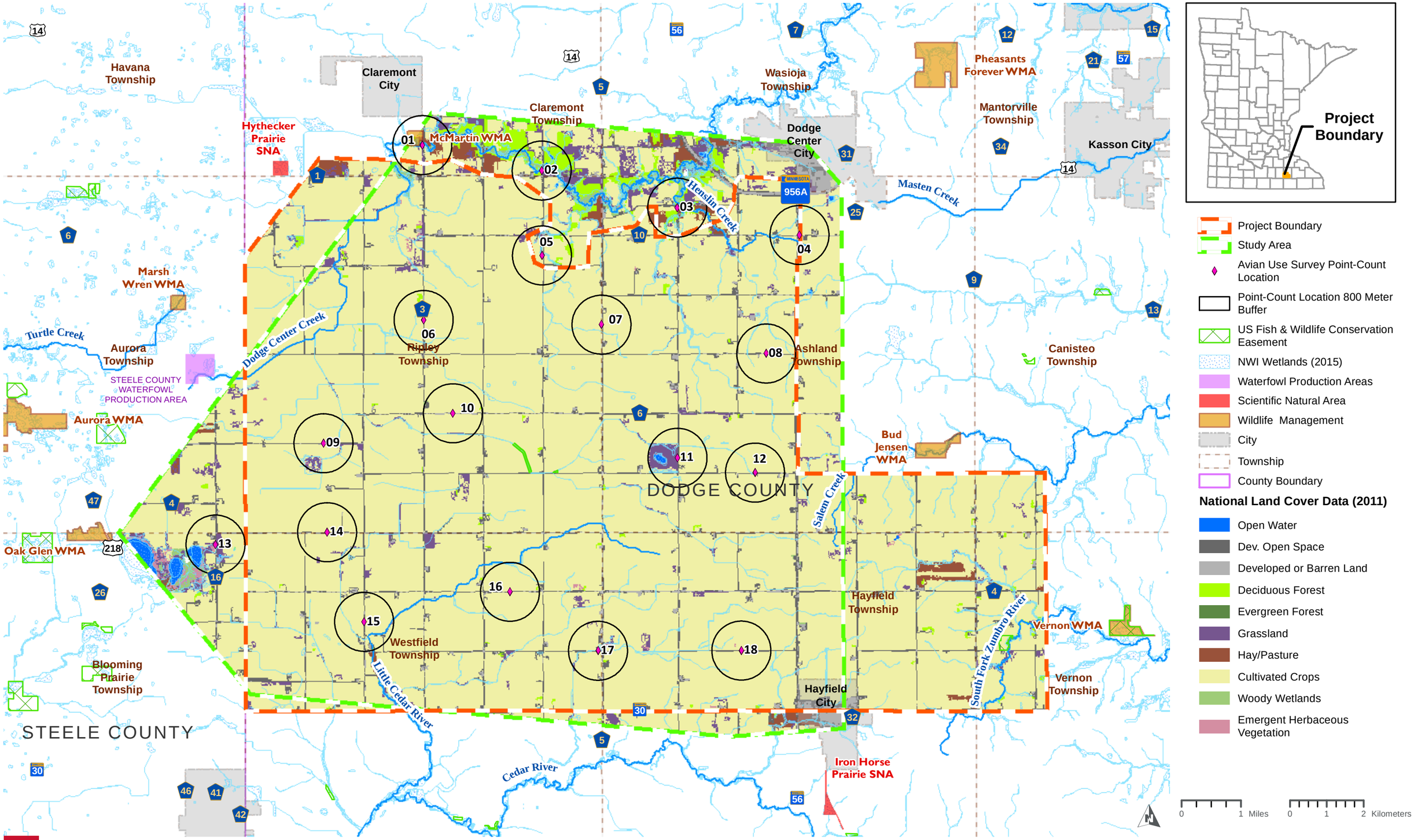
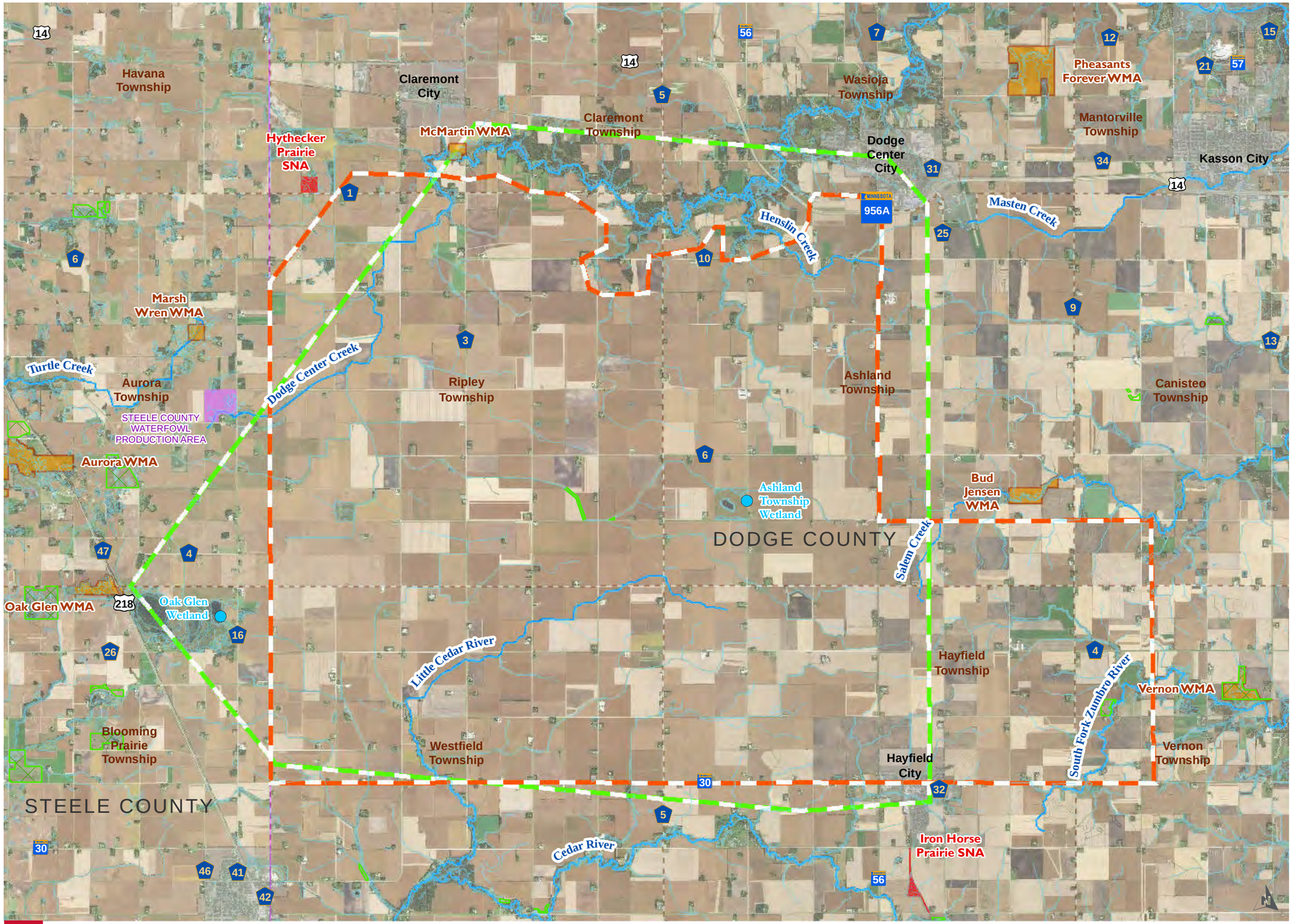
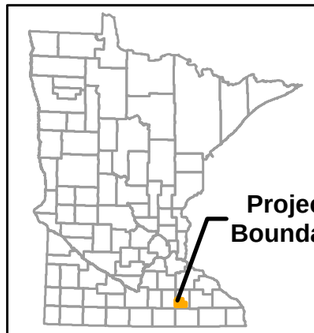


FIGURE 4
AVIAN USE SURVEY POINT-COUNT LOCATION LAND COVER
DODGE AND STEELE COUNTIES, MINNESOTA





- Project Boundary
- Study Area
- Wetland Avian Utilization Survey Site
- US Fish & Wildlife Conservation Easement
- NWI Wetlands (2015)
- Waterfowl Production Areas
- Scientific Natural Area
- Wildlife Management Area
- City
- Township
- County Boundary

0 1 Miles 0 1 2 Kilometers

FIGURE 5
AVIAN WETLAND UTILIZATION SURVEY LOCATIONS
DODGE AND STEELE COUNTIES, MINNESOTA

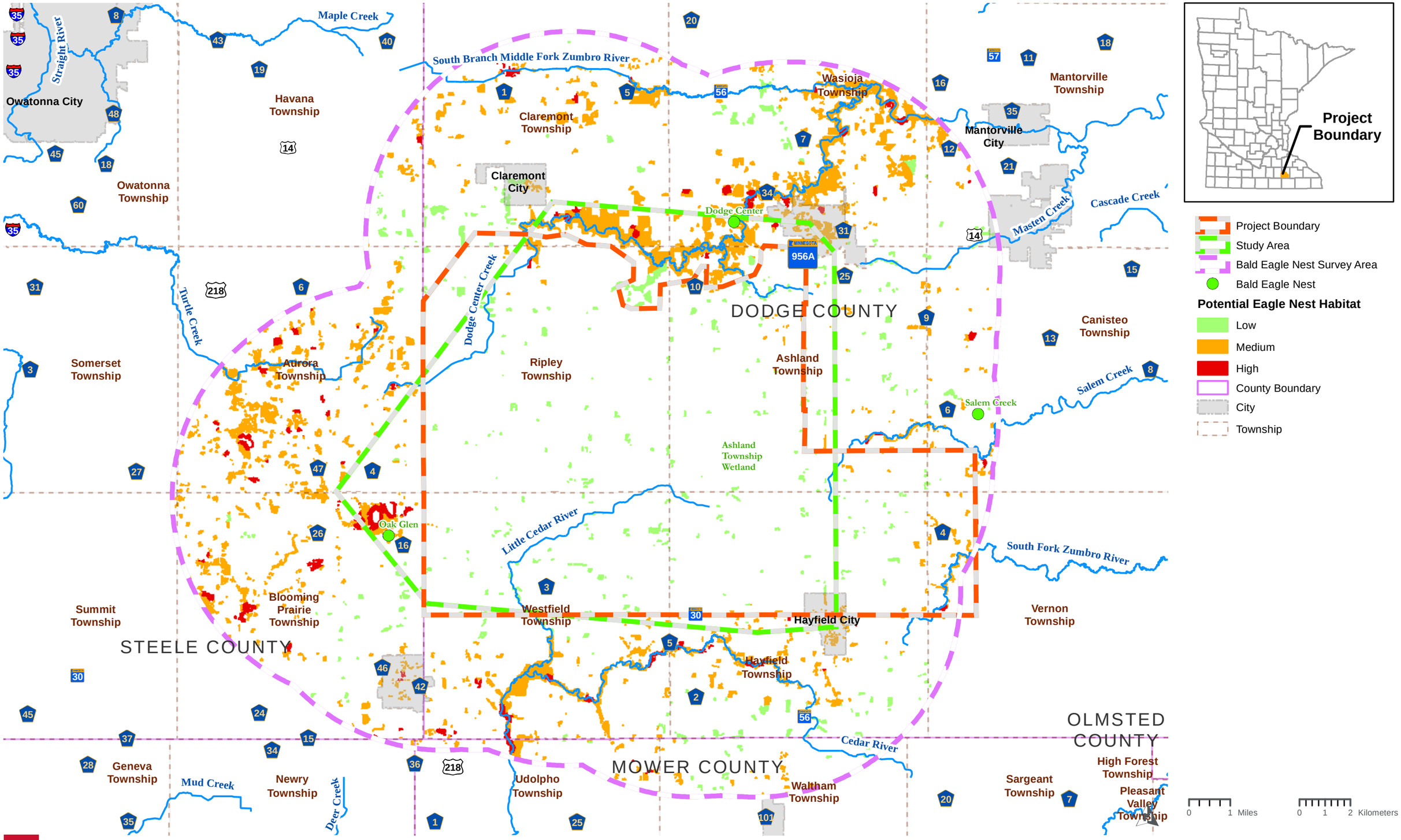
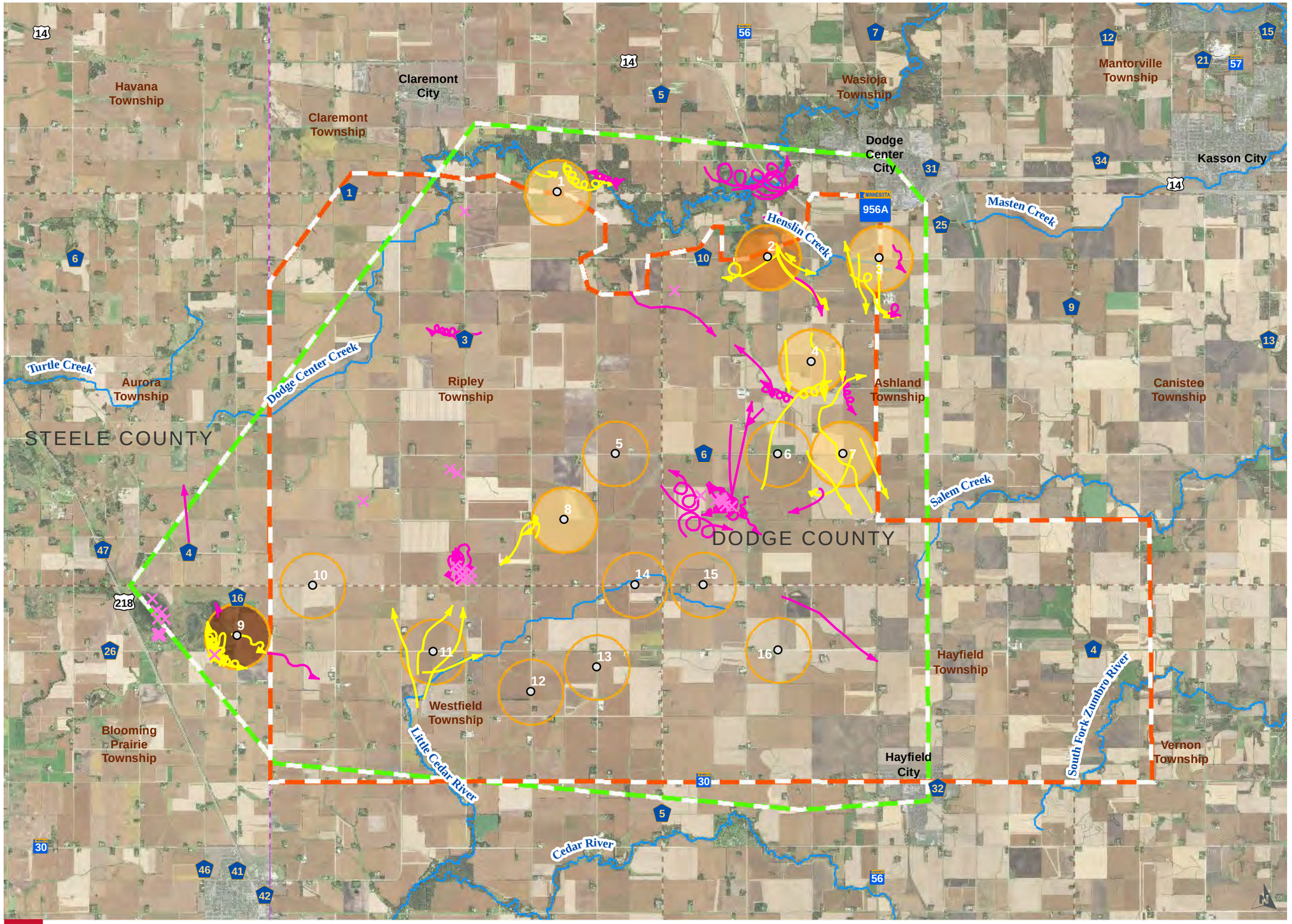
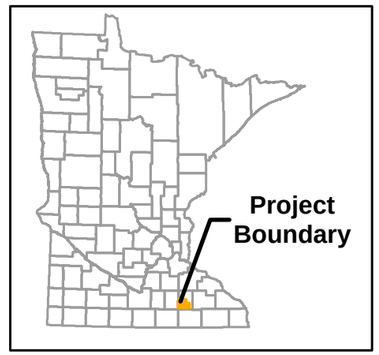


FIGURE 6
BALD EAGLE NEST HABITAT MODEL AND SURVEY RESULTS
DODGE AND STEELE COUNTIES, MINNESOTA





Project Boundary
Study Area
Bald Eagle Survey Point
Incidental Observation

Incidental

Flightpath - incidental
Flightpath - official minutes

Flight_Min_Dec16

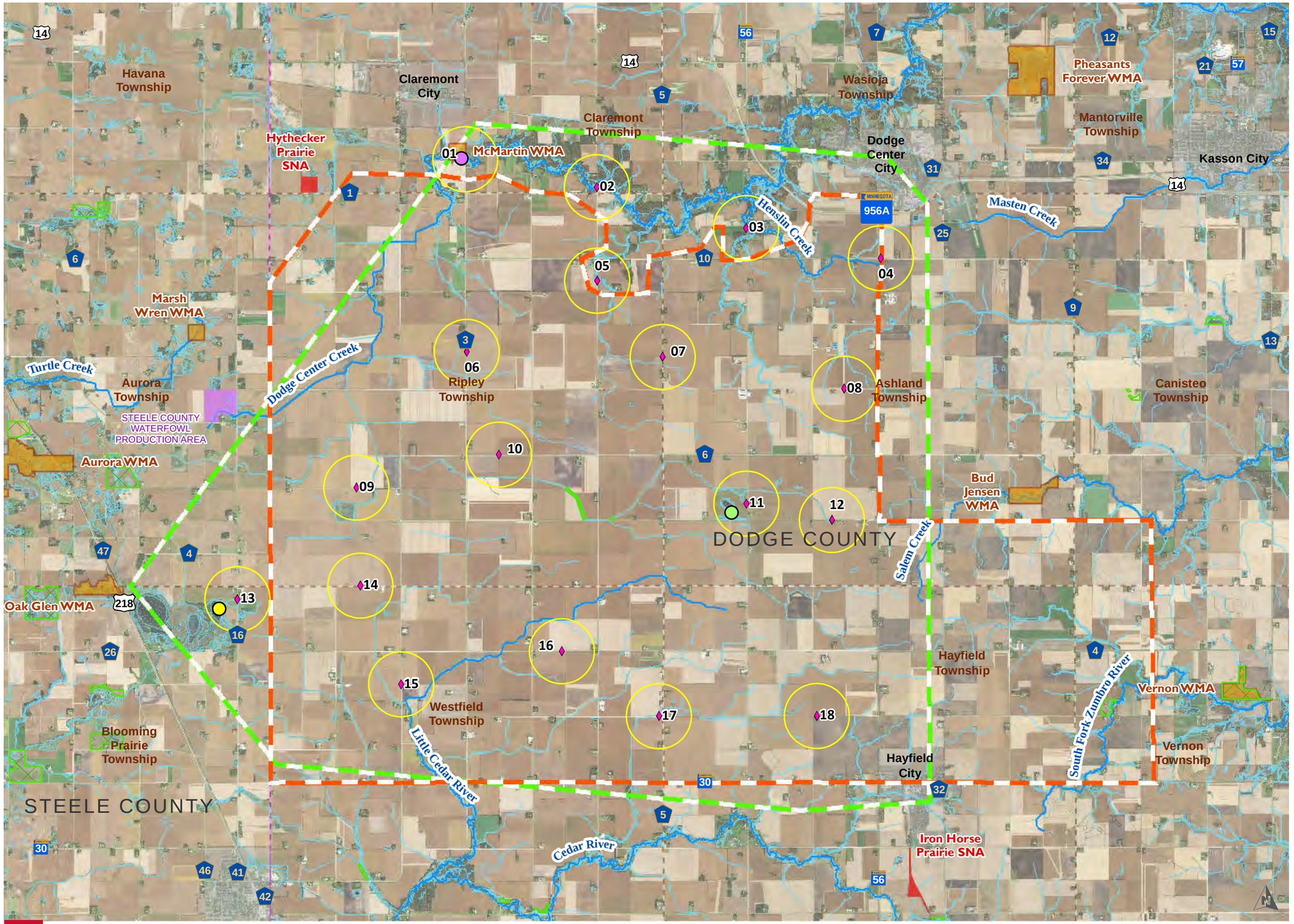
No Eagle Flight Minutes
1 - 5 Eagle Flight Minutes
5 - 10 Eagle Flight Minutes
20 - 30 Eagle Flight Minutes
City
Township
County Boundary

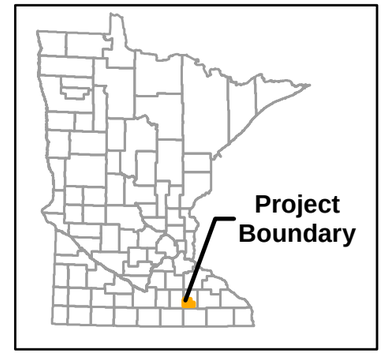
0 1 Miles 0 1 2 Kilometers

FIGURE 7
BALD EAGLE POINT-COUNT SURVEY LOCATIONS AND RESULTS
DODGE AND STEELE COUNTIES, MINNESOTA

PATH: \\MSPE-GIS-FILE\GISPROJ\NEXTERA\229065\MAP_DOCS\REPORT\REPORT_FIGURE_7.MXD - USER: JWALTER - DATE: 3/12/2017

DODGE COUNTY WIND PROJECT





- Project Boundary
- Study Area
- Acadian Flycatcher
- Franklin's Gull
- Henslow's Sparrow
- Avian Use Survey Point-Count Location
- Point-Count Location 800 Meter Buffer
- US Fish & Wildlife Conservation Easement
- NWI Wetlands (2015)
- Waterfowl Production Areas
- Scientific Natural
- Wildlife Management
- City
- Township
- County Boundary

0 1 Miles 0 1 2 Kilometers

FIGURE 8
SENSITIVE SPECIES OBSERVATION
DODGE AND STEELE COUNTIES, MINNESOTA

A

Avian Use Project Snapshot

Project Snapshot

255804 Dodge County Wind

SPECIES DATA

Overall Species Richness

155

Species List

Species	Abundance
Red-winged Blackbird	4178
Common Grackle	1575
American Robin	865
Lapland Longspur	640
Horned Lark	586
Barn Swallow	516
American Crow	488
Blue Jay	482
Cliff Swallow	471
European Starling	469
Mallard	452
Canada Goose	436
American Goldfinch	400
Brown-headed Cowbird	374
Greater White-fronted Goose	336
Dark-eyed Junco	317
Unidentified Duck	308
Killdeer	212
Blue-winged Teal	205
Song Sparrow	191
Unidentified Passerine	128
Black-capped Chickadee	127
Unidentified Warbler	124
Tree Swallow	114
Unidentified Shorebird	114
Brewer's Blackbird	100
Mourning Dove	96

Species Richness By Point

Point Number	Species Richness
255804-001	71
255804-002	73
255804-003	78
255804-004	38
255804-005	57
255804-006	30
255804-007	31
255804-008	29
255804-009	49
255804-010	29
255804-011	54
255804-012	46
255804-013	63
255804-014	25
255804-015	34
255804-016	25
255804-017	46
255804-018	27

Species Richness By Habitat

Habitat Type	Species Richness
Agriculture - Cropland	104
Grassland-Non-native	54
Floodplain Forest	110
Marsh	57
Wetland Prairie	63

Sensitive Species

Species	Abundance
Acadian Flycatcher	1
American Golden-Plover	38
Bald Eagle	23
Black-billed Cuckoo	1
Blue-winged Warbler	3
Bobolink	46
Brown Thrasher	17
Common Nighthawk	25
Dickcissel	5

Vesper Sparrow	75
House Sparrow	63
Chipping Sparrow	60
Northern Cardinal	53
Red-tailed Hawk	49
Bobolink	46
Turkey Vulture	44
Northern Flicker	39
Yellow-rumped Warbler	39
American Golden-Plover	38
Cedar Waxwing	37
American Kestrel	36
Eastern Phoebe	35
Downy Woodpecker	34
Eastern Bluebird	33
Wood Duck	32
Fox Sparrow	29
Savannah Sparrow	29
Sedge Wren	29
Indigo Bunting	28
Northern Harrier	28
American Tree Sparrow	28
Red-bellied Woodpecker	28
Sandhill Crane	28
Rock Pigeon	27
Lesser Scaup	26
Great Blue Heron	25
Wild Turkey	25
Common Yellowthroat	25
Eastern Kingbird	25
Common Nighthawk	25
White-breasted Nuthatch	24
Unidentified Sparrow	23
Bald Eagle	23
House Wren	21
Hairy Woodpecker	21
Dunlin	2
Eastern Meadowlark	19
Eastern Wood-Pewee	7
Field Sparrow	5
Franklin's Gull	14
Grasshopper Sparrow	5
Least Flycatcher	4
Lesser Scaup	26
Marsh Wren	1
Northern Harrier	28
Northern Rough-winged Swallow	12
Red-headed Woodpecker	5
Rose-breasted Grosbeak	9
Sedge Wren	29
Short-billed Dowitcher	1
Swamp Sparrow	15
Upland Sandpiper	5
Virginia Rail	1
White-throated Sparrow	20
Willow Flycatcher	2
Wood Thrush	1
Yellow-bellied Sapsucker	2

Unidentified Swallow	21
White-throated Sparrow	20
Snow Goose	20
Pectoral Sandpiper	20
Ring-necked Pheasant	20
Eastern Meadowlark	19
American Coot	18
American Pipit	17
Brown Thrasher	17
Snow Bunting	16
Swamp Sparrow	15
Unidentified Bird	15
Gray Catbird	14
Franklin's Gull	14
Sharp-shinned Hawk	13
Ruby-crowned Kinglet	13
Baltimore Oriole	12
Northern Rough-winged Swallo	12
Red-eyed Vireo	11
Ring-necked Duck	11
Palm Warbler	11
Cooper's Hawk	10
Great Crested Flycatcher	9
Hooded Merganser	9
Yellow-throated Vireo	9
Rose-breasted Grosbeak	9
Unidentified Raptor	9
Clay-colored Sparrow	8
American Redstart	8
Eastern Wood-Pewee	7
Warbling Vireo	6
Double-crested Cormorant	6
Nashville Warbler	6
Sanderling	6
Western Meadowlark	6
Dickcissel	5

Grasshopper Sparrow	5
House Finch	5
Wilson's Warbler	5
Field Sparrow	5
Upland Sandpiper	5
Red-headed Woodpecker	5
Scarlet Tanager	5
Black-bellied Plover	5
Belted Kingfisher	5
Golden-crowned Kinglet	4
Gray Partridge	4
Least Flycatcher	4
Yellow Warbler	4
Lincoln's Sparrow	4
Ring-billed Gull	4
Wilson's Snipe	3
Blue-winged Warbler	3
Blackpoll Warbler	3
Chimney Swift	3
Tennessee Warbler	3
Ruby-throated Hummingbird	3
Yellow-bellied Sapsucker	2
Spotted Sandpiper	2
Yellow-billed Cuckoo	2
Yellow-headed Blackbird	2
Ruddy Duck	2
Dunlin	2
Alder Flycatcher	2
Willow Flycatcher	2
Broad-winged Hawk	2
Brown Creeper	2
Green-winged Teal	2
Hermit Thrush	2
Common Snipe	2
Mourning Warbler	2
Pileated Woodpecker	2

Bank Swallow	1
Acadian Flycatcher	1
Green Heron	1
Wood Thrush	1
Magnolia Warbler	1
Marsh Wren	1
Virginia Rail	1
Unidentified Vireo	1
Black-throated Green Warbler	1
Unidentified Buteo	1
Northern Shoveler	1
Black-and-white Warbler	1
Sora	1
Black-billed Cuckoo	1
Short-billed Dowitcher	1
Orange-crowned Warbler	1
Osprey	1
Pied-billed Grebe	1
Unidentified Hawk	1

ABUNDANCE DATA

Overall Mean Abundance

4

Total Abundance All Intervals

16112

Total Abundance 20 Min. Interval

16095

Mean Abundance By Point

Point Number	Mean Abundance
255804-001	4
255804-002	5
255804-003	2
255804-004	3
255804-005	5
255804-006	2
255804-007	2
255804-008	3
255804-009	4
255804-010	2
255804-011	7
255804-012	3
255804-013	5
255804-014	2
255804-015	3
255804-016	2
255804-017	3
255804-018	4

Mean Abundance By Habitat

Habitat Type	Mean Abundance
Agriculture - Cropland	3
Grassland-Non-native	5
Floodplain Forest	4
Marsh	5
Wetland Prairie	7

Waterfowl Abundance

Sample Date	Abundance
6/4/2015	57
6/18/2015	3
3/16/2016	112
3/17/2016	901
3/22/2016	52
3/25/2016	56
3/29/2016	29
4/5/2016	4
4/6/2016	34
4/11/2016	1
4/12/2016	12
4/20/2016	6
4/22/2016	21
4/28/2016	7
5/5/2016	3
5/6/2016	8
5/12/2016	19

5/20/2016	21
5/24/2016	2
5/26/2016	32
8/16/2016	1
8/29/2016	33
9/8/2016	53
9/15/2016	22
9/20/2016	39
9/27/2016	9
10/6/2016	202
10/10/2016	9
10/21/2016	26
10/25/2016	15
10/28/2016	28

Abundance by Date and Group All Groups		
6/2/2015	Passerine	50
6/4/2015	Passerine	126
6/4/2015	Raptor	2
6/4/2015	Waterbirds	5
6/4/2015	Waterfowl	57
6/18/2015	Passerine	196
6/18/2015	Raptor	7
6/18/2015	Waterbirds	4
6/18/2015	Waterfowl	3
6/24/2015	Passerine	15
6/24/2015	Raptor	2
6/24/2015	Waterbirds	5
6/25/2015	Passerine	172
6/25/2015	Raptor	3
6/25/2015	Waterbirds	8
3/16/2016	Passerine	150
3/16/2016	Raptor	12
3/16/2016	Waterbirds	4
3/16/2016	Waterfowl	112
3/17/2016	Passerine	208
3/17/2016	Raptor	3
3/17/2016	Waterbirds	8
3/17/2016	Waterfowl	901
3/22/2016	Passerine	317
3/22/2016	Raptor	2
3/22/2016	Waterbirds	17
3/22/2016	Waterfowl	52
3/25/2016	Passerine	126
3/25/2016	Raptor	1
3/25/2016	Waterbirds	10
3/25/2016	Waterfowl	56
3/29/2016	Passerine	713
3/29/2016	Raptor	14
3/29/2016	Waterbirds	36

Abundance by Date and Group Sensitive Groups		
6/2/2015	Passerine	4
6/4/2015	Passerine	4
6/4/2015	Raptor	2
6/18/2015	Passerine	2
6/24/2015	Waterbirds	4
6/25/2015	Passerine	5
3/16/2016	Raptor	2
3/17/2016	Raptor	2
3/22/2016	Raptor	1
3/25/2016	Waterfowl	26
3/29/2016	Passerine	3
3/29/2016	Raptor	5
3/29/2016	Waterbirds	1
4/5/2016	Raptor	2
4/6/2016	Raptor	1
4/6/2016	Waterbirds	2
4/11/2016	Raptor	1
4/12/2016	Passerine	1
4/12/2016	Raptor	1
4/20/2016	Passerine	6
4/22/2016	Passerine	7
4/22/2016	Raptor	2
4/28/2016	Passerine	14
4/28/2016	Raptor	1
5/5/2016	Passerine	7
5/5/2016	Raptor	2
5/6/2016	Passerine	12
5/6/2016	Raptor	1
5/6/2016	Waterbirds	1
5/12/2016	Passerine	23
5/12/2016	Raptor	4
5/20/2016	Passerine	30
5/20/2016	Waterbirds	1
5/24/2016	Passerine	7

3/29/2016	Waterfowl	29
4/5/2016	Passerine	362
4/5/2016	Raptor	4
4/5/2016	Waterbirds	7
4/5/2016	Waterfowl	4
4/6/2016	Passerine	101
4/6/2016	Raptor	3
4/6/2016	Waterbirds	28
4/6/2016	Waterfowl	34
4/11/2016	Passerine	269
4/11/2016	Raptor	6
4/11/2016	Waterbirds	7
4/11/2016	Waterfowl	1
4/12/2016	Passerine	117
4/12/2016	Raptor	2
4/12/2016	Waterbirds	6
4/12/2016	Waterfowl	12
4/20/2016	Passerine	253
4/20/2016	Raptor	2
4/20/2016	Waterbirds	7
4/20/2016	Waterfowl	6
4/22/2016	Passerine	304
4/22/2016	Raptor	3
4/22/2016	Waterbirds	3
4/22/2016	Waterfowl	21
4/27/2016	Passerine	44
4/27/2016	Waterbirds	2
4/28/2016	Passerine	251
4/28/2016	Raptor	2
4/28/2016	Waterbirds	3
4/28/2016	Waterfowl	7
5/5/2016	Passerine	222
5/5/2016	Raptor	2
5/5/2016	Waterbirds	6
5/5/2016	Waterfowl	3
5/6/2016	Passerine	241
5/26/2016	Passerine	32
5/26/2016	Raptor	2
8/16/2016	Passerine	1
8/18/2016	Passerine	4
8/23/2016	Passerine	5
8/26/2016	Passerine	5
8/26/2016	Raptor	1
8/29/2016	Passerine	27
8/29/2016	Waterbirds	2
8/30/2016	Passerine	7
9/9/2016	Passerine	7
9/9/2016	Waterbirds	16
9/15/2016	Passerine	3
9/20/2016	Passerine	10
9/20/2016	Waterbirds	14
9/27/2016	Passerine	3
9/27/2016	Raptor	8
10/4/2016	Passerine	1
10/4/2016	Raptor	2
10/6/2016	Passerine	2
10/6/2016	Raptor	3
10/6/2016	Waterbirds	18
10/10/2016	Raptor	4
10/13/2016	Raptor	1
10/18/2016	Passerine	2
10/18/2016	Raptor	1
10/21/2016	Raptor	1
10/21/2016	Waterbirds	2
10/25/2016	Raptor	1

5/6/2016	Raptor	3
5/6/2016	Waterbirds	17
5/6/2016	Waterfowl	8
5/12/2016	Passerine	503
5/12/2016	Raptor	8
5/12/2016	Waterbirds	6
5/12/2016	Waterfowl	19
5/19/2016	Passerine	40
5/19/2016	Waterbirds	1
5/20/2016	Passerine	263
5/20/2016	Raptor	1
5/20/2016	Waterbirds	10
5/20/2016	Waterfowl	21
5/24/2016	Passerine	231
5/24/2016	Raptor	3
5/24/2016	Waterbirds	15
5/24/2016	Waterfowl	2
5/26/2016	Passerine	206
5/26/2016	Raptor	3
5/26/2016	Waterbirds	17
5/26/2016	Waterfowl	32
6/16/2016	Passerine	17
8/16/2016	Passerine	148
8/16/2016	Raptor	5
8/16/2016	Waterfowl	1
8/18/2016	Passerine	238
8/18/2016	Raptor	1
8/18/2016	Waterbirds	30
8/23/2016	Passerine	258
8/23/2016	Raptor	7
8/23/2016	Waterbirds	1
8/26/2016	Passerine	206
8/26/2016	Raptor	5
8/29/2016	Passerine	354
8/29/2016	Raptor	1
8/29/2016	Waterbirds	2

8/29/2016	Waterfowl	33
8/30/2016	Passerine	192
8/30/2016	Raptor	5
8/30/2016	Waterbirds	5
9/8/2016	Passerine	324
9/8/2016	Raptor	2
9/8/2016	Waterbirds	4
9/8/2016	Waterfowl	53
9/9/2016	Passerine	265
9/9/2016	Raptor	2
9/9/2016	Waterbirds	21
9/15/2016	Passerine	192
9/15/2016	Raptor	8
9/15/2016	Waterfowl	22
9/20/2016	Passerine	1478
9/20/2016	Raptor	14
9/20/2016	Waterbirds	19
9/20/2016	Waterfowl	39
9/27/2016	Passerine	407
9/27/2016	Raptor	36
9/27/2016	Waterfowl	9
10/4/2016	Passerine	113
10/4/2016	Raptor	5
10/6/2016	Passerine	189
10/6/2016	Raptor	3
10/6/2016	Waterbirds	165
10/6/2016	Waterfowl	202
10/10/2016	Passerine	231
10/10/2016	Raptor	19
10/10/2016	Waterbirds	17
10/10/2016	Waterfowl	9
10/13/2016	Passerine	101
10/13/2016	Raptor	1
10/13/2016	Waterbirds	3
10/18/2016	Passerine	1154
10/18/2016	Raptor	13

10/18/2016	Waterbirds	8
10/21/2016	Passerine	361
10/21/2016	Raptor	1
10/21/2016	Waterbirds	2
10/21/2016	Waterfowl	26
10/25/2016	Passerine	1727
10/25/2016	Raptor	1
10/25/2016	Waterfowl	15
10/28/2016	Passerine	83
10/28/2016	Waterfowl	28

MEAN USE DATA

Mean Annual Use By Group

Group	Mean Use
Passerine	8.62
Raptor	0.40
Waterbirds	0.46
Waterfowl	0.33

Mean Annual Use By Species

Species	Mean Use
Acadian Flycatcher	0.00
Alder Flycatcher	0.00
American Coot	0.02
American Crow	0.47
American Golden-Plover	0.02
American Goldfinch	0.43
American Kestrel	0.07
American Pipit	0.01
American Redstart	0.02
American Robin	0.78
American Tree Sparrow	0.02
Bald Eagle	0.04
Baltimore Oriole	0.02
Bank Swallow	0.00
Barn Swallow	0.42
Belted Kingfisher	0.01
Black-and-white Warbler	0.00
Black-bellied Plover	0.00
Black-billed Cuckoo	0.00
Black-capped Chickadee	0.16
Blackpoll Warbler	0.01
Black-throated Green Wa	0.00
Blue Jay	0.28
Blue-winged Teal	0.01
Blue-winged Warbler	0.01
Bobolink	0.07
Brewer's Blackbird	0.00
Broad-winged Hawk	0.00
Brown Creeper	0.00
Brown Thrasher	0.04
Brown-headed Cowbird	0.40
Canada Goose	0.16

Cedar Waxwing	0.03
Chimney Swift	0.01
Chipping Sparrow	0.11
Clay-colored Sparrow	0.00
Cliff Swallow	0.19
Common Grackle	0.71
Common Nighthawk	0.01
Common Snipe	0.00
Common Yellowthroat	0.05
Cooper's Hawk	0.02
Dark-eyed Junco	0.09
Dickcissel	0.00
Double-crested Cormoran	0.00
Downy Woodpecker	0.08
Dunlin	0.00
Eastern Bluebird	0.04
Eastern Kingbird	0.04
Eastern Meadowlark	0.04
Eastern Phoebe	0.08
Eastern Wood-Pewee	0.02
European Starling	0.19
Field Sparrow	0.00
Fox Sparrow	0.02
Franklin's Gull	0.00
Golden-crowned Kinglet	0.00
Grasshopper Sparrow	0.01
Gray Catbird	0.03
Gray Partridge	0.00
Great Blue Heron	0.04
Great Crested Flycatcher	0.02
Greater White-fronted G	0.00
Green Heron	0.00
Green-winged Teal	0.00
Hairy Woodpecker	0.05
Hermit Thrush	0.00
Hooded Merganser	0.00

Horned Lark	0.89
House Finch	0.00
House Sparrow	0.04
House Wren	0.05
Indigo Bunting	0.06
Killdeer	0.28
Lapland Longspur	0.12
Least Flycatcher	0.01
Lesser Scaup	0.00
Lincoln's Sparrow	0.00
Magnolia Warbler	0.00
Mallard	0.09
Marsh Wren	0.00
Mourning Dove	0.14
Mourning Warbler	0.00
Nashville Warbler	0.01
Northern Cardinal	0.10
Northern Flicker	0.08
Northern Harrier	0.06
Northern Rough-winged S	0.02
Northern Shoveler	0.00
Orange-crowned Warbler	0.00
Osprey	0.00
Palm Warbler	0.02
Pectoral Sandpiper	0.01
Pied-billed Grebe	0.00
Pileated Woodpecker	0.00
Red-bellied Woodpecker	0.06
Red-eyed Vireo	0.02
Red-headed Woodpecker	0.01
Red-tailed Hawk	0.11
Red-winged Blackbird	0.76
Ring-billed Gull	0.00
Ring-necked Duck	0.01
Ring-necked Pheasant	0.04
Rock Pigeon	0.03

Rose-breasted Grosbeak	0.02
Ruby-crowned Kinglet	0.02
Ruby-throated Humming	0.01
Ruddy Duck	0.00
Sanderling	0.00
Sandhill Crane	0.03
Savannah Sparrow	0.05
Scarlet Tanager	0.01
Sedge Wren	0.05
Sharp-shinned Hawk	0.03
Short-billed Dowitcher	0.00
Snow Bunting	0.00
Snow Goose	0.00
Song Sparrow	0.37
Sora	0.00
Spotted Sandpiper	0.00
Swamp Sparrow	0.02
Tennessee Warbler	0.01
Tree Swallow	0.08
Turkey Vulture	0.06
Unidentified Bird	0.00
Unidentified Buteo	0.00
Unidentified Duck	0.01
Unidentified Hawk	0.00
Unidentified Passerine	0.12
Unidentified Raptor	0.01
Unidentified Shorebird	0.02
Unidentified Sparrow	0.02
Unidentified Swallow	0.01
Unidentified Vireo	0.00
Unidentified Warbler	0.05
Upland Sandpiper	0.01
Vesper Sparrow	0.16
Virginia Rail	0.00
Warbling Vireo	0.01
Western Meadowlark	0.00

White-breasted Nuthatch	0.05
White-throated Sparrow	0.02
Wild Turkey	0.02
Willow Flycatcher	0.00
Wilson's Snipe	0.01
Wilson's Warbler	0.01
Wood Duck	0.03
Wood Thrush	0.00
Yellow Warbler	0.01
Yellow-bellied Sapsucker	0.00
Yellow-billed Cuckoo	0.00
Yellow-headed Blackbird	0.00
Yellow-rumped Warbler	0.03
Yellow-throated Vireo	0.01

FLIGHT HEIGHT DATA

Mean Flight Height

11 meters

Mean Flight Height By Point

Point #	Mean Flight Height
255804-00	11 meters
255804-00	13 meters
255804-00	13 meters
255804-00	13 meters
255804-00	9 meters
255804-00	8 meters
255804-00	9 meters
255804-00	12 meters
255804-00	16 meters
255804-01	11 meters
255804-01	12 meters
255804-01	10 meters
255804-01	12 meters
255804-01	14 meters
255804-01	12 meters
255804-01	12 meters
255804-01	9 meters
255804-01	11 meters

Total Flights By Group

Group	Total Flights
Passerine	10607
Raptor	182
Waterbirds	317
Waterfowl	1704

Mean Flight Height By Group

Group	Mean Flight Height
Passerine	10 m
Raptor	21 m
Waterbirds	20 m
Waterfowl	26 m

Mean Flight Height By Species

Species	Mean Flight Height
	m
Acadian Flycatcher	m
Alder Flycatcher	m
American Coot	14 m
American Crow	10 m
American Golden-Plover	6 m
American Goldfinch	11 m
American Kestrel	13 m
American Pipit	14 m
American Redstart	6 m
American Robin	9 m
American Tree Sparrow	2 m
Bald Eagle	40 m
Baltimore Oriole	7 m
Bank Swallow	2 m
Barn Swallow	8 m
Belted Kingfisher	15 m
Black-and-white Warbler	m
Black-bellied Plover	5 m
Black-billed Cuckoo	m
Black-capped Chickadee	3 m
Blackpoll Warbler	4 m
Black-throated Green Warble	m
Blue Jay	9 m
Blue-winged Teal	27 m
Blue-winged Warbler	m
Bobolink	5 m
Brewer's Blackbird	10 m
Broad-winged Hawk	30 m
Brown Creeper	m
Brown Thrasher	3 m

Brown-headed Cowbird	6 m
Canada Goose	25 m
Cedar Waxwing	11 m
Chimney Swift	7 m
Chipping Sparrow	4 m
Clay-colored Sparrow	m
Cliff Swallow	10 m
Common Grackle	11 m
Common Nighthawk	43 m
Common Snipe	5 m
Common Yellowthroat	2 m
Cooper's Hawk	33 m
Dark-eyed Junco	3 m
Dickcissel	2 m
Double-crested Cormorant	100 m
Downy Woodpecker	9 m
Dunlin	5 m
Eastern Bluebird	6 m
Eastern Kingbird	4 m
Eastern Meadowlark	3 m
Eastern Phoebe	4 m
Eastern Wood-Pewee	m
European Starling	7 m
Field Sparrow	3 m
Fox Sparrow	3 m
Franklin's Gull	23 m
Golden-crowned Kinglet	m
Grasshopper Sparrow	m
Gray Catbird	m
Gray Partridge	2 m
Great Blue Heron	21 m
Great Crested Flycatcher	8 m
Greater White-fronted Goose	45 m
Green Heron	10 m
Green-winged Teal	m

Hairy Woodpecker	8 m
Hermit Thrush	m
Hooded Merganser	25 m
Horned Lark	13 m
House Finch	22 m
House Sparrow	7 m
House Wren	1 m
Indigo Bunting	8 m
Killdeer	16 m
Lapland Longspur	18 m
Least Flycatcher	m
Lesser Scaup	30 m
Lincoln's Sparrow	1 m
Magnolia Warbler	m
Mallard	28 m
Marsh Wren	m
Mourning Dove	9 m
Mourning Warbler	m
Nashville Warbler	m
Northern Cardinal	4 m
Northern Flicker	9 m
Northern Harrier	7 m
Northern Rough-winged Swal	22 m
Northern Shoveler	m
Orange-crowned Warbler	m
Osprey	15 m
Palm Warbler	4 m
Pectoral Sandpiper	2 m
Pied-billed Grebe	m
Pileated Woodpecker	10 m
Red-bellied Woodpecker	5 m
Red-eyed Vireo	30 m
Red-headed Woodpecker	8 m
Red-tailed Hawk	21 m
Red-winged Blackbird	9 m

Ring-billed Gull	20 m
Ring-necked Duck	20 m
Ring-necked Pheasant	1 m
Rock Pigeon	14 m
Rose-breasted Grosbeak	m
Ruby-crowned Kinglet	5 m
Ruby-throated Hummingbird	5 m
Ruddy Duck	m
Sanderling	10 m
Sandhill Crane	40 m
Savannah Sparrow	6 m
Scarlet Tanager	20 m
Sedge Wren	1 m
Sharp-shinned Hawk	20 m
Short-billed Dowitcher	m
Snow Bunting	6 m
Snow Goose	20 m
Song Sparrow	2 m
Sora	m
Spotted Sandpiper	5 m
Swamp Sparrow	m
Tennessee Warbler	m
Tree Swallow	13 m
Turkey Vulture	26 m
Unidentified Bird	10 m
Unidentified Buteo	20 m
Unidentified Duck	28 m
Unidentified Hawk	150 m
Unidentified Passerine	7 m
Unidentified Raptor	4 m
Unidentified Shorebird	18 m
Unidentified Sparrow	10 m
Unidentified Swallow	18 m
Unidentified Vireo	15 m
Unidentified Warbler	19 m

Upland Sandpiper	90 m
Vesper Sparrow	5 m
Virginia Rail	m
Warbling Vireo	10 m
Western Meadowlark	4 m
White-breasted Nuthatch	5 m
White-throated Sparrow	2 m
Wild Turkey	m
Willow Flycatcher	m
Wilson's Snipe	12 m
Wilson's Warbler	m
Wood Duck	21 m
Wood Thrush	m
Yellow Warbler	5 m
Yellow-bellied Sapsucker	m
Yellow-billed Cuckoo	8 m
Yellow-headed Blackbird	m
Yellow-rumped Warbler	14 m
Yellow-throated Vireo	10 m

FLIGHT ZONE DATA

All Flight Zones Summary

% in Flight Zones: All Species	
<20m:	75.98%
20-150m:	23.84%
>150m:	0.18%

% in Flight Zones: Sensitive Species	
<20m:	67.96117%
20-150m:	31.55340%
>150m:	0.48544%

Rotor Sweep Zone

% in Rotor Sweep By Sensitive Species

Group	Abundance	%
Bald Eagle	10	58.824%
Common Nighthaw	3	12.000%
Franklin's Gull	14	100.000%
Lesser Scaup	26	100.000%
Northern Harrier	3	11.111%
Northern Rough-wi	6	54.545%
Upland Sandpiper	3	100.000%

% in Rotor Sweep By Sensitive Group

Group	Abundance	%
Passerine	9	4.369%
Raptor	13	6.311%
Waterbirds	17	8.252%
Waterfowl	26	12.621%

% in Rotor Sweep By All Species

Group	Abundance	%
American Coot	3	18.750%
American Crow	54	14.876%
American Goldfinc	69	19.167%
American Kestrel	4	21.053%
American Pipit	8	57.143%
American Robin	62	12.971%
Bald Eagle	10	58.824%
Barn Swallow	60	12.195%
Belted Kingfisher	1	33.333%
Blue Jay	72	19.251%
Blue-winged Teal	202	99.020%
Broad-winged Haw	1	50.000%
Brown-headed Co	7	2.800%
Canada Goose	260	64.677%
Cliff Swallow	118	25.160%
Common Grackle	164	11.469%
Common Nighthaw	3	12.000%
Cooper's Hawk	9	90.000%
Double-crested Cor	6	100.000%
European Starling	4	1.028%
Franklin's Gull	14	100.000%
Great Blue Heron	8	36.364%
Greater White-fron	336	100.000%
Hooded Merganser	9	100.000%
Horned Lark	73	23.028%

House Finch	5	100.000%
Indigo Bunting	2	16.667%
Killdeer	30	31.250%
Lapland Longspur	216	36.181%
Lesser Scaup	26	100.000%
Mallard	322	87.978%
Mourning Dove	7	10.145%
Northern Flicker	1	5.000%
Northern Harrier	3	11.111%
Northern Rough-wi	6	54.545%
Red-eyed Vireo	3	100.000%
Red-tailed Hawk	16	41.026%
Red-winged Blackbi	181	4.677%
Ring-billed Gull	2	100.000%
Ring-necked Duck	1	100.000%
Rock Pigeon	6	22.222%
Sandhill Crane	9	64.286%
Scarlet Tanager	1	100.000%
Sharp-shinned Haw	7	58.333%
Snow Goose	20	100.000%
Tree Swallow	39	35.780%
Turkey Vulture	34	77.273%
Unidentified Bird	14	93.333%
Unidentified Buteo	1	100.000%
Unidentified Duck	306	99.351%
Unidentified Hawk	1	100.000%
Unidentified Passer	6	6.250%
Unidentified Shore	101	93.519%
Unidentified Sparro	7	31.818%
Unidentified Swallo	20	95.238%
Unidentified Warbl	73	62.931%
Upland Sandpiper	3	100.000%
Wood Duck	22	68.750%
Yellow-rumped Wa	6	21.429%

% in Rotor Sweep By All Groups

Group	Abundance	%
Passerine	1288	10.055%
Raptor	86	0.671%
Waterbirds	176	1.374%
Waterfowl	1504	11.741%

Less than 30 meters

% < 20 meters By Sensitive Groups

Group	Abundance	%
Passerine	96	46.602%
Raptor	30	14.563%
Waterbirds	14	6.796%

% < 20 meters By All Groups

Group	Abundance	%
Passerine	9312	72.693%
Raptor	95	0.742%
Waterbirds	141	1.101%
Waterfowl	185	1.444%

% < 20 meters By Sensitive Species

Group	Abundance	%
American Golden-Plover	12	100.000%
Bald Eagle	6	35.294%
Bobolink	39	100.000%
Brown Thrasher	1	100.000%
Common Nighthawk	22	88.000%
Dickcissel	5	100.000%
Dunlin	2	100.000%
Eastern Meadowlark	9	100.000%
Field Sparrow	2	100.000%
Northern Harrier	24	88.889%
Northern Rough-winged Swallo	5	45.455%
Red-headed Woodpecker	4	100.000%
Sedge Wren	3	100.000%
White-throated Sparrow	6	100.000%

% < 20 meters By All Species

Group	Abundance	%
American Coot	13	81.250%
American Crow	309	85.124%
American Golden-Plover	12	100.000%
American Goldfinch	291	80.833%
American Kestrel	15	78.947%
American Pipit	6	42.857%
American Redstart	4	100.000%
American Robin	416	87.029%
American Tree Sparrow	1	100.000%
Bald Eagle	6	35.294%
Baltimore Oriole	7	100.000%
Bank Swallow	1	100.000%
Barn Swallow	425	86.382%
Belted Kingfisher	2	66.667%
Black-bellied Plover	5	100.000%
Black-capped Chickadee	29	100.000%
Blackpoll Warbler	2	100.000%
Blue Jay	302	80.749%
Blue-winged Teal	2	0.980%
Bobolink	39	100.000%
Brewer's Blackbird	100	100.000%
Broad-winged Hawk	1	50.000%
Brown Thrasher	1	100.000%
Brown-headed Cowbird	243	97.200%
Canada Goose	127	31.592%

Cedar Waxwing	22	100.000%
Chimney Swift	3	100.000%
Chipping Sparrow	23	100.000%
Cliff Swallow	351	74.840%
Common Grackle	1266	88.531%
Common Nighthawk	22	88.000%
Common Snipe	2	100.000%
Common Yellowthroat	1	100.000%
Cooper's Hawk	1	10.000%
Dark-eyed Junco	118	100.000%
Dickcissel	5	100.000%
Downy Woodpecker	10	100.000%
Dunlin	2	100.000%
Eastern Bluebird	16	100.000%
Eastern Kingbird	16	100.000%
Eastern Meadowlark	9	100.000%
Eastern Phoebe	15	100.000%
European Starling	385	98.972%
Field Sparrow	2	100.000%
Fox Sparrow	2	100.000%
Gray Partridge	4	100.000%
Great Blue Heron	14	63.636%
Great Crested Flycatcher	4	100.000%
Green Heron	1	100.000%
Hairy Woodpecker	9	100.000%
Horned Lark	244	76.972%
House Sparrow	32	100.000%
House Wren	1	100.000%
Indigo Bunting	10	83.333%
Killdeer	66	68.750%
Lapland Longspur	381	63.819%
Lincoln's Sparrow	2	100.000%
Mallard	44	12.022%
Mourning Dove	62	89.855%
Northern Cardinal	4	100.000%
Northern Flicker	19	95.000%

Northern Harrier	24	88.889%
Northern Rough-winged Swallo	5	45.455%
Osprey	1	100.000%
Palm Warbler	9	100.000%
Pectoral Sandpiper	7	100.000%
Pileated Woodpecker	1	100.000%
Red-bellied Woodpecker	5	100.000%
Red-headed Woodpecker	4	100.000%
Red-tailed Hawk	23	58.974%
Red-winged Blackbird	3689	95.323%
Ring-necked Pheasant	1	100.000%
Rock Pigeon	21	77.778%
Ruby-crowned Kinglet	1	100.000%
Ruby-throated Hummingbird	3	100.000%
Sanderling	3	100.000%
Sandhill Crane	5	35.714%
Savannah Sparrow	13	100.000%
Sedge Wren	3	100.000%
Sharp-shinned Hawk	5	41.667%
Snow Bunting	16	100.000%
Song Sparrow	40	100.000%
Spotted Sandpiper	2	100.000%
Tree Swallow	70	64.220%
Turkey Vulture	10	22.727%
Unidentified Bird	1	6.667%
Unidentified Duck	2	0.649%
Unidentified Passerine	90	93.750%
Unidentified Raptor	9	100.000%
Unidentified Shorebird	7	6.481%
Unidentified Sparrow	15	68.182%
Unidentified Swallow	1	4.762%
Unidentified Vireo	1	100.000%
Unidentified Warbler	43	37.069%
Vesper Sparrow	16	100.000%
Warbling Vireo	2	100.000%
Western Meadowlark	6	100.000%

White-breasted Nuthatch	5	100.000%
White-throated Sparrow	6	100.000%
Wilson's Snipe	2	100.000%
Wood Duck	10	31.250%
Yellow Warbler	1	100.000%
Yellow-billed Cuckoo	2	100.000%
Yellow-rumped Warbler	22	78.571%
Yellow-throated Vireo	4	100.000%

More than 150 meters

% > 150 meters By Sensitive Groups

Group	Abundance	%
Raptor	1	0.485%

% > 150 meters By All Groups

Group	Abundance	%
Passerine	7	0.055%
Raptor	1	0.008%
Waterfowl	15	0.117%

% > 150 meters By Sensitive Species

Group	Abundance	%
Bald Eagle	1	5.882%

% > 150 meters By All Species

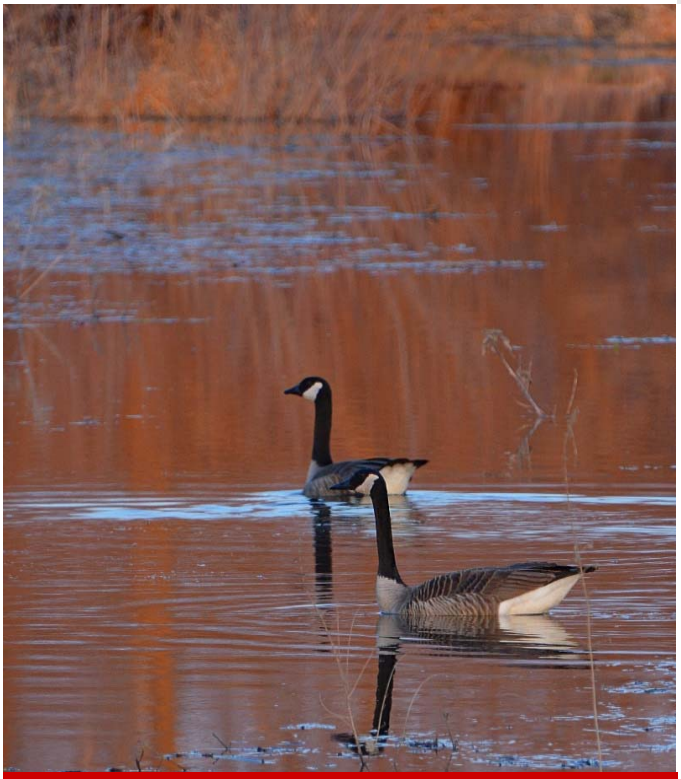
Group	Abundance	%
Bald Eagle	1	5.882%
Barn Swallow	7	1.423%
Canada Goose	15	3.731%

OBSERVATION DATA

Total Observations By Date

Sample Date	Abundance
6/2/2015	50
6/4/2015	190
6/18/2015	210
6/24/2015	22
6/25/2015	183
3/16/2016	278
3/17/2016	1120
3/22/2016	388
3/25/2016	193
3/29/2016	792
4/5/2016	377
4/6/2016	166
4/11/2016	283
4/12/2016	137
4/20/2016	268
4/22/2016	331
4/27/2016	46
4/28/2016	263
5/5/2016	233
5/6/2016	269
5/12/2016	536
5/19/2016	41
5/20/2016	295
5/24/2016	251
5/26/2016	258
6/16/2016	17
8/16/2016	154
8/18/2016	269
8/23/2016	266
8/26/2016	211
8/29/2016	390
8/30/2016	202
9/8/2016	383
9/9/2016	288
9/15/2016	222
9/20/2016	1550
9/27/2016	452
10/4/2016	118
10/6/2016	559
10/10/2016	276
10/13/2016	105

10/18/2016	1175
10/21/2016	390
10/25/2016	1743
10/28/2016	111



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Wetland Use Data

Ashland Township Wetland				
Common Name	Scientific Name	Abundance	Location	Date
American Coot	Fulica americana	60	Ashland	3/29/2016
American Wigeon	Anas americana	10	Ashland	3/29/2016
Bald Eagle	Haliaeetus leucocephalus	2	Ashland	3/29/2016
Blue-winged Teal	Anas discors	6	Ashland	3/29/2016
Green-winged Teal	Anas crecca	20	Ashland	3/29/2016
Lesser Scaup	Aythya affinis	50	Ashland	3/29/2016
Mallard	Anas platyrhynchos	24	Ashland	3/29/2016
Northern Shoveler	Anas clypeata	20	Ashland	3/29/2016
Redhead	Aythya americana	30	Ashland	3/29/2016
Ring-necked Duck	Aythya collaris	10	Ashland	3/29/2016
Ruddy Duck	Oxyura jamaicensis	6	Ashland	3/29/2016
Sandhill Crane	Antigone canadensis	2	Ashland	3/29/2016
American Coot	Fulica americana	30	Ashland	4/5/2016
American Robin	Turdus migratorius	1	Ashland	4/5/2016
Bald Eagle	Haliaeetus leucocephalus	2	Ashland	4/5/2016
Blue-winged Teal	Anas discors	9	Ashland	4/5/2016
Dark-eyed Junco	Junco hyemalis	30	Ashland	4/5/2016
Green-winged Teal	Anas crecca	6	Ashland	4/5/2016
Lesser Scaup	Aythya affinis	20	Ashland	4/5/2016
Mallard	Anas platyrhynchos	100	Ashland	4/5/2016
Northern Shoveler	Anas clypeata	10	Ashland	4/5/2016
Redhead	Aythya americana	30	Ashland	4/5/2016
Ring-necked Duck	Aythya collaris	20	Ashland	4/5/2016
Ruddy Duck	Oxyura jamaicensis	6	Ashland	4/5/2016
American Coot	Fulica americana	30	Ashland	4/7/2016
American Crow	Corvus brachyrhynchos	4	Ashland	4/7/2016
American Robin	Turdus migratorius	1	Ashland	4/7/2016
American Tree Sparrow	Spizelloides arborea	2	Ashland	4/7/2016
Canada Goose	Branta canadensis	4	Ashland	4/7/2016
Eastern Meadowlark	Sturnella magna	1	Ashland	4/7/2016
Mallard	Anas platyrhynchos	15	Ashland	4/7/2016
Northern Flicker	Colaptes auratus	1	Ashland	4/7/2016
Northern Harrier	Circus cyaneus	1	Ashland	4/7/2016
Northern Shoveler	Anas clypeata	4	Ashland	4/7/2016
Redhead	Aythya americana	10	Ashland	4/7/2016
Red-tailed Hawk	Buteo jamaicensis	1	Ashland	4/7/2016
Ring-necked Duck	Aythya collaris	30	Ashland	4/7/2016
Ruddy Duck	Oxyura jamaicensis	4	Ashland	4/7/2016
Sandhill Crane	Antigone canadensis	2	Ashland	4/7/2016
American Coot	Fulica americana	12	Ashland	5/5/2016
American Crow	Corvus brachyrhynchos	2	Ashland	5/5/2016
Bald Eagle	Haliaeetus leucocephalus	1	Ashland	5/5/2016
Barn Swallow	Hirundo rustica	2	Ashland	5/5/2016

Oak Glen Wetland				
Common Name	Scientific Name	Abundance	Location	Date
Greater White-fronted Goo	Anser albifrons	400	Oak Glen	3/29/2016
Canada Goose	Branta canadensis	8	Oak Glen	3/29/2016
Gadwall	Anas strepera	50	Oak Glen	3/29/2016
Mallard	Anas platyrhynchos	12	Oak Glen	3/29/2016
Redhead	Aythya americana	500	Oak Glen	3/29/2016
Ring-necked Duck	Aythya collaris	100	Oak Glen	3/29/2016
Lesser Scaup	Aythya affinis	100	Oak Glen	3/29/2016
Bufflehead	Bucephala albeola	6	Oak Glen	3/29/2016
Ruddy Duck	Oxyura jamaicensis	30	Oak Glen	3/29/2016
Bald Eagle	Haliaeetus leucocephalus	1	Oak Glen	3/29/2016
American Coot	Fulica americana	300	Oak Glen	3/29/2016
Ring-billed Gull	Larus delawarensis	30	Oak Glen	3/29/2016
Dark-eyed Junco	Junco hyemalis	4	Oak Glen	3/29/2016
Song Sparrow	Melospiza melodia	1	Oak Glen	3/29/2016
Canada Goose	Branta canadensis	16	Oak Glen	4/5/2016
Tundra Swan	Cygnus columbianus	2	Oak Glen	4/5/2016
Gadwall	Anas strepera	100	Oak Glen	4/5/2016
American Wigeon	Anas americana	10	Oak Glen	4/5/2016
Canvasback	Aythya valisineria	200	Oak Glen	4/5/2016
Redhead	Aythya americana	200	Oak Glen	4/5/2016
Ring-necked Duck	Aythya collaris	200	Oak Glen	4/5/2016
Lesser Scaup	Aythya affinis	200	Oak Glen	4/5/2016
Bufflehead	Bucephala albeola	6	Oak Glen	4/5/2016
Ruddy Duck	Oxyura jamaicensis	6	Oak Glen	4/5/2016
Pied-billed Grebe	Podilymbus podiceps	1	Oak Glen	4/5/2016
American Coot	Fulica americana	600	Oak Glen	4/5/2016
Ring-billed Gull	Larus delawarensis	2	Oak Glen	4/5/2016
Song Sparrow	Melospiza melodia	1	Oak Glen	4/5/2016
Greater White-fronted Goo	Anser albifrons	200	Oak Glen	4/7/2016
Canada Goose	Branta canadensis	12	Oak Glen	4/7/2016
Gadwall	Anas strepera	100	Oak Glen	4/7/2016
American Wigeon	Anas americana	30	Oak Glen	4/7/2016
Mallard	Anas platyrhynchos	6	Oak Glen	4/7/2016
Redhead	Aythya americana	100	Oak Glen	4/7/2016
Ring-necked Duck	Aythya collaris	50	Oak Glen	4/7/2016
Lesser Scaup	Aythya affinis	50	Oak Glen	4/7/2016
Ruddy Duck	Oxyura jamaicensis	10	Oak Glen	4/7/2016
Pied-billed Grebe	Podilymbus podiceps	1	Oak Glen	4/7/2016
Horned Grebe	Podiceps auritus	1	Oak Glen	4/7/2016
American Coot	Fulica americana	300	Oak Glen	4/7/2016
Ring-billed Gull	Larus delawarensis	30	Oak Glen	4/7/2016
Canada Goose	Branta canadensis	15	Oak Glen	5/5/2016
Trumpeter Swan	Cygnus buccinator	2	Oak Glen	5/5/2016

Ashland Township Wetland					Oak Glen Wetland				
Common Name	Scientific Name	Abundance	Location	Date	Common Name	Scientific Name	Abundance	Location	Date
Blue-winged Teal	Anas discors	6	Ashland	5/5/2016	Lesser Scaup	Aythya affinis	4	Oak Glen	5/5/2016
Bobolink	Dolichonyx oryzivorus	3	Ashland	5/5/2016	Bufflehead	Bucephala albeola	2	Oak Glen	5/5/2016
Canada Goose	Branta canadensis	2	Ashland	5/5/2016	Common Goldeneye	Bucephala clangula	1	Oak Glen	5/5/2016
Lesser Scaup	Aythya affinis	1	Ashland	5/5/2016	Hooded Merganser	Lophodytes cucullatus	1	Oak Glen	5/5/2016
Mallard	Anas platyrhynchos	3	Ashland	5/5/2016	Ruddy Duck	Oxyura jamaicensis	20	Oak Glen	5/5/2016
Pied-billed Grebe	Podilymbus podiceps	6	Ashland	5/5/2016	Pied-billed Grebe	Podilymbus podiceps	20	Oak Glen	5/5/2016
Red-winged Blackbird	Agelaius phoeniceus	2	Ashland	5/5/2016	Horned Grebe	Podiceps auritus	2	Oak Glen	5/5/2016
Ruddy Duck	Oxyura jamaicensis	2	Ashland	5/5/2016	Double-crested Cormorant	Phalacrocorax auritus	5	Oak Glen	5/5/2016
Sandhill Crane	Antigone canadensis	1	Ashland	5/5/2016	American White Pelican	Pelecanus erythrorhynchos	3	Oak Glen	5/5/2016
Song Sparrow	Melospiza melodia	1	Ashland	5/5/2016	American Coot	Fulica americana	40	Oak Glen	5/5/2016
Sora	Porzana carolina	1	Ashland	5/5/2016	Mourning Dove	Zenaida macroura	1	Oak Glen	5/5/2016
Vesper Sparrow	Pooecetes gramineus	2	Ashland	5/5/2016	Downy Woodpecker	Picoides pubescens	1	Oak Glen	5/5/2016
American Coot	Fulica americana	1	Ashland	5/12/2016	Tree Swallow	Tachycineta bicolor	1	Oak Glen	5/5/2016
Bank Swallow	Riparia riparia	5	Ashland	5/12/2016	American Robin	Turdus migratorius	1	Oak Glen	5/5/2016
Barn Swallow	Hirundo rustica	50	Ashland	5/12/2016	Brown Thrasher	Toxostoma rufum	3	Oak Glen	5/5/2016
Black Tern	Chlidonias niger	2	Ashland	5/12/2016	Song Sparrow	Melospiza melodia	2	Oak Glen	5/5/2016
Blue-winged Teal	Anas discors	2	Ashland	5/12/2016	Red-winged Blackbird	Agelaius phoeniceus	20	Oak Glen	5/5/2016
Bobolink	Dolichonyx oryzivorus	20	Ashland	5/12/2016	Common Grackle	Quiscalus quiscula	6	Oak Glen	5/5/2016
Brown-headed Cowbird	Molothrus ater	2	Ashland	5/12/2016	American Goldfinch	Spinus tristis	2	Oak Glen	5/5/2016
Cooper's Hawk	Accipiter cooperii	1	Ashland	5/12/2016	Canada Goose	Branta canadensis	6	Oak Glen	5/12/2016
Northern Rough-winged S	Stelgidopteryx serripennis	6	Ashland	5/12/2016	Mallard	Anas platyrhynchos	2	Oak Glen	5/12/2016
Pied-billed Grebe	Podilymbus podiceps	2	Ashland	5/12/2016	Lesser Scaup	Aythya affinis	5	Oak Glen	5/12/2016
Redhead	Aythya americana	5	Ashland	5/12/2016	Ruddy Duck	Oxyura jamaicensis	30	Oak Glen	5/12/2016
Red-tailed Hawk	Buteo jamaicensis	1	Ashland	5/12/2016	Bald Eagle	Haliaeetus leucocephalus	1	Oak Glen	5/12/2016
Sharp-shinned Hawk	Accipiter striatus	1	Ashland	5/12/2016	Black Tern	Chlidonias niger	13	Oak Glen	5/12/2016
Song Sparrow	Melospiza melodia	1	Ashland	5/12/2016	Peregrine Falcon	Falco peregrinus	1	Oak Glen	5/12/2016
Sora	Porzana carolina	1	Ashland	5/12/2016	Yellow-throated Vireo	Vireo flavifrons	6	Oak Glen	5/12/2016
Tree Swallow	Tachycineta bicolor	40	Ashland	5/12/2016	Barn Swallow	Hirundo rustica	10	Oak Glen	5/12/2016
American Coot	Fulica americana	1	Ashland	5/24/2016	Common Yellowthroat	Geothlypis trichas	1	Oak Glen	5/12/2016
Black Tern	Chlidonias niger	7	Ashland	5/24/2016	Yellow Warbler	Setophaga petechia	1	Oak Glen	5/12/2016
Bobolink	Dolichonyx oryzivorus	25	Ashland	5/24/2016	Chipping Sparrow	Spizella passerina	1	Oak Glen	5/12/2016
Canada Goose	Branta canadensis	17	Ashland	5/24/2016	Song Sparrow	Melospiza melodia	1	Oak Glen	5/12/2016
Cliff Swallow	Petrochelidon pyrrhonota	2	Ashland	5/24/2016	Red-winged Blackbird	Agelaius phoeniceus	6	Oak Glen	5/12/2016
Common Grackle	Quiscalus quiscula	6	Ashland	5/24/2016	Common Grackle	Quiscalus quiscula	3	Oak Glen	5/12/2016
Common Yellowthroat	Geothlypis trichas	3	Ashland	5/24/2016	Baltimore Oriole	Icterus galbula	1	Oak Glen	5/12/2016
Double-crested Cormorar	Phalacrocorax auritus	1	Ashland	5/24/2016	Canada Goose	Branta canadensis	12	Oak Glen	5/24/2016
Eastern Meadowlark	Sturnella magna	1	Ashland	5/24/2016	Ring-necked Duck	Aythya collaris	1	Oak Glen	5/24/2016
Grasshopper Sparrow	Ammodramus savannarum	2	Ashland	5/24/2016	Franklin's Gull	Leucophaeus pipixcan	2	Oak Glen	5/24/2016
Hooded Merganser	Lophodytes cucullatus	3	Ashland	5/24/2016	Forster's Tern	Sterna forsteri	21	Oak Glen	5/24/2016
Mourning Dove	Zenaida macroura	2	Ashland	5/24/2016	Willow Flycatcher	Empidonax traillii	1	Oak Glen	5/24/2016
Northern Rough-winged S	Stelgidopteryx serripennis	2	Ashland	5/24/2016	Warbling Vireo	Vireo gilvus	1	Oak Glen	5/24/2016
Red-winged Blackbird	Agelaius phoeniceus	8	Ashland	5/24/2016	Black-capped Chickadee	Poecile atricapillus	1	Oak Glen	5/24/2016
Ring-necked Pheasant	Phasianus colchicus	1	Ashland	5/24/2016	Gray Catbird	Dumetella carolinensis	1	Oak Glen	5/24/2016

Ashland Township Wetland					Oak Glen Wetland				
Common Name	Scientific Name	Abundance	Location	Date	Common Name	Scientific Name	Abundance	Location	Date
Sedge Wren	Cistothorus platensis	4	Ashland	5/24/2016	Yellow Warbler	Setophaga petechia	1	Oak Glen	5/24/2016
Tree Swallow	Tachycineta bicolor	2	Ashland	5/24/2016	Chestnut-sided Warbler	Setophaga pensylvanica	1	Oak Glen	5/24/2016
American Goldfinch	Spinus tristis	3	Ashland	5/26/2016	Blackpoll Warbler	Setophaga striata	1	Oak Glen	5/24/2016
Black Tern	Chlidonias niger	6	Ashland	5/26/2016	Red-winged Blackbird	Agelaius phoeniceus	6	Oak Glen	5/24/2016
Bobolink	Dolichonyx oryzivorus	8	Ashland	5/26/2016	Common Grackle	Quiscalus quiscula	3	Oak Glen	5/24/2016
Common Grackle	Quiscalus quiscula	4	Ashland	5/26/2016	Trumpeter Swan	Cygnus buccinator	2	Oak Glen	5/26/2016
Common Yellowthroat	Geothlypis trichas	2	Ashland	5/26/2016	Mallard	Anas platyrhynchos	4	Oak Glen	5/26/2016
Grasshopper Sparrow	Ammodramus savannarum	1	Ashland	5/26/2016	Ruddy Duck	Oxyura jamaicensis	8	Oak Glen	5/26/2016
Mallard	Anas platyrhynchos	3	Ashland	5/26/2016	Black Tern	Chlidonias niger	6	Oak Glen	5/26/2016
Red-winged Blackbird	Agelaius phoeniceus	6	Ashland	5/26/2016	Red-eyed Vireo	Vireo olivaceus	1	Oak Glen	5/26/2016
Sedge Wren	Cistothorus platensis	1	Ashland	5/26/2016	House Wren	Troglodytes aedon	1	Oak Glen	5/26/2016
American Goldfinch	Spinus tristis	2	Ashland	8/16/2016	Common Yellowthroat	Geothlypis trichas	2	Oak Glen	5/26/2016
Barn Swallow	Hirundo rustica	8	Ashland	8/16/2016	American Redstart	Setophaga ruticilla	1	Oak Glen	5/26/2016
Cliff Swallow	Petrochelidon pyrrhonota	15	Ashland	8/16/2016	Red-winged Blackbird	Agelaius phoeniceus	4	Oak Glen	5/26/2016
Common Yellowthroat	Geothlypis trichas	1	Ashland	8/16/2016	Common Grackle	Quiscalus quiscula	2	Oak Glen	5/26/2016
Henslow's Sparrow	Ammodramus henslowii	2	Ashland	8/16/2016	Trumpeter Swan	Cygnus buccinator	5	Oak Glen	8/16/2016
Mallard	Anas platyrhynchos	10	Ashland	8/16/2016	Pied-billed Grebe	Podilymbus podiceps	12	Oak Glen	8/16/2016
Northern Harrier	Circus cyaneus	1	Ashland	8/16/2016	Franklin's Gull	Leucophaeus pipixcan	50	Oak Glen	8/16/2016
Pied-billed Grebe	Podilymbus podiceps	15	Ashland	8/16/2016	Barn Swallow	Hirundo rustica	5	Oak Glen	8/16/2016
Sedge Wren	Cistothorus platensis	5	Ashland	8/16/2016	Sedge Wren	Cistothorus platensis	2	Oak Glen	8/16/2016
Solitary Sandpiper	Tringa solitaria	1	Ashland	8/16/2016	American Goldfinch	Spinus tristis	3	Oak Glen	8/16/2016
Song Sparrow	Melospiza melodia	1	Ashland	8/16/2016	Trumpeter Swan	Cygnus buccinator	6	Oak Glen	8/18/2016
Yellow-billed Cuckoo	Coccyzus americanus	1	Ashland	8/16/2016	Pied-billed Grebe	Podilymbus podiceps	25	Oak Glen	8/18/2016
Barn Swallow	Hirundo rustica	6	Ashland	8/18/2016	Double-crested Cormorant	Phalacrocorax auritus	1	Oak Glen	8/18/2016
Cliff Swallow	Petrochelidon pyrrhonota	12	Ashland	8/18/2016	Ruby-throated Hummingbir	Archilochus colubris	3	Oak Glen	8/18/2016
Eastern Meadowlark	Sturnella magna	1	Ashland	8/18/2016	American Crow	Corvus brachyrhynchos	2	Oak Glen	8/18/2016
Great Blue Heron	Ardea herodias	1	Ashland	8/18/2016	Barn Swallow	Hirundo rustica	5	Oak Glen	8/18/2016
Pied-billed Grebe	Podilymbus podiceps	10	Ashland	8/18/2016	Tennessee Warbler	Oreothlypis peregrina	2	Oak Glen	8/18/2016
Sedge Wren	Cistothorus platensis	3	Ashland	8/18/2016	American Goldfinch	Spinus tristis	3	Oak Glen	8/18/2016
Tree Swallow	Tachycineta bicolor	2	Ashland	8/18/2016	Trumpeter Swan	Cygnus buccinator	6	Oak Glen	8/23/2016
American Goldfinch	Spinus tristis	2	Ashland	8/23/2016	Turkey Vulture	Cathartes aura	1	Oak Glen	8/23/2016
American Kestrel	Falco sparverius	2	Ashland	8/23/2016	Franklin's Gull	Leucophaeus pipixcan	25	Oak Glen	8/23/2016
Barn Swallow	Hirundo rustica	6	Ashland	8/23/2016	Ruby-throated Hummingbir	Archilochus colubris	3	Oak Glen	8/23/2016
Cliff Swallow	Petrochelidon pyrrhonota	12	Ashland	8/23/2016	Cliff Swallow	Petrochelidon pyrrhonota	5	Oak Glen	8/23/2016
Pied-billed Grebe	Podilymbus podiceps	6	Ashland	8/23/2016	American Goldfinch	Spinus tristis	2	Oak Glen	8/23/2016
Sedge Wren	Cistothorus platensis	1	Ashland	8/23/2016	Trumpeter Swan	Cygnus buccinator	5	Oak Glen	8/30/2016
Tree Swallow	Tachycineta bicolor	1	Ashland	8/23/2016	Pied-billed Grebe	Podilymbus podiceps	20	Oak Glen	8/30/2016
American Goldfinch	Spinus tristis	3	Ashland	8/31/2016	Franklin's Gull	Leucophaeus pipixcan	200	Oak Glen	8/30/2016
American Kestrel	Falco sparverius	1	Ashland	8/31/2016	American Goldfinch	Spinus tristis	4	Oak Glen	8/30/2016
Barn Swallow	Hirundo rustica	6	Ashland	8/31/2016	Trumpeter Swan	Cygnus buccinator	5	Oak Glen	8/31/2016
Cliff Swallow	Petrochelidon pyrrhonota	30	Ashland	8/31/2016	Mallard	Anas platyrhynchos	2	Oak Glen	8/31/2016
Great Blue Heron	Ardea herodias	1	Ashland	8/31/2016	Pied-billed Grebe	Podilymbus podiceps	10	Oak Glen	8/31/2016
Killdeer	Charadrius vociferus	1	Ashland	8/31/2016	Franklin's Gull	Leucophaeus pipixcan	100	Oak Glen	8/31/2016

Ashland Township Wetland					Oak Glen Wetland				
Common Name	Scientific Name	Abundance	Location	Date	Common Name	Scientific Name	Abundance	Location	Date
Mallard	Anas platyrhynchos	2	Ashland	8/31/2016	Ruby-throated Hummingbir	Archilochus colubris	4	Oak Glen	8/31/2016
Northern Harrier	Circus cyaneus	1	Ashland	8/31/2016	Cliff Swallow	Petrochelidon pyrrhonota	5	Oak Glen	8/31/2016
Pied-billed Grebe	Podilymbus podiceps	4	Ashland	8/31/2016	Cedar Waxwing	Bombycilla cedrorum	6	Oak Glen	8/31/2016
Red-tailed Hawk	Buteo jamaicensis	1	Ashland	8/31/2016	American Goldfinch	Spinus tristis	2	Oak Glen	8/31/2016
Sedge Wren	Cistothorus platensis	1	Ashland	8/31/2016	Trumpeter Swan	Cygnus buccinator	5	Oak Glen	9/8/2016
Sora	Porzana carolina	1	Ashland	8/31/2016	Mallard	Anas platyrhynchos	1	Oak Glen	9/8/2016
sparrow sp.	Emberizidae sp. (sparrow sp.)	2	Ashland	8/31/2016	Pied-billed Grebe	Podilymbus podiceps	5	Oak Glen	9/8/2016
American Coot	Fulica americana	3	Ashland	9/8/2016	Franklin's Gull	Leucophaeus pipixcan	100	Oak Glen	9/8/2016
American Goldfinch	Spinus tristis	2	Ashland	9/8/2016	Ring-billed Gull	Larus delawarensis	10	Oak Glen	9/8/2016
Barn Swallow	Hirundo rustica	2	Ashland	9/8/2016	Mourning Dove	Zenaida macroura	1	Oak Glen	9/8/2016
Canada Goose	Branta canadensis	5	Ashland	9/8/2016	Ruby-throated Hummingbir	Archilochus colubris	4	Oak Glen	9/8/2016
Cliff Swallow	Petrochelidon pyrrhonota	13	Ashland	9/8/2016	Black-capped Chickadee	Poecile atricapillus	1	Oak Glen	9/8/2016
Eastern Meadowlark	Sturnella magna	1	Ashland	9/8/2016	Cedar Waxwing	Bombycilla cedrorum	2	Oak Glen	9/8/2016
Lesser Yellowlegs	Tringa flavipes	2	Ashland	9/8/2016	American Goldfinch	Spinus tristis	3	Oak Glen	9/8/2016
Mallard	Anas platyrhynchos	7	Ashland	9/8/2016	Trumpeter Swan	Cygnus buccinator	6	Oak Glen	9/20/2016
Pied-billed Grebe	Podilymbus podiceps	6	Ashland	9/8/2016	Pied-billed Grebe	Podilymbus podiceps	100	Oak Glen	9/20/2016
Sandhill Crane	Antigone canadensis	3	Ashland	9/8/2016	American Coot	Fulica americana	30	Oak Glen	9/20/2016
Sedge Wren	Cistothorus platensis	1	Ashland	9/8/2016	Franklin's Gull	Leucophaeus pipixcan	100	Oak Glen	9/20/2016
American Coot	Fulica americana	10	Ashland	9/20/2016	Barn Swallow	Hirundo rustica	20	Oak Glen	9/20/2016
American Goldfinch	Spinus tristis	2	Ashland	9/20/2016	Trumpeter Swan	Cygnus buccinator	5	Oak Glen	9/27/2016
Barn Swallow	Hirundo rustica	10	Ashland	9/20/2016	Pied-billed Grebe	Podilymbus podiceps	40	Oak Glen	9/27/2016
Blue-winged Teal	Anas discors	90	Ashland	9/20/2016	Turkey Vulture	Cathartes aura	1	Oak Glen	9/27/2016
Eastern Meadowlark	Sturnella magna	1	Ashland	9/20/2016	Northern Harrier	Circus cyaneus	1	Oak Glen	9/27/2016
Northern Shoveler	Anas clypeata	6	Ashland	9/20/2016	Cooper's Hawk	Accipiter cooperii	1	Oak Glen	9/27/2016
Pied-billed Grebe	Podilymbus podiceps	25	Ashland	9/20/2016	Bald Eagle	Haliaeetus leucocephalus	1	Oak Glen	9/27/2016
Sedge Wren	Cistothorus platensis	3	Ashland	9/20/2016	American Coot	Fulica americana	1000	Oak Glen	9/27/2016
Yellow-rumped Warbler	Setophaga coronata	2	Ashland	9/20/2016	Ring-billed Gull	Larus delawarensis	20	Oak Glen	9/27/2016
American Coot	Fulica americana	38	Ashland	9/27/2016	Hairy Woodpecker	Picoides villosus	1	Oak Glen	9/27/2016
American Golden-Plover	Pluvialis dominica	1	Ashland	9/27/2016	Nashville Warbler	Oreothlypis ruficapilla	5	Oak Glen	9/27/2016
American Goldfinch	Spinus tristis	2	Ashland	9/27/2016	White-throated Sparrow	Zonotrichia albicollis	5	Oak Glen	9/27/2016
Barn Swallow	Hirundo rustica	15	Ashland	9/27/2016	Trumpeter Swan	Cygnus buccinator	6	Oak Glen	10/4/2016
Canada Goose	Branta canadensis	4	Ashland	9/27/2016	Pied-billed Grebe	Podilymbus podiceps	50	Oak Glen	10/4/2016
Northern Pintail	Anas acuta	3	Ashland	9/27/2016	Bald Eagle	Haliaeetus leucocephalus	1	Oak Glen	10/4/2016
Red-tailed Hawk	Buteo jamaicensis	3	Ashland	9/27/2016	American Coot	Fulica americana	1500	Oak Glen	10/4/2016
American Crow	Corvus brachyrhynchos	1	Ashland	10/4/2016	Franklin's Gull	Leucophaeus pipixcan	1	Oak Glen	10/4/2016
Eastern Meadowlark	Sturnella magna	1	Ashland	10/4/2016	Ring-billed Gull	Larus delawarensis	2	Oak Glen	10/4/2016
Fox Sparrow	Passerella iliaca	2	Ashland	10/4/2016	Hairy Woodpecker	Picoides villosus	1	Oak Glen	10/4/2016
American Coot	Fulica americana	30	Ashland	10/6/2016	Blue-winged Teal	Anas discors	30	Oak Glen	10/6/2016
Bald Eagle	Haliaeetus leucocephalus	1	Ashland	10/6/2016	Pied-billed Grebe	Podilymbus podiceps	40	Oak Glen	10/6/2016
Blue-winged Teal	Anas discors	50	Ashland	10/6/2016	Cooper's Hawk	Accipiter cooperii	1	Oak Glen	10/6/2016
Eastern Meadowlark	Sturnella magna	5	Ashland	10/6/2016	Bald Eagle	Haliaeetus leucocephalus	1	Oak Glen	10/6/2016
Palm Warbler	Setophaga palmarum	4	Ashland	10/6/2016	Red-tailed Hawk	Buteo jamaicensis	1	Oak Glen	10/6/2016
Pied-billed Grebe	Podilymbus podiceps	2	Ashland	10/6/2016	American Coot	Fulica americana	2000	Oak Glen	10/6/2016

Ashland Township Wetland

Common Name	Scientific Name	Abundance	Location	Date
Rock Pigeon (Feral Pigeor	Columba livia (Feral Pigeon)	1	Ashland	10/6/2016
Turkey Vulture	Cathartes aura	1	Ashland	10/6/2016
Yellow-rumped Warbler	Setophaga coronata	4	Ashland	10/6/2016
American Coot	Fulica americana	5	Ashland	10/10/2016
Bald Eagle	Haliaeetus leucocephalus	1	Ashland	10/10/2016
Horned Lark	Eremophila alpestris	1	Ashland	10/10/2016
Lapland Longspur	Calcarius lapponicus	5	Ashland	10/10/2016
American Coot	Fulica americana	20	Ashland	10/18/2016
Blue-winged Teal	Anas discors	35	Ashland	10/18/2016
Bufflehead	Bucephala albeola	3	Ashland	10/18/2016
Gadwall	Anas strepera	10	Ashland	10/18/2016
Northern Harrier	Circus cyaneus	1	Ashland	10/18/2016
Red-tailed Hawk	Buteo jamaicensis	1	Ashland	10/18/2016
Ruddy Duck	Oxyura jamaicensis	6	Ashland	10/18/2016
Song Sparrow	Melospiza melodia	2	Ashland	10/18/2016
American Coot	Fulica americana	35	Ashland	10/21/2016
American Crow	Corvus brachyrhynchos	2	Ashland	10/21/2016
American Goldfinch	Spinus tristis	2	Ashland	10/21/2016
American Wigeon	Anas americana	5	Ashland	10/21/2016
Canvasback	Aythya valisineria	1	Ashland	10/21/2016
Horned Lark	Eremophila alpestris	1	Ashland	10/21/2016
Lapland Longspur	Calcarius lapponicus	3	Ashland	10/21/2016
Lesser Scaup	Aythya affinis	4	Ashland	10/21/2016
Pied-billed Grebe	Podilymbus podiceps	1	Ashland	10/21/2016
Redhead	Aythya americana	6	Ashland	10/21/2016
Ruddy Duck	Oxyura jamaicensis	3	Ashland	10/21/2016
American Crow	Corvus brachyrhynchos	3	Ashland	10/25/2016
American Wigeon	Anas americana	2	Ashland	10/25/2016
Bald Eagle	Haliaeetus leucocephalus	1	Ashland	10/25/2016
Mallard	Anas platyrhynchos	5	Ashland	10/25/2016
Song Sparrow	Melospiza melodia	4	Ashland	10/25/2016
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Oak Glen Wetland

Common Name	Scientific Name	Abundance	Location	Date
American Crow	Corvus brachyrhynchos	2	Oak Glen	10/6/2016
Swamp Sparrow	Melospiza georgiana	2	Oak Glen	10/6/2016
Red-winged Blackbird	Agelaius phoeniceus	30	Oak Glen	10/6/2016
Canada Goose	Branta canadensis	30	Oak Glen	10/10/2016
Trumpeter Swan	Cygnus buccinator	6	Oak Glen	10/10/2016
Blue-winged Teal	Anas discors	1	Oak Glen	10/10/2016
Northern Pintail	Anas acuta	2	Oak Glen	10/10/2016
Pied-billed Grebe	Podilymbus podiceps	20	Oak Glen	10/10/2016
American White Pelican	Pelecanus erythrorhynchos	70	Oak Glen	10/10/2016
Bald Eagle	Haliaeetus leucocephalus	3	Oak Glen	10/10/2016
American Coot	Fulica americana	2000	Oak Glen	10/10/2016
Franklin's Gull	Leucophaeus pipixcan	70	Oak Glen	10/10/2016
Ring-billed Gull	Larus delawarensis	40	Oak Glen	10/10/2016
Downy Woodpecker	Picoides pubescens	1	Oak Glen	10/10/2016
White-breasted Nuthatch	Sitta carolinensis	1	Oak Glen	10/10/2016
Ruby-crowned Kinglet	Regulus calendula	6	Oak Glen	10/10/2016
Trumpeter Swan	Cygnus buccinator	6	Oak Glen	10/18/2016
Gadwall	Anas strepera	10	Oak Glen	10/18/2016
American Wigeon	Anas americana	16	Oak Glen	10/18/2016
Mallard	Anas platyrhynchos	4	Oak Glen	10/18/2016
Blue-winged Teal	Anas discors	30	Oak Glen	10/18/2016
Redhead	Aythya americana	20	Oak Glen	10/18/2016
Ring-necked Duck	Aythya collaris	40	Oak Glen	10/18/2016
Lesser Scaup	Aythya affinis	30	Oak Glen	10/18/2016
Ruddy Duck	Oxyura jamaicensis	10	Oak Glen	10/18/2016
Pied-billed Grebe	Podilymbus podiceps	30	Oak Glen	10/18/2016
Double-crested Cormorant	Phalacrocorax auritus	1	Oak Glen	10/18/2016
Bald Eagle	Haliaeetus leucocephalus	2	Oak Glen	10/18/2016
Red-tailed Hawk	Buteo jamaicensis	1	Oak Glen	10/18/2016
American Coot	Fulica americana	2000	Oak Glen	10/18/2016
Franklin's Gull	Leucophaeus pipixcan	200	Oak Glen	10/18/2016
Ring-billed Gull	Larus delawarensis	100	Oak Glen	10/18/2016
Blue Jay	Cyanocitta cristata	2	Oak Glen	10/18/2016
American Crow	Corvus brachyrhynchos	4	Oak Glen	10/18/2016
Canada Goose	Branta canadensis	2	Oak Glen	10/21/2016
American Wigeon	Anas americana	10	Oak Glen	10/21/2016
Mallard	Anas platyrhynchos	1	Oak Glen	10/21/2016
Northern Shoveler	Anas clypeata	10	Oak Glen	10/21/2016
Redhead	Aythya americana	10	Oak Glen	10/21/2016
Ring-necked Duck	Aythya collaris	10	Oak Glen	10/21/2016
Ruddy Duck	Oxyura jamaicensis	30	Oak Glen	10/21/2016
Pied-billed Grebe	Podilymbus podiceps	50	Oak Glen	10/21/2016
Red-tailed Hawk	Buteo jamaicensis	1	Oak Glen	10/21/2016

Ashland Township Wetland					Oak Glen Wetland				
Common Name	Scientific Name	Abundance	Location	Date	Common Name	Scientific Name	Abundance	Location	Date
					American Coot	Fulica americana	3000	Oak Glen	10/21/2016
					Franklin's Gull	Leucophaeus pipixcan	175	Oak Glen	10/21/2016
					Ring-billed Gull	Larus delawarensis	50	Oak Glen	10/21/2016
					Red-bellied Woodpecker	Melanerpes carolinus	1	Oak Glen	10/21/2016
					Blue Jay	Cyanocitta cristata	2	Oak Glen	10/21/2016
					American Robin	Turdus migratorius	2	Oak Glen	10/21/2016
					Red-winged Blackbird	Agelaius phoeniceus	30	Oak Glen	10/21/2016
					American Wigeon	Anas americana	10	Oak Glen	10/25/2016
					Mallard	Anas platyrhynchos	10	Oak Glen	10/25/2016
					Blue-winged Teal	Anas discors	10	Oak Glen	10/25/2016
					Canvasback	Aythya valisineria	10	Oak Glen	10/25/2016
					Ring-necked Duck	Aythya collaris	40	Oak Glen	10/25/2016
					Lesser Scaup	Aythya affinis	6	Oak Glen	10/25/2016
					Ruddy Duck	Oxyura jamaicensis	30	Oak Glen	10/25/2016
					Pied-billed Grebe	Podilymbus podiceps	10	Oak Glen	10/25/2016
					Northern Harrier	Circus cyaneus	1	Oak Glen	10/25/2016
					Bald Eagle	Haliaeetus leucocephalus	2	Oak Glen	10/25/2016
					American Coot	Fulica americana	3000	Oak Glen	10/25/2016
					Ring-billed Gull	Larus delawarensis	6	Oak Glen	10/25/2016
					Black-capped Chickadee	Poecile atricapillus	2	Oak Glen	10/25/2016
							21241		

C

Eagle Use Data

Date	Point #	Temperature	Eagle Age	Behavior	Direction from Point	Distance from Point	Flight Direction	Height	Duration	Abundance	Eagle Minutes
5/27/2015	1	65									0
5/27/2015	2	71									0
5/27/2015	3	74									0
5/27/2015	4	74									0
5/27/2015	7	77									0
5/27/2015	6	78									0
5/27/2015	5	80									0
5/27/2015	4	81									0
5/27/2015	8	81									0
5/27/2015	14	79									0
5/27/2015	15	82									0
5/27/2015	16	81									0
5/27/2015	13	76									0
5/27/2015	12	72									0
5/27/2015	11	69									0
5/27/2015	10	66									0
5/27/2015	9	64									0
6/23/2015	13	70									0
6/23/2015	10	68									0
6/23/2015	9	70									0
6/23/2015	11	74									0
6/23/2015	12	73									0
6/23/2015	14	75									0
6/23/2015	15	77									0
6/23/2015	16	77									0
6/25/2015	1	70									0
6/25/2015	2	71									0
6/25/2015	3	73									0
6/25/2015	4	75									0
6/25/2015	7	78									0
6/25/2015	6	81									0
6/25/2015	5	77									0
6/25/2015	8	80									0
7/21/2015	1	71									0
7/21/2015	2	73									0
7/21/2015	3	74									0

Date	Point #	Temperature	Eagle Age	Behavior	Direction from Point	Distance from Point	Flight Direction	Height	Duration	Abundance	Eagle Minutes
7/21/2015	4	75									0
7/21/2015	7	78									0
7/21/2015	6	80									0
7/21/2015	5	73									0
7/21/2015	8	75									0
7/29/2015	9	68									0
7/29/2015	10	74									0
7/29/2015	11	79									0
7/29/2015	12	81									0
7/29/2015	13	78									0
7/29/2015	14	80									0
7/29/2015	15	83									0
7/29/2015	16	79									0
8/4/2015	1	65									0
8/4/2015	5	65									0
8/4/2015	8	71									0
8/4/2015	15	73									0
8/4/2015	14	75									0
8/4/2015	13	75									0
8/4/2015	12	75									0
8/4/2015	11	76									0
8/25/2015	9	55									0
8/25/2015	10	60									0
8/25/2015	16	62									0
8/25/2015	7	66									0
8/25/2015	6	68									0
8/25/2015	4	68									0
8/25/2015	2	72									0
8/25/2015	3	73									0
9/22/2015	1	67									0
9/22/2015	3	71									0
9/22/2015	4	72									0
9/22/2015	6	71									0
9/22/2015	7	73									0
9/22/2015	16	75									0
9/22/2015	15	77									0

Date	Point #	Temperature	Eagle Age	Behavior	Direction from Point	Distance from Point	Flight Direction	Height	Duration	Abundance	Eagle Minutes
9/30/2015	9	47									0
9/30/2015	10	55									0
9/30/2015	11	56									0
9/30/2015	12	60									0
9/30/2015	13	62									0
9/30/2015	14	62									0
9/30/2015	5	62									0
9/30/2015	8	62									0
10/14/2015	1	64	Adult	S	NE	650	E	70	3	1	3
10/14/2015	9	50	Adult	P	SW	750	-	-	2	1	0
10/14/2015	9	50	Adult	PF	SW	750	SW	15	1	1	1
10/14/2015	10	51									0
10/14/2015	11	60									0
10/14/2015	12	62									0
10/14/2015	13	62									0
10/14/2015	8	62									0
10/14/2015	5	62									0
10/22/2015	3	47									0
10/22/2015	2	54									0
10/22/2015	4	59									0
10/22/2015	6	62									0
10/22/2015	7	62									0
10/22/2015	16	62									0
10/22/2015	15	64									0
10/22/2015	14	66									0
3/10/2016	2	31	Adult	PF	NE	300	SW	10	2	1	2
3/10/2016	1	31	Adult	PF	N	300		10	1	1	1
3/10/2016	1	29									0
3/10/2016	3	34									0
3/10/2016	4	36									0
3/10/2016	7	36									0
3/10/2016	6	37									0
3/10/2016	5	39									0
3/10/2016	8	42									0
3/16/2016	9	44	Adult	PF	W	100	SE	30	1	2	2
3/16/2016	9	44	Adult	PF	SW	600	N	30	4	1	4

Date	Point #	Temperature	Eagle Age	Behavior	Direction from Point	Distance from Point	Flight Direction	Height	Duration	Abundance	Eagle Minutes
3/16/2016	9	44	Immature	PF	W	700	SW	40	4	1	4
3/16/2016	9	44	Adult	PF	W	750	NW	20	1	2	2
3/16/2016	9	44	Adult	PF	W	780	NW	15	1	1	1
3/16/2016	9	44	Adult	P						1	0
3/16/2016	10	44									0
3/16/2016	11	44									0
3/17/2016	16	41									0
3/17/2016	15	40									0
3/17/2016	14	39									0
3/29/2016	13	55									0
3/29/2016	12	58									0
4/5/2016	5	33									0
4/5/2016	8	35									0
4/26/2016	16	45									0
4/27/2016	15	45									0
4/27/2016	14	50									0
4/27/2016	12	44									0
4/27/2016	13	50									0
4/28/2016	1	40									0
4/28/2016	2	40									0
4/28/2016	3	40									0
4/28/2016	4	40									0
4/28/2016	6	40									0
4/28/2016	7	40									0
5/6/2016	14	73									0
5/6/2016	15	82									0
5/20/2016	9		Adult	P						1	0
11/17/2016	5	48									0
11/17/2016	6	48									0
11/17/2016	1	51									0
11/17/2016	2	54									0
11/17/2016	3	58									0
11/17/2016	4	58									0
11/17/2016	7	59									0
11/17/2016	8	60									0
11/29/2016	14	34									0

Date	Point #	Temperature	Eagle Age	Behavior	Direction from Point	Distance from Point	Flight Direction	Height	Duration	Abundance	Eagle Minutes
11/29/2016	15	33									0
11/29/2016	10	37									0
11/29/2016	9	37									0
11/29/2016	11	35									0
11/29/2016	12	35									0
11/29/2016	13	34									0
12/13/2016	3	-2	Adult	PF	N	200	S	30	1	1	1
12/13/2016	2	-8	Adult	PF	E	400	NW	5	1	1	1
12/13/2016	4	2	Adult	PF	N	500	S	20	1	1	1
12/13/2016	7	4	Adult	PF	NE	500	SE	20	2	1	2
12/13/2016	1	-11	Immature	PF	NE	600	SE	10	1	1	1
12/13/2016	2	-8	Immature	PF	NE	600	SE	15	1	1	1
12/13/2016	2	-8	Adult	PF	NE	600	SE	20	2	1	2
12/13/2016	2	-8	Adult	PF	NE	600	SE	20	2	1	2
12/13/2016	2	-8	Adult	PF	NE	600	SE	20	1	1	1
12/13/2016	3	-2	Adult	PF	SE	600	SE	20	2	1	2
12/13/2016	3	-2	Immature	PF	W	700	SE	20	1	1	1
12/13/2016	4	2	Adult	PF	W	700	S	20	1	1	1
12/13/2016	4	2	Adult	PF	E	750	S	20	1	1	1
12/13/2016	7	4	Adult	PF	SW	750	SE	15	1	1	1
12/13/2016	8	1	Immature	PF	W	750	SW	10	1	1	1
12/13/2016	8	1	Adult	PF	W	750	SW	15	1	1	1
12/13/2016	6	3									0
12/13/2016	5	5									0
12/20/2016	9	29	Adult	P	SW	750			2	1	0
12/20/2016	9	29	Adult	PF	SW	750	SE	10	1	1	1
12/20/2016	9	29	Adult	PF	SW	750	SW	10	1	1	1
12/20/2016	9	29	Adult	PF	SW	750	N	10	1	1	1
12/20/2016	9	29	Immature	PF	SW	750	S	10	2	1	2
12/20/2016	9	29	Immature	S	SW	750	SW	15	2	1	2
12/20/2016	9	29	Adult	S	SW	750	SW	15	1	1	1
12/20/2016	10	31									0
12/20/2016	11	31									0
12/20/2016	12	32									0
12/20/2016	14	34									0
12/20/2016	15	34									0

Date	Point #	Temperature	Eagle Age	Behavior	Direction from Point	Distance from Point	Flight Direction	Height	Duration	Abundance	Eagle Minutes
12/20/2016	16	31									0
1/1/2017	1	18									0
1/1/2017	2	18									0
1/1/2017	3	22									0
1/1/2017	4	23									0
1/1/2017	5	25									0
1/1/2017	6	26									0
1/1/2017	7	25									0
1/1/2017	8	25									0
1/17/2017	9	27									0
1/17/2017	10	27									0
1/17/2017	11	29									0
1/17/2017	12	29									0
1/17/2017	13	31									0
1/17/2017	14	33									0
1/17/2017	15	35									0
1/17/2017	16	35									0
1/26/2017	3	27	Adult	PF	SW	780	NW	10	1	1	1
1/26/2017	1	26									0
1/26/2017	2	25									0
1/26/2017	7	28	Adult								0
1/26/2017	6	27									0
1/26/2017	5	25									0
1/26/2017	8	25									0
2/22/2017	7	54	Adult	PF	E	100	SW	10	1	1	1
2/22/2017	6	56	Adult	PF	SW	400	NE	30	2	1	2
2/22/2017	7	54	Adult	PF	SE	600	N	10	2	1	2
2/22/2017	1	40									0
2/22/2017	2	45									0
2/22/2017	3	52									0
2/22/2017	8	58									0
2/23/2017	11	34	Adult	PF	S	400	NE	20	1	1	1
2/23/2017	11	34	Immature	PF	SW	500	NE	5	4	1	4
2/23/2017	11	34	Immature	PF	S	600	NE	5	3	1	3
2/23/2017	11	34	Immature	PF	SW	780	NW	15	1	1	1
2/23/2017	9	34									0

Date	Point #	Temperature	Eagle Age	Behavior	Direction from Point	Distance from Point	Flight Direction	Height	Duration	Abundance	Eagle Minutes
2/23/2017	12	37									0
2/23/2017	13	37									0
2/23/2017	14	37								52	0
2/23/2017	16	37									0
										Total	63

PRE-CONSTRUCTION AVIAN MIGRATION & EAGLE USE STUDY
Year 2
Spring 2017 through Spring 2018
for

DODGE COUNTY WIND PROJECT
DODGE AND STEELE COUNTIES, MINNESOTA

Prepared for

Dodge County Wind, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Submitted by: Atwell, LLC – Atwell Project No. 16002517

September 7, 2018

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APPENDICES

EXECUTIVE SUMMARY

This report summarizes the second year (year-two) of pre-construction avian and eagle use surveys at the proposed Dodge County Wind Project (the Project) in Dodge and Steele Counties, Minnesota. Year-two avian surveys were conducted from May 2017 through April 2018 by Atwell, LLC (Atwell) on behalf of Dodge County Wind, LLC (Dodge County Wind). The study addresses avian use of the Dodge Wind Project Area, which encompasses the area in which all wind turbines for the Dodge Wind project will be sited. This report includes results and discussion from: one year of standardized eagle use surveys, spring and fall avian migration surveys, one year of wetland utilization surveys, and one season of nesting and winter roost surveys across the Project Area and surrounding study areas.

This second year of pre-construction avian and eagle use study supplements existing eagle and general avian use data gathered as part of the year-one avian study previously conducted within the Project Area by HDR (HDR 2017) .

Key results include:

- Federal Threatened/Endangered avian species were not observed within the Project Area during migration stopover or during standardized avian use point count surveys.

- Two (2) total Golden Eagles detections occurred during the study period. One (1) Golden Eagle was detected during standardized eagle use surveys and one was detected while *en route* to survey locations and is considered an incidental detection. The Project Area is located outside of the Golden Eagle nesting distribution (Kochert et al. 2002), and Golden Eagle nests were not observed within the Project Area.

- 358 total Bald Eagle detections occurred over the year-two study. One hundred ninety seven (197) Bald Eagles were observed during aerial nest and roost surveys. 68 Bald Eagle detections occurred during standardized eagle use surveys. Ninety three (93) Bald Eagle detections were detected/recorded incidental to surveys. Incidental detections include eagles seen *en route* to surveys, eagles seen beyond the 800 m standardized count cylinder about the survey point, and eagles observed only before or after standardized count durations at the point.

- No Bald Eagle nests or eagle concentrations were found within the Project Area. Two (2) Bald Eagle roosts were found within 10 miles of the Project Area. Thirteen (13) Bald Eagle nests were found within 10 miles of the original Project Area boundary. After a boundary shift in May 2017, seven (7) of these 13 nests are within 10 miles of the current Project Area boundary. One (1) nest at a historic location appears to have been removed and was not seen during aerial surveys.

- Bald Eagle mean use rates and accrued minutes at collision risk heights were highest in the spring, though similar to results recorded in the fall and winter. Bald Eagles were rarely observed during standardized surveys in the summer.

- A variety of avian species migrates through the Project Area, use habitat within the Project Area during migration stopover, and nest within the Project Area. In general, species of conservation concern are not found in high concentrations. Where scarce habitats are present (e.g., shrublands, grassland), avian species of conservation priority may be found to be utilizing Project Area habitats during the breeding season.

Key discussion points include:

- *Habitat Risk.* There is no evidence that eagles currently nest within the Project Area. It is anticipated that there will be no direct impacts to eagle nesting or wintering habitat resources as part of the proposed wind energy development.

- *Turbine Collision Fatality Risk.* The highest proportion of observed eagle minutes within the 35 – 150 meter rotor swept zone (RSZ) occurred during the spring and fall. The waterbird and raptor species guilds demonstrated the riskiest flight profile behavior within the Project Area observed during spring and fall.

1.0 INTRODUCTION

Atwell was contracted in 2017 by Dodge County Wind, a subsidiary of NextEra Energy Resources, LLC (NextEra), to conduct avian surveys and an eagle use-assessment study for the proposed Dodge County Wind Energy Center (Project) in Dodge and Steele Counties, Minnesota. Avian resources were previously evaluated through one year of pre-construction eagle use surveys, spring and fall migration surveys, raptor nest surveys, winter eagle roost surveys, and all-species avian surveys across several wetland areas. Taken together, these avian surveys provide comprehensive quantitative documentation of avian migration use, summer use, raptor nesting use, and winter use. Dodge County Wind commissioned these pre-construction surveys to occur from May 2017 through April 2018, which equates to a second year of avian use studies associated with the development of this Project (e.g., HDR 2017). Year-1 avian use study was conducted between 2016 and 2017 by HDR and findings from the Year-1 study are summarized separately (HDR 2017).

This report summarizes one of several studies that Dodge County Wind has conducted as part of a holistic natural resources review approach to assess potential effects from development of this wind energy project on species of concern and their habitats. The results reported herein will be combined with results from other natural resource studies and will aid in responsibly siting wind turbines, access roads, underground electric collection lines, an electric substation, overhead high-voltage transmission line, and other proposed infrastructure. To date, this approach has enabled Dodge County Wind to adapt quickly during project design planning and has further minimized potential impacts to sensitive natural resources.

The Dodge Wind Project includes the development of up to 70 wind turbines, associated collection line, access roads, and a collector substation to be located in Dodge and Steele counties. A transmission line is also proposed that extends approximately 21 miles from the Project collector substation to the existing Byron Substation. The transmission line is located in Dodge and Olmsted counties. *Figure 1 - Avian Migration Use & Eagle Use Point County Survey Schematic*, **Appendix I** shows the location of the Project's preliminary wind turbine array in relation to the Project Area. All wind facilities are planned within the Project Area and the transmission line extends to the east of the Project Area. The transmission line corridor is shown in *Figure 2 - Aerial Raptor Nest Survey Study Plan Schematic*, **Appendix I**.

The objective of the survey tasks that are summarized in this report was to document eagle use, in addition to use by other avian species, fulfilling a second year of eagle use data collection as recommended by USFWS Twin Cities Ecological Field Office during a Project coordination meeting on April 13, 2017. Eagle survey task objectives included evaluating migration patterns, potential for breeding, and potential for concentrated use, such as winter communal roosting. As such, the protocols described herein were selected as they comply with Tier 3 requirements established by the *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines* (WEG, USFWS 2012) and with

Stage 2 assessments described in the *Eagle Conservation Plan Guidance (ECPG): Module 1 – Land-based Wind Energy Version 2* (USFWS 2013). These two documents were developed to provide wind energy operators guidelines for compliance with the *Bald and Golden Eagle Protection Act* (BGEPA 1940). Additionally, Atwell utilized industry standard approaches to designing avian use studies at proposed wind energy developments as promoted by the National Wind Wildlife Coordinating Collaborative (e.g., Strickland et al. 2011).

In order to develop and document a baseline presentation of raptor use within the Project Area, Atwell completed the following WEG Tier 3 (USFWS 2012) surveys:

- Eagle use surveys (May 2017 through April 2018)
- Raptor nest surveys (March 2017)
- Winter eagle roost survey (March 2017).

Atwell also conducted wetland utilization surveys at two (2) locations that were also studied during the Year-1 avian use survey (HDR 2017), as well as at a third location that was added to the study in 2017. Wetland utilization survey results are also summarized in this report. Atwell executed targeted Henslow's Sparrow and Loggerhead Shrike breeding surveys that are discussed in this report but are summarized in additional detail separately under separate cover (Atwell 2017b).

Eagle use surveys were also designed to meet the following secondary study objectives:

1. Document nesting presence of Bald Eagles (*Haliaeetus leucocephalus*) within 10 miles of the Project Area.
2. Document Bald Eagle and Golden Eagle (*Aquila chrysaetos*) winter roost locations within 10 miles of the Project Area.
3. Document standardized migratory Bald Eagle and Golden Eagle use within the Project Area.
4. Characterize seasonal differences in the migration flight profiles of Bald and Golden Eagles migrating through the Project Area.
5. Document relative wind turbine exposure risks for Bald and Golden Eagles within the Project Area.
6. Document areas within and, when possible, near the Project Area that concentrate Bald Eagle and Golden Eagle use.
7. Document seasonal presence of other raptor species that breed and migrate within the Project Area, applying eagle objectives listed above to other species to develop a more complete representation of raptor use.

This report addresses avian resources documented during the 2017-2018 migratory ecological periods. Results from bi-weekly spring migration surveys (conducted in May 2017 and March

through April 2018), and bi-weekly fall migration surveys (August through November 2017) are described and analyzed in detail.

2.0 METHODS

2.1 Project Setting

The Project Area covers approximately 52,085 acres in southwestern Dodge County and southeastern Steele County, Minnesota and is located approximately 15 miles west of Rochester and 67 miles south of Minneapolis (see *Figure 1 - Eagle Use and Migration Watch Study Points,* **Appendix I)**. Overall, the Project Area is dominated by agricultural cropland and is drained by a moderately extensive network of agricultural ditches and intermittent and ephemeral streams, many of which support herbaceous riparian buffers. The general topography of the Project Area is described as undulating, rolling relief with approximate elevations between 1,210 and 1,354 feet above mean sea level (MSL) and generally has an eastern aspect.

The 2011 National Land Cover Database (NLCD; Homer et al. 2015) classifies roughly 87.4% (approximately 45,530 acres) of the Project Area as cultivated cropland (*Figure 1*). Approximately 5.2% (roughly 2,702 acres) of the Project Area is classified as either pasture or grassland/herbaceous. Developed, open space makes up approximately 4.4% (or 2,283 acres) of the Project Area. Deciduous Forest (1.17%), Emergent Herbaceous Wetlands (0.70%), Woody Wetlands (0.23%), Open Water (0.12%), Scrub/Shrub (0.01%), and Barren Land (0.01%) cover small portions of the Project Area.

2.2 Eagle Use Surveys

Eagle use surveys followed a fixed-point protocol designed to record activity and behavior of individual bird detections (e.g. minutes of flight within a cylindrical air-space plot) in full adherence with ECPG Stage 2 methodology guidance (USFWS 2013). This protocol is typically used for wind energy projects in the United States, with the survey area being an 800-meter fixed-radius circular plot approach (Strickland et al. 2011). The ECPG refers to these surveys as point counts, recognizing that a point-based protocol that also records flight duration is slightly different than traditional point count methodology used for other bird species (USFWS 2013). For each observed eagle, the surveyor recorded the distance to initial detection, closest distance to detection, time of detection, and duration of flight within RSZ within 800 m of the point count station.

Over one year, 461 hours of standardized eagle use surveys were conducted (*Table 1 – Standardized Survey Effort Review*) and incidental (i.e., non-standardized) eagle observations were recorded while *en route* to surveys, during Bald Eagle nest surveys, and during targeted breeding season surveys (as described in Sections 2.3-2.7 below).

Following ECPG recommendations, surveys were scheduled year-round, with survey data summarized according to the following seasons for ease of data organization and analysis: winter (December – February), spring (March – May), summer (June – July), and fall (August – November). The survey period began in May 2017 and continued through April 2018, yielding a dataset with surveys through one (1) spring period, one (1) summer period, one (1) fall period, and one (1) winter period. Survey effort at each point count station is summarized by season in *Table 1*.

All point count stations were surveyed for 60-minute durations twice monthly. Point count stations were divided into a series of two subgroups (i.e., A and B) containing eight (8) points each, and each subgroup was surveyed on alternating weeks. Stations within the same subgroup were a minimum of 1,600 m apart in order to avoid overlap of the 800-m fixed point count radius.

The avian use study plan was developed in accordance with USFWS-ECP Guidance and designated roadside point count stations across the Project Area (*Figure 1 – Eagle Use and Migration Watch Study Points,* **Appendix I**). Point count stations maintained a stratified sampling schematic for representative habitat diversity and were located along roads with low traffic levels, year-round access, and where reasonable survey vantages of the surrounding landscape were attainable.

Point locations are illustrated in *Figure 1,* **Appendix I**, and seasonal effort totals are reported for each station in *Table 1 – Standardized Survey Effort Review.* Sixteen (16) points were established based on an earlier project boundary at the study's outset, in May 2017. After two site visits, the boundary shifted, requiring dropping and adding point station locations to meet the Project Area's updated geography. Based on the boundary shift, five (5) points in the eastern section of the original sample (point stations 32, 34, 40, 82, and 87) were dropped from the survey schedule, and nine (9) points (stations 71, 72, 73, 74, 75, 76, 77, 78, and 79) were added to the sample. Nineteen roadside point count stations were used for the remainder of the study. *Figure 1*, **Appendix I** shows the pre-boundary shift avian study points that were dropped with the revised Project Area and the avian study points used for the remainder of the study for the revised Project Area.

Sixteen (16) of 19 point count stations intersect the Project Area, covering 13.66% of the Project Area. As of the August 20, 2018 turbine layout, point counts and their associated 800-m radius standardized count cylinders cover 12.65% of the turbine layout's 1 km buffer. Nine (9) standardized count cylinders intersect the turbine layout's 1 km buffer (*Figure 1,* **Appendix I**).

Table 1. Standardized Avian Use Survey Effort Hours at Dodge County Wind Energy Center

	Survey Effort Hours				
Avian Use Point	**Winter**	**Spring**	**Summer**	**Fall**	**Total Hours**
11	6	6	4	8	24
12	6	6	4	8	24
13	6	6	4	8	24
14	0	0	0	1	1
21	6	6	4	8	24
22	6	6	4	8	24
24	6	6	4	8	24
25	6	6	4	8	24
31	6	6	4	8	24
32	0	1	0	0	1
34	0	1	0	0	1
40	0	1	0	0	1
41	6	6	4	7	23
42	6	6	4	8	24
71	6	6	4	8	24
72	6	6	4	8	24
73	6	6	4	8	24
75	6	6	4	8	24
76	6	6	4	8	24
77	6	6	4	8	24
78	6	6	4	8	24
79	6	6	4	8	24
82	0	1	0	0	1
84	6	6	4	8	24
87	0	1	0	0	1
Grand Total	**114**	**119**	**76**	**152**	**461**

2.3 Raptor Nest Surveys

Prior to April 2017 aerial surveys, historic eagle nest data taken in the vicinity of the Nest Survey Study Area were provided by the USFWS (USFWS unpublished data, March 07, 2017). 2017 aerial surveys also followed pre-survey Tier 2 analysis (Tetra Tech EC, INC 2013, Atwell 2017a) and previous Tier 3 reporting (HDR 2017) which found that the Project Area could potentially contain Bald Eagle nesting habitat. ,

An aerial nest survey was conducted to identify nest structures of Bald Eagles, of other raptor species, and of large-bodied colonial-nesting birds. The study was conducted from March 17-21, 2017, covering the Project Area and area within 10 miles of portions of the Project Area as shown in *Figure 2*, **Appendix I**. This search area is referred to as the Nest Survey Study Area. Aerial transect surveys were conducted by Atwell avian specialists and were flown via helicopter at low speeds (30 – 40 knots).

Riparian target zones (*Figure 2,* **Appendix I**) were defined from a desktop approach using a Geographic Information System (GIS) and satellite imagery data. Most target zones were defined based on at least one major forested riparian corridor, in addition to the presence of other relatively more contiguous upland forest cover and wetland/open water systems where Bald Eagles would be most expected to nest (Buehler 2000).

Flight-line transects at 1-kilometer intervals were created in GIS across each target zone of the Nest Search Study Area. No noticeable forest canopy leaf out was evident at the time of surveys. When nest structures were identified, the helicopter hovered for up to 15 seconds and no closer than 50 m from a nest in order to provide efficient data capture.

Ground Nest Surveys

In addition to the aerial nest survey, Atwell conducted a limited ground-based raptor nest survey that consisted of approximately seven (7) hours of survey effort focused particularly on a target zone surrounding the Straight River (*Figure 2*, **Appendix I**). Accessible roads flanking this heavily forested riparian corridor were used to gain as many ground-based habitat vantages as possible. Additional targeted survey effort was performed near other open water features such as small ponds and/or lakes.

2.4 Eagle Winter Roost Surveys

Incidental eagle observations were documented throughout the aerial survey (Section 2.3, above). During the survey, specific eagle concentrations were observed, which indicated the possible presence of nearby communal roosts. Communal roosts are locations where Bald Eagles may congregate in large numbers to overnight during the winter season. Roost site selection has been correlated to canopy structure and composition, disturbance regime, and proximity to foraging areas locations (Buehler 2000). These factors may exist in limiting extents throughout the Bald Eagle wintering range, and Bald Eagles may thus rely on preferred roosting sites throughout the season and across years. Atwell conducted ground-based reconnaissance of these concentration areas during crepuscular periods on two evenings (March 19 - 20, 2017) to identify Bald Eagle roost areas in the Project Area vicinity. This targeted roost observation effort was conducted utilizing the recommendations within the ECP Guidance (USFWS 2013) and the USFWS *Northern States Bald*

Eagle Recovery Plan (USFWS 1983) to provide a more comprehensive picture of other eagle use factors pertaining to the Project Area.

Areas with eagle concentrations that were identified during 2017 aerial roost surveys were revisited for crepuscular surveys on December 14, 2017, March 10-11, 2018 and April 10-11, 2018.

2.5 Spring and Fall Migration Watch Surveys

Point count methodologies adhered to typical industry standard recommendations (National Wind Coordinating Committee 1999, Strickland et al. 2011) and those targeted specifically at providing eagle collision risk due diligence (USFWS 2013).

The same survey point locations that were identified as eagle use survey points also served as locations for migration watch surveys (*Figure 1,* **Appendix I**). Point count methodology followed ECP guidance (USFWS 2013) but with minor adaptations to accommodate the capture of baseline avian use data for a wider array of avian taxa.

The point count protocol was designed to document diurnal bird movements through the Project Area and to assess potential collision risk of those species detected during daytime migration. During each point count station visit, biologists conducted a point count of 20 minutes in duration, recording all avian species detected. Large-bodied birds (e.g., waterfowl, raptors) detected within an 800-meter radius (approx. 2 km^2) and small-bodied birds (e.g., passerines) detected within a 300-meter radius (approx. 0.3 km^2) were noted. Habitat use, count, behaviors, detection distance, and flight height profile were recorded for all detections.

The spring migration watch weekly point count survey window occurred between May 1 and May 31, 2017, and between March 1 and April 30, 2018. The fall migration watch weekly point count survey window occurred between August 1 and November 30, 2017. Surveys were conducted between dawn and dusk.

2.6 Wetland Utilization Surveys

The Ashland Township Wetland Complex (ATWC), the Oak Glen Wetland Complex (OGWC), and the Dodge Center Creek Waterfowl Production Area (DWPA) (*Figure 1*, **Appendix I**) were surveyed weekly during the spring, summer, and winter periods to evaluate incidental avian wetland utilization. These sites have been designated for their conservation value and hold habitats reminiscent of prairie and prairie pothole ecosystems more common in the region prior to the landscape being converted to agricultural use. These wetland complexes may support higher bird

abundance and richness of bird species than surrounding agricultural habitats and they provide an opportunity to assess breeding statuses for several sensitive species, particularly passerine bird species that are more difficult to assess from roadside point count locations. The objectives of the wetland utilization surveys were 1) to document seasonal use by sensitive species at wetland areas and 2) to observe the tendency for there to be relatively large numbers of avian species (i.e., waterfowl and other waterbirds) concentrated at these locations. The ATWC and OGWC were also surveyed as part of the first year of avian use study that was completed by HDR (HDR 2017). The DWPA was added to the survey schedule in May 2017.

Surveys generally followed protocol outlined in the *Minnesota Department of Natural Resources Guidance for Commercial Wind Energy Projects* (MNDNR 2011). These non-standardized surveys were designed and executed to document all avian use during each visit. As such, effort varied between visits and was dependent on the time required for the observer to adequately assess all birds that were believed to be present (generally 10 – 20 minutes per visit). Cumulative numbers of visits to each wetland area are summarized in *Table 2 – Cumulative Wetland Utilization Survey Visits.*

Table 2. Cumulative Wetland Utilization Survey Visits at Dodge County Wind Energy Center

SEASON	ATWC	OGWC	DWPA
Spring (May) 2017	4	4	3
Summer (June – July) 2017	9	9	10
Fall (August – November) 2017	17	17	17
Spring (March – April) 2018	14	14	14

2.7 Breeding Bird Survey

Targeted breeding surveys for Loggerhead Shrike (*Lanius ludovicianus*) and Henslow's Sparrow (*Ammodramus henslowii*) were conducted in June 2017 and described under a separate cover (Atwell 2017b). Other targeted breeding bird surveys were not conducted, but breeding observations for sensitive species found within the Project Area, including singing, pairs found in suitable habitat, territorial defense, courtship displays, copulation, agitated behavior suggesting proximity of an active nest, nesting material carries, nests, food carries, and dependent fledglings were recorded during avian use surveys in the spring and summer. When a state listed species or other conservation concern species was first detected, occurrences of those species were tracked over subsequent visits in an effort to ascertain the species' breeding statuses within the Project Area. Currently assessed breeding status is included with a superscripted numeral in *Table 6* after the species name: 1 = observed only, 2 = unlikely to breed within the Project Area, 3 = possibly breeding within the Project Area, 4 = probably breeding within the Project Area. Breeding statuses for raptor species are reported in Section 3 below.

2.8 Incidental Observations

Outside of weekly standardized surveys, incidental avian data were recorded for raptors and eagles, and sensitive species that were observed within the Project Area and its surrounding buffers. Particular attention was given to habitats that may act as local concentration points for a variety of avian taxa. All observation locations were marked with a GPS, and species, number of individuals, and behaviors were recorded. Incidental detections included observations recorded while *en route* to surveys, birds observed beyond the 800 m-radius standardized count cylinder during point count surveys, birds observed immediately outside the beginning and end of the point count survey duration, and birds observed during non-standardized breeding bird surveys.

2.9 Data Management

Protocol surveys described above were conducted by five (5) avian biologists over the course of the study. All completed data forms were proof-checked and photocopied, with data subsequently entered into an electronic database and proofed-checked to confirm accurate data entry.

2.10 Data Analysis

Data were organized and analyzed with *Microsoft Excel* and *Program R* (R CORE TEAM 2014). The following statistics/data appearing in this report are:

- Site species richness
- Species mean use
- Relative abundance (for selected species only)
- Species occurrence frequency
- Species percent composition
- Raptor species richness
- Eagle mean use
- Raptor occurrence frequency
- Raptor percent composition
- Eagle seasonal movement profiles

Point count data were standardized across time and area. All data were analyzed on a seasonal basis alone. Mean use statistics were calculated for each species per unit of area (e.g., eagles/km^2) per point count period (e.g., standardized species count/20-minute survey). It is important to note that mean use does not reflect absolute density of a particular species. Therefore, the term “abundance” should not be used to describe mean use statistics. Standard deviations are reported alongside of mean use values.

Frequency of occurrence is the percentage of surveys (as a percentage of total surveys conducted) that a particular species was recorded during conducted surveys. Frequency statistics are reported seasonally across all point count stations and across use surveys. Species composition is a measure of overall mean use in comparison to all other species recorded during scheduled surveys. Since many avian species migrate in flocks, some of which can approach hundreds or thousands of birds per flock, statistics pertaining to mean use may not accurately reflect their relative occurrence within this portion of Minnesota during migration periods. Frequency of occurrence and species composition provide additional insight into the overall avian use diversity at the survey area.

Adhering to the sampling framework outlined in USFWS (2013) allowed for collection of use data suitable for possible incorporation into the USFWS collision fatality model, following Tier 4 guidance outlined in USFWS (2012).

3.0 RESULTS

3.1 Raptor Nests and Local Area Bald Eagle Nesting Population

Key results from the 2017 aerial nest survey include the following:

- Zero (0) Bald Eagle nests were identified within the Project Area.

- Eleven (11) active Bald Eagle nests and two (2) inactive Bald Eagle nests were found within the pre- March 2017 Nest Survey Study Area during aerial nest surveys. After the Project Area shifted northwestward in May 2017, five (5) active Bald Eagle nests and two (2) inactive Bald Eagle nests remain within 10 miles of the current Project Area boundary (*Figure 3 – Bald Eagle Nest Map*, **Appendix I**).

- Five (5) of these nests were newly identified and not previously identified in a USFWS nest data query (USFWS data, accessed March 7, 2017) or in previous eagle nest survey results (HDR 2017).

- One (1) previously known Bald Eagle nest (USFWS data) located within the Nest Survey Study Area was found to no longer be present during aerial surveys.

There are 14 known Bald Eagle nest locations located within 18 miles of project turbines. This includes nests that are now beyond 10 miles from the Project Area but which were found before the Project Area's boundary shift in May 2017. These nests are listed in *Table 3* and are described in detail below:

Table 3. Bald Eagle Nest Distances to Closest Turbines at Dodge County Wind Energy Center

NEST NAME	COUNTY	DISTANCE TO CLOSEST TURBINE (mi)	TURBINE NO.	LATITUDE	LONGITUDE	STATUS
Blooming Prairie North	Steele	2.12	12	43.92101°N	93.06162°W	Active
Dodge Center North	Dodge	3.02	55	44.03116°N	92.89324°W	Active
Havana North	Steele	4.38	2	44.09531°N	93.15203°W	Inactive
Moland South	Steele	7.05	2	44.14048°N	93.04584°W	Active
Kasson South	Dodge	7.36	66	43.96345°N	92.77390°W	Active
Hayfield Southwest	Mower	9.16	70	43.84606°N	92.89208°W	Active
Kasson Northeast	Dodge	11.19	66	44.06009°N	92.72145°W	Inactive
Waltham	Mower	11.32	70	43.82268°N	92.85727°W	Removed
Berne South	Dodge	11.47	43	44.13097°N	92.78332°W	Active
Mantorville East	Dodge	11.74	66	44.06661°N	92.71391°W	Active
Vernon Southeast	Dodge	13.20	66	43.88098°N	92.69502°W	Active
Byron Southeast	Olmsted	15.06	66	43.98154°N	92.61691°W	Active
Rock Dell East	Olmsted	17.06	66	43.90759°N	92.59328°W	Active
High Forest West	Olmsted	17.95	66	43.84837°N	92.61118°W	Active

Bald Eagle Nests Identified in Dodge County

- Dodge Center North Nest: (44.03116°N, 92.89324°W, Dodge County, Wasioja Township, Section 32): 3.02 miles northeast of proposed Turbine #55. This known nest location was provided by the USFWS and is near Dodge Center Creek. An adult was observed on the nest during the 2017 aerial survey. 2017 Status: *Active-Confirmed.*

- Kasson South Nest: (43.96345°N, 92.77390°W, Dodge County, Canisteo Township, Section 29): 7.36 miles east of proposed Turbine #66. This known nest location was provided by the USFWS. An adult was observed on the nest during the aerial survey 2017 Status: *Active-Confirmed.*

- Kasson Northeast Nest: (44.06009°N, 92.72145°W, Dodge County, Mantorville Township, Section 22): 11.19 miles northeast of proposed Turbine #66. This known nest location was provided by the USFWS and is on the South Branch of the Zumbro River. This nest was not found to be active, and it is a suspected alternate nest for the active Mantorville East nest located 0.6 miles northeast. 2017 Status: *Inactive-Confirmed.*

- Berne South Nest: (44.13097°N, 92.78332°W, Dodge County, Milton Township, Section 30): 11.47 miles northeast of proposed Turbine #43. This is a new nest location and is on

Milliken Creek. An adult was observed on the nest during the aerial survey. 2017 Status: *Active-Confirmed.*

- Mantorville East Nest: (44.06661°N, 92.71391°W, Dodge County, Mantorville Township, Section 14): 11.74 miles northeast of proposed Turbine #66. This is a new nest location and is on the South Branch of the Zumbro River. This nest may be an alternate nest for the inactive Kasson Northeast nest located 0.6 miles southwest. An adult was observed on the nest during follow-up ground reconnaissance, and the landowner indicated that this nest has been present at least five years. 2017 Status: *Active-Confirmed.*

- Vernon Southeast Nest: (43.88098°N, 92.69502°W, Dodge County, Vernon Township, Section 24): 13.20 southeast of proposed Turbine #66. This known nest location was provided by the USFWS. An adult was observed on the nest during the aerial survey 2017 Status: *Active-Confirmed.*

Bald Eagle Nests Identified in Mower County

- Hayfield Southwest Nest: (43.84606°N, 92.89208°W, Mower County, Waltham Township, Section 5): 9.16 miles southeast of proposed Turbine #70. This is known nest location provided by the USFWS. An adult was observed on the nest during the aerial survey. 2017 Status: *Active-Confirmed.*

- Waltham Nest: (43.82268°N, 92.85727°W, Mower County, Waltham Township, Section 10): 11.32 miles southeast of proposed Turbine #70. This is known nest location provided by the USFWS. An isolated grove of cottonwoods that likely held the nest was found, but the nest was not observed, and freshly-cut branch stumps were observed on a possible nest tree within this grove of cottonwoods. 2017 Status: *Historic-No Longer Present.*

Bald Eagle Nests Identified in Olmsted County

- Byron Southeast Nest: (43.98154°N, 92.61691°W, Olmsted County, Salem Township, Section 16): 15.06 miles east of proposed Turbine #66. This is a new nest location located between a flooded gravel pit and Salem Creek. An adult was observed on the nest during the aerial survey. 2017 Status: *Active-Confirmed.*

- Rock Dell East Nest: (43.90759°N, 92.59328°W, Olmsted County, Rock Dell Township, Section 11): 17.06 miles southeast of proposed Turbine #66. This is a new nest location. An adult was observed on the nest during the aerial survey. 2017 Status: *Active-Confirmed.*

- High Forest West Nest: (43.84837°N, 92.61118°W, Olmsted County, Rock Dell Township, Section 34): 17.95 miles southeast of proposed Turbine #66. This known nest location was provided by the USFWS and is on the North Branch of the Root River. An adult was observed on the nest during the aerial survey. 2017 Status: *Active-Confirmed.*

Bald Eagle Nests Identified in Steele County

- Blooming Prairie North Nest: (43.92101°N, 93.06162°W, Steele County, Blooming Prairie Township, Section 12): 2.12 miles southwest of proposed Turbine #12. This known nest location was provided by the USFWS, and is just south of the Oak Glen Wetland Complex (Section 2.6). This nest was frequently observed during utilization surveys and was found to be active in both 2017 and 2018. 2017 Status: *Active-Confirmed.* 2018 Status: *Active-Confirmed.*

- Havana North Nest (44.09531°N, 93.15203°W, Steele County, Havana Township, Section 6): 4.38 miles northwest of proposed Turbine #2. This is a new nest location, discovered during the aerial survey near Maple Creek. The nest was consistent for Bald Eagle in size and structure, and Bald Eagles were observed within one mile of the nest during the aerial survey. No activity was seen at the nest itself. 2017 Status: *Inactive-Possible.*

- Moland South Nest (44.14045°N, 93.04584°W, Steele County, Merton Township, Section 23): 7.05 miles northeast of proposed Turbine #2. This is a new nest location, discovered during the aerial survey. A female was found to be incubating two eggs. 2017 Status: *Active-Confirmed.*

Two other historic eagle nest locations provided by the USFWS (Hayfield East, 43.88599°N, 92.69926°W, and Hayfield East Alternate, 43.90302°N, 92.69768°W) were not observed during the aerial survey. However, the historic Hayfield East locations were only listed as approximate, and the nearby Vernon Southeast nest (above) may represent one of these nests. Coordinates of both Hayfield East nests are greater than 10 miles from the closest proposed turbine.

Other Raptor Nests

Atwell located twenty-two (22) active Red-tailed Hawk (*Buteo jamaicensis*) nests and eleven (11) active Great Horned Owl (*Bubo virginianus*) nests during March 2017 aerial nest surveys (see *Figure 4 – Raptor Nest Map,* **Appendix I**). Of these, one (1) Red-tailed Hawk nest and two (2) Great Horned Owl nests were found within the Project Area. Each active nest was observed with either: an incubating adult, an adult defending the nest, eggs, or nestlings.

Atwell noted thirty-three (33) raptor nests during the aerial nest survey that were not associated with a known raptor species (*Figure 4,* **Appendix I**). These nests were described as large enough to be raptor nests (though likely too small to be eagle nests), of recent construction (2016 or 2017, gauging from condition of nesting material and nest cup structure), yet unattended by hawks or owls. In addition to Red-tailed Hawks and Great Horned Owls, Broad-winged Hawks (*Buteo platypterus)*, Cooper's Hawks (*Accipiter cooperii*), Swainson's Hawks (*Buteo swainsoni*) and Barred Owl (*Strix varia*) are all potential breeders within the Project Area and may use these structures (Pfannmuller et al. 2017). Only one of these unattended structures is located within the Project Area.

During the standardized point count use surveys in late spring and summer, a mated pair of Swainson's Hawks (*Buteo swainsoni*) was observed in multiple locations within the same general vicinity of the Project Area (Steele County segment at approximately 43.986478°N, 93.12386°W) (Atwell 2017c). This *Buteo* species migrates into the state later than typical timing used to conduct eagle nest surveys and may be missed during typical raptor nest surveys because of methodology timing. At the time this species was detected within the Project Area, forest canopy leaf-out was complete, thus eliminating confirmation of an exact nest location. Regardless, observed behavior cues indicated that a pair of Swainson's Hawks likely is nesting within at least one location in the Steele County portion of the Project Area.

Nesting Swainson's Hawks are listed as a species of greatest conservation need in Minnesota (MNDNR 2016). Pfannmuller et al. (2017) confirm that Swainson's Hawk is a rare nesting hawk that nests primarily in the southwestern corner of the state, whereas breeding observations are distributed sparsely to the south and southeast of Minneapolis. The observation of a probable nesting pair within the Project Area was not unprecedented, and the breeding bird atlas project recently documented a possible nesting observation from Steele County (Pfannmuller et al. 2017).

3.2 Bald Eagle Winter Roost Surveys

Bald Eagle roost locations were identified during aerial surveys and subsequently revisited with ground reconnaissance. Key Bald Eagle detections, including aggregations of Bald Eagles, include:

- Two (2) communal roosts were identified within the Nest Search Survey Area; Rice Lake in Merton Township, Steele County, and Cedar River in Udolpho Township, Mower County (*Figure 5 – Bald Eagle Observations & Roosts Map*, **Appendix I**).

- Seventeen (17) Bald Eagles were observed at the Cedar River communal roost on March 19, 2017. The Cedar River roost is located 9.92 miles from the closest proposed turbine (Turbine #12).

- Ten (10) Bald Eagles were observed at the Rice Lake communal roost on March 20, 2017. The Rice Lake roost is located 4.89 miles from the closest proposed turbine (Turbine #2).

- 197 Bald Eagles were observed from 71 different locations (*Figure 5 – Bald Eagle Observations & Roosts Map*, **Appendix I**). All but three (3) of the individuals were observed outside of the Project Area.

Concentrations of 10-20 Bald Eagles were repeatedly seen during mid-day during the aerial survey, with birds clustered at roadkill. These locations (visible in *Figure 5*, which notes the number of eagles observed for each sighting) were revisited on March 19-20, 2017, yielding the locations of the Cedar River and Rice Lake roosts when eagles were again seen nearby.

3.3 Eagle Use Characterization

3.3.1 Bald Eagle

Overall Detections

Overall, 68 Bald Eagles were detected over 461 hours of standardized effort during this pre-construction eagle use study (see *Table 4 – Raptor Survey Seasonal Use Summary Statistics* and *Figure 6a – Eagle Observation Density Map*, **Appendix I**).

This total only includes eagles observed during standardized use surveys and which were detected within the 800 m-radius count cylinder about the point. When 93 incidental detections are included (detections beyond the 800 m-radius count cylinder during surveys and detections while *en route* to points), 161 total Bald Eagle detections occurred during standardized use surveys and during travel between standardized use points (*Figure 6,* **Appendix I**).

Seasonal Mean Eagle Use

Bald Eagle standardized mean use rates were similar in the spring, fall, and winter, and were highest in the spring (*Table 4 – Raptor Survey Seasonal Use Summary Statistics*). Bald Eagle mean use rates decreased by an order of magnitude in the summer compared to other seasons.

Standardized mean use (Bald Eagles/20 minutes within 800 m of point count stations) was 0.076 Bald Eagles/20 minutes (*SD* = 0.331) during the spring, 0.053 Bald Eagles/20 minutes (*SD* = 0.314) during the fall, and 0.046 Bald Eagles/20 minutes (*SD* = 0.272) during the winter period (*Table 4*). Mean use was 0.004 Bald Eagles/20 minutes (*SD* = 0.066) during the summer period.

One (1) Bald Eagle was observed for approximately every 4.4 hours of standardized observation effort during the spring, one (1) individual for approximately every 6.3 hours of standardized surveys during the fall, and one (1) individual for every 7.3 hours during the winter. One (1) Bald Eagle was observed for every 83.3 hours of standardized observation during the summer period.

Figure 7 - Raptor Monthly Occurrence Frequency, **Appendix I** plots monthly species-specific occurrence frequencies observed during standardized use surveys and includes monthly occurrence of other raptor species for context.

Bald Eagle Standardized Use Relative to Other Raptor Species

Bald Eagles accounted for 9.1% of total raptor (hawks, eagles, falcons, owls, and excluding vultures) detections recorded at distances of under 800 m over the course of the 1-yr study period (*Table 4*).

Excluding vultures, Bald Eagles accounted for 14.4% of spring raptor detections during standardized surveys, 1.2% of summer raptor detections, 5.6% of fall raptor detections, and 30.2% of winter detections.

- Bald Eagle seasonal use patterns do not parallel the seasonal use patterns for the raptor guild as a whole (hawks, eagles, falcons, and owls, (*Table 4*). During colder winter months, Bald Eagle use rates diminished but remained similar to use rates observed in the spring and fall. However, Bald Eagles are one of the only raptor species that were observed using the Project Area during the winter period, the season with lowest mean use for the raptor guild as a whole.

- Contrary to Bald Eagle seasonal use patterns, use rates for the raptor guild as a whole (hawks, eagles, falcons, owls, and excluding vultures) were the highest in the fall period. This pattern was driven by a large movement of migrating Broad-winged Hawks (*Buteo platypterus*) that were recorded during surveys on September 26, 2017.

Excluding vultures, mean raptor use was highest during the fall migration period (mean use = 0.934 raptors/20 minutes, *SD* = 7.169), and spring migration period (mean use = 0.527 raptors/20 minutes, *SD* = 0.879). Mean raptor use (excluding vultures) was 0.155 raptors/20 min (*SD* = 0.443) during the winter period, and mean use was 0.364 raptors/20 min (*SD* = 0.793) during the summer period, when Bald Eagles were rarely seen (*Table 4*). *Figure 7,* **Appendix I** identifies Red-tailed Hawks, Northern Harriers (*Circus hudsonius*), and Bald Eagles as the drivers of raptor mean use during the spring and fall, later-arriving Swainson's Hawks join these three species to dominate summer mean use, and Rough-legged Hawks (*Buteo lagopus*) contribute to raptor mean use during the winter period.

Spatial Distribution of Detections

Figure 6 - Eagle Observation Density Map, **Appendix I** displays Bald Eagle observation densities throughout the Project Area, and *Figures 8a-8d - Seasonal Bald Eagle Mean Use Maps,* **Appendix I** separate mean use values by season. In *Figure 6*, Bald Eagle relative observation densities within five miles of each eagle observation are shaded from green (lowest density) to red (highest density) across the Project Area. Bald Eagles were most frequently observed in the southwestern portion of the Project Area, with many observations occurring near an active nest near the Oak Glen Wetland Complex in Blooming Prairie Township, immediately southwest of the Project Area.

Figures 8e-8h Seasonal Raptor Mean Use Maps, **Appendix I** portray each eagle observation recorded during standardized point count surveys and incidental to point count observations. Each season's map lacks a clear pattern of spatial distribution of detections across the Project Area, suggesting that there are not physiographic or habitat features within the Project Area that notably aggregate raptor use, particularly during migration flights.

Table 4. Seasonal Use Summary Statistics for Raptor Species Detected within the Dodge County Wind Energy Center

Species Group/Species Name	SPRING						SUMMER						FALL						WINTER					
	Total Std. Detections	All Detections	% Comp.	Mean Use (birds/20-min)	Stan. Dev.	Occur. Freq.	Total Std. Detections	All Detections	% Comp.	Mean Use (birds/20-min)	Stan. Dev.	Occur. Freq.	Total Std. Detections	All Detections	% Comp.	Mean Use (birds/20-min)	Stan. Dev.	Occur. Freq.	Total Std. Detections	All Detections	% Comp.	Mean Use (birds/20-min)	Stan. Dev.	Occur. Freq.
American Kestrel	14	16	5.58%	0.039	0.221	0.034	30	30	20.98%	0.132	0.531	0.079	21	21	4.00%	0.046	0.210	0.046	3	3	5.66%	0.009	0.093	0.009
Merlin	5	6	1.99%	0.014	0.118	0.014	.	.	.	.	.	.	3	3	0.57%	0.007	0.105	0.004	.	.	.	.	.	.
Peregrine Falcon	3	3	1.20%	0.008	0.091	0.008	.	.	.	.	.	.	1	1	0.19%	0.002	0.047	0.002	.	.	.	.	.	.
Unknown Falcon	0	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Golden Eagle	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0.19%	0.002	0.047	0.002	.	.	.	.	.	.
Bald Eagle	27	75	10.76%	0.076	0.331	0.056	1	3	0.70%	0.004	0.066	0.004	24	27	4.57%	0.053	0.314	0.035	16	56	30.19%	0.047	0.272	0.035
Unknown Eagle	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	4	.	.	.	.
Osprey	.	.	.	.	.	.	.	.	.	.	.	.	4	4	0.76%	0.009	0.093	0.009	.	.	.	.	.	.
Broad-winged Hawk	4	4	1.59%	0.011	0.167	0.006	.	.	.	.	.	.	283	283	53.90%	0.621	7.010	0.026	.	.	.	.	.	.
Northern Harrier	23	24	9.16%	0.064	0.307	0.050	6	6	4.20%	0.026	0.160	0.026	13	13	2.48%	0.029	0.191	0.024	.	.	.	.	.	.
Swainson's Hawk	5	5	1.99%	0.014	0.140	0.011	10	10	6.99%	0.044	0.322	0.026	1	1	0.19%	0.002	0.047	0.002	.	.	.	.	.	.
Red-tailed Hawk	77	102	30.68%	0.216	0.509	0.171	33	33	23.08%	0.145	0.451	0.105	48	48	9.14%	0.105	0.452	0.070	24	30	45.28%	0.070	0.298	0.058
Rough-legged Hawk	13	25	5.18%	0.036	0.215	0.031	.	.	.	.	.	.	4	4	0.76%	0.009	0.093	0.009	4	9	7.55%	0.012	0.108	0.012
Unknown Buteo	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	1.89%	0.003	0.054	0.003
Sharp-shinned Hawk	5	5	1.99%	0.014	0.140	0.011	.	.	.	.	.	.	10	10	1.90%	0.022	0.161	0.020	.	.	.	.	.	.
Cooper's Hawk	6	6	2.39%	0.017	0.149	0.014	2	2	1.40%	0.009	0.093	0.009	9	9	1.71%	0.020	0.139	0.020	.	.	.	.	.	.
Unknown Accipiter	1	1	0.40%	0.003	0.053	0.003	1	1	0.70%	0.004	0.066	0.004	1	1	0.19%	0.002	0.047	0.002	.	.	.	.	.	.
Turkey Vulture	63	63	25.10%	0.176	1.049	0.059	60	60	41.96%	0.263	1.119	0.114	99	99	18.86%	0.217	0.645	0.129	.	.	.	.	.	.
Short-eared Owl	1	1	0.40%	0.003	0.053	0.003	.	.	.	.	.	.	3	3	0.57%	0.007	0.081	0.007	.	.	.	.	.	.
Snowy Owl	2	2	0.80%	0.006	0.075	0.006	.	.	.	.	.	.	.	.	.	.	.	.	5	5	9.43%	0.015	0.120	0.015
Unknown Raptor	2	9	0.80%	0.006	0.075	0.006	.	.	.	.	.	.	.	.	.	.	.	.	0	6	.	.	.	.
All Raptors	**251**	**351**	**100.00%**	**0.703**	**1.524**	**0.370**	**143**	**145**	**100.00%**	**0.627**	**1.413**	**0.289**	**525**	**528**	**100.00%**	**1.151**	**7.248**	**0.311**	**53**	**115**	**100.00%**	**0.155**	**0.443**	**0.126**
All Raptors (excluding vultures)	**188**	**288**	**74.90%**	**0.527**	**0.879**	**0.353**	**83**	**85**	**58.04%**	**0.364**	**0.793**	**0.232**	**426**	**429**	**81.14%**	**0.934**	**7.169**	**0.221**	**53**	**115**	**100.00%**	**0.155**	**0.443**	**0.126**

Seasonal mean use statistics by species. *Total Std. Detections* = total number of detections occurring within the 800 m-radius count cylinder during standardized use surveys; *All Detections* = total number of detections including incidental detections. Both detection totals are cumulative and occasionally may double-count individuals observed across concurrent 20-minute segments at the point. *% Comp.* = % of species composition using total standardized detections; *Mean Use* = Total standardized detections divided by number of point count segments conducted within the season, with standard deviation; *Occur. Freq.* = occurrence frequency, the number of segments at which the taxon was detected divided by the total number of segments conducted during that season.

Directional Movements

Bald Eagle directional movements are summarized in rose-plot diagrams in *Bald Eagle Directional Movement Plots – Figures 9a-c*, **Appendix I**. Key patterns are listed below:

- Directional movements (see) trended southward in the fall, as expected during migration.
- Over a third of the Bald Eagles observed during the spring period were moving in a southerly direction, suggesting that a significant proportion of eagles observed during the spring period may be territorial residents or lingering wintering individuals.
- There was no clear directional trend during the winter season, consistent with a pattern expected from wintering Bald Eagles.

Seasonal sample sizes for directional movement analysis were small (particularly during the spring season) and do not eliminate the possibility that observed patterns in directional movement were not due to chance.

Flight Heights

Flight heights were highest during the fall survey period for Bald Eagles and for raptors as a whole (see *Figures 10a – d Raptor Flight Height Profiles,* **Appendix I**). Bald Eagle mean minimum and maximum flight heights were within the 35 – 150 m RSZ zone during the fall and winter periods, and Bald Eagle mean maximum flight height was within the RSZ during the spring.

Figures 10a – d, **Appendix I** provide a series of boxplots that describe the distributions of minimum and maximum flight heights for Bald Eagles, Golden Eagles, Swainson's Hawks, Red-tailed Hawks, Rough-legged Hawks, and Northern Harriers. Spring maximum flight height means were within the RSZ for Swainson's Hawk, Red-tailed Hawk, Rough-legged Hawk, and Bald Eagle. Fall maximum flight height means were within the RSZ for Bald Eagle and Red-tailed Hawk. It is important to note that these figures strictly describe the distribution of flight height data, and they do not necessarily speak to collision probability.

Collision Risk

Bald Eagles were encountered at flight heights within the 35 – 150 m RSZ within the Project Area. Rates of passage within the RSZ were similar in the spring (0.229 minutes within RSZ/standardized survey hour), fall (0.194 RSZ minutes/survey hour), and winter (0.211 RSZ minutes/survey hour).

Bald Eagles were observed within the RSZ for 27.2 minutes over 119 spring survey hours, 29.5 minutes over 152 fall survey hours, and for 24.1 minutes over 114 winter survey hours. Bald Eagles were not observed within the RSZ over 76 hours of standardized surveys in the summer. In total, Bald Eagles were observed flying within the RSZ for a total of 80.8 minutes over 461 total standardized survey hours across the year.

3.3.2 Golden Eagle

Two (2) Golden Eagle detections occurred over the course of this pre-construction eagle use study (see *Figure 6a, 6b - Eagle Observation Density Map*, **Appendix I**). One (1) of these individuals was observed during 461 hours of standardized mean use surveys.

The Golden Eagle observed during standardized use surveys was seen from point # 77 on November 2, 2017. It was observed within the standardized count cylinder for 5.3 minutes and was moving south-southwestward in apparent migration. The other Golden Eagle was observed incidentally on March 10, 2017, in Ripley Township (43.9503°N, 92.9417°W), perched on the side of the road.

Standardized mean use was 0.002 Golden Eagles/20 minutes (*SD* = 0.047) during the fall and zero (0) during other seasons.

3.4 Wetland Utilization Survey Summary

No federally listed species were observed during wetland utilization surveys. One (1) State Endangered Henslow's Sparrow (*Ammodramus henslowii*) was observed singing on June 22, 2017 at the DWPA. This individual was not observed on subsequent visits and thus Henslow's Sparrow breeding status was determined by Atwell as *possible* within the Project Area in *Table 5 – Incidental Wetland Utilization Survey Summary*. For more information regarding the results of targeted endangered avian species surveys, please reference Atwell (2017b). Several Minnesota *Species of Greatest Conservation Need* (SGCN; MNDNR 2016) associated with grassland habitats were determined by Atwell to be probable breeders within the Project Area, including (in order of decreasing frequency of occurrence): Dickcissel (*Spiza americana*), Bobolink (*Dolichonyx oryzivorus*), Sedge Wren (*Cistothorus platensis*), Swamp Sparrow (*Melospiza georgiana*), Eastern Meadowlark (*Sturnella magna*), and Marsh Wren (*Cistothorus palustris*).

American White Pelican (MNDNR-SGCN*, Pelecanus erythrorhynchos*) represented the single species that demonstrated a tendency to flock in relatively large numbers during the observation period. State Threatened Trumpeter Swans (*Cygnus buccinator*) were present in moderate numbers during the breeding season and are considered to be probable breeders within the Project Area (*Table 5*).

Table 5. Incidental Wetland Avian Utilization Survey Summary – Dodge County Wind Energy Center

STATUS	SPECIES	ATWC				OGWC				DWPA			
		Spring 2017	Summer 2017	Fall 2017	Spring 2018	Spring 2017	Summer 2017	Fall 2017	Spring 2018	Spring 2017	Summer 2017	Fall 2017	Spring 2018
SE	Henslow's Sparrow[3]	0	0	0	0	0	0	0	0	0	**1**	0	0
	Horned Grebe[1]	0	0	0	0	**8**	0	0	0	0	0	0	0
ST	Trumpeter Swan[4]	0	0	0	0	**13**	**57**	**32**	0	0	0	0	0
SC	Short-eared Owl[1]	0	0	0	**1**	0	0	0	0	0	0	0	0
SGCN	American Bittern[3]	0	0	0	0	**2**	0	0	0	0	0	0	0
	American White Pelican[1]	0	**1**	0	0	**182**	0	**167**	0	0	0	**12**	0
	Black Tern[1]	0	0	0	0	0	0	**14**	0	0	0	0	0
	Black-billed Cuckoo[1]	0	0	0	0	0	0	1	0	0	0	0	0
	Black-throated Blue Warbler[1]	0	0	0	0	**1**	0	0	0	0	0	0	0
	Bobolink[4]	**50**	**76**	**3**	0	0	0	0	0	**31**	**71**	0	0
	Brown Thrasher[4]	**1**	0	0	0	0	**1**	0	0	0	0	0	0
	Dickcissel[4]	0	**35**	0	0	0	**17**	**1**	0	0	**24**	0	0
	Eared Grebe[1]	0	0	0	0	**2**	0	0	0	0	0	0	0
	Eastern Meadowlark[3]	**2**	**4**	**1**	**1**	0	0	0	0	**2**	**3**	0	0
	Eastern Wood-Pewee[3]	0	0	**0**	0	**1**	**5**	**10**	0	0	0	0	0
	Forster's Tern[1]	**4**	0	0	0	0	0	**3**	0	0	0	0	0
	Lesser Scaup[1]	0	0	0	**2**	**10**	0	0	0	0	0	0	0
	Marsh Wren[4]	**2**	0	0	0	**4**	**14**	0	0	**2**	**5**	0	0
	Northern Harrier[3]	**4**	**2**	**2**	**4**	0	0	0	**1**	**1**	**1**	0	**3**
	Northern Pintail[1]	0	0	0	0	0	0	**79**	0	0	0	0	0
	Red-headed Woodpecker[3]	0	0	0	0	0	0	0	0	0	**2**	**1**	0
	Red-necked Grebe[3]	0	0	0	0	**4**	**1**	0	0	0	0	0	0
	Rose-breasted Grosbeak[3]	0	0	0	0	**2**	**1**	0	0	0	0	0	0
	Rusty Blackbird[1]	0	0	0	0	0	0	0	0	0	0	0	**8**
	Sedge Wren[4]	**6**	**42**	**19**	0	**3**	**20**	**1**	0	**6**	**36**	**6**	0
	Willow Flycatcher[3]	**2**	**2**	0	0	0	0	0	0	0	**2**	0	0
BGEPA	Bald Eagle[2]	**2**	0	**1**	**2**	**4**	0	**9**	**13**	0	0	0	**1**

ATWC = Ashland Township Wetland Complex; **OGWC** = Oak Glen Wetland Complex; **DWPA** = Dodge Center Creek Waterfowl Production Area. **SE** = State Endangered; **ST =** State Threatened; **SC** = Special Concern; **SGCN** = Species of Greatest Conservation Need; **BGEPA** = Bald and Golden Eagle Protection Act species. Breeding statuses are provided with superscripted numerals occurring after each special status species name and include: 1 = observed only; 2 = unlikely breeder within the Project Area due to extensive surveys within the Project Area; 3 = possibly breeding within the Project Area; and 4 = probably breeding within the Project Area. Breeding statuses within the Project Area were informed by preliminary data from the Minnesota Breeding Bird Atlas Project (Pfannmuller et al. 2017) and field observation. Breeding status definitions can be found on the Minnesota Breeding Bird Atlas website at https://mnbirds.com/wp-content/uploads/2016/11/BreedingEvidenceCodes_Tips.pdf

3.5 Review of Migration Use Data

Migration use of the Project Area was higher during the fall season than during the spring season, though specific taxonomic groups (e.g., waterfowl) did not follow this pattern (*Figure 11,* **Appendix I**).

- Fall Migration = 3,761 total individuals were detected during the fall season, a rate of approximately 25 birds/20-minute count segment during fall standardized surveys.

- Spring Migration = 2,647 individuals were detected during the spring season, a rate of approximately 22 birds/20-minute count segment during spring standardized surveys.

Small-bodied passerines, corvids, and waterfowl together comprised the large majority of detections during both seasons (87% of spring detections and 84% of fall detections), largely driving seasonal differences in avian use of the Project Area during migration. Mean use statistics for all species referenced below and encountered during spring and fall standardized surveys are provided in **Appendix II**.

Avian guilds utilize Project Area air space at different altitudes (*Figure 12a, 12b,* **Appendix I**). When taken together, the waterbird and raptor species guilds encounter relatively riskier flight heights more so than other avian species guilds.

Waterfowl

Waterfowl (3.8 individuals/spring 20-min count segment) represented 17.2% of spring migration detections. Numbers decreased during fall migration to 1.7 individuals/20-min fall count segment, representing only 6.9% of fall migration detections. Canada Geese (*Branta Canadensis*) and Mallards (*Anas platyrhynchos*) together represented the majority of waterfowl observations during spring and fall migration (96.7% and 90.4% of waterfowl detections respectively).

Waterbirds

The waterbird group includes loons, grebes, cormorants, and gulls. Waterbird detections increased notably from the spring to the fall, from only four (4) individuals detected over the entire spring survey period (0.03 detections/20-min count segment in the spring) to 0.8 detections/20-min count segment in the fall. This seasonal difference was driven by passage of Franklin's Gulls (*Leucophaeus pipixcan*) through the Project Area in the fall, representing 95.9% of fall waterbird detections.

Waders

Waders include herons and cranes. They were rarely recorded during migration, with 20 individuals observed over the entire spring period, and 11 individuals observed over the entire fall period. Sandhill Cranes (*Grus Canadensis*) accounted for the majority of wader detections (55% in the spring and 91% in the fall).

Shorebirds

Shorebirds were observed at similar rates in the spring and fall (0.4 spring detections/20-min count segment and 0.3 fall detections/20-min count segment, respectively). They accounted for 1.6% of overall detections in the spring and 1.3% of all overall detections in the fall. Killdeer (*Charadrius vociferous*) accounted for the majority of shorebird detections (73.7% of spring shorebird detections and 45.8% of fall shorebird detections).

Upland Gamebirds

Upland gamebirds were detected three times more frequently in the spring (0.3 detections/20-min count segment) than in the fall (0.1 detections/20-min count segment). They represented 1.6% of overall spring detections and 0.4% of overall fall detections. This seasonal pattern was driven entirely by Wild Turkeys (*Meleagris gallopavo*), which were not observed during the fall period.

Raptors

Seasonal raptor use of the Project Area is described in Section 3.3 above. Use rates were highest during the fall season, driven by large movements of Broad-winged Hawks through the Project Area over short durations. Fall and spring raptor use rates were otherwise similar, with raptors representing 3.1% of all total bird detections in the spring and 2.6% of all bird detections in the fall during 20-minute migration watch count segments.

Non-passerines

Non-passerines include woodpeckers, doves, pigeons, and swifts. Detection rates of non-passerines were higher in the fall (1.9 detections/20-min count segment) than in the spring (1.4 detections/20-min count segment). Non-passerine detections accounted for 7.7% of all detections in the fall and 6.2% of all detections in the spring. The large majority of non-passerine detections were Rock Pigeons (*Columba livia*, 83.5% of spring non-passerine detections and 91.0% of fall non-passerine detections).

Corvids

Corvid detection rates were higher in the spring (1.8 detections/20-min count segment) than in the fall (1.5 detections/20-min count segment). This species group represented 8.0% of all spring detections and 6.0% of all fall detections. All corvid detections were American Crows (*Corvus brachyrhynchos*).

Passerines

Small-bodied passerine species accounted for the large majority of detections both in the spring (61.3%) and in the fall (71.5%). Observers recorded 13.6 small-bodied passerines/spring 20-min count segment and 17.7 small-bodied passerines/fall 20-min count segment.

Fifty-nine (59) small-bodied passerine species were recorded during standardized migration watch surveys. Red-winged Blackbirds (*Agelaius phoeniceus*, 20.4% of spring passerine detections and 20.6% of fall passerine detections), Common Grackles (*Quiscalus quiscula*, 11.4% of spring passerine detections and 9.1% of fall passerine detections), Horned Larks (*Eremophila alpestris*, 20.3% of spring passerine detections and 2.8% of fall passerine detections), Lapland Longspurs (*Calcarius lapponicus,* 22.7% of spring passerine detections, 3.7% of fall passerine detections), and European Starlings (*Sturnus vulgaris*, 2.6% of spring passerine detections and 10.6% of fall passerine detections) were the most common passerine species observed during migration watch surveys.

Seasonal patterns in passerine use of the Project Area were largely driven by increased use in the fall season by European Starlings, swallows (Barn Swallows [*Hirundo rustica*] and Cliff Swallows [*Petrochelidon pyrrhonata*]), American Goldfinches (*Spinus tristis*), and Blue Jays (*Cyanocitta cristata*) that were found in significantly higher numbers during the fall season (**Appendix II**).

3.6 Review of Sensitive Species Data

3.6.1 Federally Listed Species

Atwell biologists did not observe species listed as federally threatened or endangered during surveys throughout the April 2017 – March 2018 study period.

3.6.2 Minnesota State Listed Species and Species of Greatest Conservation Need

Table 6 – Summary of Sensitive Species Detected During Standardized Use Surveys summarizes Bald and Golden Eagle Protection Act (BGEPA) species, Minnesota State Endangered Species (E), Threatened Species (T), Species of Concern (SC), and the State Wildlife Action Plan's SGCN observed during spring, summer, and fall eagle use surveys. Basic summary statistics detail species counts; percent of spring point count locations (16 in 2017 and 19 in 2018) and summer and fall point count locations (19) at which the species was observed; percent of total spring 2017 site visits (*n* = 43), summer 2017 site visits (*n* = 76), fall 2017 site visits (*n* = 152), winter 2017-18 site visits (*n* = 114), and spring 2018 site visits (*n* = 76) during which the species was observed.

One (1) State Threatened Species (Trumpeter Swan) and nine (9) SGCN are considered to be probable breeders within the Project Area, including Swainson's Hawk, American Kestrel (*Falco sparverius*), Marsh Wren (*Cistothorus palustris*), Sedge Wren (*Cistothorus platensis*), Brown Thrasher (*Toxostoma rufum*), Swamp Sparrow (*Melospiza georgiana*), Dickcissel (*Spiza americana*), and Bobolink (*Dolichonyx oryzivorus*).

Table 6. Summary of Sensitive Avian Species Detected during Standardized Avian Use Surveys – Dodge County Wind Energy Center

Special Status Desig.	Species	Total Individuals Observed					Frequency of Stations Species Was Detected					Frequency of Surveys Species Was Detected				
		Spr 17	Sum 17	Fall 17	Win 17	Spr 18	Spr 17	Sum 17	Fall 17	Win 17	Spr 18	Spr 17	Sum 17	Fall 17	Win 17	Spr 18
ST	Trumpeter Swan[4]	2	3	2	0	0	4%	5%	5%	0%	0%	2%	1%	1%	0%	0%
SC	American White Pelican[1]	35	0	66	0	20	17%	0%	16%	0%	5%	9%	0%	3%	0%	1%
	Peregrine Falcon[1]	2	0	1	0	0	8%	0%	5%	0%	0%	5%	0%	1%	0%	0%
	Purple Martin[3]	7	7	1	0	0	13%	16%	5%	0%	0%	7%	4%	1%	0%	0%
	Short-eared Owl[1]	0	0	1	0	1	0%	0%	5%	0%	5%	0%	0%	1%	0%	1%
SGCN	American Kestrel[4]	6	16	21	0	0	21%	37%	58%	0%	0%	14%	13%	13%	0%	0%
	Belted Kingfisher[3]	2	2	0	0	0	19%	5%	0%	0%	0%	3%	1%	0%	0%	0%
	Bobolink[4]	32	78	14	0	0	13%	47%	16%	0%	0%	5%	25%	3%	0%	0%
	Brown Thrasher[4]	8	13	0	0	0	21%	32%	0%	0%	0%	19%	13%	0%	0%	0%
	Chimney Swift[3]	4	14	1	0	0	13%	16%	5%	0%	0%	7%	4%	1%	0%	0%
	Dickcissel[4]	3	122	2	0	0	13%	84%	5%	0%	0%	7%	54%	1%	0%	0%
	Eastern Meadowlark[3]	3	10	6	0	0	8%	26%	11%	0%	0%	5%	11%	2%	0%	0%
	Field Sparrow[3]	0	1	1	0	0	0%	5%	5%	0%	0%	0%	3%	1%	0%	0%
	Franklin's Gull[1]	0	0	385	0	0	0%	0%	26%	0%	0%	0%	0%	8%	0%	0%
	Least Flycatcher[3]	1	5	0	0	0	4%	26%	0%	0%	0%	2%	7%	0%	0%	0%
	Marsh Wren[4]	2	14	3	0	0	4%	11%	11%	0%	0%	2%`	8%	1%	0%	0%
	Northern Harrier[3]	7	8	10	0	0	21%	37%	32%	0%	0%	14%	9%	5%	0%	0%
	Red-headed Woodpecker[3]	0	2	1	0	0	0%	11%	5%	0%	0%	0%	3%	1%	0%	0%
	Sedge Wren[4]	9	33	14	0	0	17%	32%	11%	0%	0%	9%	18%	4%	0%	0%
	Swainson's Hawk[4]	3	15	1	0	0	6%	16%	5%	0%	0%	5%	5%	1%	0%	0%
	Swamp Sparrow[4]	14	25	7	0	0	13%	21%	11%	0%	0%	7%	12%	3%	0%	0%
	Upland Sandpiper[3]	1	9	3	0	0	4%	5%	11%	0%	0%	2%	5%	1%	0%	0%
	Virginia Rail[1]	2	0	1	0	0	4%	0%	5%	0%	0%	2%	0%	1%	0%	0%
	Willow Flycatcher[3]	0	4	0	0	0	0%	16%	0%	0%	0%	0%	4%	0%	0%	0%
	Yellow-bellied Sapsucker[1]	0	1	0	0	0	0%	5%	0%	0%	0%	0%	3%	0%	0%	0%
BGEPA	Bald Eagle[2]	10	3	22	41	37	33%	16%	58%	79%	89%	19%	4%	11%	21%	29%
	Golden Eagle[1]	0	0	1	0	0	0%	0%	5%	0%	0%	0%	0%	1%	0%	0%

Station Frequencies calculated from 16 stations sampled in spring 2017 and 19 stations sampled in seasons thereafter. **Survey Frequencies** calculated from: 43 spring 2017 visits; 76 summer 2017 visits; 152 fall 2017 visits; 114 winter 2017-18 visits; and 76 spring 2018 visits. **ST** = State Threatened; **SC** = Special Concern; **SGCN** = Species of Greatest Conservation Need; **BGEPA** = Bald and Golden Eagle Protection Act species. Breeding statuses are provided with superscripted numerals occurring after each special status species name and include: 1 = observed only; 2 = unlikely breeder within the Project Area due to extensive surveys within the Project Area; 3 = possibly breeding within the Project Area; and 4 = probably breeding within the Project Area. Breeding statuses within the Project Area were informed by preliminary data from the Minnesota Breeding Bird Atlas Project (Pfannmuller et al. 2017) and field observation. Breeding status definitions can be found on the Minnesota Breeding Bird Atlas website at https://mnbirds.com/wp-content/uploads/2016/11/BreedingEvidenceCodes_Tips.pdf

4.0 DISCUSSION & CONCLUSIONS

This Year-2 pre-construction avian use study provides a comprehensive assessment of avian use within the Project Area from May 1, 2017 through April 30, 2018. Key study findings include the following:

- Federal Threatened/Endangered Species were not observed within the Project Area.
- A wide variety of avian species migrate through the Project Area during spring and fall. Use rates vary widely among species guilds and across within-guild species.
- Golden Eagles detections during standardized surveys were rare events, only occurring once over 461 hours of standardized use surveys. Migration and wintering density of Golden Eagle is expected to be low within the Project Area.
- No Bald Eagle nests are known to be located within the Project Area. Five (5) active and two (2) inactive Bald Eagle nests are currently known to be located within 10 miles of the Project Area. The closest nest to turbine distance is 2.12 miles.
- Large congregations of Bald Eagles were not observed within the Project Area. The Cedar River roost (9.92 miles from the closest proposed turbine location) and the Rice Lake roost (4.89 miles from the closest proposed turbine location) were found during the March 2017 aerial nest survey and subsequent ground reconnaissance follow-up surveys.
- Bald Eagle standardized mean use was relatively constant in the spring, fall, and winter, though highest in the spring. Bald Eagles do not appear to intensively utilize the Project Area during summer months (i.e., June-July, and including August). Bald Eagle flight heights were highest in the fall, but seasonal rates at which Bald Eagles flew within the RSZ rates of flight within RSZ matched seasonal mean use patterns.
- One (1) State Threatened Species and eight (8) Minnesota Species of Greatest Conservation Need were observed within the Project Area during standardized use surveys are categorized as be probable breeders, including Trumpeter Swan, Swainson's Hawk, American Kestrel, Marsh Wren, Sedge Wren, Brown Thrasher, Swamp Sparrow, and Bobolink.
- American White Pelicans were the only species to congregate in large numbers during wetland utilization surveys. Trumpeter Swans were present in moderate numbers during wetland utilization surveys.

5.0 REFERENCES

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APPENDIX I

Report Figures

Figure 1. Avian Migration Use & Eagle Use Point County Survey Schematic – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

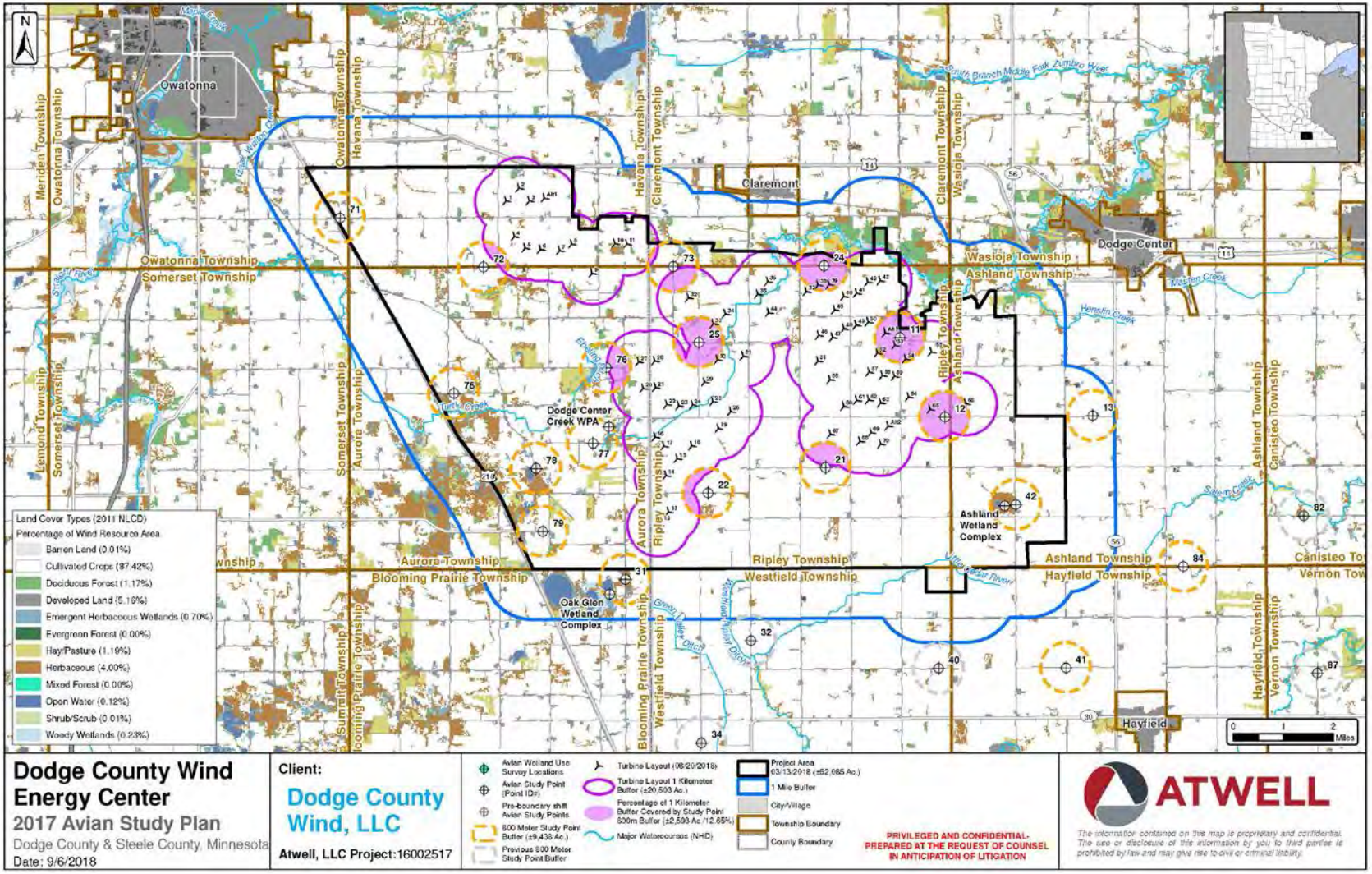


Figure 2. Aerial Raptor Nest Survey Study Plan Schematic – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

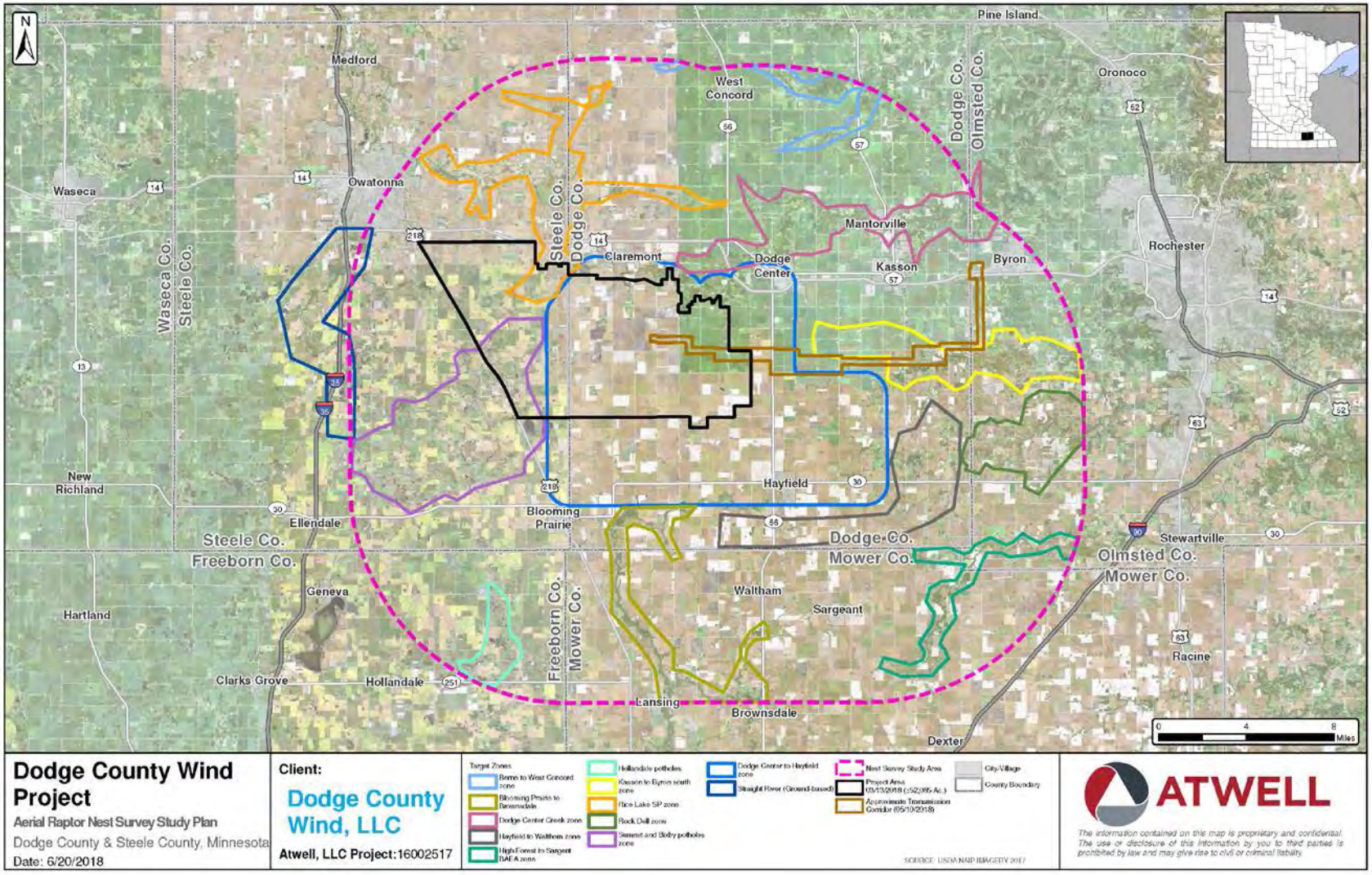


Figure 3. Eagle Nest Locations & Distances to Nearest Planned WTG – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

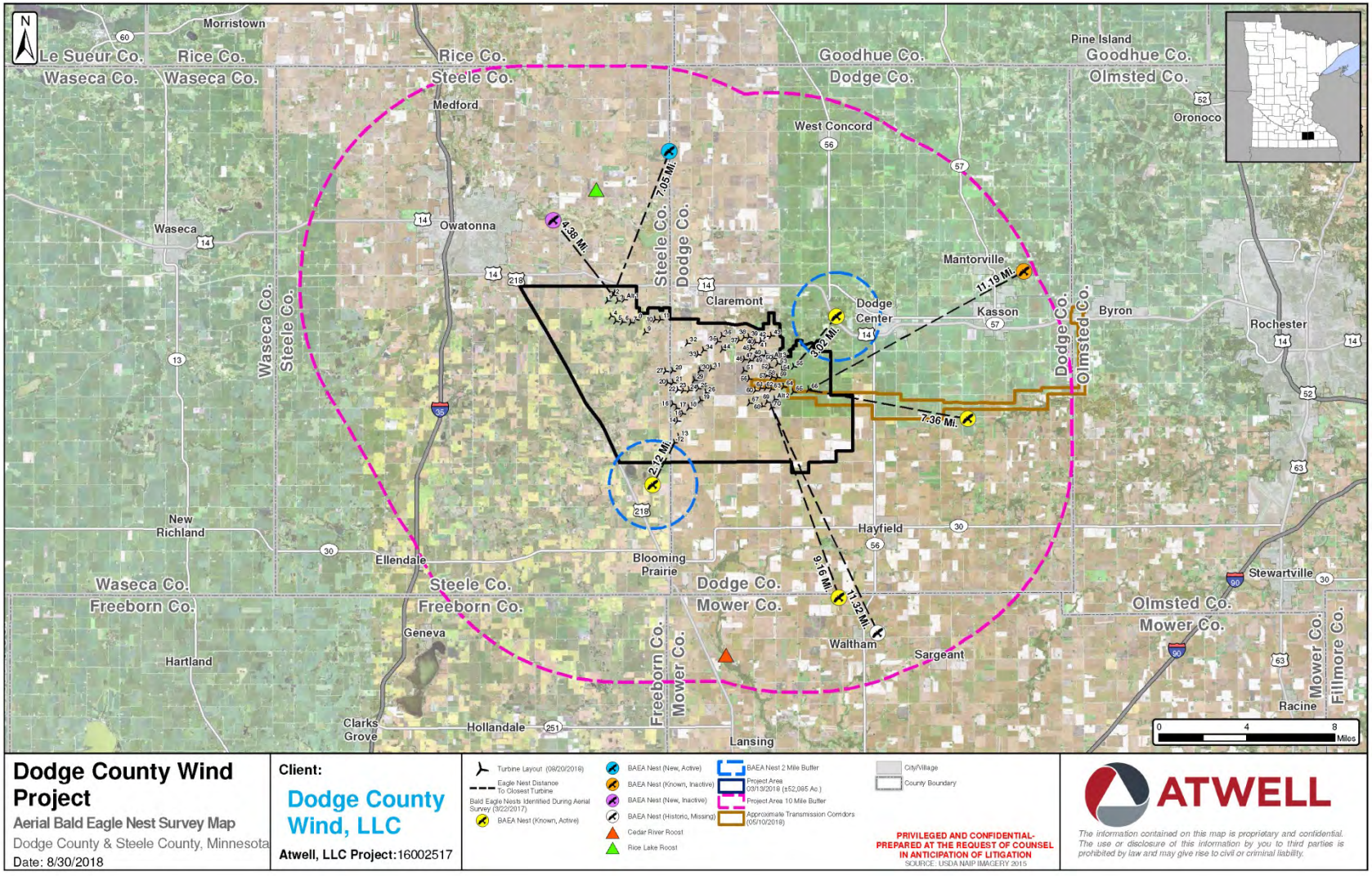


Figure 4. Other Raptor Species Nests (Including Heron Rookery Locations) – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

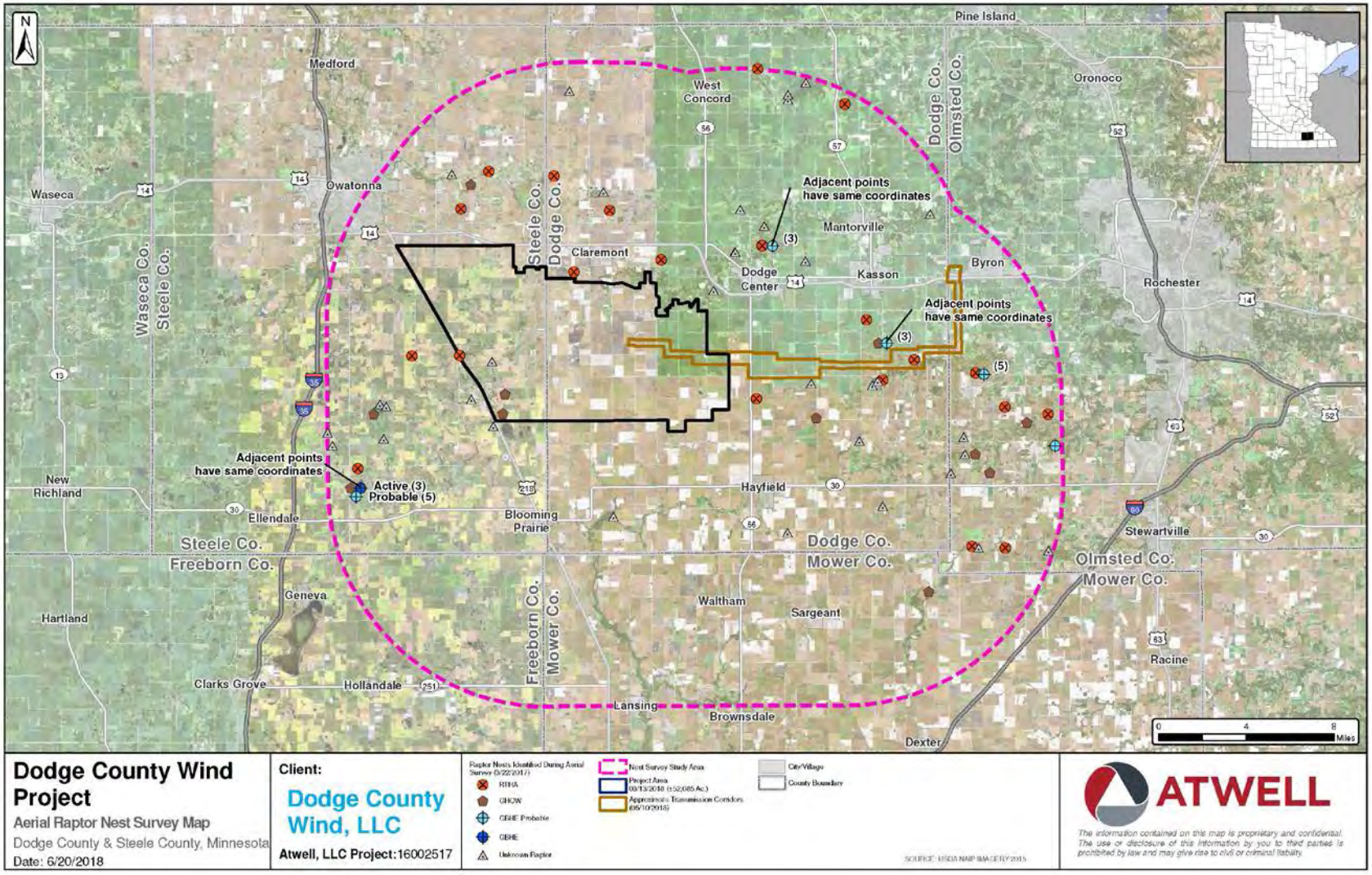


Figure 5. Bald Eagle Observation & Winter Communal Roosts from Aerial Survey Efforts (March 2017) – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

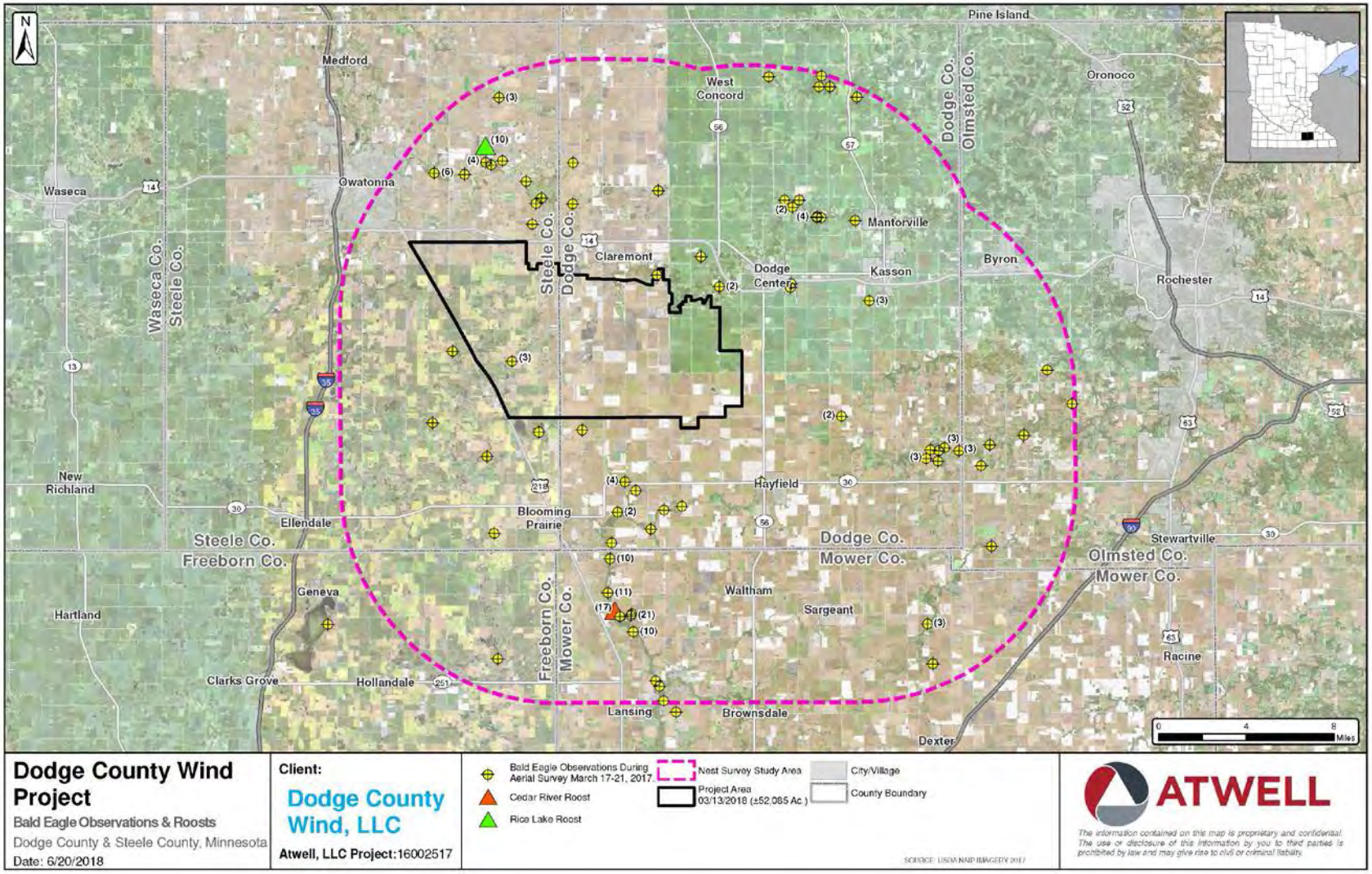


Figure 6. Eagle Observation Density Model (All Observations) – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

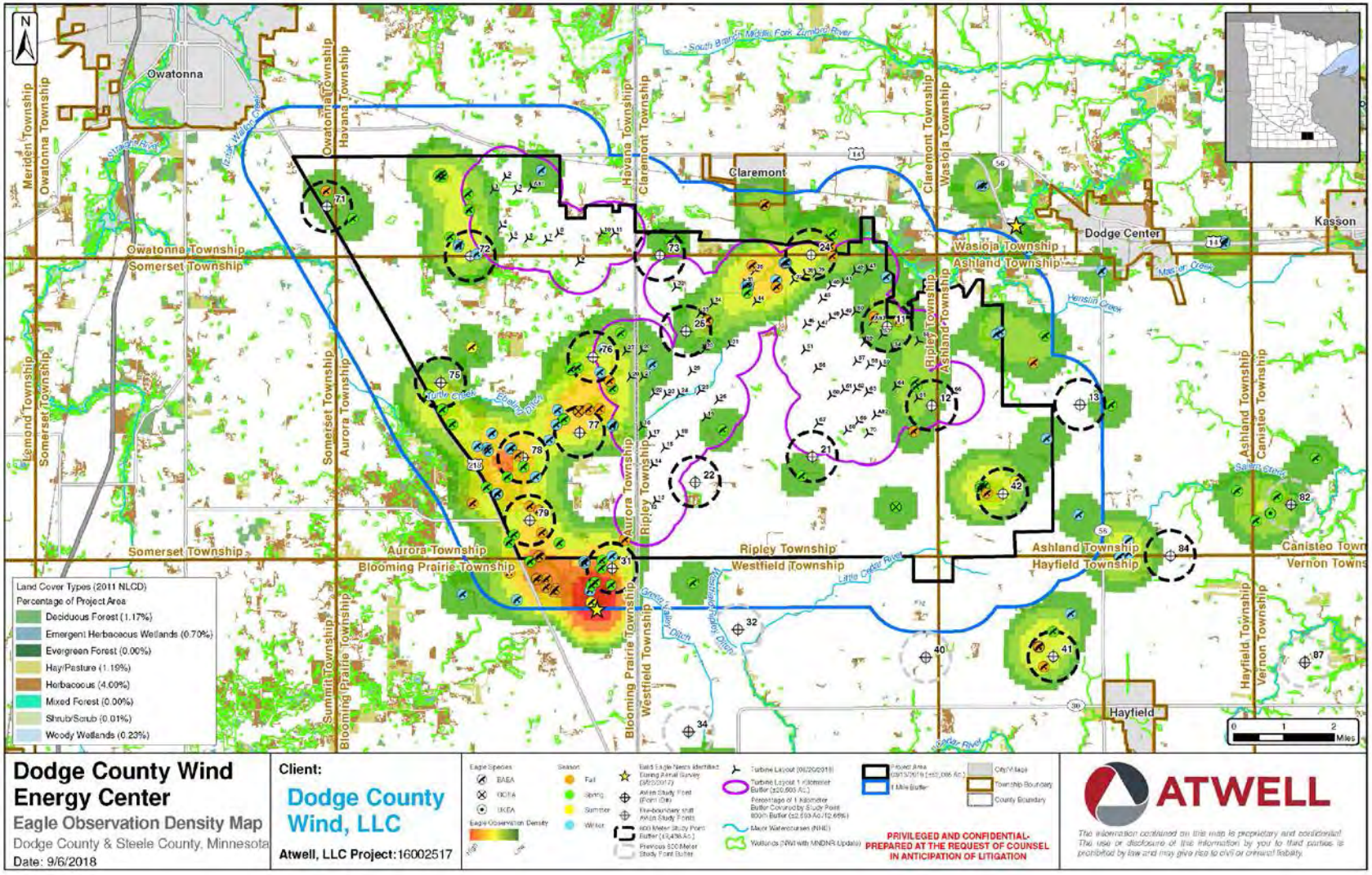


Figure 7. Raptor Species Occurrence Frequency by Month – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

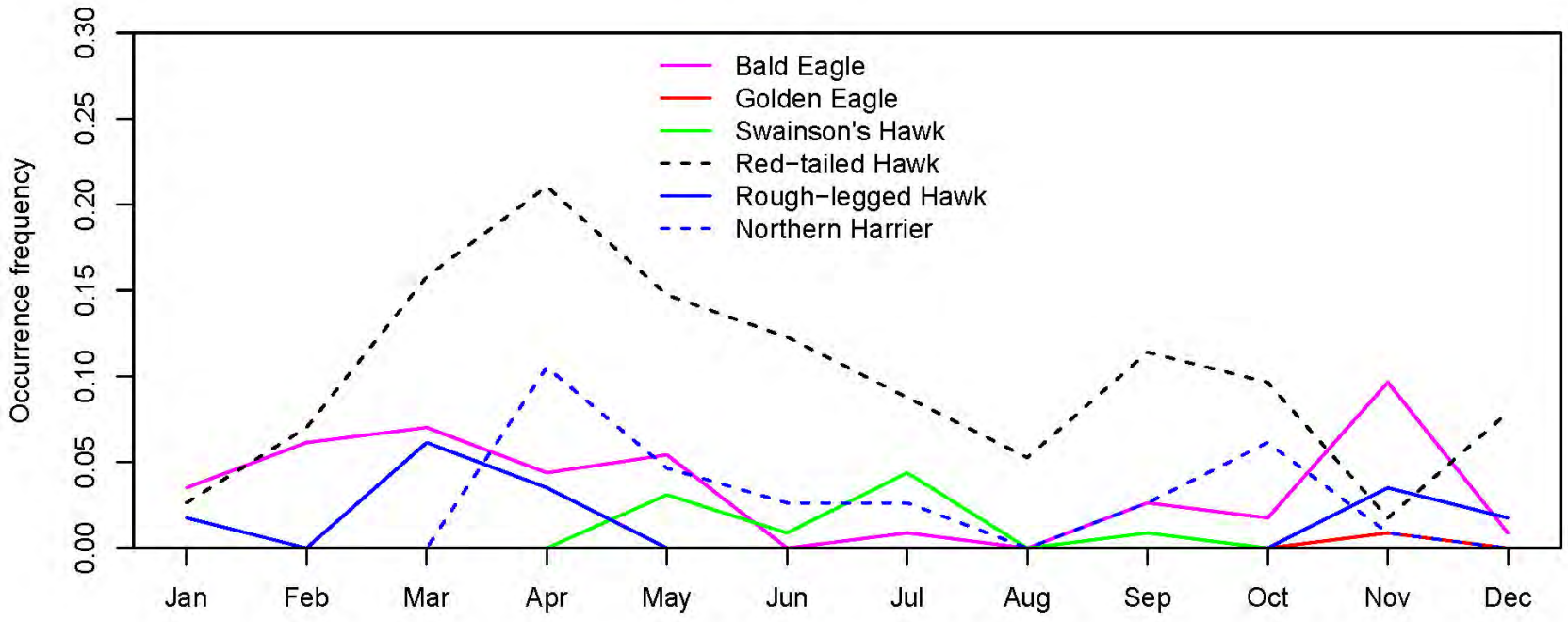


Figure 8a. Bald Eagle Mean Use by Point Count Station during Spring Migration – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

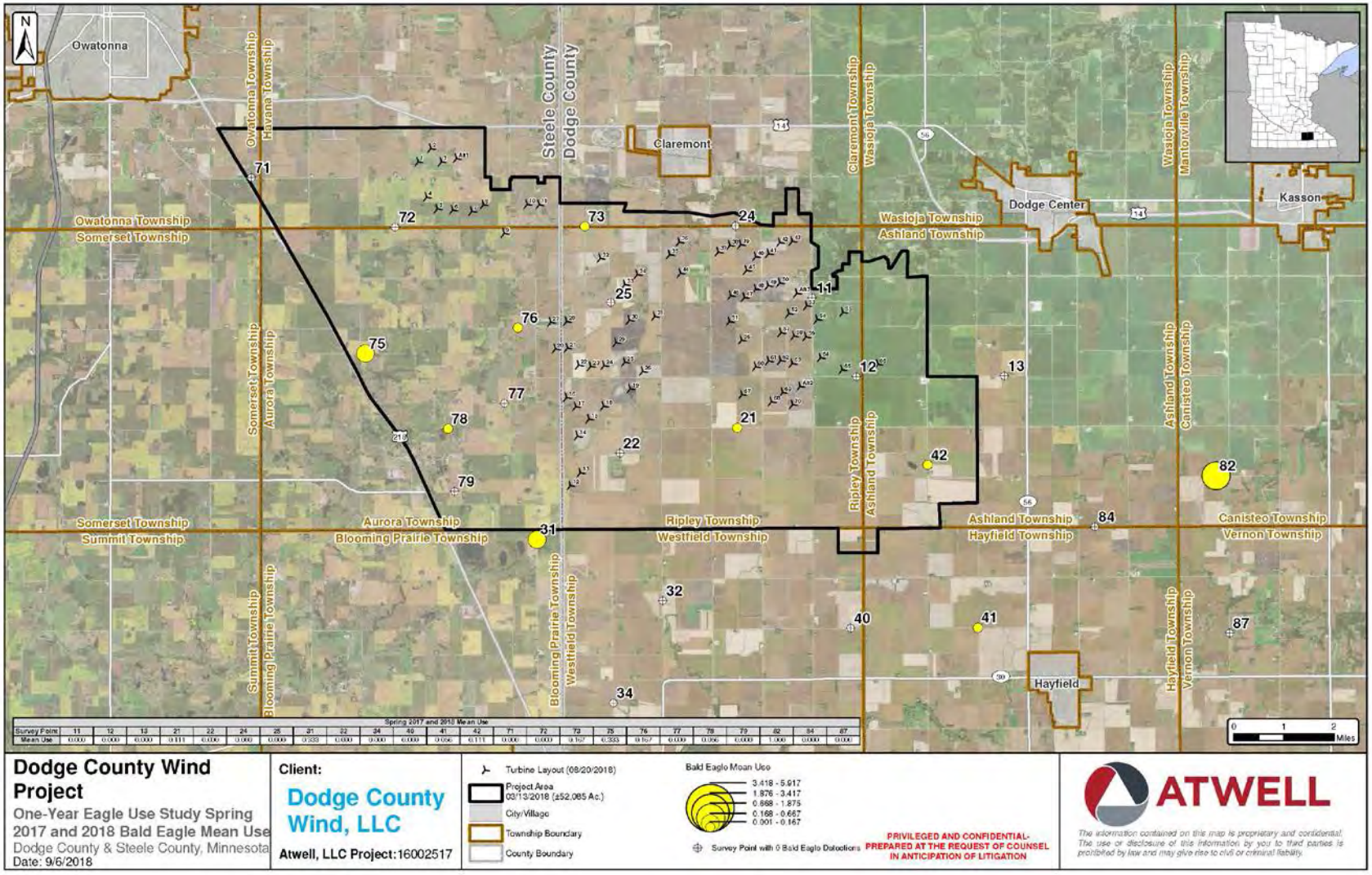


Figure 8b. Bald Eagle Mean Use by Point Count Station during Summer – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

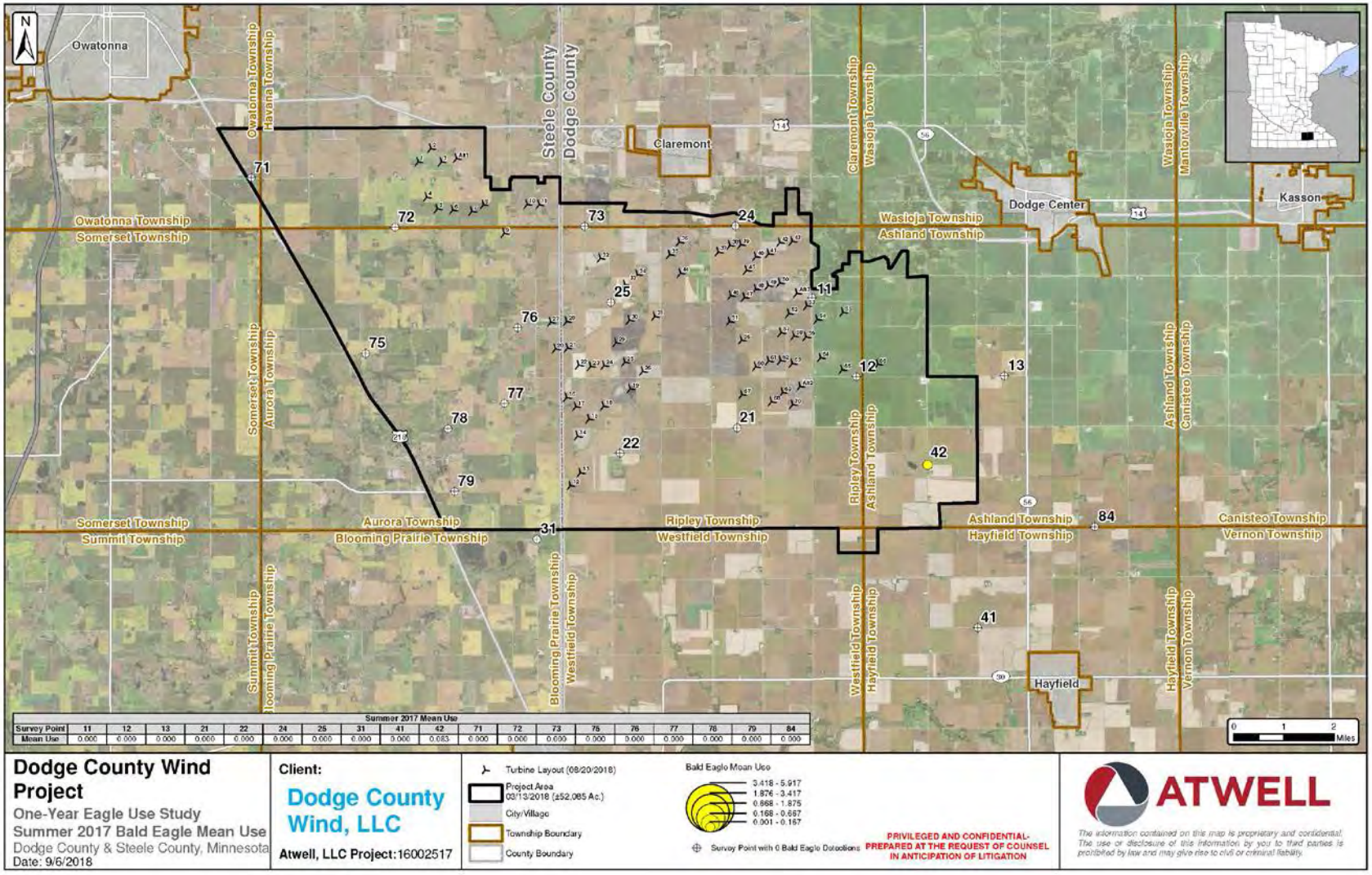


Figure 8c. Bald Eagle Mean Use by Point Count Station during Fall Migration – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

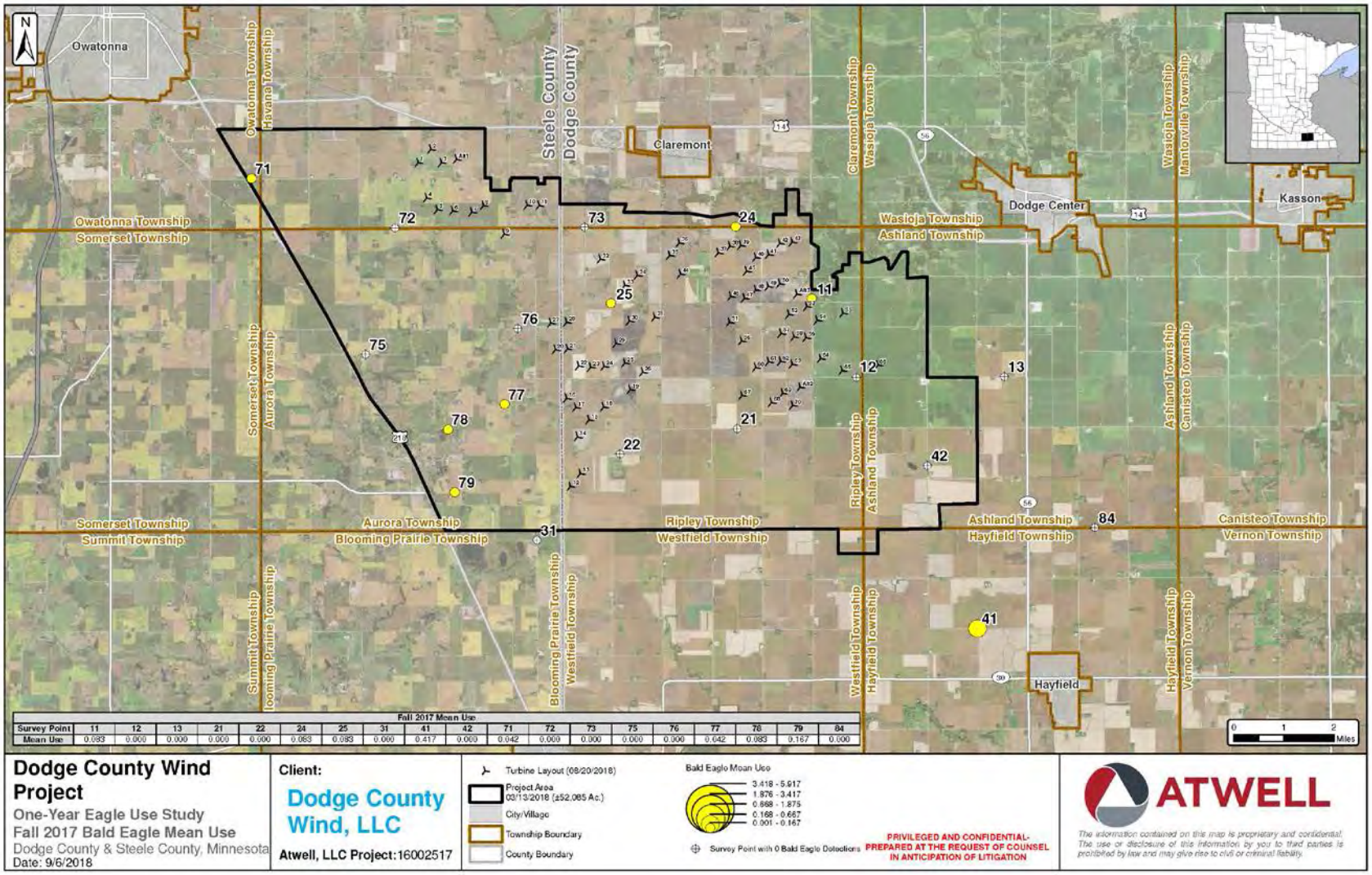


Figure 8d. Bald Eagle Mean Use by Point Count Station during Winter – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

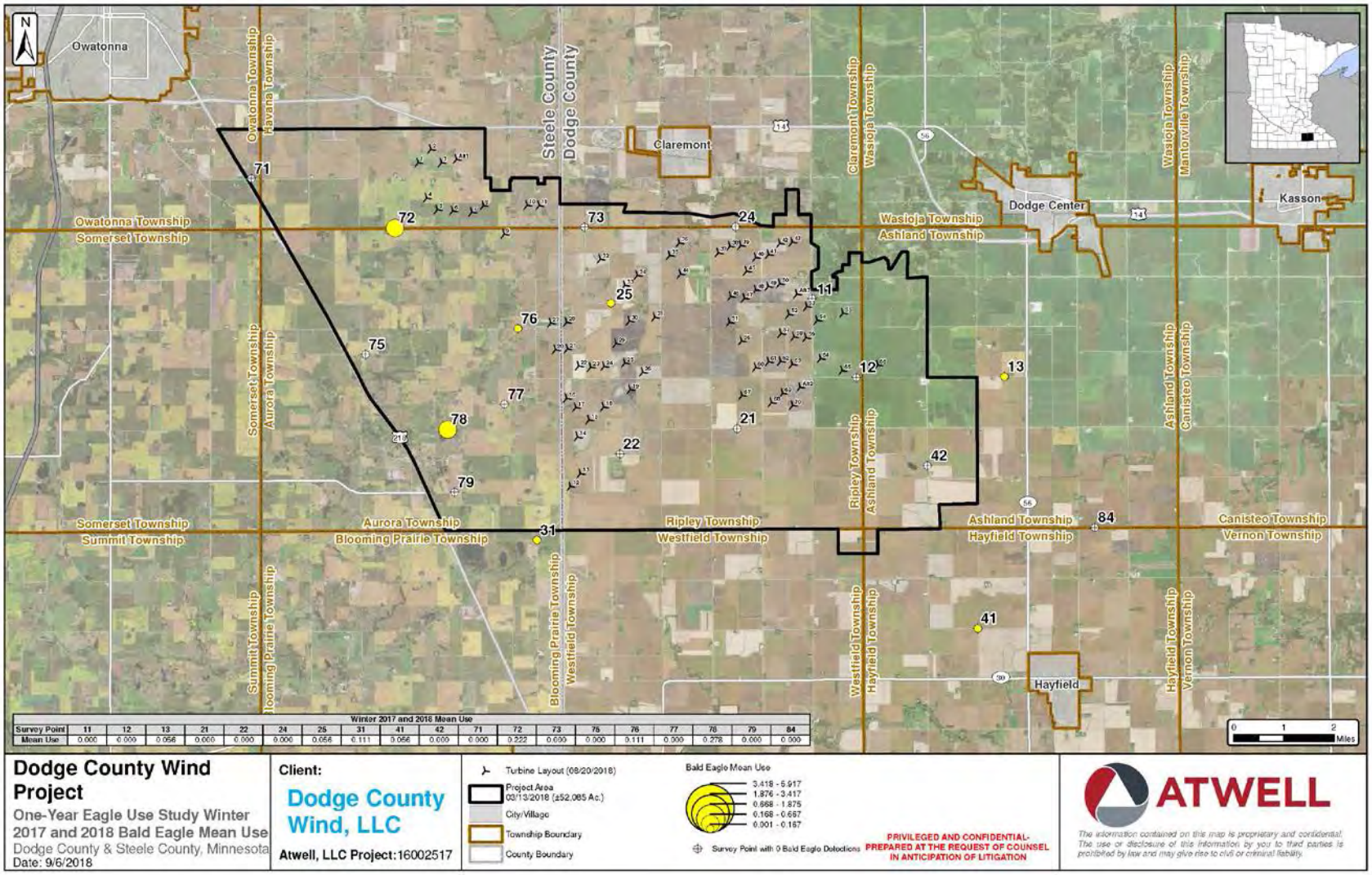


Figure 8e. Raptor Guild Mean Use by Point Count Station during Spring Migration – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

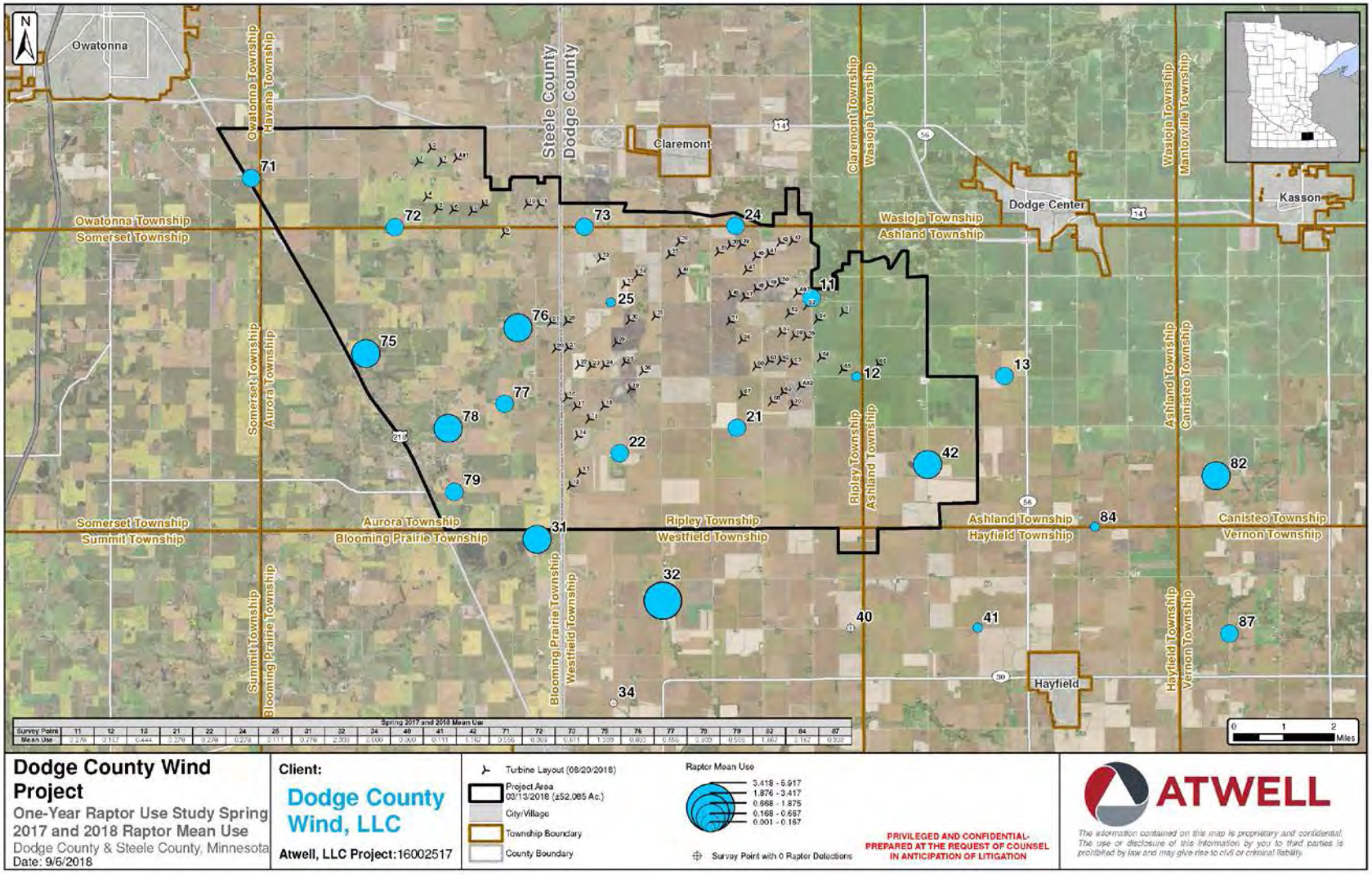


Figure 8f. Raptor Guild Mean Use by Point Count Station during Summer – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

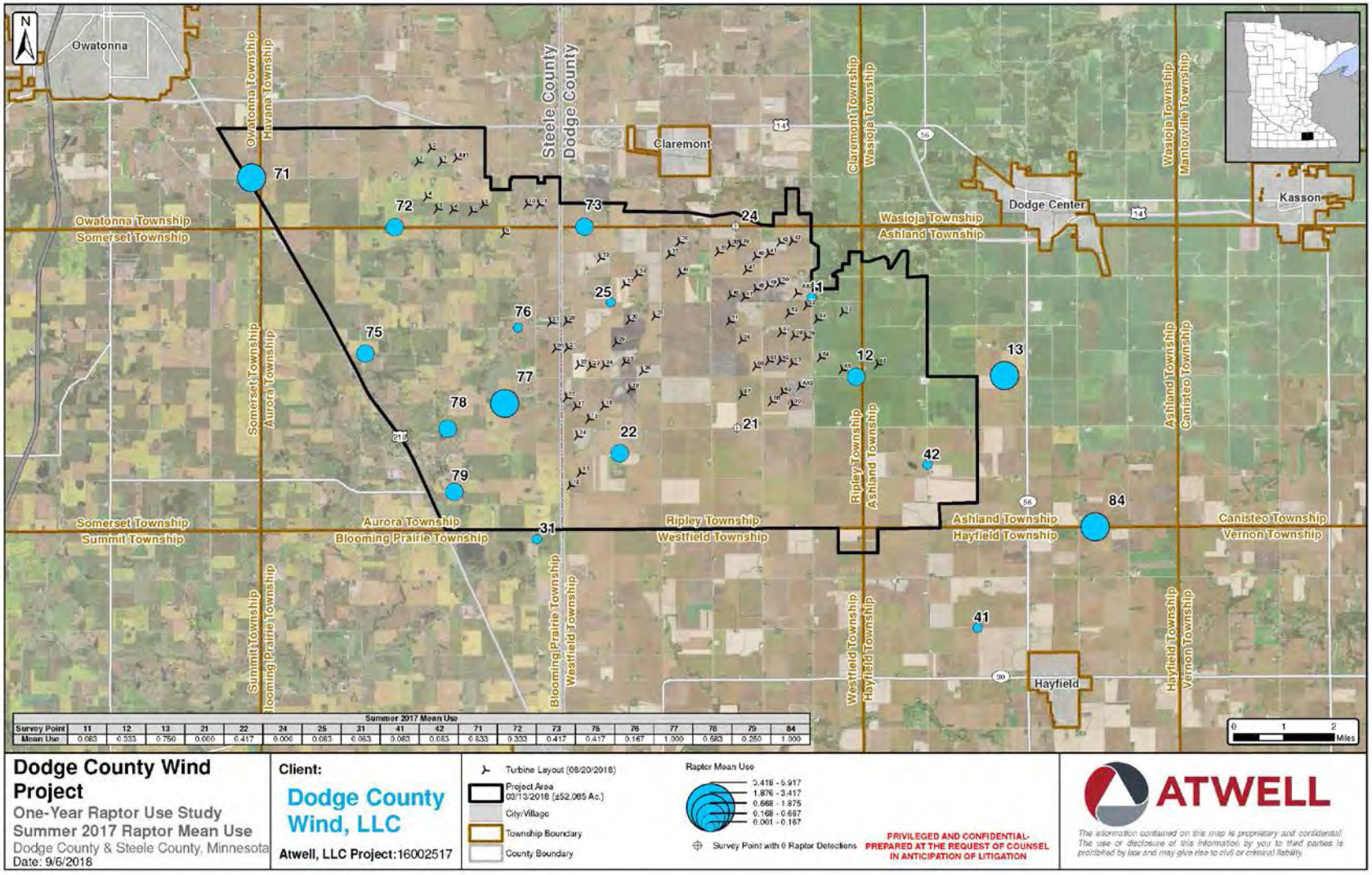


Figure 8g. Raptor Guild Mean Use by Point Count Station during Fall Migration – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

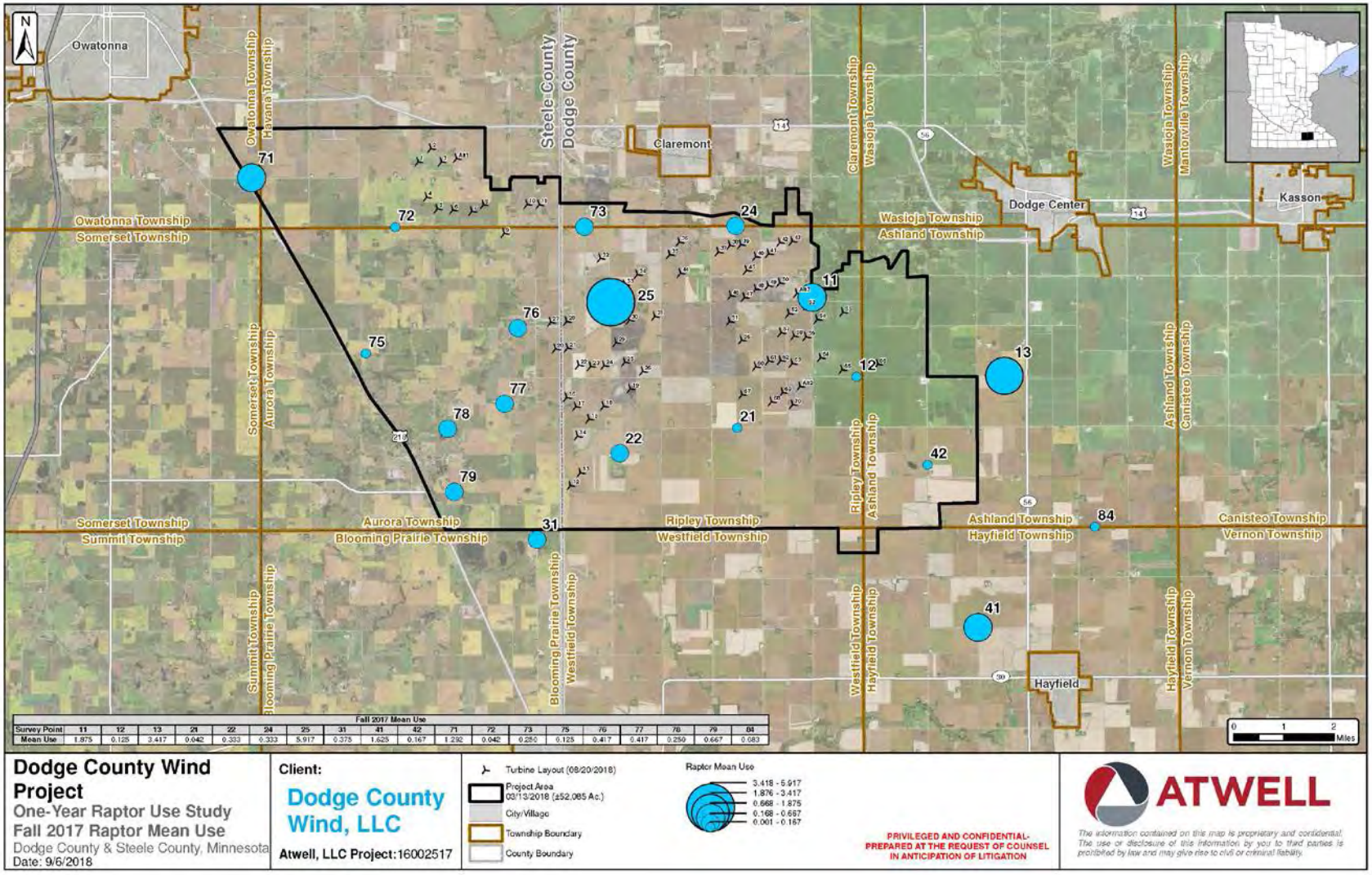


Figure 8h. Raptor Guild Mean Use by Point Count Station during Winter – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

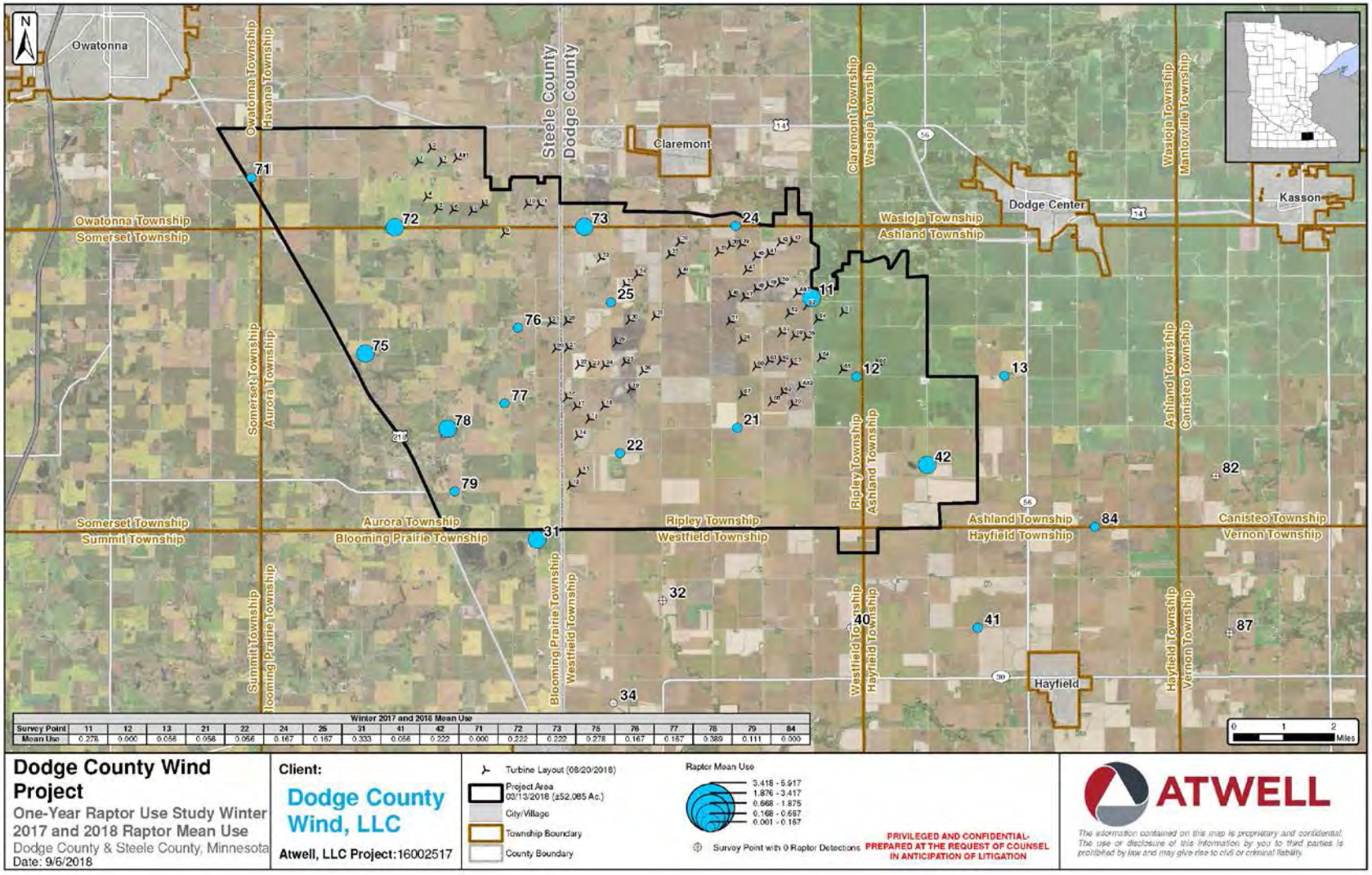


Figure 9a. Bald Eagle Flight Direction Rose Plot for Spring Observations – Dodge County Wind Energy Center

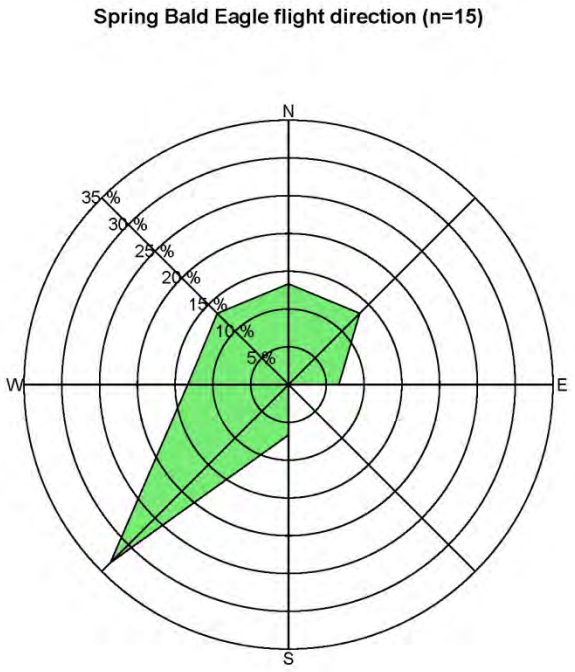


Figure 9b. Bald Eagle Flight Direction Rose Plot for Fall Observations – Dodge County Wind Energy Center

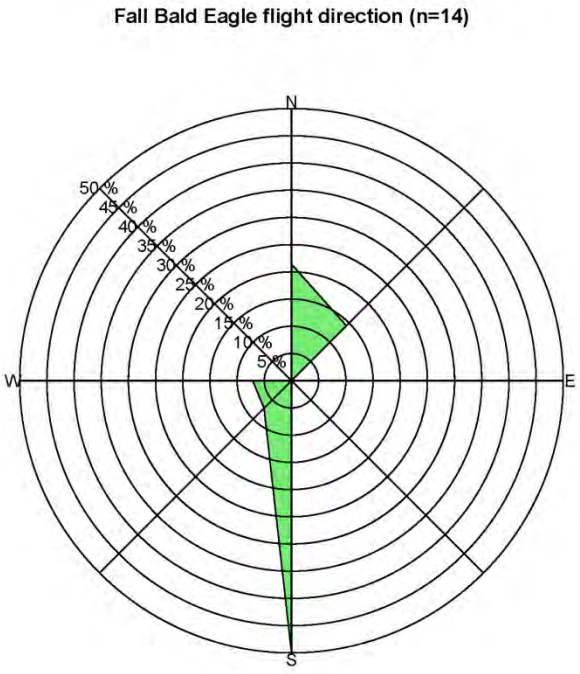


Figure 9c. Bald Eagle Flight Direction Rose Plot for Winter Observations – Dodge County Wind Energy Center

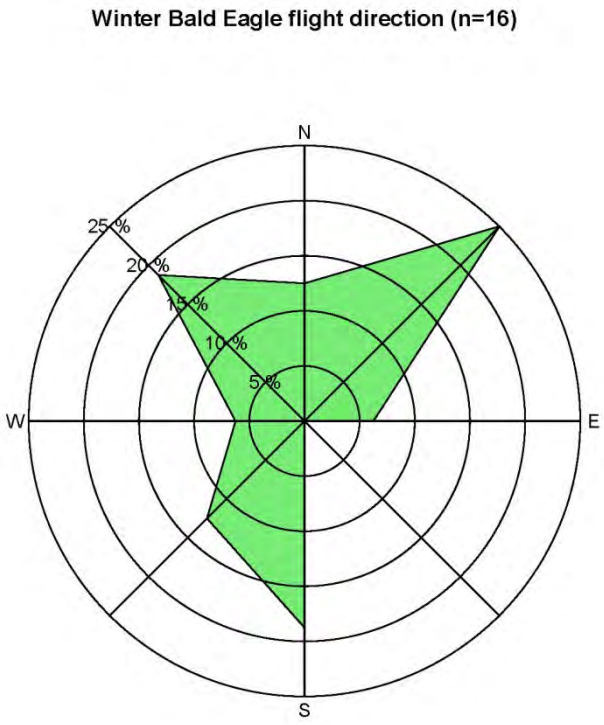


Figure 10a. Spring Migration Flight Height Profiles for Select Raptor Species Including Eagles – Dodge County Wind Energy Center (Dodge & Steele Counties, MN)

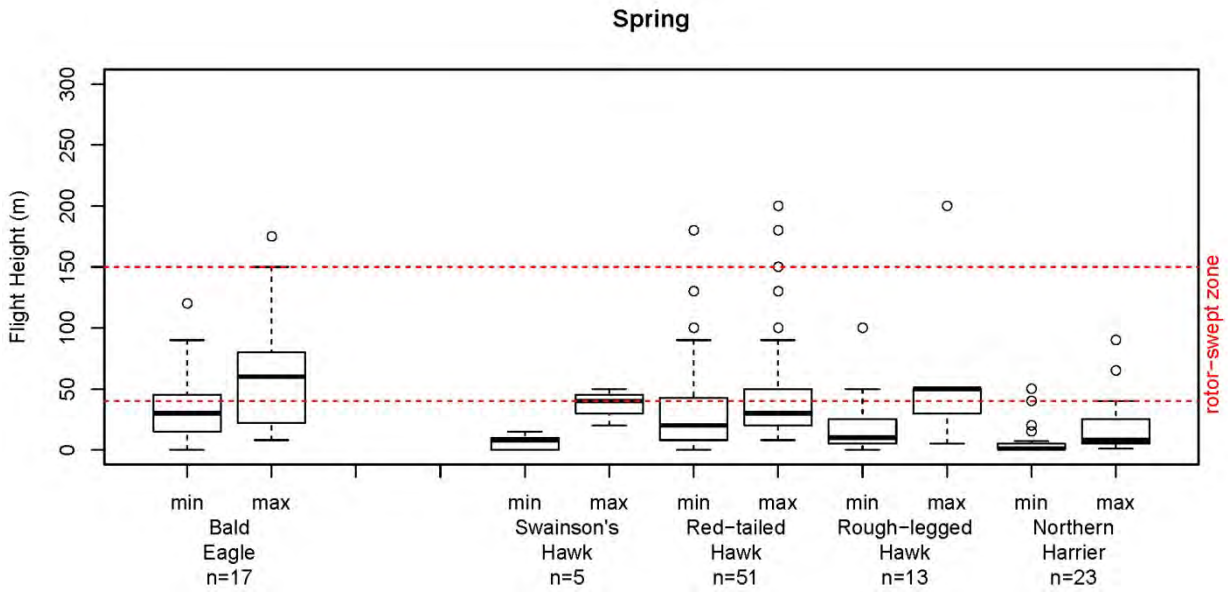


Figure 10b. Summer Flight Height Profiles for Select Raptor Species – Dodge County Wind Energy Center (Dodge & Steele Counties, MN)

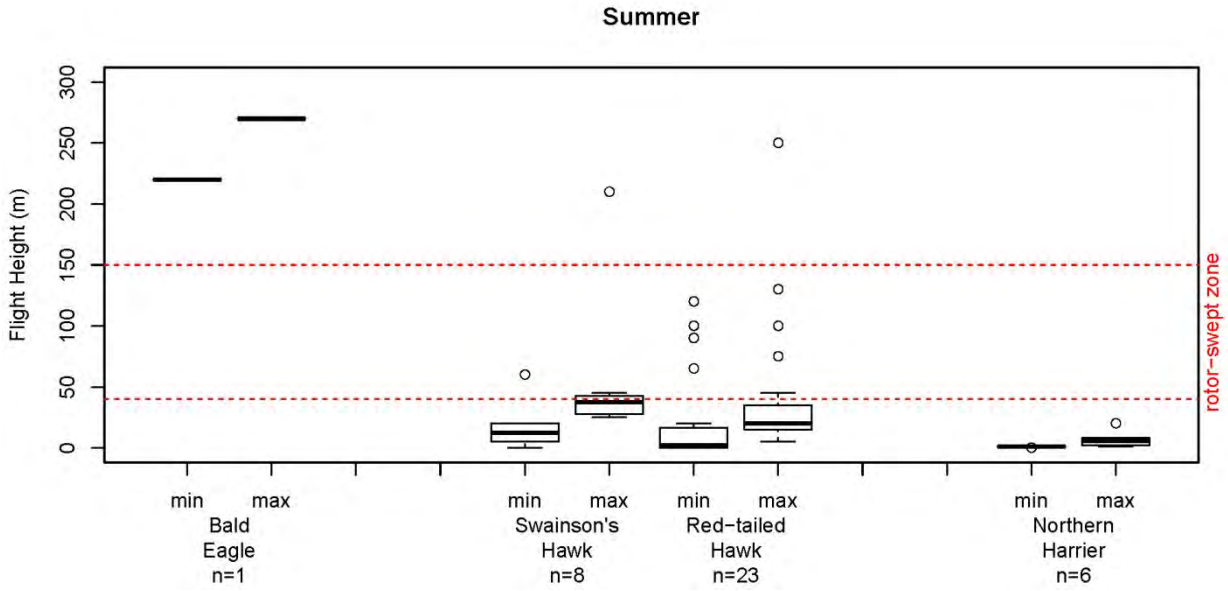


Figure 10c. Fall Migration Flight Height Profiles for Select Raptor Species Including Eagles – Dodge County Wind Energy Center (Dodge & Steele Counties, MN)

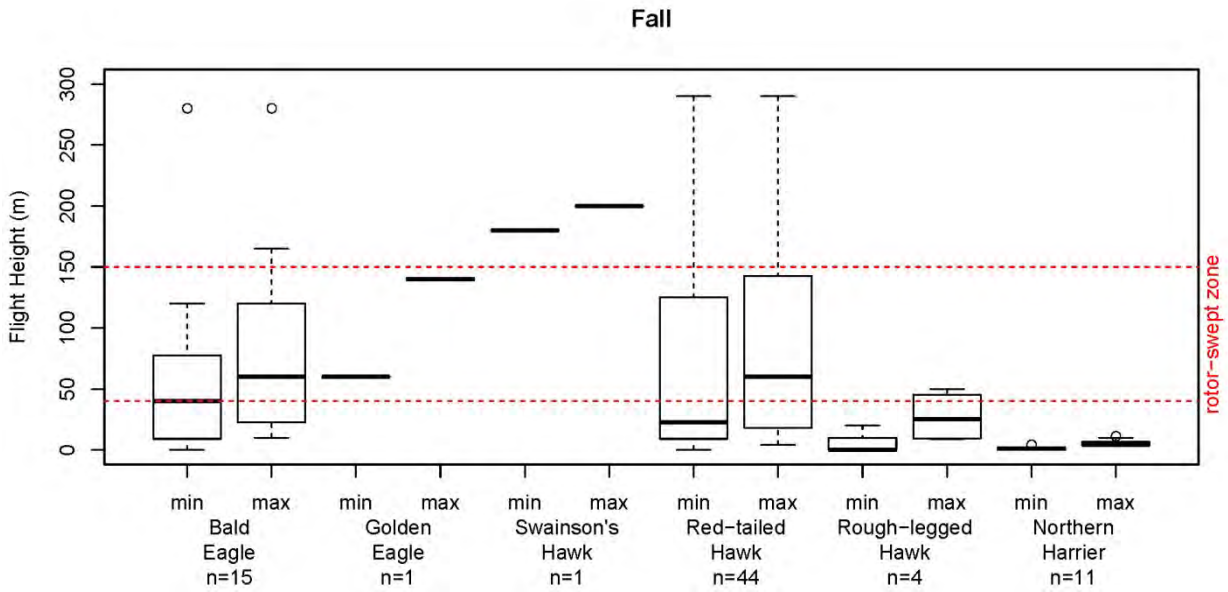


Figure 10d. Winter Flight Height Profiles for Select Raptor Species Including Eagles – Dodge County Wind Energy Center (Dodge & Steele Counties, MN)

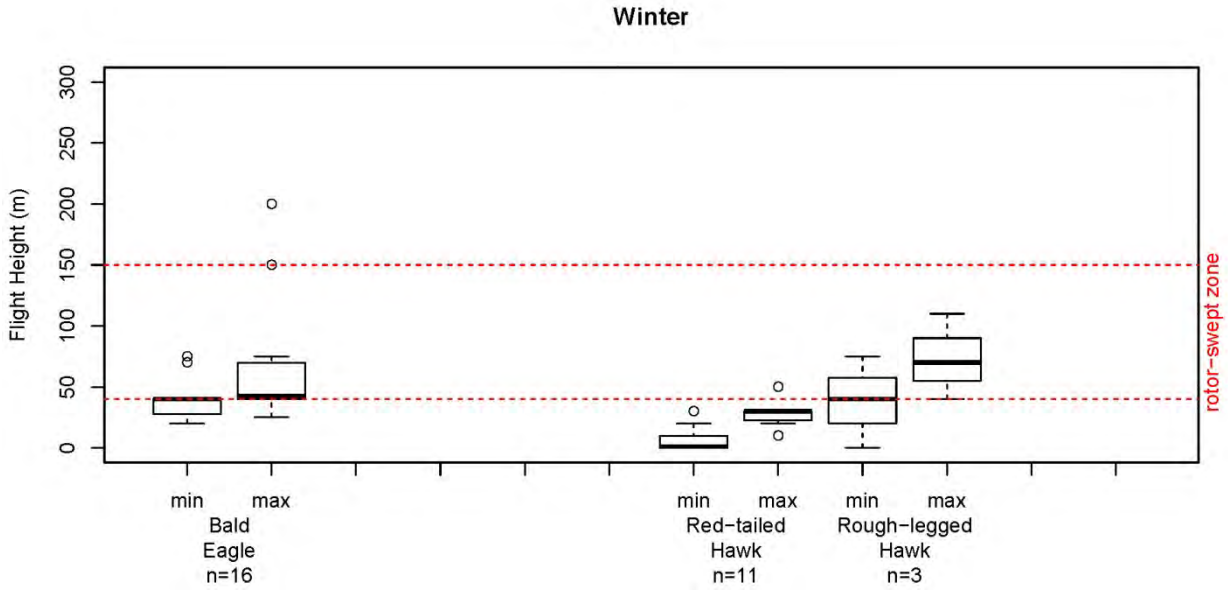


Figure 11. Avian Species Guild Monthly Occurrence Frequency during Spring & Fall Migration Periods – Dodge County Wind Energy Center (Dodge & Steele Counties, Minnesota)

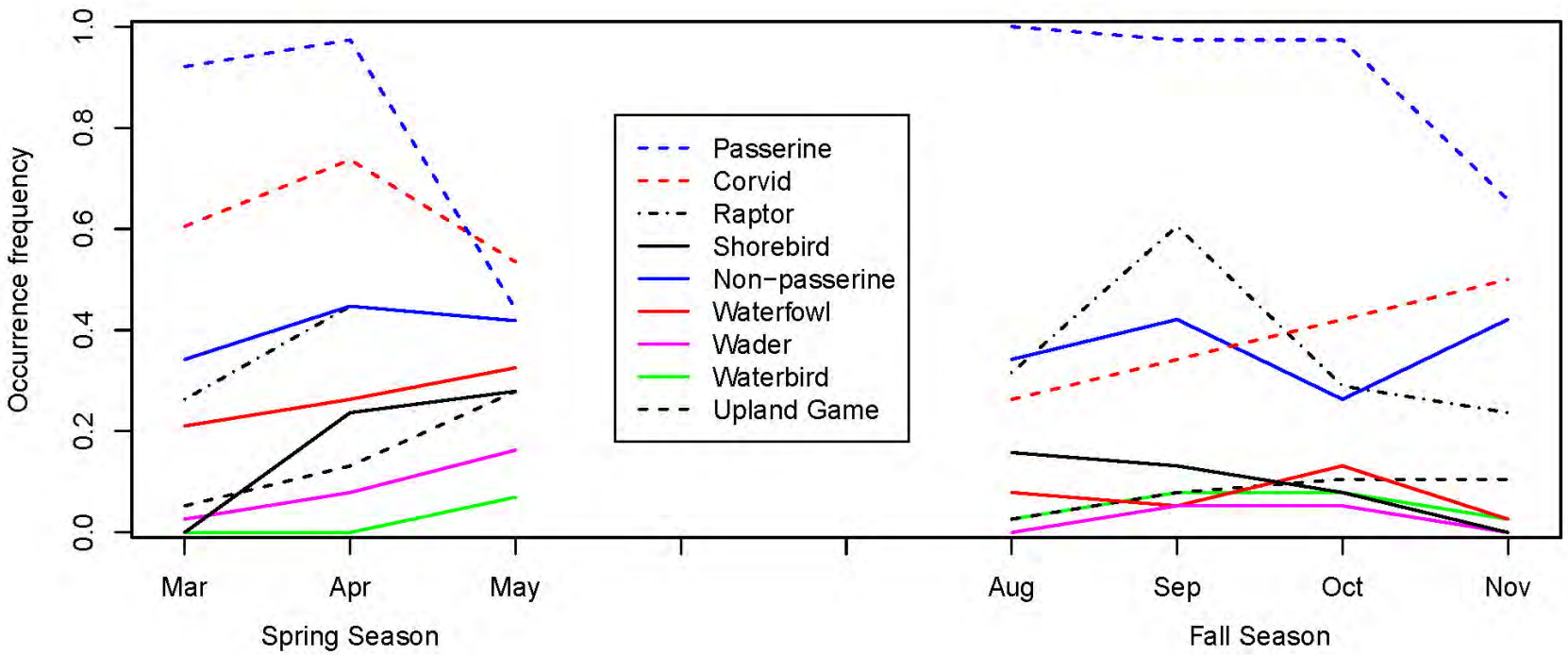


Figure 12a. Spring Migration Flight Height Profiles for Avian Species Guilds – Dodge County Wind Energy Center (Dodge & Steele Counties, MN)

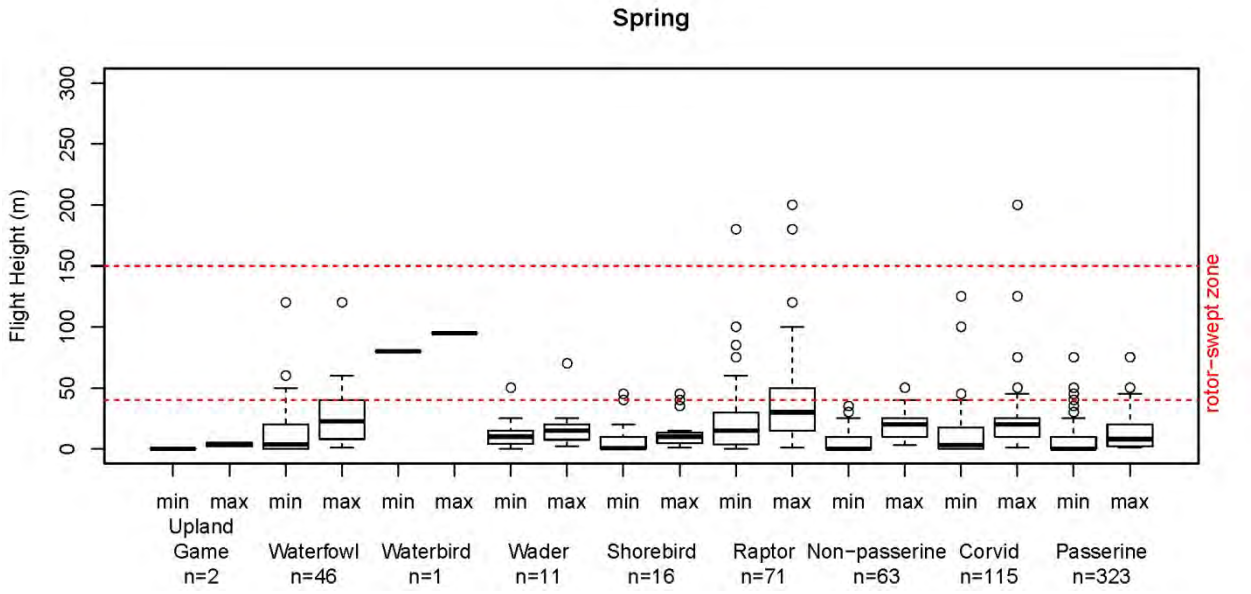
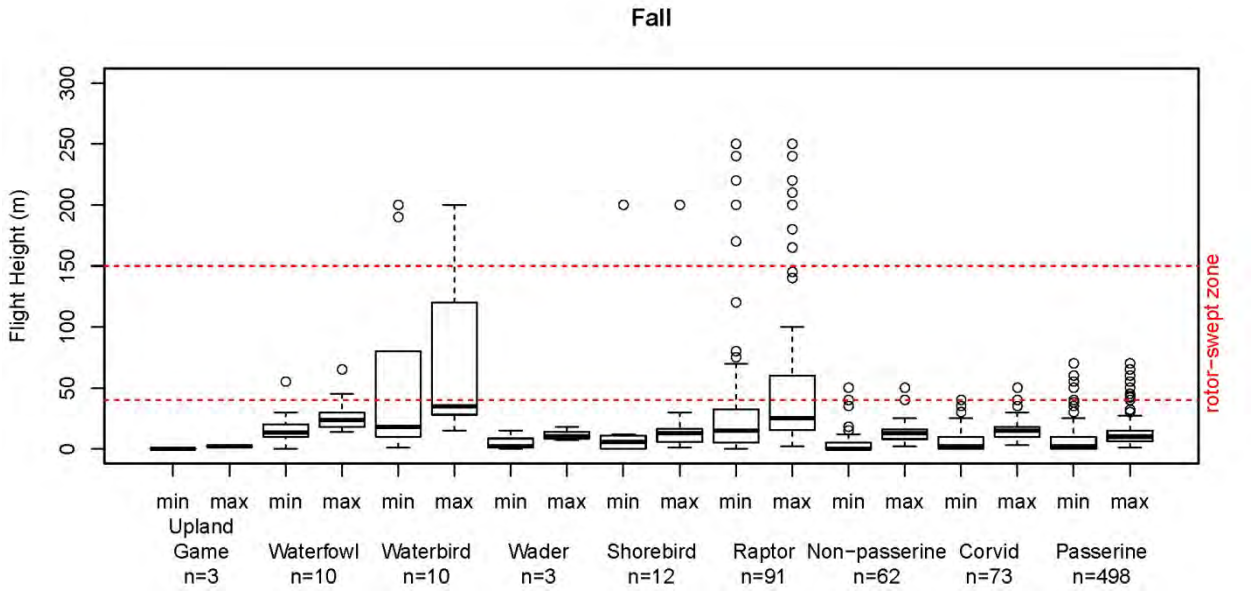


Figure 12b. Fall Migration Flight Height Profiles for Avian Species Guilds – Dodge County Wind Energy Center (Dodge & Steele Counties, MN)



APPENDIX II

Avian Migration Use Summary Statistics for Spring & Fall Migration Periods (2017)

APPENDIX II. Mean use statistics for all species during migration watch surveys in spring (May 2017), fall (August – November 2017), and spring (March – April 2018). Dodge County Wind Energy Center, Dodge & Steele Counties, MN.

Species Group/Species Name	SPRING						FALL					
	Total	Total Flocks	% of Total Season Detections	Mean Use (birds/20-min)	Stan. Dev.	% of Points Observed	Total	Total Flocks	% of Total Season Detections	Mean Use (birds/20-min)	Stan. Dev.	% of Points Observed
WATERFOWL												
Blue-winged Teal	2	1	0.08%	0.017	0.183	0.84%	.	.	.	.	.	.
Canada Goose	286	52	10.80%	2.403	10.288	21.01%	196	8	5.21%	1.289	7.986	4.61%
Gadwall	.	.	.	.	.	.	9	1	0.24%	0.059	0.730	0.66%
Green-winged Teal	1	1	0.04%	0.008	0.092	0.84%	.	.	.	.	.	.
Mallard	155	15	5.86%	1.303	11.646	10.92%	40	4	1.06%	0.263	2.335	2.63%
Northern Shoveler	6	1	0.23%	0.050	0.550	0.84%	.	.	.	.	.	.
Trumpeter Swan	2	1	0.08%	0.017	0.183	0.84%	2	1	0.05%	0.013	0.162	0.66%
Unknown Swan	2	1	0.08%	0.017	0.183	0.84%	1	1	0.03%	0.007	0.081	0.66%
Wood Duck	2	2	0.08%	0.017	0.129	1.68%	13	3	0.35%	0.086	0.700	1.97%
WATERBIRDS												
American Coot	1	1	0.04%	0.008	0.092	0.84%	.	.	.	.	.	.
Double-crested Cormorant	1	1	0.04%	0.008	0.092	0.84%	.	.	.	.	.	.
Franklin's Gull	.	.	.	.	.	.	118	9	3.14%	0.776	4.801	3.29%
Pied-billed Grebe	.	.	.	.	.	.	1	1	0.03%	0.007	0.081	0.66%
Ring-billed Gull	.	.	.	.	.	.	1	1	0.03%	0.007	0.081	0.66%
Sora	2	2	0.08%	0.017	0.183	0.84%	2	2	0.05%	0.013	0.162	0.66%
Virginia Rail	.	.	.	.	.	.	1	1	0.03%	0.007	0.081	0.66%
WADERS												
Great Blue Heron	7	6	0.26%	0.059	0.327	4.20%	1	1	0.03%	0.007	0.081	0.66%
Green Heron	2	1	0.08%	0.017	0.183	0.84%	.	.	.	.	.	.
Sandhill Crane	11	5	0.42%	0.092	0.451	4.20%	10	4	0.27%	0.066	0.497	1.97%
SHOREBIRDS												
American Golden-Plover	.	.	.	.	.	.	2	2	0.05%	0.013	0.114	1.32%
Killdeer	28	22	1.06%	0.235	0.607	16.81%	22	9	0.58%	0.145	1.019	5.92%
Least Sandpiper	3	1	0.11%	0.025	0.275	0.84%	.	.	.	.	.	.
Pectoral Sandpiper	7	1	0.26%	0.059	0.642	0.84%	3	1	0.08%	0.020	0.243	0.66%
Unknown Dowitcher species	.	.	.	.	.	.	5	1	0.13%	0.033	0.406	0.66%
Unknown Shorebird	.	.	.	.	.	.	14	2	0.37%	0.092	0.986	1.32%
Wilson's Snipe	5	3	0.19%	0.042	0.273	2.52%	2	2	0.05%	0.013	0.114	1.32%
UPLAND GAMEBIRDS												
Ring-necked Pheasant	19	17	0.72%	0.160	0.431	13.45%	16	13	0.43%	0.105	0.477	7.89%
Wild Turkey	22	6	0.83%	0.185	1.836	2.52%	.	.	.	.	.	.
RAPTORS												
American Kestrel	4	4	0.15%	0.034	0.181	3.36%	8	8	0.21%	0.053	0.224	5.26%
Bald Eagle	7	7	0.26%	0.059	0.300	4.20%	8	8	0.21%	0.053	0.300	3.95%

Species Group/Species Name	SPRING						FALL					
	Total	Total Flocks	% of Total Season Detections	Mean Use (birds/20-min)	Stan. Dev.	% of Points Observed	Total	Total Flocks	% of Total Season Detections	Mean Use (birds/20-min)	Stan. Dev.	% of Points Observed
Broad-winged Hawk	3	3	0.11%	0.025	0.275	0.84%	5	5	0.13%	0.033	0.213	2.63%
Cooper's Hawk	1	1	0.04%	0.008	0.092	0.84%	5	5	0.13%	0.033	0.179	3.29%
Merlin	.	.	.	.	.	.	3	3	0.08%	0.020	0.181	1.32%
Northern Harrier	7	7	0.26%	0.059	0.270	5.04%	5	5	0.13%	0.033	0.213	2.63%
Osprey	.	.	.	.	.	.	3	3	0.08%	0.020	0.140	1.97%
Peregrine Falcon	3	3	0.11%	0.025	0.157	2.52%	1	1	0.03%	0.007	0.081	0.66%
Red-tailed Hawk	27	27	1.02%	0.227	0.528	17.65%	12	12	0.32%	0.079	0.355	5.92%
Rough-legged Hawk	7	7	0.26%	0.059	0.236	5.88%	1	1	0.03%	0.007	0.081	0.66%
Sharp-shinned Hawk	.	.	.	.	.	.	6	6	0.16%	0.039	0.227	3.29%
Short-eared Owl	.	.	.	.	.	.	1	1	0.03%	0.007	0.081	0.66%
Swainson's Hawk	1	1	0.04%	0.008	0.092	0.84%	.	.	.	.	.	.
Turkey Vulture	22	22	0.83%	0.185	0.939	7.56%	40	36	1.06%	0.263	0.787	13.82%
NON-PASSERINES												
Belted Kingfisher	2	2	0.08%	0.017	0.129	1.68%	.	.	.	.	.	.
Downy Woodpecker	1	1	0.04%	0.008	0.092	0.84%	2	2	0.05%	0.013	0.114	1.32%
Eurasian Collared Dove	9	4	0.34%	0.076	0.585	2.52%	2	1	0.05%	0.013	0.162	0.66%
Hairy Woodpecker	2	2	0.08%	0.017	0.129	1.68%	1	1	0.03%	0.007	0.081	0.66%
Mourning Dove	4	3	0.15%	0.034	0.258	1.68%	12	9	0.32%	0.079	0.373	5.26%
Northern Flicker	4	4	0.15%	0.034	0.181	3.36%	4	4	0.11%	0.026	0.161	2.63%
Pileated Woodpecker	2	2	0.08%	0.017	0.129	1.68%	.	.	.	.	.	.
Red-bellied Woodpecker	3	3	0.11%	0.025	0.157	2.52%	.	.	.	.	.	.
Rock Pigeon	137	58	5.18%	1.151	2.302	32.77%	264	47	7.02%	1.737	3.856	29.61%
Ruby-throated Hummingbird	.	.	.	.	.	.	5	5	0.13%	0.033	0.242	1.97%
LARGE-BODIED CORVIDS												
American Crow	213	150	8.05%	1.790	2.752	62.18%	224	70	5.96%	1.474	5.366	38.16%
PASSERINES												
American Goldfinch	11	6	0.42%	0.092	0.469	5.04%	289	125	7.68%	1.901	3.023	50.66%
American Pipit	.	.	.	.	.	.	20	5	0.53%	0.132	0.859	3.29%
American Robin	77	38	2.91%	0.647	2.985	16.81%	60	19	1.60%	0.395	2.336	11.84%
American Tree Sparrow	14	4	0.53%	0.118	1.027	2.52%	.	.	.	.	.	.
Baltimore Oriole	1	1	0.04%	0.008	0.092	0.84%	.	.	.	.	.	.
Bank Swallow	.	.	.	.	.	.	6	4	0.16%	0.039	0.254	2.63%
Barn Swallow	33	13	1.25%	0.277	1.096	10.08%	210	53	5.58%	1.382	3.367	25.66%
Black-capped Chickadee	3	3	0.11%	0.025	0.157	2.52%	19	11	0.51%	0.125	0.479	7.24%
Blue Jay	12	10	0.45%	0.101	0.399	6.72%	138	42	3.67%	0.908	4.027	27.63%
Bobolink	9	9	0.34%	0.076	0.585	2.52%	7	3	0.19%	0.046	0.352	1.97%
Brown Thrasher	2	2	0.08%	0.017	0.129	1.68%	.	.	.	.	.	.

Species Group/Species Name	SPRING						FALL					
	Total	Total Flocks	% of Total Season Detections	Mean Use (birds/20-min)	Stan. Dev.	% of Points Observed	Total	Total Flocks	% of Total Season Detections	Mean Use (birds/20-min)	Stan. Dev.	% of Points Observed
Brown-headed Cowbird	20	11	0.76%	0.168	0.572	9.24%	1	1	0.03%	0.007	0.081	0.66%
Cedar Waxwing	4	1	0.15%	0.034	0.367	0.84%	16	9	0.43%	0.105	0.504	5.26%
Chipping Sparrow	.	.	.	.	.	.	4	4	0.11%	0.026	0.161	2.63%
Cliff Swallow	1	1	0.04%	0.008	0.092	0.84%	320	44	8.51%	2.105	6.667	17.76%
Common Grackle	185	59	6.99%	1.555	5.798	19.33%	246	25	6.54%	1.618	16.810	10.53%
Common Yellowthroat	6	5	0.23%	0.050	0.255	4.20%	7	7	0.19%	0.046	0.240	3.95%
Dark-eyed Junco	52	9	1.96%	0.437	3.356	5.04%	7	3	0.19%	0.046	0.332	1.97%
Dickcissel	1	1	0.04%	0.008	0.092	0.84%	1	1	0.03%	0.007	0.081	0.66%
Eastern Bluebird	1	1	0.04%	0.008	0.092	0.84%	48	7	1.28%	0.316	1.720	4.61%
Eastern Kingbird	7	6	0.26%	0.059	0.300	4.20%	10	10	0.27%	0.066	0.249	6.58%
Eastern Meadowlark	3	3	0.11%	0.025	0.157	2.52%	4	1	0.11%	0.026	0.324	0.66%
Eastern Phoebe	1	1	0.04%	0.008	0.092	0.84%	1	1	0.03%	0.007	0.081	0.66%
Eastern Wood-Pewee	.	.	.	.	.	.	2	2	0.05%	0.013	0.114	1.32%
European Starling	42	18	1.59%	0.353	1.183	11.76%	284	27	7.55%	1.868	7.110	15.13%
Gray Catbird	2	2	0.08%	0.017	0.129	1.68%	.	.	.	.	.	.
Hooded Warbler	2	1	0.08%	0.017	0.183	0.84%	.	.	.	.	.	.
Horned Lark	330	153	12.47%	2.773	5.829	57.98%	77	29	2.05%	0.507	1.367	17.11%
House Finch	.	.	.	.	.	.	1	1	0.03%	0.007	0.081	0.66%
House Sparrow	11	5	0.42%	0.092	0.552	4.20%	53	16	1.41%	0.349	2.053	9.87%
House Wren	.	.	.	.	.	.	3	3	0.08%	0.020	0.140	1.97%
Indigo Bunting	.	.	.	.	.	.	4	4	0.11%	0.026	0.161	2.63%
Lapland Longspur	369	15	13.94%	3.101	21.093	5.88%	99	13	2.63%	0.651	2.908	8.55%
Lincoln's Sparrow	.	.	.	.	.	.	3	3	0.08%	0.020	0.140	1.97%
Marsh Wren	2	2	0.08%	0.017	0.183	0.84%	2	2	0.05%	0.013	0.114	1.32%
Nashville Warbler	.	.	.	.	.	.	1	1	0.03%	0.007	0.081	0.66%
Northern Cardinal	3	2	0.11%	0.025	0.204	1.68%	2	2	0.05%	0.013	0.114	1.32%
Orange-crowned Warbler	.	.	.	.	.	.	1	1	0.03%	0.007	0.081	0.66%
Orchard Oriole	2	1	0.08%	0.017	0.183	0.84%	.	.	.	.	.	.
Pine Siskin	.	.	.	.	.	.	1	1	0.03%	0.007	0.081	0.66%
Purple Martin	.	.	.	.	.	.	1	1	0.03%	0.007	0.081	0.66%
Red Crossbill	.	.	.	.	.	.	16	1	0.43%	0.105	1.298	0.66%
Red-winged Blackbird	331	89	12.50%	2.782	8.851	23.53%	555	57	14.76%	3.651	22.657	21.05%
Rusty Blackbird	.	.	.	.	.	.	32	1	0.85%	0.211	2.596	0.66%
Savannah Sparrow	3	3	0.11%	0.025	0.204	1.68%	18	9	0.48%	0.118	0.563	5.92%
Sedge Wren	3	3	0.11%	0.025	0.204	1.68%	5	5	0.13%	0.033	0.213	2.63%
Snow Bunting	9	4	0.34%	0.076	0.507	3.36%	6	2	0.16%	0.039	0.487	0.66%
Song Sparrow	37	10	1.40%	0.311	2.049	7.56%	16	16	0.43%	0.105	0.308	10.53%

Species Group/Species Name	SPRING Total	SPRING Total Flocks	SPRING % of Total Season Detections	SPRING Mean Use (birds/20-min)	SPRING Stan. Dev.	SPRING % of Points Observed	FALL Total	FALL Total Flocks	FALL % of Total Season Detections	FALL Mean Use (birds/20-min)	FALL Stan. Dev.	FALL % of Points Observed
Swainson's Thrush	1	1	0.04%	0.008	0.092	0.84%	.	.	.	.	.	.
Swamp Sparrow	2	2	0.08%	0.017	0.129	1.68%	3	3	0.08%	0.020	0.140	1.97%
Tree Swallow	1	1	0.04%	0.008	0.092	0.84%	14	3	0.37%	0.092	0.740	1.97%
Unknown Blackbird	2	1	0.08%	0.017	0.183	0.84%	12	1	0.32%	0.079	0.973	0.66%
Unknown Passerine	18	6	0.68%	0.151	1.140	4.20%	2	2	0.05%	0.013	0.114	1.32%
Unknown Sparrow	3	2	0.11%	0.025	0.275	0.84%	9	5	0.24%	0.059	0.330	3.29%
Unknown Swallow	.	.	.	.	.	.	15	1	0.40%	0.099	1.217	0.66%
Vesper Sparrow	5	5	0.19%	0.042	0.201	4.20%	9	9	0.24%	0.059	0.263	5.26%
Western Meadowlark	1	1	0.04%	0.008	0.092	0.84%	.	.	.	.	.	.
White-breasted Nuthatch	.	.	.	.	.	.	2	2	0.05%	0.013	0.114	1.32%
White-crowned Sparrow	.	.	.	.	.	.	1	1	0.03%	0.007	0.081	0.66%
White-throated Sparrow	.	.	.	.	.	.	12	3	0.32%	0.079	0.751	1.97%
Yellow Warbler	1	1	0.04%	0.008	0.092	0.84%	1	1	0.03%	0.007	0.081	0.66%
Yellow-headed Blackbird	1	1	0.04%	0.008	0.092	0.84%	.	.	.	.	.	.
Yellow-rumped Warbler	.	.	.	.	.	.	14	10	0.37%	0.092	0.451	5.92%
TAXONOMIC GROUP TOTALS												
Corvid	213	150	8.05%	1.790	2.752	62.18%	224	70	5.96%	1.474	5.366	38.16%
Non-passerine	164	79	6.20%	1.378	2.514	40.34%	290	69	7.71%	1.908	3.897	36.18%
Passerine	1624	513	61.35%	13.647	26.611	76.47%	2690	613	71.52%	17.697	31.940	90.13%
Raptor	82	82	3.10%	0.689	1.376	37.82%	98	94	2.61%	0.645	1.124	36.18%
Shorebird	43	27	1.62%	0.361	1.118	17.65%	48	17	1.28%	0.316	1.770	9.21%
Upland Game	41	23	1.55%	0.345	1.871	15.97%	16	13	0.43%	0.105	0.477	7.89%
Wader	20	12	0.76%	0.168	0.572	9.24%	11	5	0.29%	0.072	0.503	2.63%
Waterbird	4	4	0.15%	0.034	0.223	2.52%	123	14	3.27%	0.809	4.803	5.26%
Waterfowl	456	74	17.23%	3.832	15.712	26.89%	261	18	6.94%	1.717	10.544	7.24%

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Monday, April 24, 2017

BALD EAGLE & RAPTOR NEST AERIAL SURVEY SUMMARY REPORT

PROJECT: Dodge County Wind Project, Dodge County, Minnesota (Atwell #16002517)

CLIENT: Dodge County Wind, LLC

Dodge County Wind, LLC (Dodge County Wind, Client) contracted Atwell, LLC (Atwell) to conduct a review of raptor nest resources for the proposed Dodge County Wind Resource Area (WRA) and the associated transmission line assessment area (hereafter collectively referred to as the Project Area) in Dodge County, Minnesota, approximately 15 miles west of Rochester (*Figure 1*). A significant component of this avian resources review was to assess raptor nest resources within the Project Area, particularly for Bald Eagle (*Haliaeetus leucocephalus*).

In preparation for conducting the aerial eagle nest survey and delineation of aerial transect placement, Atwell incorporated data review (including USFWS provided eagle nest data queries[1]) and prior nest survey data that was collected from prior nest studies within previous iterations of the WRA boundary (during 2015 and 2016[2]). The 2017 aerial nest survey conducted by Atwell evaluated the WRA, a 10-mile WRA footprint buffer[3], and the *transmission line assessment area*. Within the 10-mile buffer of the WRA and the transmission line assessment area, primary survey effort was standardized within target zones of habitat and/or habitat concentration that were deemed more likely to provide nesting resources for Bald Eagles (*Study Area*). Approximately five (5) percent of the transmission line assessment area fell outside of the 10-mile buffer of the WRA. This portion of the transmission line assessment area was observed incidentally for eagles, since no delineated target zones overlapped with this relatively small portion of the *Project Area*.

These target zones (*Figure 1*) were defined from a desktop approach using a Geographic Information System (GIS) and the most appropriate satellite imagery data. Most target zones were defined based on at least one major forested riparian corridor, in addition to the presence of other relatively more contiguous upland forest cover and wetland/open water systems. In general, target zones did not incorporate large expanses of non-forested cultivated cropland. Additionally, target zones largely avoided expanses of cultivated cropland where the majority of deciduous forest cover existed only as isolated and widely scattered woodlots.

[1] Atwell requested and obtained Bald Eagle nest data from USFWS Ecological Services Field Office – Bloomington, MN on March 7, 2017.

[2] HDR (2017). Avian Use Report; Dodge Wind LLC, Dodge County Wind Project; Dodge and Steele Counties, Minnesota.

[3] USFWS (2011). Draft Eagle Conservation Plan Guidance. [Online.] Available at http://www.fws.gov/windenergy/docs/Final_ECP_draft_guidance_2.8.CLEAN.pdf.

Flight-line transects at 1-kilometer intervals were created in GIS across the entire WRA (including a standard 1-mile buffer inclusion) and each target zone of the overall *Study Area* (*Figure 1*). The helicopter was flown at relatively slow speeds (30 to 40 knots). The helicopter aerial nest survey was conducted between March 17-21, 2017, which coincided with peak Bald Eagle detectability per that species' local breeding phenology. No noticeable forest canopy leaf out was evident at the time of surveys. When nest structures were identified, the helicopter hovered for up to 15 seconds, no closer than 50 m from a nest in order to provide efficient data capture.

Incidental eagle observation data were documented throughout the aerial survey. During the survey, specific eagle concentrations were observed, which indicated the possible presence of nearby communal roosts. Atwell conducted ground-based reconnaissance during crepuscular periods on two evenings (March 19 & 20, 2017)[4] to identify Bald Eagle roost areas in the WRA vicinity. This targeted roost observation effort was conducted utilizing the recommendations within the ECP Guidance[5] and the USFWS *Northern States Bald Eagle Recovery Plan*[6] in order to provide a more comprehensive picture of other eagle use factors pertaining to this WRA.

Bald Eagle & Raptor Nest Survey Results (March 17-21, 2017)

During the aerial nest survey, 79 potential raptor nests were located (*Figure 2*). Table 1 provides a summary of the nest data.

No Bald Eagle nests were found within the WRA boundary. Thirteen (13) Bald Eagle nests (11 active and two inactive) were located within ten miles of the WRA (*Figure 2, Table 1*). Of these 13 nests, five (5) of them were newly identified during the aerial evaluation and were not previously identified in the USFWS nest data query (USFWS unpub. data, March 07, 2017) or previous eagle nest survey results[7]. These recently identified nests (*n* = 5), three (3) were active nests and two (2) were inactive.

Inactive Bald Eagle nests were carefully studied to ensure that they were not large Red-tailed Hawk (*Buteo jamaicensis*) nests (see Photographic Log). In general, Bald Eagle nests range from 4.9-5.9 ft. (1.5–1.8 m) in diameter and 2.3-3.9 ft. (0.7–1.2 m) in height. Nest shape is reported as conforming to

[4] While not specifically included in the aerial raptor nest survey scope, these targeted surveys were conducted in areas where double-digit concentrations of eagles were observed during aerial surveys in order to provide a more complete picture of eagle use within the Study Area.

[5] USFWS (2011). Draft Eagle Conservation Plan Guidance. [Online.] Available at http://www.fws.gov/windenergy/docs/Final_ECP_draft_guidance_2.8.CLEAN.pdf.

[6] USFWS (1983). Northern States Bald Eagle Recovery Plan.

[7] HDR (2017). Avian Use Report; Dodge Wind LLC, Dodge County Wind Project; Dodge and Steele Counties, Minnesota.

the shape of substrate tree and can be cylindrical, cone-shaped, or even platform-like[8]. Judging such dimensions in the field can be difficult, particularly when viewing nest structures from a distance through high-powered optics. Using a helicopter to standardize the distance from which each nest was viewed helped to gain true perspective for nest shape and size, and helped to attain additional visual cues by hovering above each nest. Inactive nest structures that did not support the above dimension criteria simply were labeled as "unknown raptor nests" (Table 1; Figure 2).

Of particular note was the absence of any eagle nest structure at three locations where USFWS data (March 07, 2017) had indicated previous eagle nest presence. Two (2) nest locations, provided by USFWS, were located to the southeast of the WRA and were carefully scrutinized, but no eagle nests were located. It is unknown what caused the disappearance of these previously identified nest structures. A third nest location south of the WRA was evaluated and at this location, it was apparent that the eagle nest had been removed. These former nest locations are noted in *Figure 2*.

A total of four (4) Bald Eagle nests (3 active and 1 inactive) are located within the transmission line assessment area (*Figure 2 & Table 2*). Approximately five percent of the transmission line assessment area is located outside of the WRA 10-mile buffer and no additional nests were located incidentally within the transmission line assessment area that is outside of the WRA 10-mile buffer.

Table 1. March 2017 Aerial Transect Raptor Nest Survey Results

Common Name	Active Nests	Inactive Nests	Nests/sq. mile (WRA & 1-mile)	Nests/sq. mile (10-mile Target Zones)
Bald Eagle (BAEA)	11	2	0.020	0.046
Red-tailed Hawk (RTHA)	22	--	0.014	0.101
Great Horned Owl (GHOW)	11	--	0.006	0.051
Unknown Raptor	n/a	33	0.020	0.152
Total Suitable Raptor Nests	**44**	**35**	**0.061**	**0.452**

Thirty-three (33) nest nests classified as "unknown raptor" nest structures. These unknown raptor nests may not have been active for the current breeding season, or may have been active nests that, at the time of the raptor nest surveys, were either not yet in use, or activity was not detectable at the time of surveys. Please refer to *Figure 2*, the *Photographic Log*, and Table 1 below.

[8] Buehler, D. A. 2000. Bald Eagle (Haliaeetus leucocephalus). The Birds of North America Online.

In addition to raptor nests identified during the survey, 20 Great Blue Heron (GBHE; *Ardea herodias*) nest structures (17 of which were inactive) were identified. These nest structures have the potential to provide nesting resources for other raptors species, such as Great Horned Owls (*Bubo virginianus*; see *Figure 2*).

In general, overall raptor nest density within the WRA is relatively low when compared to the nest density calculated within the surrounding target zones (*Table 1*).

Table 2. Spring 2017 - Active & Inactive Bald Eagle Nest Locations Identified During the Aerial Survey within the 10-Mile Buffer of the Dodge County WRA.

Nest Name	Latitude	Longitude	County	Nest Activity	T-Line Assess. Area	WRA + 1-mile**
Blooming Prairie North	**43.921008**	**-93.061618**	**Steele**	**ACTIVE**		**Yes****
Dodge Center West	**44.031159**	**-92.893242**	**Dodge**	**ACTIVE**	**Yes**	**Yes****
Kasson South	**43.963452**	**-92.773896**	**Dodge**	**ACTIVE**	**Yes**	**Yes****
Vernon Southeast	43.880975	-92.695019	Dodge	ACTIVE		
Hayfield Southwest	43.846056	-92.892081	Mower	ACTIVE		
Moland South	44.140482	-93.045837	Steele	ACTIVE		
Havana North	*44.095309*	*-93.152030*	*Steele*	***Inactive***		
High Forest West	43.848372	-92.611177	Olmstead	ACTIVE		
Rock Dell East	43.907593	-92.593279	Olmstead	ACTIVE		
Kasson Northeast	*44.060083*	*-92.721457*	*Dodge*	***Inactive***	***Yes***	
Byron Southeast	43.981540	-92.616910	Olmstead	ACTIVE		
Mantorville East	44.066497	-92.713903	Dodge	ACTIVE	**Yes**	
Berne South	44.130971	-92.783316	Dodge	ACTIVE	**Yes**	

***none of these nests fell within actual WRA footprint; please refer to Figure 2*

The inter-nest distance between these 13 nest structures is 15.0 miles (*SD* =6.9 miles), with the WRA situated among the majority of nests. USFWS ECPG-Module 1 states (page 28)[9]:

"One-half the mean inter-nest distance has been used as a coarse approximation for the territory boundary in a number of raptor studies (e.g., Thorstrom 2001[10]). Eagle pairs at nests within 1⁄2 the

[9] USFWS (2011). Draft Eagle Conservation Plan Guidance. [Online.] Available at http://www.fws.gov/windenergy/docs/Final_ECP_draft_guidance_2.8.CLEAN.pdf.

mean project-area inter-nest distance of the project footprint are potentially susceptible to disturbance take and blade-strike mortality, as these pairs and offspring may use the project footprint. We recommend using this distance to delineate territories and associated breeding eagles at risk of mortality or disturbance."

Using this definition of an eagle territory, five (5) of the nests within the 10-mile nest assessment buffer would belong to circular territories that overlap the WRA (assuming a territory radius of *7.5 miles*; see *Figure 3*).

Bald Eagle Communal Winter Roost Observations

Over the course of the combined aerial nest helicopter survey and ground-based targeted roost effort conducted from March 17 to March21, 2017, two (2) communal wintering roosts were located within the Study Area (*Figure 4*).

A total of 197 individual Bald Eagles were observed from 71 different locations (*Figure 4*; **Appendix I**). Some of these individuals may have been counted more than once across multiple days of this survey effort, but this total excludes eagles observed at active nests. The vast majority of these observations were made outside of the WRA boundary (*Figure 4*). Golden Eagles (*Aquila chrysaetos*) were not observed during the 2017 aerial nest survey effort.

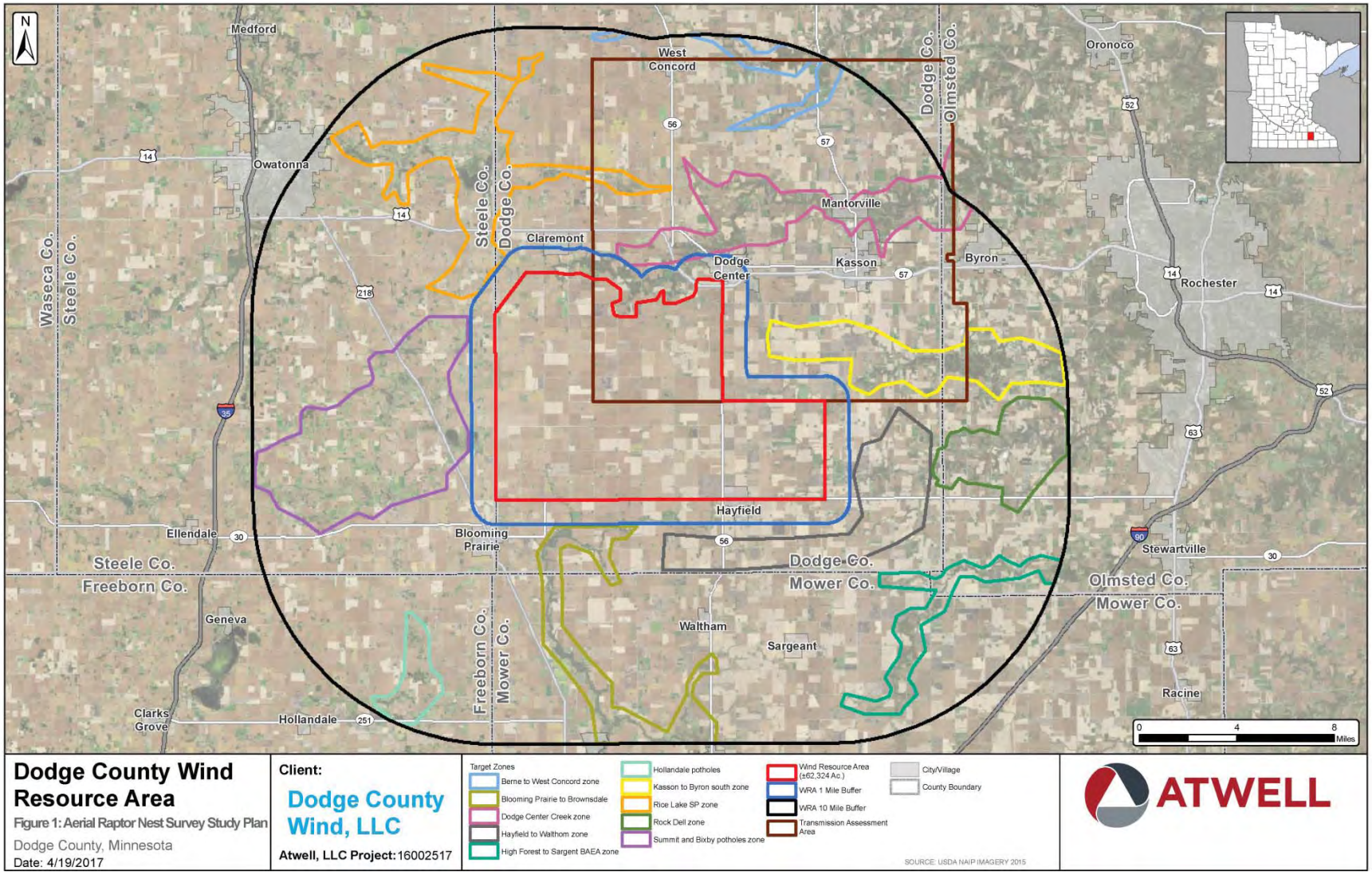
Of particular note were mid-day concentrations of 10-20 Bald Eagles at several locations with the *Study Area*, often in association with carrion food resources (see *Photographic Log)*. Based on these observed concentrations of Bald Eagles, Atwell conducted a targeted and ground-based survey effort during the evenings of March 19 and 20, 2017 at four locations in the general vicinity of the previously observed concentrations of Bald Eagles. Winter communal roosts are located at:

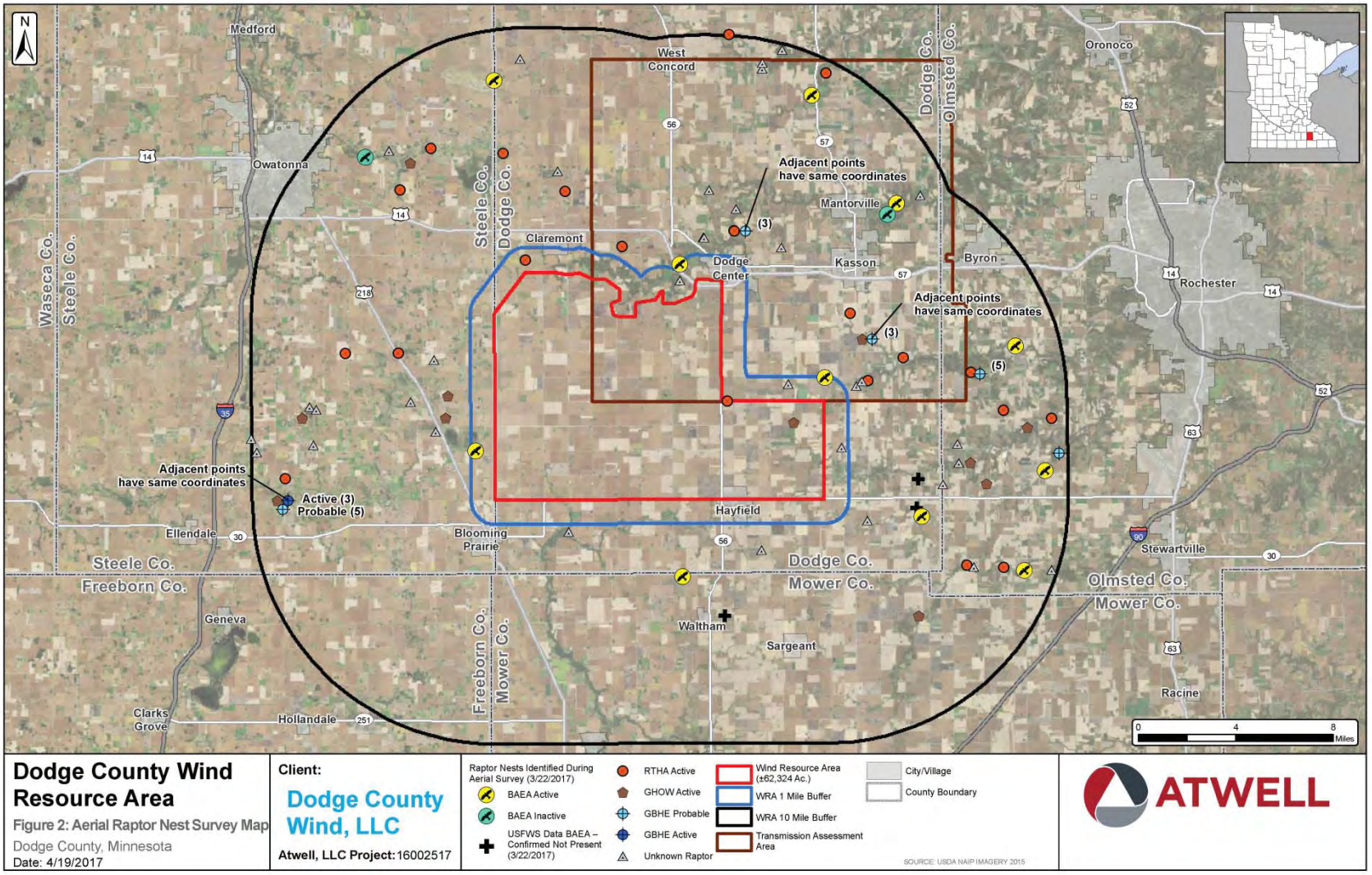
- Cedar River – 17 eagles observed the evening of March 19 located approximately 5.8 miles south of the WRA
- Rice Lake Roost – 10 eagles observed the evening of March 20 located approximately 7.6 miles northwest of the WRA

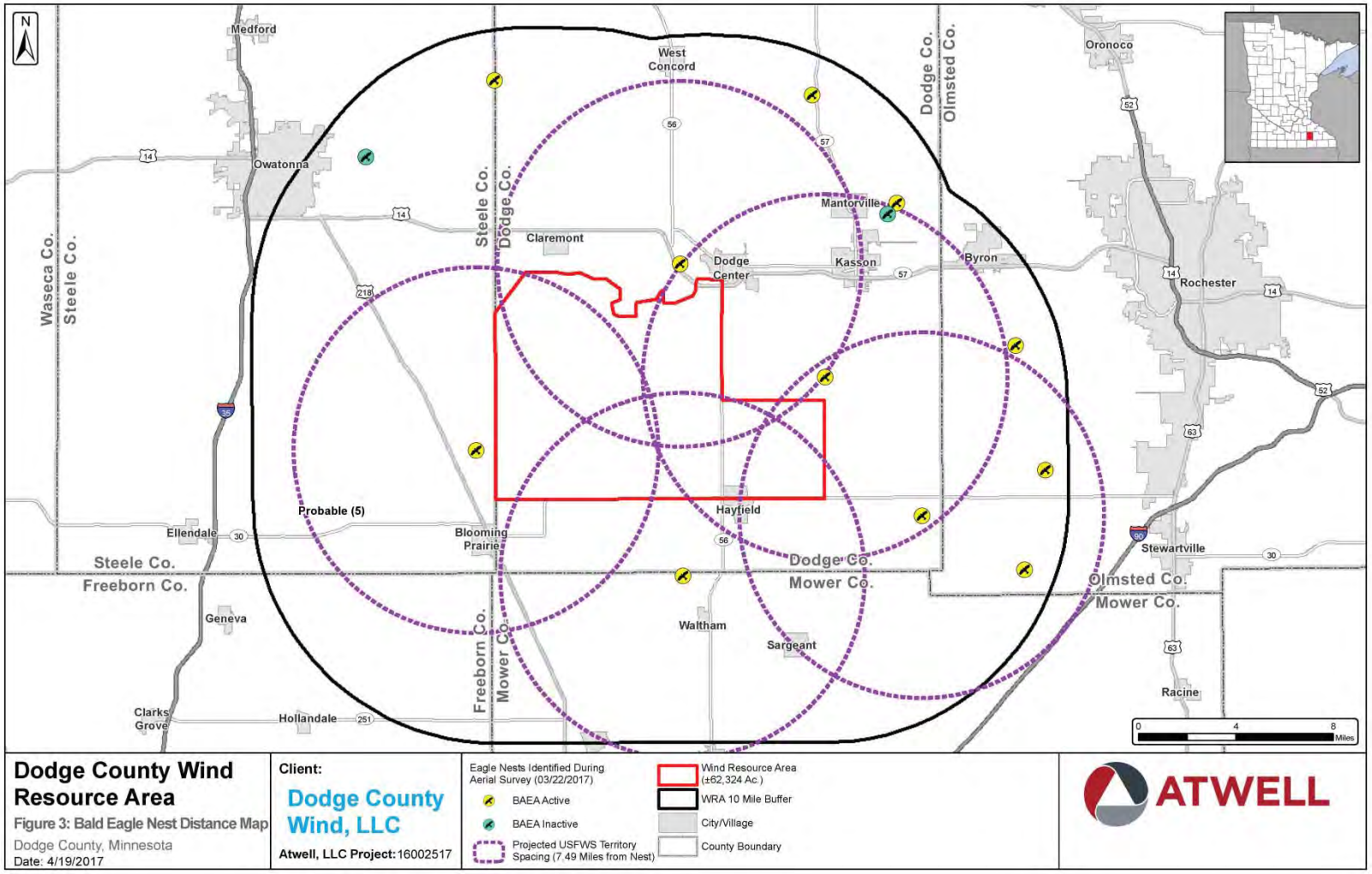
[10] Thorstrom, R. (2001). Nest-site characteristics and breeding density of two sympatric forest-falcons in Guatemala. Ornitologia Neotropical 12:337–343.

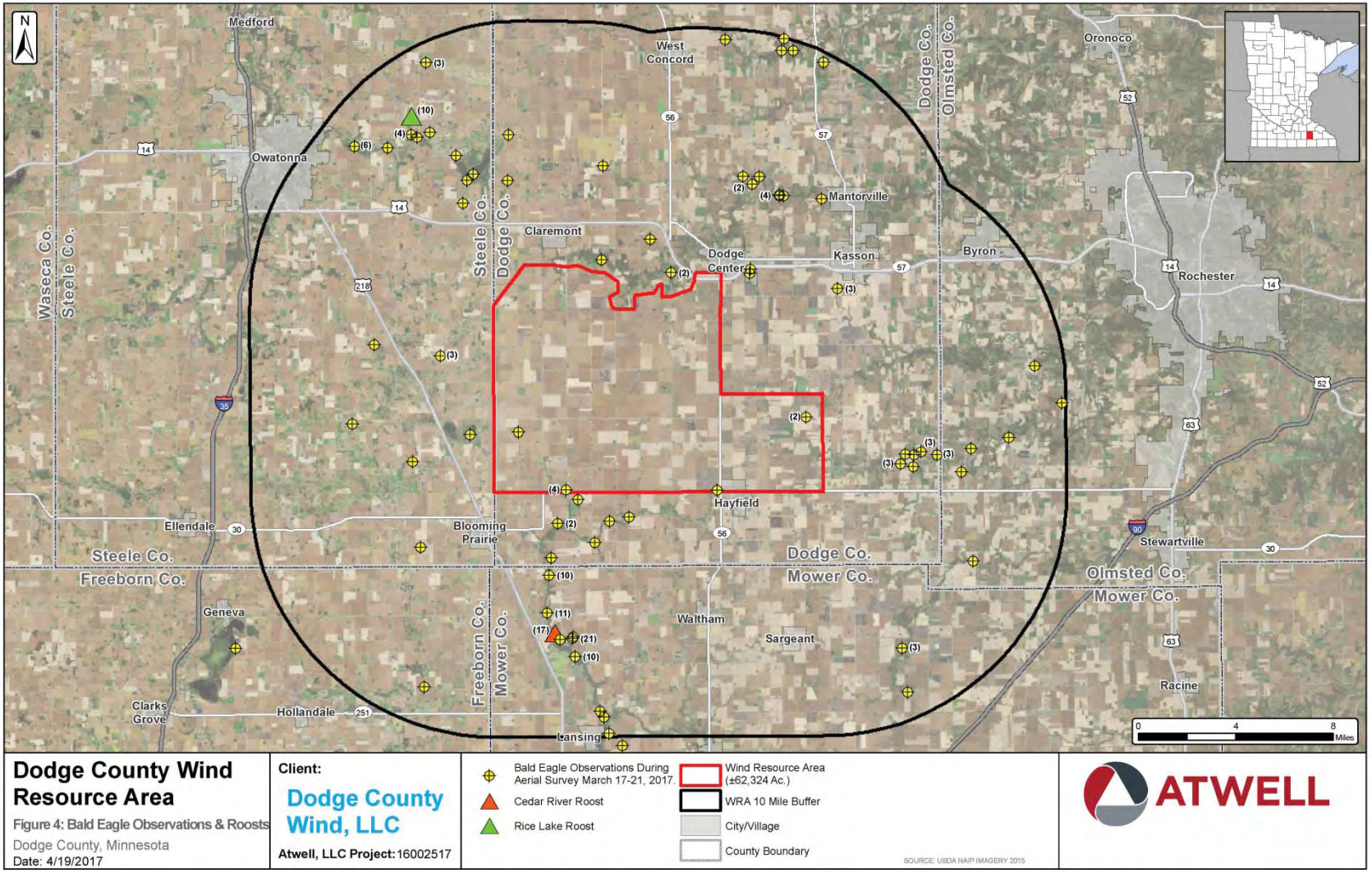
General Findings & Conclusions

- Raptor nest resources identified during this aerial raptor nest survey across the *Study Area* were limited to those species whose breeding phenology in southeastern Minnesota overlaps with late-March.
    - Overall raptor stick nest density was notably lower within the WRA & 1-mile buffer when compared to that within the 10-mile target zones.
- Bald Eagle nests were not identified within the WRA. Thirteen (13) Bald Eagle nests were observed within the overall *Study Area* including:
    - three (3) nests within the 1-mile buffer of the WRA and
    - five (5) within the transmission line assessment area.
- Eight (8) Bald Eagles not in association with nests were observed within the WRA. Bald Eagles not associated with nests were observed widely throughout the 10-mile buffer of the WRA, often feeding on carrion. Two (2) communal wintering Bald Eagle roosts were identified within the Study Area. These eagle roosts are not located within the WRA or the transmission line assessment area.


N
Medford
West Concord
Dodge Co.
Olmsted Co.
Oronoco
Owatonna
Steele Co.
Dodge Co.
Mantorville
Claremont
Dodge Center
Kasson
Byron
Rochester
Waseca Co.
Steele Co.
Hayfield
Ellendale
Blooming Prairie
Steele Co.
Freeborn Co.
Dodge Co.
Mower Co.
Stewartville
Olmsted Co.
Mower Co.
Geneva
Waltham
Sargeant
Freeborn Co.
Mower Co.
Racine
Clarks Grove
Hollandale
0 4 8 Miles
Dodge County Wind Resource Area
Figure 1: Aerial Raptor Nest Survey Study Plan
Dodge County, Minnesota
Date: 4/19/2017
Client:
Dodge County Wind, LLC
Atwell, LLC Project: 16002517
Target Zones
Berne to West Concord zone
Blooming Prairie to Brownsdale
Dodge Center Creek zone
Hayfield to Waltham zone
High Forest to Sargent BAEA zone
Hollandale potholes
Kasson to Byron south zone
Rice Lake SP zone
Rock Dell zone
Summit and Bixby potholes zone
Wind Resource Area (±62,324 Ac.)
WRA 1 Mile Buffer
WRA 10 Mile Buffer
Transmission Assessment Area
City/Village
County Boundary
SOURCE: USDA NAIP IMAGERY 2015
ATWELL


N
Medford
West Concord
Oronoco
Owatonna
Adjacent points have same coordinates
(3)
Mantorville
Claremont
Dodge Center
Kasson
Byron
Rochester
Adjacent points have same coordinates
(3)
(5)
Waseca Co.
Steele Co.
Dodge Co.
Olmsted Co.
Adjacent points have same coordinates
Active (3)
Probable (5)
Ellendale
Blooming Prairie
Hayfield
Stewartville
Steele Co.
Freeborn Co.
Dodge Co.
Mower Co.
Olmsted Co.
Mower Co.
Geneva
Waltham
Sargeant
Racine
Clarks Grove
Hollandale
Freeborn Co.
Mower Co.
0 4 8 Miles
Dodge County Wind Resource Area
Figure 2: Aerial Raptor Nest Survey Map
Dodge County, Minnesota
Date: 4/19/2017
Client:
Dodge County Wind, LLC
Atwell, LLC Project: 16002517
Raptor Nests Identified During Aerial Survey (3/22/2017)
BAEA Active
BAEA Inactive
USFWS Data BAEA – Confirmed Not Present (3/22/2017)
RTHA Active
GHOW Active
GBHE Probable
GBHE Active
Unknown Raptor
Wind Resource Area (±62,324 Ac.)
WRA 1 Mile Buffer
WRA 10 Mile Buffer
Transmission Assessment Area
City/Village
County Boundary
SOURCE: USDA NAIP IMAGERY 2015
ATWELL


N
Medford
West Concord
Oronoco
Owatonna
Mantorville
Claremont
Dodge Center
Kasson
Byron
Rochester
Waseca Co.
Steele Co.
Dodge Co.
Olmsted Co.
Probable (5)
Hayfield
Ellendale
Blooming Prairie
Stewartville
Steele Co.
Freeborn Co.
Dodge Co.
Mower Co.
Olmsted Co.
Mower Co.
Geneva
Waltham
Sargeant
Racine
Clarks Grove
Hollandale
0 4 8 Miles
Dodge County Wind Resource Area
Figure 3: Bald Eagle Nest Distance Map
Dodge County, Minnesota
Date: 4/19/2017
Client:
Dodge County Wind, LLC
Atwell, LLC Project: 16002517
Eagle Nests Identified During Aerial Survey (03/22/2017)
BAEA Active
BAEA Inactive
Projected USFWS Territory Spacing (7.49 Miles from Nest)
Wind Resource Area (±62,324 Ac.)
WRA 10 Mile Buffer
City/Village
County Boundary
ATWELL


Medford
West Concord
Oronoco
Owatonna
Mantorville
Claremont
Dodge Center
Kasson
Byron
Rochester
Hayfield
Ellendale
Blooming Prairie
Stewartville
Geneva
Waltham
Sargeant
Racine
Clarks Grove
Hollandale
Lansing
Waseca Co.
Steele Co.
Dodge Co.
Olmsted Co.
Freeborn Co.
Mower Co.
0 4 8 Miles
Dodge County Wind Resource Area
Figure 4: Bald Eagle Observations & Roosts
Dodge County, Minnesota
Date: 4/19/2017
Client:
Dodge County Wind, LLC
Atwell, LLC Project: 16002517
Bald Eagle Observations During Aerial Survey March 17-21, 2017.
Cedar River Roost
Rice Lake Roost
Wind Resource Area (±62,324 Ac.)
WRA 10 Mile Buffer
City/Village
County Boundary
SOURCE: USDA NAIP IMAGERY 2015
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Technical Data Summary Addendum

TO: Jennifer Field (Dodge County Wind, LLC)

FROM: Atwell, LLC

DATE: June 2, 2017

RE: Dodge County Wind – Raptor Nest Survey, Steele County Expansion

Dodge County Wind, LLC (DCW, Client) contracted Atwell, LLC (Atwell) to conduct a review of avian resources for the proposed Dodge County Wind Resource Area (WRA) and the associated proposed transmission line assessment area (hereafter collectively referred to as the *Project Area*) in Dodge County, Minnesota. A significant component of this avian resources review was to assess raptor nest resources within the *Project Area*, particularly for Bald Eagle (*Haliaeetus leucocephalus*).

During March 2015, an initial eagle nest survey effort was executed within the WRA and surrounding 5-mile buffer (HDR 2017). An additional eagle nest assessment on existing known nest locations was conducted in June of 2016 (HDR 2017).

Atwell incorporated additional raptor nest data acquisition through publicly available databases and reviewed information provided by DCW, including the aforementioned avian use study completed by HDR (2017), prior to conducting aerial raptor nest surveys for the original *Project Area* boundary and a 10-mile buffer around the *Project Area,* per guidance within U.S. Fish and Wildlife Service (USFWS 2013), during March 2017.

Within the WRA and a one-mile buffer, Atwell utilized flight-line transects at 1-kilometer intervals. Target Zones within the 10-mile buffer were also flown using transect flight-line methods. These Target Zones (*Figure 1*) were defined from a desktop approach using a Geographic Information System (GIS) and the most appropriate satellite imagery data. Most Target Zones were defined based on at least one major forested riparian corridor, in addition to the presence of other relatively more contiguous upland forest cover and wetland/open water systems. In general, Target Zones did not incorporate large expanses of non-forested cultivated cropland. Additionally, Target Zones largely avoided expanses of cultivated cropland where the majority of deciduous forest cover existed only as isolated and widely scattered woodlots. Surveys within the 10-mile buffer of the WRA focused only on Target Zones while surveys within the one-mile buffer utilized flight-line transects at 1-kilometer intervals

Atwell received a revised WRA boundary from DCW on May 11, 2017. The expanded boundary shifted the western portion of the WRA into Steele County, with U.S. Highway 218 serving as the new western boundary of the WRA. As such, a new 10-mile buffer around the WRA was generated, per guidance within USFWS (2013), and ground-based raptor nest surveys were conducted on May 11, 2017. As shown in the attached *Figure 1*, aerial surveys conducted by Atwell in March 2017 covered the following portions of the newly expanded WRA:

- One-mile buffer of the previous WRA
- GIS-identified Target Zones

Of the approximately 22,083 acres included in the Steele County expansion of the WRA, approximately 10,755 acres were covered by the March 2017 aerial surveys, leaving 11,328 acres (approximately 51%) of the revised WRA that have not been surveyed from the air.

The purpose of this addendum is to supplement previously conducted studies (HDR 2017, Atwell 2017) in consideration of the expanded *Project Area*, to assess areas within the newly generated 10-mile buffer not previously assessed, and to prioritize areas of avoidance/concern, in order to identify and highlight potential habitat and raptor nesting resources that could represent development constraints warranting further investigation, and/or mitigation.

The *Scope of Work* for the raptor nest survey included data acquisition, map creation, and site reconnaissance to address the following:

- to assess known eagle nest data (e.g., unpublished data from Minnesota Department of Natural Resources) within the expanded WRA and out to 10 miles from the expanded WRA footprint, in consideration of USFWS (2013)

- to generate a final technical summary report of the results of the raptor nest survey

RAPTOR RESOURCES ASSESSMENT

Atwell received updated USFWS and Minnesota Department of Natural Resources (MNDNR) Bald Eagle nest spatial data for the expanded 10-mile buffer from Margaret Rheude (USFWS) on May 9, 2017. A review of these data did not identify any additional known eagle nest structures within the expanded 10-mile buffer. USFWS noted that no formal eagle nest surveys have been conducted in Minnesota since federal de-listing of the species in 2007, thereby making the USFWS dataset outdated for purposes of precise *Project Area* assessment.

An Atwell biologist conducted a ground-based raptor nest survey within the expanded WRA and 10-mile buffer extension on May 11, 2017. Approximately seven (7) hours of survey effort were invested in updating eagle nest data. Within the new WRA, Atwell's biologist drove north/south

and east/west roads searching for raptor nests. Within the 10-mile buffer, the Atwell biologist focused particularly on an additional Target Zone surrounding the Straight River. Accessible roads flanking this heavily forested riparian corridor were used to gain as many ground-based habitat vantages as possible. Additional targeted survey effort was performed near other open water features present within the 10-mile buffer extension, such as small ponds and/or lakes.

Four new raptor nests were identified during ground-based nest surveys. Two nests were observed to be active (a red-tailed hawk was present on one nest and an unidentified *accipter* species was present on the other active nest) and two nests did not exhibit signs of activity. No Bald Eagles or Bald Eagle nests were observed during this ground-based survey.

Atwell's biologist noted advanced tree canopy leaf-out during surveys, which notably contributed to limited visibility into the farther reaches of deciduous woodlands. All four raptor nests identified during surveys were located on the edges of woodlands, near open areas – the extent of forest cover that was visible to Atwell's biologist. It is important to note that, given the advanced progression of tree canopy leaf-out within the Steele County WRA expansion and 10-mile buffer extension, the absence of Bald Eagle nest observations should not be interpreted as a lack of occurrence.

GENERAL FINDINGS & CONCLUSIONS

- USFWS and MNDNR data for the expanded 10-mile buffer surrounding the updated WRA boundary do not identify any additional known Bald Eagle nest structures, but available datasets should be deemed incomplete
- No Bald Eagles or Bald Eagle nest structures were observed during ground-based raptor nest surveys of the expanded 10-mile buffer
    - March 2017 aerial surveys covered approximately 51% of the newly expanded WRA boundary
    - Tree canopy leaf-out was advanced during the May ground-based survey period, likely limiting adequate visibility

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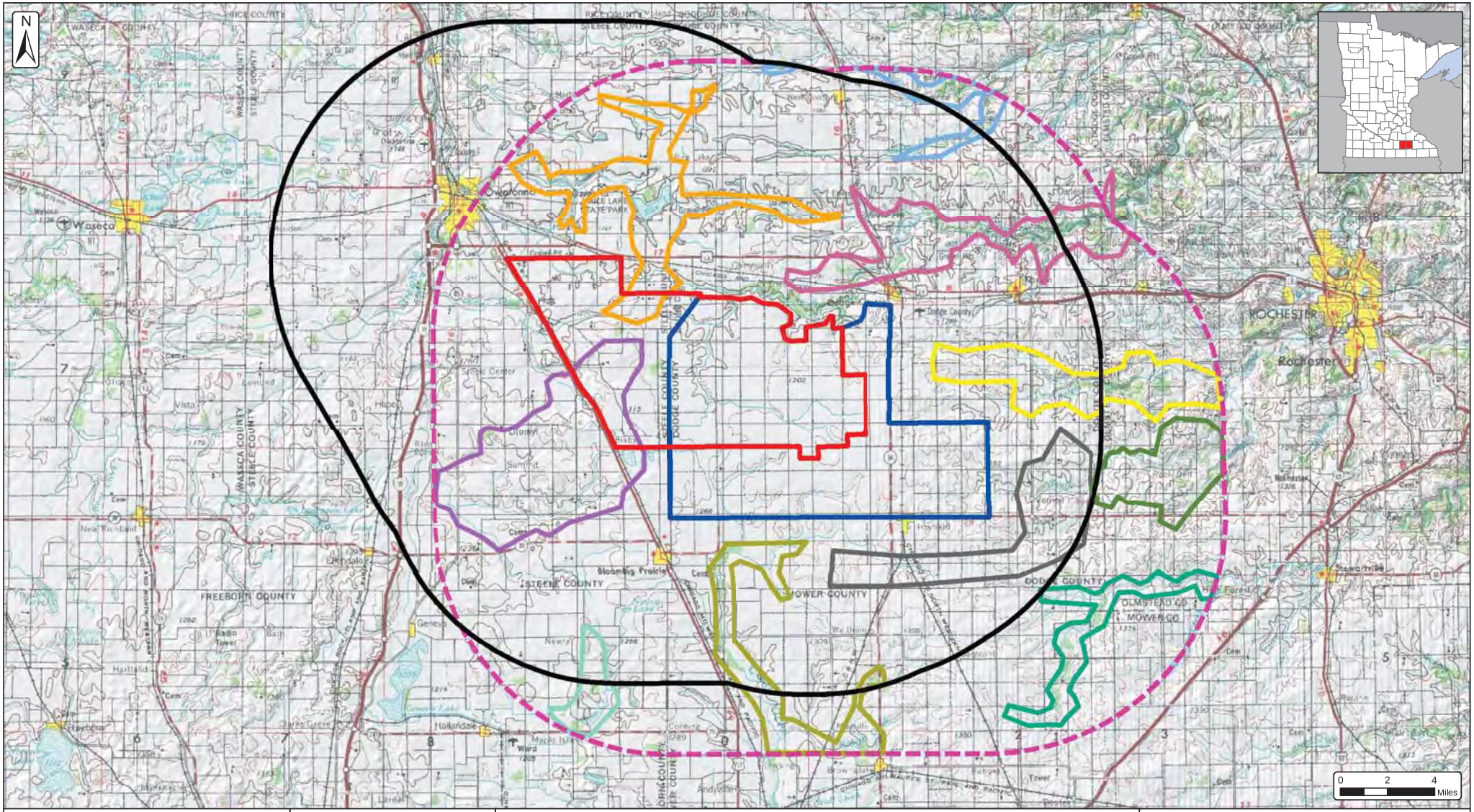

Dodge County Wind Resource Area

Aerial Raptor Nest Survey Plan

Dodge County & Steele County, Minnesota

Date: 5/16/2017

Client:

Dodge County Wind, LLC

Atwell, LLC Project:16002517

- Wind Turbine Siting Area (05/10/2017)
- 10 Mile Buffer (05/10/2017)

Previous Boundary

- Wind Turbine Siting Area (01/09/2017)
- 10 Mile Buffer (01/09/2017)

Target Zones

- Berne to West Concord zone
- Blooming Prairie to Brownsdale
- Dodge Center Creek zone
- Hayfield to Walthom zone
- High Forest to Sargent BAEA zone
- Hollandale potholes
- Kasson to Byron south zone
- Rice Lake SP zone
- Rock Dell zone
- Summit and Bixby potholes zone

SOURCE: USGS TOPO QUADS AUSTIN (1985), ROCHESTER (1985), FAIRBAULT (1985), ALBERT LEA (1985)

ATWELL

2020 Raptor Nest Survey

Dodge County Wind Energy Project

Dodge and Steele counties, Minnesota

Prepared for:

Dodge County Wind, LLC

700 Universe Boulevard
Juno Beach, Florida 33408

Prepared by:

Cecily Foo

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 300
Golden Valley, Minnesota 55427

February 9, 2021

STUDY PARTICIPANTS

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Cecily Foo	Biologist/Report Writer
Jordan Harrison	Biologist
Valerie Woelfel	GIS Specialist
Carmen Boyd	Project Tracking and Data Manager
Carissa Goodman	Technical Editor

REPORT REFERENCE

Foo, C. 2020. 2020 Raptor Nest Survey, Dodge County Wind Energy Project, Dodge and Steele Counties, Minnesota. Prepared for Dodge County Wind, LLC, Juno Beach, Florida. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. February 9, 2021.

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INTRODUCTION

Dodge County Wind, LLC (DCW), an indirect, wholly owned subsidiary of NextEra Energy Resources, LLC (NEER), is proposing the development of the Dodge County Wind Energy Project (Project) in Steele and Dodge counties, Minnesota. DCW contracted Western EcoSystems Technology, Inc. (WEST) to conduct an aerial raptor nest survey to record bald eagle (*Haliaeetus leucocephalus*) and other raptor nests in and near the Project boundary (Study Area). The aerial survey was conducted in accordance with the guidance provided in the US Fish and Wildlife Service (USFWS) *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013) and the USFWS *Interim Golden Eagle Technical Guidance* (Pagel et al. 2010).

SURVEY AREA

The survey area for all raptor stick-nests consisted of a 1.0-mile (mi; 1.6-kilometer [km]) buffer surrounding the Study Area, and the survey area for bald eagle nests consisted of a 5.0-mi (8.0-km) buffer of the Study Area (Figure 1). This area falls within the Western Corn Belt Plains Level III Ecoregion, and the Eastern Iowa and Minnesota Drift Plains Level IV Ecoregion (US Environmental Protection Agency [USEPA] 2016). The topography of the Eastern Iowa and Minnesota Drift Plains ecoregion ranges from undulating to level; the western and eastern portions of the ecoregion were formerly tallgrass prairie and the central portion was oak savannah. The majority of the ecoregion has been converted to cropland (USEPA 2016). There are no major waterbodies within the Study Area (Figure 1).

METHODS

Aerial Raptor Nest Survey

Aerial surveys were conducted from a helicopter from April 13 – 15, 2020, a period before leaf-out when raptors would be actively tending to a nest or incubating eggs. Aerial surveys were conducted in accordance with the guidance provided in the ECPG (USFWS 2013) and the USFWS *Interim Golden Eagle Technical Guidance* (Pagel et al. 2010). An experienced raptor ecologist and a skilled helicopter pilot conducted the surveys. Raptors were defined for the surveys as kites, accipiters, buteos, harriers, eagles, falcons, and owls (Buehler 2020). However, the main focus of the surveys was to identify bald eagle nests. Surveyors focused on locating eyries (large, stick nest structures) in suitable eagle nesting substrate (e.g., trees, transmission lines) within and around the Study Area. Pre-flight planning included the creation of field maps and mobile Geographic Information System files and review of relevant background information, such as previously recorded nest locations, topographic maps, and aerial photographs.

Surveys within the Study Area and 1.0-mi buffer documented all potential raptor nests, including bald eagle nests, while the surveys out to the 5.0-mi buffer of the Study Area focused only on identifying potential bald eagle nests. Efforts were made to minimize disturbance to breeding

raptors; the greatest possible distance at which the species could be identified was maintained, with distances varying, depending upon nest location and wind conditions.

In general, all potential bald eagle and raptor nest habitat was surveyed by flying transects spaced approximately 0.5 mi (0.8 km) apart, flying at speeds of approximately 50 mi (80 km) per hour when actively scanning for nests. This survey was conducted concurrently with portions of the Dodge County Wind Energy Project Transmission Line Raptor Nest Survey[1]. Historic nest locations in the vicinity of the survey were checked using data collected during the 2017 eagle and raptor nest survey for the Project (Atwell 2017). Surveys were typically conducted between 07:00 hours and 19:00 hours.

The helicopter was positioned to allow thorough visual inspection of the habitat, and, in particular, to provide a view of the tops of the tallest dominant trees where bald eagles generally prefer to nest (Buehler 2020). The locations of all nests were recorded using a GPS-enabled tablet running Locus Map Pro software. The survey track was also recorded to ensure all areas were adequately covered.

To determine the status of a nest, the biologist evaluated behavior of any adults on or near the nest, and presence of eggs, young, whitewash, or fresh building materials (Pagel et al. 2010). Attempts were made to identify the species of raptor associated with each active nest. Raptor species, nest size, nest status, nest condition, and nest substrate were recorded at each nest location to the extent possible.

Follow-up Ground Survey of Eagle Nests

On May 18 and 19, 2020, WEST conducted follow-up ground-based surveys of potential bald eagle of interest that were documented during the aerial survey to confirm species, occupancy, and activity status. The follow-up survey occurred 33-36 days after the initial aerial survey, following ECPG recommendations that eagle nest status be checked at least 30 days after the initial observation.

Terminology

Included below are descriptions of terms used during the documentation of nests (see Results section).

Nest ID – WEST assigned a unique nest identification number for each nest documented.

Species – A species was assigned to each nest when possible, otherwise, it was classified as an unidentified raptor nest. Unidentified raptor nests were defined as any stick nest not having an occupant associated with it at the time of the survey. Many times nests become abandoned or are no longer used, and, over time, may become historic nest sites. Unidentified raptor nests, including nests that could become suitable for raptors, were documented in order to populate a

[1] Data collected within the overlapping survey areas is presented in each report. For transmission line survey results, see Foo 2020.

nest database to ensure future surveys include all potentially suitable nest sites. Unidentified raptor species nests that appeared consistent in size and structure with bald eagle nests were further classified as potential nesting sites for bald eagles.

Nest Condition – Nest condition was categorized as good, fair, or poor. Although the determination of nest condition can be subjective and may vary between observers, it gives a general sense of when a nest or nest site was last used. Nests in good condition were excellently maintained with a very well-defined bowl, no sagging, and would be possible to use immediately or were currently in use. Nests in fair condition had a fairly well-defined bowl, minor sagging, and might require some repair or addition to use immediately. Nests in poor condition were sloughing or sagging heavily, and would require effort to restore for successful nesting.

Substrate – Nest substrate was recorded to provide future observers a visual reference. Substrates include man-made structures (e.g., power lines, nest platforms, dock hoists), and biological and physical structures (e.g., conifer and deciduous tree species, cliff faces).

Nest Status – Nest status was categorized using definitions originally proposed by Postupalsky (1974) and largely followed the USFWS ECPG (USFWS 2013). Nests were classified as occupied if any of the following were observed at the nest structure:

1) an adult in an incubating position
2) eggs
3) nestlings or fledglings
4) presence of an adult (sometimes sub-adults)
5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed earlier in the breeding season, or
6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath

Occupied nests were further classified as active if (1) an adult was present on the nest in incubating position, (2) an egg or eggs were present, or (3) nestlings observed. Occupied nests were further classified as inactive if no eggs or nestlings were present. Nests not meeting the above criteria for occupied were simply classified as inactive.

RESULTS

Aerial Raptor Nest Survey

Twenty raptor nests representing three identifiable species and one great-blue heron colony were detected during the aerial surveys on April 13 – 15, 2020 and the ground-based follow up surveys on May 18 and 19, 2020 (Figure 1, Table 1). Five occupied and active bald eagle nests were documented within the 5.0-mi buffer; one additional occupied and active bald eagle nest was documented outside of the 5.0-mi buffer.

Additional raptor nests documented during the survey included two occupied and active red-tailed hawk (*Buteo jamaicensis*) nests, one occupied and active great horned owl (*Bubo virginianus*) nest, two occupied inactive unidentified raptor nests, and nine inactive unidentified raptor nests (Figure 1, Table 1). One great blue heron (*Ardea herodias*) colony was detected within the northeastern portion of the Study Area.

The following section provides more details on the bald eagle nests and nests consistent in size and structure with an eagle nest documented during the aerial surveys:

Nest 17081 – This nest was located 0.9 mi (1.4 km) west of the Study Area. The nest was in good condition and was consistent in size and structure with an eagle nest. During the aerial survey on April 14, no adults or eggs were observed and the nest was determined to be an inactive unidentified raptor nest. During the ground-based follow-up survey on May 19, two adult bald eagles were observed on the nest. The presence of nestlings could not be confirmed due to poor visibility due to dense leaves; however, the adults appeared to be tending nestlings. Therefore, this nest is considered an occupied and active bald eagle nest in 2020 (Figure 1; Appendix A1).

Nest 17078 – This nest was located 1.8 mi (2.9 km) southwest of the Study Area. The nest was in good condition. An adult bald eagle was present on the nest and in incubating position during the aerial survey on April 13. No follow-up survey was conducted at this nest. The nest is therefore considered an occupied and active bald eagle nest in 2020 (Figure 1, Appendix A2).

Nest 17057 – This nest was located 2.2 mi (3.5 km) northeast of the Study Area. The nest was in good condition. During the aerial survey on April 13, an adult bald eagle was present on the nest and in an incubating position. Therefore, this nest is considered an occupied and active bald eagle nest in 2020 (Figure 1, Appendix A3).

Nest 17083 – This nest was located 2.6 mi (4.2 km) southeast of the Study Area. The nest was in good condition. During the aerial survey on April 14, one adult bald eagle flushed and two eggs were observed on the nest. A follow-up survey was conducted on May 18 and two adults were observed perched near the nest. The presence of nestlings could not be confirmed due to dense leaves and poor visibility. Therefore, this nest is considered an occupied and active bald eagle nest in 2020 (Figure 1, Appendix A4).

Nest 17074 – This nest was located 4.8 mi (1.6 km) north of the Study Area. The nest was in good condition. During the aerial survey on April 13, an adult bald eagle was present on the nest and in an incubating position. No follow-up survey was conducted at this nest. Therefore, this nest is considered an occupied and active bald eagle nest in 2020 (Figure 1, Appendix A5).

Nest 17097 – This nest was located 6.1 mi (9.8 km) north of the Study Area. The nest was in good condition. During the aerial survey on April 15, an adult bald eagle was present on the nest and in an incubating position. No follow-up survey was conducted at this nest. Therefore, this nest

is considered an occupied and active bald eagle nest in 2020 (Figure 1, Appendix A6). This nest was included in the 2017 survey for the Project and was called Moland South (Atwell 2017).

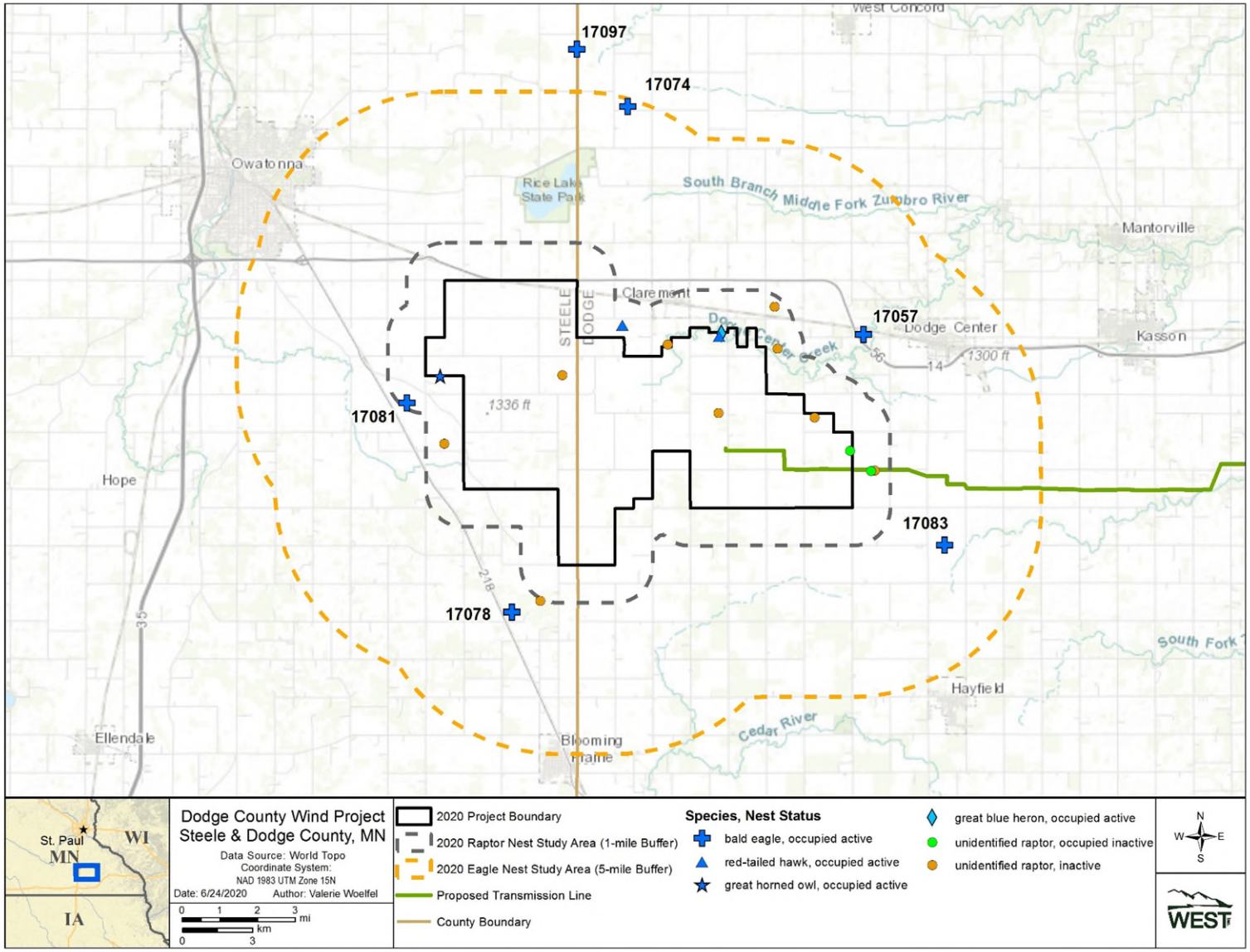

Figure 1. Raptor nests documented April 13 – April 15, 2020, near Dodge County Wind Energy Project, Dodge and Steele counties, Minnesota.

Table 1. Raptor Nest ID, location, species, status, substrate, and condition of nests documented during the 2020 raptor nest survey for the Dodge County Wind Energy Project, Dodge and Steele counties, Minnesota.

Nest ID	2017 Nest ID	Latitude	Longitude	Species[1]	Status	Nest Substrate	Condition
17081	--	44.00492	-93.13615	BAEA	occupied active[2]	deciduous tree	good
17078	--	43.92477	-93.08011	BAEA	occupied active	deciduous tree	good
17057	--	44.03116	-92.89324	BAEA	occupied active	coniferous tree	good
17083	--	43.95036	-92.85032	BAEA	occupied active	deciduous tree	good
17074	--	44.11859	-93.01863	BAEA	occupied active	deciduous tree	good
17097	Moland South	44.14048	-93.04584	BAEA	occupied active	deciduous tree	good
17072	--	44.03055	-92.97002	RTHA	occupied active	deciduous tree	good
17075	--	44.03490	-93.02154	RTHA	occupied active	deciduous tree	good
17079	--	44.01528	-93.11846	GHOW	occupied active	deciduous tree	good
17076	--	44.01554	-93.05355	UNRA	inactive	deciduous tree	fair
17071	--	44.00107	-92.97044	UNRA	inactive	deciduous tree	good
17059	--	43.99935	-92.91936	UNRA	inactive	deciduous tree	good
17058	--	43.98666	-92.90055	UNRA	occupied inactive	deciduous tree	good
17095	--	44.02732	-92.99733	UNRA	inactive	deciduous tree	poor
17070	--	44.02584	-92.93900	UNRA	inactive	deciduous tree	good
17055	--	43.97886	-92.88935	UNRA	occupied inactive	deciduous tree	good
17080	--	43.98934	-93.11620	UNRA	inactive	deciduous tree	good
17056	--	43.97896	-92.88737	UNRA	inactive	deciduous tree	fair
17060	--	44.04188	-92.94048	UNRA	inactive	deciduous tree	good
17077	--	43.92909	-93.06502	UNRA	inactive	deciduous tree	fair
17073	--	44.03164	-92.96871	GBHE	occupied active	deciduous tree	--

[1]BAEA = bald eagle; GHOW = great-horned owl; RTHA = red-tailed hawk; UNRA = unidentified raptor; GBHE = great blue heron.

[2]Nest 17081 was an inactive unidentified raptor nest during the aerial survey on April 14, 2020, but was updated to an occupied active bald eagle nest based on the follow-up survey on May 19, 2020.

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Appendix A. Images of Occupied and Active Eagle Nests Found During the 2020 Raptor Nest Survey for the Dodge County Wind Energy Project, Dodge and Steele Counties, Minnesota.

Appendix A1. Nest 17081 was located 0.9 mi (1.4 km) west of the Study Area. During the aerial survey on April 14, the nest was determined to be an inactive unidentified raptor nest (pictured). During the ground-based follow-up survey on May 19, two adults were observed on the nest and appeared to be tending nestlings. Therefore, this nest is considered an occupied and active bald eagle nest in 2020.

Appendix A2. Nest 17078 was located 1.8 mi (2.9 km) southwest of the Study Area. An adult bald eagle was present on the nest and in incubating position during the aerial survey. The nest is therefore considered an occupied and active bald eagle nest in 2020.