Large Filing Separator Sheet

Case Number: 10-2865-EL-BGN

File Date: 3/10/11

Section: 6

Number of Pages: 200

Description of Document: Application

5 Results

5.1 Passerine Migratory Bird Surveys

5.1.1 Fall 2008

During the fall 2008 surveys a total of 362 birds representing 27 species were observed at the three survey points within the Project area. See Appendix D for summary tables presenting the results of the fall 2008 surveys. The Red-winged Blackbird (*Agelaius phoeniceus*), Canada Goose (*Branta canadensis*), European Starling (*Sturnus vulgaris*), and American Crow (*Corvus brachyrhynchos*) were the most commonly observed species, comprising over 65% of all birds observed. These species were observed on nearly every survey day at most points. The non-native Rock Pigeon (*Columba livia*), European Starling (*Sturnus vulgaris*), and House Sparrow (*Passer domesticus*) were noted if observed; however, these species are afforded no protection under the Migratory Bird Treaty Act. In addition, the majority of the species observed (18 out of 27 species) have year-round ranges within central Ohio. Table 5.1-1 presents a complete listing of species and the number of detections during the fall 2008 passerine study.

Table 5.1-1 Species Observed at the Black Fork Wind Project, Fall 2008

Species	Total Birds Observed
Canada Goose *(Branta canadensis)*	54
Wild Turkey *(Meleagris gallopavo)*	2
Red-tailed Hawk *(Buteo jamaicensis)*	3
American Kestrel *(Falco sparverius)*	1
Killdeer *(Charadrius vociferous)*	17
Mourning Dove *(Zenaida macroura)*	3
Red-bellied Woodpecker *(Melanerpes carolinus)*	15
Downy Woodpecker *(Picoides pubescens)*	10
Hairy Woodpecker *(Picoides villosus)*	3
Northern Flicker *(Colaptes auratus)*	8
Eastern Wood-Pewee *(Contopus virens)*	1
Blue Jay *(Cyanocitta cristata)*	32

Table 5.1-1 Species Observed at the Black Fork Wind Project, Fall 2008

Species	Total Birds Observed
American Crow *(Corvus brachyrhynchos)*	78
Carolina Chickadee *(Poecile carolinensis)*	1
Black-capped Chickadee *(Poecile atricapillus)*	2
Tufted Titmouse *(Baeolophus bicolor)*	1
White-breasted Nuthatch *(Sitta carolinensis)*	3
Carolina Wren *(Thryothorus ludovicianus)*	2
American Robin *(Turdus migratorius)*	8
Gray Catbird *(Dumetella carolinensis)*	6
Brown Thrasher *(Toxostoma rufum)*	2
*European Starling *(Sturnus vulgaris)*	55
Field Sparrow *(Spizella pusilla)*	1
Song Sparrow *(Melospiza melodia)*	2
Northern Cardinal *(Cardinalis cardinalis)*	1
Red-winged Blackbird *(Agelaius phoeniceus)*	50
Purple Finch *(Carpodacus purpureus)*	1
Total	**362**

*Non-native/unprotected species.

Some individuals that breed in the northern portions of their range will overwinter in the southern extent of their range and migrate in the spring to their breeding grounds. As a result, it is difficult to determine which individuals of the species observed were migrants and which were residents. Given that most of the birds observed were not in large flocks, there was not a significant decrease in the number of individuals counted as the season progressed, and there is a lack of geological or topographical features in the area that would concentrate migrants to the Project area, it is likely that most of the observed birds were residents.

No federal or state threatened, endangered, or species of concern birds were documented during the fall 2008 passerine migratory study.

An average of 10.9 birds were counted at each of the three survey points during the fall 2008 passerine migratory survey period. Table 5.1-2 presents a summary of the survey results for each survey day, and Table 5.1-3 presents a summary of the survey results for each survey point. The total number of individuals observed on each day surveyed ranged between 8 and 155 individuals. On November 2, 2008 the season high of 173 birds was observed. This high number is attributed to flocks of 50 Canada Geese, 55 European Starlings, and 50 Red-winged Blackbirds. These three observations were the largest concentration of birds seen throughout the fall 2008 season.

Table 5.1-2 Fall Passerine Migratory Survey Results by Date, Fall 2008

	9/3/08	9/9/08	9/17/08	9/21/08	10/2/08	10/5/08	10/17/08	10/19/08	10/31/08	11/2/08	11/4/08
Total Individuals on Survey	13	8	17	16	11	15	59	11	21	173	14
Average Total Birds per Survey Point	4.3	2.7	5.7	5.3	3.7	5	19.7	3.7	7	57.7	4.7
Total Species in Survey	8	5	11	11	8	10	8	6	6	10	6
Average Number of Species per Survey Point	4	2.7	5.3	5	3.7	4.7	3.3	3.3	4	5.3	3.3

Table 5.1-3 Fall Passerine Migratory Survey Results by Location, Fall 2008

	BF-01	BF-02	BF-03	Total
Total Individuals	115	114	123	352
Average Number of Birds Per Point	10.5	10.4	11.2	
Total Species*	15	19	18	27
Average Number of Species Per Point	4.2	4.1	3.9	
Number of Survey Days	11	11	11	

*Species count does not include unidentified birds.

5.1.2 Spring 2009

A total of 1,781 birds representing 69 different species were observed during the spring 2009 migratory season at 18 survey points within the Project area (see Table 5.1-4). An average of 18.9 individuals was counted at each of the 18 points. All 18 of the survey points (BF-01 through BF-18) were surveyed five times during the spring 2009 season and points BF-01 through BF-03 were surveyed an additional two times. These additional two surveys were the first two surveys of the season (April 17 and April 19, 2009) and were done before the project area expanded and the additional 15 points were added to the survey. See Appendix E for summary tables presenting the results of the spring 2009 surveys.

Table 5.1-4 Species Observed at the Black Fork Wind Project, Spring 2009

Species	Total Birds Observed
Canada Goose (*Branta canadensis*)	24
Great Blue Heron (*Ardea Herodias*)	1
Turkey Vulture (*Cathartes aura*)	1
Red-tailed Hawk (*Buteo jamaicensis*)	9
Wild Turkey (*Meleagris gallopavo*)	1
Killdeer (*Charadrius vociferus*)	67

Table 5.1-4 Species Observed at the Black Fork Wind Project, Spring 2009

Species	Total Birds Observed
*Rock Pigeon (*Columba livia*)	1
Mourning Dove (*Zenaida macroura*)	76
Yellow-billed Cuckoo (*Coccyzus americanus*)	2
Chimney Swift (*Chaetura pelagica*)	3
Red-bellied Woodpecker (*Melanerpes carolinus*)	41
Downy Woodpecker (*Picoides pubescens*)	1
Northern Flicker (*Colaptes auratus*)	17
Pileated Woodpecker (*Dryocopus pileatus*)	3
Eastern Wood-Pewee (*Contopus virens*)	4
Eastern Phoebe (*Sayornis phoebe*)	2
Great Crested Flycatcher (*Myiarchus crinitus*)	5
Eastern Kingbird (*Tyrannus tyrannus*)	3
Red-eyed Vireo (*Vireo olivaceus*)	24
Yellow-throated Vireo (*Vireo flavifrons*)	1
Blue Jay (*Cyanocitta cristata*)	65
American Crow (*Corvus brachyrhynchos*)	100
Horned Lark (*Eremophila alpestris*)	115
Barn Swallow (*Hirundo rustica*)	84
Tree Swallow (*Tachycineta bicolor*)	18
Black-capped Chickadee (*Poecile atricapillus*)	2
Brown Creeper (*Certhia Americana*)	1
Tufted Titmouse (*Baeolophus bicolor*)	36
Red-breasted Nuthatch (*Sitta canadensis*)	3
House Wren (*Troglodytes aedon*)	1
Carolina Wren (*Thryothorus ludovicianus*)	1
Eastern Bluebird (*Sialia sialis*)	11
Wood Thrush (*Hylocichla mustelina*)	10
American Robin (*Turdus migratorius*)	162
Gray Catbird (*Dumetella carolinensis*)	1
Northern Mockingbird (*Mimus polyglottos*)	16
Brown Thrasher (*Toxostoma rufum*)	13
American Pipit (*Anthus rubescens*)	2
*European Starling (*Sturnus vulgaris*)	3
Yellow Warbler (*Dendroica petechia*)	11
Chestnut-sided Warbler (*Dendroica pensylvanica*)	11
Yellow-rumped Warbler (*Dendroica coronata*)	31
Yellow-throated Warbler (*Dendroica dominica*)	3
Black-and-White Warbler (*Mniotilta varia*)	1
Prothonotary Warbler (*Protonotaria citrea*)	1

Table 5.1-4 Species Observed at the Black Fork Wind Project, Spring 2009

Species	Total Birds Observed
Common Yellowthroat (*Geothlypis trichas*)	2
Kentucky Warbler (*Oporornis formosus*)	2
Hooded Warbler (*Wilsonia citrine*)	1
Scarlet Tanager (*Piranga olivacea*)	1
Summer Tanager (*Piranga rubra*)	1
Dickcissel (*Spiza Americana*)	47
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)	2
Indigo Bunting (*Passerina cyanea*)	25
Northern Cardinal (*Cardinalis cardinalis*)	50
Eastern Towhee (*Pipilo erythrophthalmus*)	6
Chipping Sparrow (*Spizella passerina*)	37
Field Sparrow (*Spizella pusilla*)	104
American Tree Sparrow (*Spizella arborea*)	15
Vesper Sparrow (*Pooecetes gramineus*)	4
Grasshopper Sparrow (*Ammodramus savannarum*)	9
Song Sparrow (*Melospiza melodia*)	51
White-throated Sparrow (*Zonotrichia albicollis*)	3
Baltimore Oriole (*Icterus galbula*)	4
Eastern Meadowlark (*Sturnella magna*)	3
Red-winged Blackbird (*Agelaius phoeniceus*)	236
Common Grackle (*Quiscalus quiscula*)	87
Brown-headed Cowbird (*Molothrus ater*)	47
*House Sparrow (*Passer domesticus*)	17
American Goldfinch (*Spinus tristis*)	39
Total Birds	**1,781**

*Non-native/unprotected species.

The Red-winged Blackbird, American Robin, Horned Lark, European Starling, and American Crow were the most commonly observed species, comprising over 40% of all birds observed. Given the high percentage of agricultural land in the Project area, the large representation of these birds is not unexpected. Horned Larks, which were seen consistently throughout the 2009 surveys and were almost exclusively observed in agricultural fields, were often documented in relatively low numbers and not commonly observed in large flocks, suggesting a majority of birds were local breeders. Other common species documented include the Barn Swallow (*Hirundo rustica*), Common Grackle (*Quiscalus quiscula*), Mourning Dove (*Zenaida macroura*), and Killdeer (*Charadrius vociferus*). All of these species were observed on nearly every survey day and at most points. No federally or state threatened or endangered birds were documented during the spring migration study. Many more migratory species were observed during the

spring 2009 survey than during the fall 2008 survey. This is largely due to the increase in the number of survey locations and the increased diversity of habitats surveyed.

Table 5.1-5 presents the spring 2009 survey results by date, and Table 5.1-6 presents the spring 2009 survey results by survey point.

Most of the birds detected during the spring 2009 passerine survey were seen singularly or in small groups. Rarely were large groups of birds documented perching or in large flyover flocks during the spring surveys. It is difficult to determine which birds were migrants versus those that were local breeders given the survey results. Many of the birds documented during the spring migratory surveys were likely local breeders rather than migrants, as most species identified were within their populations' breeding range.

5.1.3 Fall 2009

A total of 5,095 birds representing 80 different species were observed during the fall 2009 migratory season at 15 survey points within the Project area (see Table 5.1-7). An average of 21.6 individuals was counted at each of the 15 points. The European Starling (*Sturnus vulgaris*), Double-crested Cormorant (*Phalacrocorax auritus*), Canada Goose (*Branta canadensis*), American Robin (*Turdus migratorius*), and Red-winged Blackbird (*Agelaius phoeniceus)* were the most abundant observed species, comprising over 59% of all birds recorded. A total of 720 Double-crested Cormorants were observed in flight on October 10th, making them the most numerous waterbird, and second most abundant species recorded during the fall 2009 survey. These birds were seen flying in three groups of several hundred and two groups of several dozen in a west and southwesterly direction at an estimated altitude of 400 feet and higher. This was the only time Double-crested Cormorants were observed during the fall 2009 survey season. See Appendix F for summary tables presenting the results of the fall 2009 surveys.

Additionally, 504 Canada Geese were observed within the project area during the fall 2009 surveys. Canada Geese were documented throughout the fall survey, typically in flocks ranging from several dozen to 100 or more at a time. Canada Geese were seen primarily in flight during the surveys; however, flocks were seen on the ground in the Project area while the surveyor was traveling between points. The birds on the ground were often seen utilizing cut agricultural fields, manicured lawns, or were in or around residential ponds, although these birds were not typically included in the abundance counts as they were not witnessed from the established survey points.

Table 5-1.5 Spring Passerine Migratory Survey Results by Date, Spring 2009

	4/17/09**	4/19/09**	4/28/09	4/29/09	4/30/09	5/08/09	5/09/09	5/10/09	5/11/09	5/21/09	5/22/09	5/28/09	5/29/09
Total Individuals on Survey	20	18	154	158	157	143	131	171	152	180	159	187	151
Average Total Birds per Survey Point	6.7	6.0	25.7	26.3	26.2	15.9	14.6	19.0	16.9	20.0	17.7	20.8	16.8
Total Species on Survey*	10	11	26	23	30	24	28	29	36	36	31	28	28
Average Number of Species per Survey Point	5.3	6.0	11.8	11.7	13.5	7.3	8.33	9.2	10.0	11.9	9.3	9.7	9.2

*Species count does not include unidentified birds.
**Only points BF-01 – BF-03 were surveyed.

Table 5.1-6 Spring Passerine Migratory Survey Results by Location, Spring 2009

	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18
Total Individuals	106	84	86	98	103	110	159	71	108	101	106	101	80	110	103	76	95	84
Average Number of Birds	15.1	12.0	12.3	19.6	20.6	22.0	31.8	14.2	21.6	20.2	21.2	20.2	16.0	22.0	20.6	15.2	19.0	16.8
Total Species*	34	28	26	25	19	19	26	27	26	22	22	30	27	27	29	28	33	26
Average Number of Species	10.1	8.3	8.3	9.6	7.6	8.8	10.4	9.6	11.2	10.2	9.0	10.8	9.2	10.4	11.0	9.4	11.0	10.0
Number of Survey Days	7	7	7	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

*Species count does not include unidentified birds.

Table 5.1-7 Species Observed at the Black Fork Wind Project, Fall 2009

Species	Total Birds Observed
Canada Goose (*Branta canadensis*)	504
Double-crested Cormorant *(Phalacrocorax auritus)*	720
Great Blue Heron (*Ardea Herodias*)	3
Turkey Vulture (*Cathartes aura*)	91
**Northern Harrier *(Circus cyaneus)*	4
Cooper's Hawk *(Accipiter cooperii)*	1
Broad-winged Hawk *(Buteo platypterus)*	1
Red-tailed Hawk (*Buteo jamaicensis*)	19
American Kestrel *(Falco sparverius)*	7
Killdeer (*Charadrius vociferus*)	218
Ring-billed Gull *(Larus delawarensis)*	5
Rock Pigeon (*Columba livia*)	6
Mourning Dove (*Zenaida macroura*)	175
Yellow-billed Cuckoo (*Coccyzus americanus*)	1
Whip-poor-will (*Caprimulgus vociferus*)	4
Chimney Swift (*Chaetura pelagica*)	1
Red-headed Woodpecker *(Melanerpes erythrocephalus)*	11
Red-bellied Woodpecker (*Melanerpes carolinus*)	17
Downy Woodpecker (*Picoides pubescens*)	45
Hairy Woodpecker *(Picoides villosus)*	20
Northern Flicker (*Colaptes auratus*)	44
Pileated Woodpecker (*Dryocopus pileatus*)	1
Eastern Wood-Pewee (*Contopus virens*)	27
***Least Flycatcher *(Empidonax minimus)*	3
Eastern Phoebe (*Sayornis phoebe*)	6
Great Crested Flycatcher (*Myiarchus crinitus*)	7
Eastern Kingbird (*Tyrannus tyrannus*)	7
Warbling Vireo *(Vireo gilvus)*	1
Red-eyed Vireo (*Vireo olivaceus*)	11
Blue Jay (*Cyanocitta cristata*)	164
American Crow (*Corvus brachyrhynchos*)	438
Horned Lark (*Eremophila alpestris*)	216
Tree Swallow (*Tachycineta bicolor*)	62
Barn Swallow (*Hirundo rustica*)	148
Black-capped Chickadee (*Poecile atricapillus*)	18
Tufted Titmouse (*Baeolophus bicolor*)	13
Red-breasted Nuthatch (*Sitta canadensis*)	10
White-breasted Nuthatch *(Sitta carolinensis)*	70
House Wren (*Troglodytes aedon*)	5

Table 5.1-7 Species Observed at the Black Fork Wind Project, Fall 2009

Species	Total Birds Observed
Winter Wren *(Troglodytes troglodytes)*	7
Ruby-crowned Kinglet *(Regulus calendula)*	1
Eastern Bluebird (*Sialia sialis*)	39
Veery *(Catharus fuscescens)*	1
Swainson's Thrush *(Catharus ustulatus)*	2
***Hermit Thrush *(Catharus guttatus)*	1
American Robin (*Turdus migratorius*)	98
Gray Catbird (*Dumetella carolinensis*)	52
Northern Mockingbird (*Mimus polyglottos*)	1
Brown Thrasher (*Toxostoma rufum*)	1
*European Starling (*Sturnus vulgaris*)	967
American Pipit *(Anthus rubescens)*	16
Cedar Waxwing *(Bombycilla cedrorum)*	24
Blue-winged Warbler (*Vermivora pinus*)	1
Tennessee Warbler *(Vermivora peregrine)*	1
Yellow Warbler *(Dendroica petechia)*	8
Black-throated Blue Warbler (*Dendroica caerulescens*)	2
Yellow-rumped Warbler (*Dendroica coronata*)	11
Palm Warbler *(Dendroica palmarum)*	1
Common Yellowthroat (*Geothlypis trichas*)	7
American Tree Sparrow (*Spizella arborea*)	14
Chipping Sparrow (*Spizella passerina*)	28
Field Sparrow (*Spizella pusilla*)	41
Vesper Sparrow (*Pooecetes gramineus*)	3
Grasshopper Sparrow (*Ammodramus savannarum*)	2
Fox Sparrow (*Passerella iliaca*)	1
Song Sparrow (*Melospiza melodia*)	51
White-throated Sparrow (*Zonotrichia albicollis*)	6
White-crowned Sparrow *(Zonotrichia leucophrys)*	4
***Dark-eyed Junco *(Junco hyemalis)*	4
Scarlet Tanager *(Piranga olivacea)*	1
Northern Cardinal (*Cardinalis cardinalis*)	34
Indigo Bunting (*Passerina cyanea*)	23
Red-winged Blackbird (*Agelaius phoeniceus*)	389
Eastern Meadowlark (*Sturnella magna*)	2
Common Grackle (*Quiscalus quiscula*)	27
Brown-headed Cowbird *(Molothrus ater)*	10
Baltimore Oriole (*Icterus galbula*)	8
House Finch *(Carpodacus mexicanus)*	1

Table 5.1-7 Species Observed at the Black Fork Wind Project, Fall 2009

Species	Total Birds Observed
American Goldfinch (*Spinus tristis*)	100
*House Sparrow (*Passer domesticus*)	1
Total Birds	**5,095**

*Non-native/unprotected species.
** State endangered Species.
*** State threatened Species.

Given the high percentage of agricultural land in the Project area, the large representation of European Starling, American Crow, and Red-winged Blackbirds is not unexpected. Other common species documented include the Killdeer (*Charadrius vociferus*), Horned Lark (*Eremophila alpestris*), Mourning Dove (*Zenaida macroura*), Blue Jay (*Cyanocitta cristata*), and Barn Swallow (*Hirundo rustica*). All of these species were observed on nearly every survey day and at nearly all survey points. More individuals and species were observed during the fall 2009 survey than during the fall 2008 and spring 2009 survey. This is largely due to the increase in the number of points surveyed during the fall 2009 season. In the spring of 2009, all 18 survey points were surveyed a total of five times, and, in the fall of 2009, the 15 points (BF-04 through BF-18) were surveyed 14 times, with exception with points BF-04 and BF-15, which were only surveyed 13 times. This is a result of an error during the field survey in which points BF-04 (9/13/09) and BF-15 (9/12/09) were inadvertently missed during the rotation.

Table 5.1-8 presents the fall 2009 survey results by date, and Table 5.1-9 presents the fall 2009 survey results by survey point.

No federal threatened or endangered birds were documented during the fall passerine migration study. However, three Ohio State threatened and one state endangered species were observed during the fall 2009 survey. E & E recorded four Northern Harriers, a state endangered species, during the fall 2009 survey. The first of these was observed on October 24, 2009, when a Northern Harrier was seen flying east at a low altitude over a plowed field. This observation was made from survey point BF-04. Two days later (October 26, 2009), three Northern Harriers were observed from survey point BF-06. Two of these birds were seen flying at a low altitude (less than 100 meters) over a soybean field in an easterly direction. Approximately 4 minutes later, the third Northern Harrier was observed at a low altitude, this time in a northerly direction. Given the flight direction and appearance of this third bird, it is believed to be a re-sighting of one of the previously documented Northern Harriers; this of course cannot be confirmed.

In addition to the Northern Harrier, the state threatened Dark-eyed Junco (*Junco hyemalis*; four times), Least Flycatcher (*Empidonax minimus*; three times), and

Table 5.1-8 Fall Passerine Migratory Survey Results by Date, Fall 2009

	8/15/09	8/16/09	8/29/09	8/30/09	9/12/09	9/13/09	9/26/09	9/27/09	10/10/09	10/11/09	10/24/09	10/26/09	11/7/09	11/8/09
Total Individuals on Survey	229	226	357	506	144	257	133	284	1,053	478	344	345	273	460
Average Total Birds per Survey Point	15.3	15.1	23.8	33.7	9.6	17.3	7.8	18.9	75.2	31.9	22.9	23	18.2	30.7
Total Species on Survey	24	25	34	45	28	23	31	35	31	27	25	38	23	29
Average Number of Species per Survey Point	6	5.3	5.9	7.7	5	5.7	4.1	6.6	7.6	6.3	5.1	7.9	4.9	7.6

*Species count does not include unidentified birds

Table 5.1-9 Fall Passerine Migratory Survey Results by Location, Fall 2009

	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Total Individuals	6	11	8	283	233	300	257	223	371	306	302	235	385	496	599	364	229	482	5,095
Average Number of Birds	6	5.5	8	21.8	16.6	21.4	18.4	15.9	26.5	21.9	21.6	16.9	27.5	35.4	46.1	28	17.6	34.4	–
Total Species	6	8	7	28	25	19	35	30	32	28	23	27	42	27	39	45	35	41	82
Average Number of Species	6	5	7	5.5	4.6	4.2	6.2	5.5	6.4	5.9	4.7	5.8	8.8	4.8	7.5	7.2	7.2	8.6	–
Number of Survey Days	1	2	1	13	14	14	14	14	14	14	14	14	14	14	13	14	14	14	–

*Points BF-01 and BF-03 were only surveyed once, and point BF-02 was surveyed twice during the fall 2009 survey season. Survey points BF-04 and BF-15 were surveyed 13 times each during the fall 2009 season.

Hermit Thrush (*Catharus guttatus*; one time) were observed. The Dark-eyed Juncos were observed on October 10, 2009 (one individual) and on November 8, 2009 (three individuals) at survey points BF-15 (one individual), BF-17 (one individual), and BF-18 (two individuals), all three of which are located near forested stands. A single Least Flycatcher was observed three times throughout the fall 2009 surveys, on August 30 and September 26 and 27, 2009. The Least Flycatcher was observed at survey points BF-01, BF-7, and BF-15. Of these three points, two (BF-01 and BF-15) are located adjacent to wooded lots while the third, BF-07, is located in an agricultural area with a nearby drainage canal, which is where the bird was observed. The Hermit Thrush was observed only once during the fall 2009 season, at survey point BF-17 (a wooded area) on September 12, 2009. These species are all very common in migration. Songbird population declines are often attributed to the loss and fragmentation of summer breeding habitat by cultivation and other human-caused development (Robinson 1997).

An average of 21.6 birds was counted during the 10-minute survey period per survey point over the course of the fall 2009 passerine migratory survey. Table 5-1.8 presents a summary of the survey results for each day surveyed, and Table 5-1.9 presents a summary of the survey results for each survey point. The total number of individuals observed on each day surveyed ranged between 133 and 1,053 individuals. The high count of 1,053 occurred on October 10, 2009 and is partially a result of the observation of 720 Double-crested Cormorants.

5.2 Diurnal Surveys

5.2.1 Fall 2008 Results

A total of eight identifiable raptor species, encompassing 486 individuals, and three waterfowl species, encompassing 326 individuals, were observed over the survey period in fall 2008 (Table 5.2-1). Total raptor individuals documented per day ranged from a low of three on September 5, to a high of 41 on October 5 (Table 5.2-2), with an average of 18.1 raptors per survey and 2.6 raptor sightings per hour. The Turkey Vulture *(Cathartes aura)* accounted for the 84% (407 observations) of the raptors observed in fall 2008. The Red-tailed Hawk *(Buteo jamaicensis)* was the second most commonly observed raptor species accounting for 11% (52 birds) of the total observations.

Total waterfowl and wading bird individuals documented per day ranged from a low of 0 recorded on several survey days to 176 documented on November 1, 2008, with an average of 12.1 waterfowl per survey and 1.7 waterfowl sightings per hour. Canada Goose (*Branta canadensis)* accounted for the greatest number of detections with 314, representing 96% of documented waterfowl; additionally, six Great Blue Herons (*Ardea herodias*) and six Mallards (*Anas platyrhynchos*) were also observed during the fall surveys. Generally, raptors, waterfowl, and wading birds would migrate through central Ohio in the spring from early March through April and in the fall from late August through October.

Table 5.2-1 Diurnal Survey Counts by Species, Black Fork Wind Project, Fall 2008

Species	Total Number Observed	Number Observed in Rotor-Swept Area*	Percentage of Species in Rotor-Swept Area*
Canada Goose	314	48	15%
Mallard	6	0	0%
Great Blue Heron	6	2	33%
Turkey Vulture	407	238	58%
Bald Eagle	1	1	100%
Northern Harrier	7	2	29%
Cooper's Hawk	2	2	100%
Red-shouldered Hawk	1	0	0%
Broad-winged Hawk	1	0	0%
Red-tailed Hawk	52	21	40%
American Kestrel	15	1	7%
Unidentified Raptor	4	4	100%
Total	**816**	**319**	**39%**

*Rotor-swept area is defined as a height of 40 – 180 meters.

Table 5.2-2 Diurnal Survey Results Reported by Date, Black Fork Wind Project, Fall 2008

Species	Individuals Per Survey Period					
	9/4/08–9/9/08	9/17/08-9/23/08	10/2/08-10/7/08	10/16/08-10/21/08	10/30/08-11/01/08	Avg. Number of Individuals per Survey
Canada Goose	21	3	90	30	170	62.8
Mallard	0	0	0	0	6	1.2
Great Blue Heron	4	0	2	0	0	1.4
Turkey Vulture	70	127	117	83	10	81.4
Bald Eagle	1	0	0	0	0	0.2
Northern Harrier	0	5	0	1	1	1.4
Cooper's Hawk	1	1	0	0	0	0.4
Red-shouldered Hawk	0	0	1	0	0	0.2
Broad-winged Hawk	0	1	0	0	0	0.2
Red-tailed Hawk	6	14	21	9	1	10.2
American Kestrel	4	3	1	2	4	2.8
Unidentified Raptor	4	0	0	0	0	0.8
Total	**112**	**154**	**232**	**125**	**192**	**163.2**

Thirty-nine percent or 319 individuals were estimated to be flying within the rotor-swept area (40 to 180 meters above ground). Of the birds documented within the rotor-swept area, the most common were the Turkey Vulture (*Cathartes aura)* with 238 individuals, and Canada Goose (*Branta canadensis)* with 48 individuals. Combined, these two species accounted for 90% of all sightings within the rotor-swept area.

Other species documented within the rotor-swept area during the fall surveys include Red-tailed Hawk (21 individuals), Cooper's Hawk (two individuals), Great Blue Heron (two individuals), Northern Harrier (two individuals), American Kestrel (one individual), and Bald Eagle (one individual). Unidentifiable raptor species were also documented in the rotor-swept area four times. When compared to the total number of individuals of that species indentified within the Project area, 58.5% of Turkey Vultures were identified within the rotor-swept area, 40% of Red-tailed Hawks, 33% of Great Blue Herons, and 29 of Northern Harriers. The percentage of observations for other species documented within the rotor-swept area is shown in Table 5.2-1.

5.2.2 Spring 2009 Results

During the spring diurnal surveys, a total of seven identifiable raptor species, encompassing 424 individuals, and four species of waterfowl and wading birds, totaling 48 individuals, were observed during the 20 survey days (Table 5.2-3). Total raptor individuals documented per day ranged from a low of five on April 28, to a high of 40 on April 16 (see Table 5.2-4), with an average of 21.4 raptors per survey and 3.0 raptor sightings per hour. The Turkey Vulture accounted for the greatest number of detections with 326, or 76% of the raptors observed in the spring of 2009. The Red-tailed Hawk was the second most commonly observed raptor species accounting for 18% (78 birds) of the total observations. Total waterfowl individuals documented per day ranged from a low of 0 recorded on several survey days, to 20 documented on April 19, with an average of 2.4 waterfowl per survey and 0.34 waterfowl sightings per hour. Canada Goose accounted for the greatest number of detections with 28, representing 58% of documented waterfowl and wading birds; additionally, 11 Mallards (23%), seven Great Blue Herons (15%), and two Wood Ducks (*Aix sponsa*; 4%) were also observed during the spring surveys.

Thirty-two percent (153 individuals) of all spring diurnal species were estimated to be within the rotor-swept area (40 to 180 meters above ground). The Turkey Vulture and Red-tailed Hawk were the only two species documented within the rotor-swept area during the spring surveys, 132 and 21 times, respectively. When compared to the total number of individuals of that species indentified within the Project area, 40.5% of Turkey Vultures and 27% of Red-tailed Hawks were identified within the rotor-swept area. The percentage of observations documented within rotor-swept area is shown in Table 5.2-3.

Table 5.2-3 Diurnal Survey Counts by Species, Black Fork Wind Project, Spring 2009

Species	Total Number Observed	Observed Flying Within the Rotor-Swept Area	Percentage of Species in Rotor-Swept Area
Canada Goose	28	0	0%
Mallard	11	0	0%
Wood Duck	2	0	0%
Great Blue Heron	7	0	0%
Turkey Vulture	326	132	40.5%
Osprey	2	0	0%
Sharp-shinned Hawk	2	0	0%
Cooper's Hawk	3	0	0%
Northern Harrier	2	0	0%
Red-tailed Hawk	78	21	27%
American Kestrel	11	0	0%
Unidentified Raptor	3	0	0%
Total	**475**	**153**	**32%**

Table 5.2-4 Diurnal Survey Results Reported by Date, Black Fork Wind Project, Spring 2009

	Individuals Per Survey Period					
Species	3/17/0-3/19/09	3/26/09-3/31/09	4/6/09-4/8/09	4/16/09-4/21/09	4/28/09-4/30/09	Average Number of Individuals per Survey
Canada Goose	10	2	2	14	0	5.6
Mallard	0	0	0	9	2	2.2
Great Blue Heron	1	0	3	3	0	1.4
Wood Duck	0	2	0	0	0	0.4
Turkey Vulture	34	46	57	145	44	65.2
Osprey	0	0	0	0	2	0.4
Sharp-shinned Hawk	0	0	0	0	2	0.4
Cooper's Hawk	0	0	1	0	2	0.6
Northern Harrier	1	0	0	0	1	0.4
Red-tailed Hawk	12	13	8	25	20	15.6
American Kestrel	2	6	2	0	1	2.2
Unidentified Raptor	0	0	0	0	3	0.6
Total	**61**	**69**	**73**	**196**	**77**	**95**

The Northern Harrier, an Ohio threatened species, was recorded twice during the spring survey period; however, in both situations the individual was observed flying lower than the rotor-swept area (40 meters). Due to heavy agricultural

practices in the Project area, nesting opportunities for this species was limited; therefore, these birds are likely migrating through to nesting grounds elsewhere.

Approximately 37% (472 individuals) of all diurnal species from the fall 2008 and spring 2009 surveys were estimated to be flying within or passing through the rotor-swept area (40 to 180 meters above ground) in their flight. On average, birds were documented flying within the rotor-swept area for 4.4 minutes. Of the birds documented within the rotor-swept area, the most common were the Turkey Vulture (364 individuals) and Canada Goose (48 individuals). Combined, the two species accounted for 89% of all species within the rotor-swept area.

Other species documented within the rotor-swept area during the spring and fall study include Red-tailed Hawk (42 individuals), Cooper's Hawk (two individuals), Great Blue Heron (two individuals), Northern Harrier (two individuals), American kestrel (one individual), and Bald Eagle (one individual). Unidentifiable raptor species were also documented with the rotor-swept area four times. When compared to the total number of individuals of that species indentified within the Project area, 49.7% of Turkey Vultures were identified within the rotor-swept area, 14% of Canada Geese, and 31% of Red-tailed Hawks. The percentage of observations for other species documented within the rotor-swept area is shown in Table 5.2-5.

Table 5.2-5 Diurnal Species Identified and Percent Observed Within the Rotor-Swept Area, Black Fork Wind Project, Fall 2008 and Spring 2009

Species	Total Number Observed	Observed in Flying Within the Rotor-Swept Area*	Percentage of Species in Rotor-Swept Area*
Great Blue Heron	13	2	15.4%
Canada Goose	342	48	14.0%
Wood Duck	2	0	0.0%
Mallard	17	0	0.0%
Turkey Vulture	733	370	50.5%
Osprey	2	0	0.0%
Sharp-shinned Hawk	2	0	0.0%
Cooper's Hawk	5	2	40.0%
Northern Harrier	9	2	22.2%
Red-shouldered Hawk	1	0	0.0%
Broad-winged Hawk	1	0	0.0%
Red-tailed Hawk	130	42	32.3%
Bald Eagle	1	1	100.0%
American Kestrel	26	1	3.8%
Unidentified Raptor	7	4	57.1%
Total	**1,291**	**472**	**36.6%**

*Rotor-swept area is defined as a height of 40 – 180 meters.

5.2.3 Comparison to Lake Erie Marsh Region

A comparison was made between the Project's diurnal study and the spring diurnal tallies in the Lake Erie Marsh Region, Ohio. The comparison was made with sites of known concentrations of raptors in the Lake Erie Marsh Region to determine whether large numbers of migrating raptors fly over the Project area in the spring and which species concentrate in the Project area. Bird counts for the Lake Erie Marsh Region are conducted from a tower at Magee Marsh Wildlife Area, located in Ottawa County, and 21 other sites (when personnel are available) scattered from Sandusky to Cullen Park (north of Toledo) near the Lake Erie shoreline. The spring survey count begins March 1st and ends in mid-May, with counts taking place from 9 a.m. to 3 p.m. This region is located approximately 60 miles to the north-northwest of the Black Fork Wind Project area. Spring diurnal migratory surveys have been taking place in this region since 2001, with surveying typically occurring through mid-May. In the spring, raptors heading north will concentrate along the southern shore of Lake Erie. The spring diurnal migratory surveys conducted by the volunteers at the Black Swamp Bird Observatory in the Lake Erie Marsh Region have yielded similar relative species diversity and abundance to those found in the Project area. The Project area is located sufficiently south of the lake shore and does not contain any topographic or landscape features to concentrate raptors within the area. The 2009 survey results from the Lake Erie Marsh Region, compared to the spring diurnal Project surveys, are shown in Table 5.2-6.

Table 5.2-6 Comparison of Spring Diurnal Species Counted at the Black Fork Wind Project and Lake Erie Marsh Region, Spring 2009

Species	Black Fork Wind Project Study	Percentage of Total Species Observations*	Lake Erie Marsh Region Surveys	Percentage of Total Species Observations*
Turkey Vulture	326	68.6%	4,708	75.80%
Osprey	2	0.40%	31	0.50%
Sharp-shinned Hawk	2	0.40%	467	7.50%
Cooper's Hawk	3	0.60%	229	3.70%
Northern Harrier	2	0.40%	61	1.00%
Red-tailed Hawk	78	16.4%	649	10.40%
American Kestrel	11	2.3%	37	0.60%
Unidentified Raptor	3	0.6%	17	0.30%
Total	**427**	**(89.7%)**	**6,199**	**(99.8%)**

Note: The percentages in this column refer to the total number of diurnal species observed, not just those that were identified at both sites and therefore the totals may not add up to 100%.

The Lake Erie Marsh Region varies dramatically in scale and land cover from the Project area, and slightly in the timing of the count. The Lake Erie Marsh Region collected diurnal data from potentially 22 survey points scattered along the

western basin of Lake Erie, where thermals and water bodies assist raptor migration. Survey data for the Project was collected from a single survey point located farther inland, and in a primarily agricultural region of central Ohio. Diurnal surveys at the Project area were conducted from the second week of April through the end of May, and counts in the Lake Erie Marsh Region begin March 1st and are conducted through mid-May. This timing varies between the two studies, with the surveys at the Project beginning approximately two weeks earlier and ending two weeks later than those in the Lake Erie Marsh Region. However, species diversity and abundance are similar between the two sites, with the Turkey Vulture and Red-tailed Hawk accounting for approximately 85% of observations.

5.3 Raptor Stick Nest Surveys

The raptor stick nest survey efforts identified a total of seven possible raptor nests within the Project area and 1-mile surrounding buffer. All seven nests were located in the western part of the project, within Crawford County. The observers were unable to document raptors at any of the nests; therefore, utilization of the nests in the spring of 2009 could not be confirmed. Several of the nests near the far western edge of the Project area are smaller and may have been created by *Accipiter* species. Other nests near the center of the Project area were larger and were potentially created by *Buteo* species such as the Red-tailed Hawk or Red-shouldered Hawk. Without the visual confirmation of bird activity in the nest, it is difficult to confirm whether the nests are currently active and by what species. Confirmation of the relatively low density of potential raptor nests within the Project area correlates well with the fragmented forest land use and generally poor nesting habitat found within the Project area.

6 Conclusions

The results presented here are designed to establish baseline data for bird activity in the Project area as well as provide an indication of whether threatened or endangered avian species are present.

6.1 Diurnal Migratory Survey

During the diurnal bird surveys an average of 3.4 species were recorded per day, including raptors and water birds. The results indicate that bird diversity was relatively low during the 46 surveys in the fall of 2008 and spring and fall of 2009. Species richness ranged from one to seven different species recorded in a single day. A total of 1,291 individuals representing 14 species were detected throughout the study area. The Northern Harrier is listed as endangered by the state of Ohio and was observed migrating through the Project area. In addition, a single, juvenile Bald Eagle was also observed. It is difficult to determine if this eagle was a local bird foraging from a nearby nest, or if it was a migrant flying through the Project area. Active Bald Eagle nests are known to be present in 41 Ohio counties, including one in Crawford County and two in Richland County (ODNR 2006). These nests were not identified during the raptor nest survey conducted in the Project area and surrounding 1-mile buffer in the spring of 2009. Bald Eagles were removed from the federal endangered species list in August 2007; however, they are still afforded protection under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c).

Results of the diurnal surveys were compared to the migratory raptor surveys conducted at the Lake Erie Marsh Region. Both areas yielded similar species diversity and abundance with the Turkey Vulture and Red-tailed Hawk composing most of the species documented. However, individual counts in the Lake Erie Marsh Region were significantly higher than those documented in the Project area. There are a number of factors responsible for the greater counts, with the most significant being the overall size of the sample area and number of survey points. The Lake Erie Marsh Region conducts migratory raptor surveys over a large portion of western basin of Lake Erie, utilizing 22 separate points to monitor for migrating raptors, compared to the single survey point for this Project. The Project area is also located farther inland and away from large bodies of water that would attract migrating raptor populations. The Project area also lacks

significant topographic contours that could potentially funnel raptor species through the area.

The lack of large water bodies and funneling terrain, and a land use composition of primarily agricultural land do not make the Project area favorable stopover habitat for migratory diurnal species. Overall, a relatively low abundance of migrating raptor and waterfowl species was detected over the 46 surveys conducted in the Project area.

6.2 Passerine Migratory Survey

During the fall 2008 surveys, the average number of birds observed per survey day ranged from 2.7 to 57.7 individuals. The average number of species recorded per survey day ranged from 2.7 to 5.3. The average number of individuals observed per survey point ranged from 10.4 to 11.2 individuals, and the average number of species recorded per survey point ranged from 3.9 to 4.2.

During the spring 2009 surveys, the average number of birds observed by survey day ranged from 6.0 to 26.3 individuals. The average number of species recorded per survey day ranged from 5.3 to 13.5 species. It should be noted that the low point of these ranges of averages occurred during the first two surveys of the season when only three survey points (BF-01 through BF-03) were being used, on 4/17/09 and 4/19/09. After these rounds the Project area increased in size and 15 additional points were added to the survey. The average number or individuals observed per survey point ranged from 12.0 to 31.8 individuals, while the average number of species recorded per survey point ranged from 7.6 to 11.2 different species.

During the fall 2009 surveys, the average number of birds observed by survey day ranged from 7.8 to 75.2 individuals. The average number of species recorded per survey point ranged from 4.1 to 7.9 different species, and the average number of individuals by location ranged from 5.5 to 46.1 individuals. Three different Ohio state threatened and one state endangered species were recorded during the fall 2009 surveys, for a total of 12 individuals. The state endangered species is the Northern Harrier, which was observed four times throughout the fall 2009 season. The Dark-eyed Junco (four sightings), Least Flycatcher (three sightings), and Hermit Thrush (one sighting), observed during the fall 2009 season, are state threatened species. The Northern Harriers were observed flying at a low altitude over the agricultural fields during surveys. The Dark-eyed Junco, Least Flycatcher, and Hermit Thrush were almost exclusively seen in wooded lots adjacent to survey points. There were no federally listed passerine species detected during the fall 2008 or spring and fall 2009 migratory bird surveys.

The three most abundant species recorded during the fall 2008 surveys were American Crow (78 individuals), European Starlings (55), Canada Geese (54 individuals); they accounted for 52% of all birds recorded. In the spring 2009 survey, the most abundant species recorded were Red-winged Blackbirds (236),

American Robins (162), and Horned Larks (115). These species accounted for nearly 29% of all observations. In the fall 2009 survey, European Starlings (967), Double-crested Cormorants (720), Canada Geese (504), American Crows (438), and Red-winged Blackbirds (389) were the most abundant species recorded, accounting for 59% of all observations. With the exception of Double-crested Cormorants, which were observed in migration during the surveys, and Canada Geese, which were witnessed during all seasons both on the ground and in flight, these most abundant species are common year-round residents in agricultural areas.

Typically, the bird species identified in the Project area during the survey do not have strict habitat requirements and will use ranging habitat types for foraging. The Project area has an almost complete absence of large bodies of water and grasslands, and most of the Project area is only one primary habitat type (agricultural land). The forested blocks, which make up approximately 9% of the land cover, are generally found in smaller blocks (less than 100 acres) and are highly fragmented by cultivated land. The results of the diurnal and seasonal passerine surveys represent this lack of abundant and unique avian habitat in the Project area. The forested blocks offer some diversity; however, overall the habitat found within the Project area varies little from the land in the surrounding region. Therefore, the Project area does not represent a "magnet" for migratory birds.

7 References

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A Ohio Department of Natural Resources On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio

Exhibit A **May 4th 2009**

On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio

An Addendum to the Ohio Department of Natural Resource's Voluntary Cooperative Agreement

The following protocols are meant to establish a standardized framework in which pre- and post-construction surveying should be conducted at proposed commercial wind turbine facilities within the state of Ohio. The Ohio Department of Natural Resources (ODNR) will assess the level of surveying effort required within the project area boundary limits (henceforth referred to as the "site"), based upon the information provided from section 1.(a) of the Cooperative Agreement, the habitat characteristics within the site (determined through a site visit by ODNR Division of Wildlife biologists and GIS analysis), and its proximity to focal points of bird and bat activity. Additional surveys for species other than birds and bats may be requested based upon a review of the ODNR Division of Natural Areas and Preserves' natural heritage database. These studies are meant to document the level and timing of species activity, diversity and abundance. Results of the studies outlined within this document will allow the ODNR Division of Wildlife to assess the potential impact that a proposed turbine facility may have either directly through mortalities or indirectly through avoidance behaviors, on Ohio's wildlife resources. Post-construction mortality estimates will be used to validate or refute pre-construction predictions, and to determine if the use of mitigation measures is warranted in order to minimize impacts to wildlife. By having consistent study methodology among projects, over time a regional assessment may be formed for adjusting the methods or duration of the studies recommended.

The type of surveying recommended will be at the discretion of the ODNR Division of Wildlife, and will be tailored to the specific site, but may fit generally into one of the categories listed below. These survey types are to be cumulative, meaning if the "moderate" level of surveying is required, the survey techniques described in the "minimum" level must also be conducted. While this document is intended to serves as a guide for wind developers as they plan projects and determine the level and type of wildlife monitoring that is likely to be recommended, the ODNR Division of Wildlife reserves the right to be flexible in the application of these surveys based on site-specific or project-specific conditions.

- **Minimum**

  These areas are large tracts of agricultural lands that do not come within 500 meters of a woodland ≥10 hectares, wetlands ≥3 hectares, or large water body (i.e., rivers, lakes or reservoirs).
- **Moderate**

  Primarily agricultural or grasslands, with patches of forests, wetlands, and/or other habitat.

- **Extensive**

  These include those areas within proximity to migratory corridors, staging areas, Audubon Important Bird Areas (IBAs), or the Lake Erie shoreline (3-mile buffer) (Fig. 1).

In an effort to standardize information collected among projects, data should be recorded on forms provided for each of the various types of recommended surveys for all pre- and post-construction monitoring activities. Completed forms should be returned to the ODNR Division of Wildlife at the conclusion of surveying. Weather data should be recorded during all types of surveying (e.g. temperature, relative humidity, cloud cover, wind speed and direction).

1. Minimum Surveying Effort

1.1. *Breeding birds*

While breeding birds in the eastern United States have not been shown to be at high risk of mortality from turbines within their territories, it is important to identify what species may be impacted through habitat disturbance or avoidance. Therefore, point-counts should be conducted at all proposed turbine locations, with 2 points established for each turbine. The first set of points should be ~ 100-meters from the turbine or any adjacent proposed turbine locations. The second set of points will be between 125 to 300-meters (distance assigned by ODNR on a site by site basis) from any proposed turbines. The 100-meter point will be used to assess those species that may be directly affected by construction of the turbine; the second point will be used to assess indirect impacts such as avoidance. Effort should be made to place all points in nearby undisturbed habitat that will remain post-construction. Habitat for the point-counts should be similar to that of the turbine location. Because of increased detectability, points within grassland habitats may be placed at every other turbine. If turbine locations have not yet been determined, 2 point-count locations should be established for the maximum number of turbines proposed. These points should be randomly stratified across the site relative to the proportion of individual habitat types. Generally, active agricultural fields are not considered suitable nesting habitat for most species of birds; thus, surveys do not need to be conducted at any point that falls within these areas. Point-count locations (GIS coverage and/or GPS coordinates) should be provided to the ODNR Division of Wildlife. Three 10-minute point-count surveys should be conducted at each point: 1 in May, and 2 in June.

Certain bird species do not frequently sing until later in the breeding season; given this reduced detectability, 1 additional point-count is required in July for sites with suitable habitat for the Henslow's sparrow, dickcissel, and/or sedge wren. These additional point-counts should be conducted on sites that contain or are directly adjacent to >50 hectares of contiguous grassland (for all 3 species) or >1 hectare of wet meadow or freshwater marsh (for sedge wren only).

All surveys should begin at approximately dawn and not extend past 10:00 a.m. EST. Surveys should be conducted by experienced personnel who are able to distinguish Ohio breeding bird species by sight and sound. All birds detected during surveys should be identified to species and their behavior, indications of breeding activity (refer to breeding bird atlas codes[1]), estimated distance, and direction (bearing) should be recorded. Birds flying overhead that do not land or originate within 200-meters of the center of the point should be listed as "fly over." Observations should be recorded using appropriate alpha species codes[2]. Incidental observations of state and federal threatened or endangered species (Table 1) should be noted regardless of whether detected with the given survey time or while at a point-count location. Due to reduced detectability, surveys are not to be conducted on mornings of heavy wind (>5 meters/second), prolonged periods of rain (>20 minutes), or fog. To assess avoidance of the project area after construction, surveys should be conducted 1 year prior to and 1 year post-construction.

For wind energy development projects proposed by Voluntary Agreement cooperators on sites deemed to pose minimum risk to wildlife resources only, breeding bird surveying can occur prior to construction and after submission of the associated permit application to the Ohio Power Siting Board (OPSB). Under these conditions, the ODNR Division of Wildlife will certify to the OPSB that these data are not required prior to evaluating the potential ecological impacts at the site of the proposed project. Submission of survey results to the ODNR Division of Wildlife must occur prior to construction, and post-construction monitoring, as noted above, is still required.

1.2. *Raptor nest searching*

One early season (1 February – 31 March) survey should be conducted on and within 1 mile of the proposed site. A 2-mile buffer should be used if the site is within 1 mile of large water bodies (lakes, rivers, or reservoirs) or wetlands >5 hectares as these areas have a higher potential for use by threatened or endangered species of raptors. The species and locations of nest sites should be marked on USGS 1:24,000 topographic quadrangles.

1.2.1. Raptor nest monitoring

Monitoring should be conducted to assess the daily movement patterns of any species of protected raptor whose nest is located within 2 miles of the proposed site. During the incubation and rearing stage the location of adult birds should be tracked for at least 4 hours twice per week until consistent activity patterns are established. Alternate monitoring strategies that assess the degree to which nesting raptors use the proposed turbine facility will be considered (contact ODNR Division of Wildlife). Information collected

[1] http://www.ohiobirds.org/obba2/uploads/Handbook%20Body.pdf
[2] http://www.pwrc.usgs.gov/bbL/manual/sname.htm

will be used to document how frequently the birds enter the proposed turbine facility and whether particular turbines may pose a more substantial risk.

1.3. *Bat acoustic monitoring*

With the expansion of wind turbines into the eastern United States, incidences of bat mortalities have become increasingly more common. Initially, these issues were limited to forested sites within the Appalachian Mountains. Now, unfortunately, they have been documented on agricultural sites as well. As a result, bat activity levels should be assessed at all proposed wind turbine facilities. For sites deemed to pose minimum risk to wildlife resources only, bat acoustic monitoring can be waived for Voluntary Agreement cooperators if the permit application for the wind turbine facility is conditioned such that turbines will not operate at wind speeds ≤4 meters/second (as measured within the rotor swept area) from dusk to dawn, July 1 to October 31 annually. Under these conditions, post-construction acoustic data will not be required unless unacceptable mortality rates are detected.

At least 1 full season (15 March – 15 November) of acoustic monitoring should be conducted. This can be accomplished by attaching AnaBat (either SD1 or those equipped with CF ZCAIMS) units to all meteorological towers, with 1 unit positioned at 5 meters of the ground, and 1 unit within or as close as possible to the rotor swept area. In an effort to standardize results among study sites, the AnaBat's sensitivity should be adjusted to detect a calibration tone[3] at 20 meters. AnaBat units must monitor from 0.5 hour before sunset until 0.5 hour after sunrise. A "pass" will be defined as any file with ≥2 echolocation pulses. When possible, detections should be identified to species or species group (e.g., big brown/silver-haired) within AnaLook. Copies of original and identified detections should be provided to the ODNR Division of Wildlife. In an effort to assess both potential attractant issues, and to correlate the number of detections with bat mortalities, acoustic monitoring should continue through the conclusion of post-construction monitoring.

2. **Moderate surveying effort**

2.1. *Passerine migration*

Numerous incidences exist of nocturnally migrating songbirds colliding with tall structures such as lighthouses, cell phone towers, and tall buildings. It is unclear what the cumulative impact of potentially 100s of turbines on the landscape will be to migrating birds. In an effort to gauge the amount of use a particular site receives during bird migration, point-counts should be conducted in the spring and fall. One point-count location should be established for every 100 hectares of

[3] Unlike most ultrasonic pest repellers, this product produces a constant ultrasonic sound and should be used to calibrate AnaBat units. http://home.earthlink.net/~nevadabat/BatChirp/index.html

combined forest, shrub, and wooded wetland; however if the site would require <5 survey points, the ODNR Division of Wildlife will consider eliminating this survey requirement after a field review of habitat quality. Points should be established in patches of the aforementioned habitats, and should be stratified across the extent of the site. Surveys should be conducted once weekly from1 April to 31 May, and from 15 August to 15 November. All surveys should begin at approximately dawn and not extend past 10:00 a.m. EST. Observers should record every bird seen or heard, during a 10-minute period at each point. Birds flying overhead that do not land or originate within 200 meters of the center of the point should be listed as "fly over." The direction (bearing) and estimated distance of the bird from the observer should also be recorded.

2.2. *Diurnal bird/raptor migration*

Though modern turbines seem to pose less of a threat to birds during the day, surveys should still be undertaken to minimize possible wildlife/wind turbine interactions. Day-long (9:00 a.m. to 4:00 p.m.) surveys should be conducted 3 times a week, during seasonally favorable weather for migration (southerly winds in spring, northerly winds in fall). Due to species-specific differences in migration timing, surveying should be conducted from15 March to 1 May, and 1 September to 31 October. The number of sample points will vary with the size and configuration of the proposed facility.

2.3. *Owl playback surveys*

These surveys should be conducted once monthly for the appropriate species: January (great horned), February (barred), and March (screech). One sample point should be created for every 100 hectares of contiguous forest. Points should be established within forest patches and be spaced >400 meters apart. Surveys should begin 0.5 hour after sunset. Owl calls should be played through a megaphone or portable radio. Three replications of 1 minute of calls, followed by 4 minutes of listening (15 minutes total per station) should be played at each point-count location. Playback calls should have a minimum of background noise, and equipment must be able to broadcast so that the sound pressure is 80-90 dB at 1 meter from the speaker.

2.4. *Bat mist-netting*

While acoustic monitoring may be able to provide a generalized activity level for the site, it can not discriminate distinct individuals nor indisputably determine species composition. Thus, mist-netting should be performed to determine species diversity and locate potential concentrations of activity. Also, the range of the federal and state endangered Indiana myotis (*Myotis sodalis*) is considered statewide within Ohio. This species is known to occur in a variety of habitats including stream and river corridors, forest canopy, and edges. Mist-net surveys

should be conducted in accordance with U.S. Fish & Wildlife Service guidelines[4], and by an individual approved to handle Indiana myotis (contact U.S. Fish & Wildlife Service for list) and have obtained an ODNR issued scientific collectors permit. Prior to beginning mist-netting activities, project consultants must meet with ODNR Division of Wildlife and U.S. Fish & Wildlife Service staff on-site to review habitats within the project area. Two netting stations should be established per square kilometer of forested area. In order to better assess the bat species community, each station should consist of a minimum of 4 net sets, with at least 1 set being a high net (3 standard mist nets stacked on top of one another to create one set that is ~ 7.5 meters tall). Each site should be surveyed on 2, non-consecutive nights between 15 June – 31 July. Mist-netting should occur during the 5 hours following sunset. Documentation photos should be taken for all species encountered on site. To identify within night recaptures, a small (i.e., ~ 5 mm) mark of non-toxic water-soluble paint should be applied to one forearm of all captured bats. Due to concerns over White Nose Syndrome (WNS), equipment should be decontaminated following U.S. Fish & Wildlife Service protocols[5].

If Indiana myotis, Rafinesque's big-eared bat, or eastern small-footed myotis[6] are encountered during mist-netting surveys the ODNR Division of Wildlife must be notified within 24 hours and additional information must be collected. Each individual captured should have voucher photographs taken of the head, body, and species-specific identifiable features, such as the calcar, foot, or mask. Radio telemetry should be conducted on up to 4 Indiana myotis (3-4 females, no more than 1 male) and all Rafinesque's big-eared bats or eastern small-footed myotis. Home range (nightly locations taken every 5 minutes, for the life of the transmitter), roost trees, and maternity colonies should all be identified. If multiple maternity colonies of listed species are suspected to be located on or adjacent to the proposed site, additional transmitters may be requested. Photos, GPS location, tree species, dbh, site characteristics, and exit counts should be collected at each roost. If high densities (>15 of 1 species) of lactating females of the more common colonial species (e.g., big brown bat, little brown, or northern myotis) are captured within a night's trapping, radio telemetry should be used to identify the location of the maternity colony. A maximum of 10 transmitters should be allocated for this task, and their use should be stratified across the proposed facility. Maternity colonies represent an area of increased activity and thus greater risk if turbines were located in proximity to nightly travel routes. Additionally, Indiana myotis are known to occasionally share roosts with the more common little brown myotis. Banding (following U.S. Fish & Wildlife Service protocol[7]) should be done on Indiana myotis and Rafinesque's big-eared bat, but not eastern small-footed myotis due to entrapment concerns associated

[4] http://www.fws.gov/northeast/nyfo/es/2007Mistnetting.pdf
[5] http://www.fws.gov/midwest/Endangered/mammals/BatDisinfectionProtocol.html
[6] Rafinesque's big-eared bat and the eastern small-footed myotis have each only been recorded once within the state. Though the likelihood of encountering these species is low, if one was captured it is important to maximize the opportunity to gather habitat information on these species.

with its over-wintering habitat. Bands will be provided by ODNR Division of Wildlife.

Finally, any possible hibernacula sites on or within 5 miles of the proposed site should be trapped during spring emergence and fall swarming to determine potential use. Monitoring should follow the current U.S. Fish & Wildlife Service protocol[7]. Surveys are to be conducted every 2 weeks from 15 March – 15 April, and 15 September – 15 November. More extensive monitoring may be requested if listed species of bat are detected during summer mist-net surveys. Nightly captures should be marked similar to those captured during mist-netting. Internal surveys are not recommended due to safety concerns, difficultly in determining species absence, and the potential transmission of WNS.

Where applicable (determined by ODNR)

2.5. *Nocturnal marsh bird surveys*

Ohio has lost >90% of its original wetland habitat. Accordingly, several species of marsh birds are protected within the state. For projects that contain or that are directly adjacent to ≥3 hectares of contiguous wetland, marsh bird surveys should be conducted. Playback surveys should be used to assess the presence of least bittern, sora, Virginia rail, king rail, and American bittern. Surveys are to be conducted weekly from 20 May to 15 June. One survey location should be established for every 50 hectares of contiguous wetland, or 1 location per wetland ≥3 hectares in size if there are multiple isolated patches of habitat. Points should be spaced >400 meters apart in appropriate habitat. Each survey should be conducted during a 2-hour period centered on either sunrise or sunset. Thirty seconds of territorial calls should be broadcast through either a portable radio or megaphone, followed by 30 seconds of listening, for each species. Playback calls should have a minimum of background noise, and equipment must be able to broadcast so that the sound pressure is 80-90 dB at 1 meter from the speaker. Due to interspecies competition, the sequence of the species calls should be played as they are listed above.

2.6. *Barn owl surveys*

Barn owls are a state listed threatened species in Ohio; thus, if suitable habitat exists additional effort should be taken to identify if individuals are nesting within the region. These surveys should be undertaken if the proposed site is within areas depicted in Fig. 2 and includes or is adjacent to ≥80 hectares of combined wet meadow, pasture, and grassland. Surveyors should contact property owners of lands that have either barns or barn owl nest boxes and inquire about whether barn owls are currently using these structures. Surveyors should also visit each suitable barn or nest box in the area once from 15 June to 15 July to look for whitewashing, pellet material, fresh pellets, feathers, or other indications of the

[7] http://www.fws.gov/Midwest/endangered/mammals/inba/DrftSrvyPrtcl.html

presence of nesting barn owls. If barn owls are suspected of using a structure, playback calls should be used in an attempt to elicit begging responses from young that may be concealed in the rafters. Playback surveys should consist of broadcasting 1 minute of adult calls, followed by 2 minutes of listening for young. This procedure should be repeated 3 times per survey and should be conducted between 0.5 hour after sunset and midnight.

2.7. *Sandhill crane migration*

Sandhill cranes are listed as an endangered species in Ohio. If sandhill cranes are known to migrate within the vicinity of the proposed project (Fig. 2), additional surveys should be conducted. These surveys will be an extension of the weekly diurnal bird/raptor migration protocol to include the timing of sandhill crane migration, from 1 November to 15 December.

2.8. *Waterfowl surveys*

Ohio not only has a large migratory population of waterfowl, but also provides important over-wintering habitat for numerous species. If the site includes ≥3 hectares of wetlands, rivers, lakes, or agricultural fields where concentrations of waterfowl are known to feed, static or driving surveys of the waterfowl community should be conducted twice monthly, from 1 September – 1 April. The number of points will vary with the size and configuration of the water body. Consult with the ODNR Division of Wildlife for possible locations, survey times, or tracts.

2.9. *Shorebird migration*

The Lake Erie basin provides important stopover habitat for migratory shorebirds. Twice monthly point-counts (15 April to 31 May, and 15 July to 15 October) should be conducted in appropriate habitat such as beaches, flooded fields and mudflats. A minimum of 10 minutes should be spent at each point; additional time may be spent to accurately assess the number and species composition of the flock. The number of points will vary with the habitat surveyed as well as the size and configuration of the site. Consultation with ODNR Division of Wildlife is strongly recommended.

3. **Extensive**

3.1. *Radar monitoring*

Marine radar should be used to monitor nightly passage rates, 5 nights a week from 15 April to 31 May, and 15 August to 31 October. Surveys should begin at sunset and continue until sunrise. Information on estimated numbers/density, direction, hourly changes in activity and altitudes should be included. Preferably 2 radar units should be operated simultaneously; to assess target density and

altitudes concurrently; if that is not logistically possible, the radar unit should be alternated between the vertical and horizontal position every 20 minutes. Hourly weather data should also be recorded in order to correlate passage rates with climatic factors. Due to reduced detectability, monitoring should not be conducted on nights of heavy rain or fog.

Interpretation of pre-construction survey results

Upon completion of surveys, a summary report of all findings should be presented to the ODNR Division of Wildlife. Once permitting applications have been filed with the OPSB, these reports will be made available to the public. Construction should not commence prior to review of these data and findings by ODNR Division of Wildlife (and U.S. Fish & Wildlife Service for federal listed species). A pre-construction meeting to review monitoring results and discuss potential concerns with respect to turbine locations and wildlife resources will be scheduled with ODNR staff, the developer, and project consultants before construction of the facility begins and before official agency comments are provided for any permits pending. Based on survey results, the ODNR Division of Wildlife may recommend 1 or several of the following:

a) The project should constructed without altering the initial design.
b) Changes are needed regarding the number or micro-siting of turbines, auxiliary structures, and/or access roads.
c) Additional surveying is recommended based upon initial survey results.
d) The project should not be constructed due to significant wildlife and/or related ecological concerns.

Facility design

Several measures are thought to decrease the likelihood of wildlife strikes at wind turbine facilities. Accordingly, these measures should be incorporated into the design of all turbine facilities within Ohio.

Lighting

Passerines use celestial cues to aid in navigation during migration. Lights are known to disorient nocturnally migrating passerines; this may directly increase the mortality risk from collisions, or indirectly through exhaustion. Therefore, the number of lights on a site should be minimized. Turbines and meteorological towers should have the fewest number of lights permitted by the Federal Aviation Administration (FAA). Preferably these will be white lights with the minimum intensity, and number of flashes per minute (longest strobe) allowable by the FAA. Lights around substations or auxiliary structures should be down-shielded, equipped with motion sensors, or turned off when not in use.

Minimization of perches

New commercial wind turbine facilities have discontinued the use of lattice-work towers which were thought to contribute to the large numbers of raptor fatalities at sites such as Altamont, California. However, effort should still be made to reduce the number of perches available at a site. When possible all electrical cables connecting turbines to each other or to the substation should be buried.

Guyed structures

Guy wires seem to pose a particularly high threat to migratory birds as demonstrated by the large number of fatalities found at certain communication towers. Thus, to the degree possible, unguyed meteorological towers should be used to reduce possible mortalities from striking wires.

Tree removal

In order to reduce the potential for the incident take of bats that form large maternity colonies, including the federally endangered Indiana bat, tree clearing should be minimized and necessary clearing should be constrained to the dates suggested by U.S. Fish & Wildlife Service (1 October to 31 May).

Avoidance of nests for protected species of raptor

Raptor nests represent an area of increased activity and thus, turbines within close proximity may pose an increase risk. Therefore, the ODNR Division of Wildlife suggests a minimum setback of ½ mile from any nest of a protected species of raptor.

Post-construction monitoring (all sites)

Wildlife monitoring

Several monitoring studies should be continued through the post-construction monitoring period. These studies will be used to assess potential behavioral changes in wildlife due to the presence of wind turbines. While avoidance behavior has been noted in species of grouse, it is unclear whether other species of grassland or forest-dwelling birds will avoid areas with wind turbines. Thus, breeding bird surveys should be continued to examine any species-specific threshold distances. Alternately, the high number of bat mortalities at turbine facilities in the eastern U.S. suggests the possibility that bats are actually being attracted to the site post-construction. In order to assess attraction and to potentially correlate bat morality with detection frequency, acoustic monitoring should also be continued throughout the post-construction monitoring phase.

Mortality searches

One initial year (1 April to 15 November) of daily mortality searches will be recommended to the OPSB for each site with an optional second season depending on the first year results. The results of the mortality searches should be submitted to ODNR Division of Wildlife and U.S. Fish and Wildlife Service for review. Depending on the results of the first year, ODNR Division of Wildlife will determine if post-construction monitoring of mortality in the second year can be waived, reduced (i.e., focused on time periods when higher numbers of fatalities were detected), or continued for a full year.

The number of turbines searched will depend on the number of turbines at the facility.

- ≤10: all searched.
- 11-40: 1/2 searched, minimum of 10.
- >40: 1/4 searched, minimum of 20.
- All meteorological towers.

Turbines to be searched will be randomly selected but may include specific turbines in areas of concern if so noted by the ODNR Division of Wildlife or U.S. Fish & Wildlife Service based on pre-construction monitoring results. Recommendations for monitoring during any second year may differ, as noted above, both in terms of time period, specific turbines and number of turbines searched to address potential wildlife impacts.

Transect area and design

At each searched turbine, north-south oriented transects should be established every 5 meters. The length of these transects, and the perpendicular distance that transects should extend from the turbine base should be equal to twice the blade length of the turbine being searched. Transects should not venture into hazardous areas, such as steep slopes or high water. Vegetation mapping should be done for each of the searched turbines 3 times a year (spring, summer, and fall), given that vegetation influences carcass detectability. Mapping will consist of recording the GPS location, vegetation height and percent cover (1-meter transect) every 10 meters for each transect. Additional points should be taken at abrupt transition zones such as the edge of a road. An estimate of searchable area also should be provided for each searched turbine. If turbines are within agricultural regions, developers should encourage landowners to plant areas within 60 meters of the turbine in either soybean or wheat crops to increase the probability of detecting carcasses.

Searcher efficiency and Scavenging rates

In order to compensate for carcasses that are scavenged or those missed by observers, searcher efficiency and scavenging rates should be determined for each site using the

procedure described below. These indices should be calculated for each year of post-construction monitoring.

Searcher efficiency

Search efficiency trials consist of placing test carcasses at locations chosen at random to assess an individual's ability to detect turbine mortalities. These surveys should be conducted by someone who is not actively involved in the searches, and carcasses should be placed unbeknownst to the searchers. Individual trials should be conducted randomly at least 200 times each year (a trial consists of the placement of an individual carcass). Carcasses may be used for multiple trials throughout the season. Each carcass should be placed at a turbine, with distance (within the searched area) and direction selected at random. Each carcass should be discreetly marked to identify it as a trial individual. Carcasses must be similar to those expected to be encountered during the search and should vary in both species composition and stage of decomposition. After a searcher has finished his or her survey, the individual conducting the efficiency trial should attempt to recover any missed carcasses to ascertain whether they were scavenged prior to the beginning of the search.

Scavenging rate

In an effort to assess how quickly carcasses are removed from the site by scavengers, a minimum of 50 carcasses per year should be placed at random distances and directions. Several carcasses should be placed each month, since rates are likely to change throughout the year. These carcasses should be checked daily for the first week, then every 2 days until the carcass is removed or completely decomposed. Preferably, carcasses used for scavenging rate estimation will be those collected from the site, and not surrogate species such as pigeons, starlings, or house sparrows since these have been found to be scavenged less frequently. Characteristics that should be recorded for each placed carcass include: the GPS location, vegetation height, percent cover, distance/direction from turbine, and species.

Turbine site searches

Each day searches should begin approximately at first light; this reduces the number of carcasses removed by diurnal scavengers and increases the likelihood of recovering live individuals. The appropriate number of surveyors should be hired to completely search the allotted turbines by 1:00 p.m. The initial start and stop time should be recorded for each survey. Searchers should walk slowly, scanning ~ 2.5 meters on either side of the transect. When a bird or bat is encountered, the distance when the observer first detected it should be recorded. The searcher should then assess whether the individual is alive or dead. If the individual is alive, efforts should be made to release or take the animal to a

licensed rehabilitator[8]. If successful rehabilitation is not likely, then the individual should be humanely euthanized through cervical dislocation[9]. For each individual (regardless of dead or alive), the site should be flagged, and returned to after the turbine search has been completed. Once relocated, a photograph should be taken of the carcass before it is moved. The carcass should be collected in individual re-sealable plastic bags, and the carcass identification number written in pencil on a piece of write-in-the-rain paper enclosed with the carcass. All information on the "Fatality Reporting Form" should be recorded. Mortalities encountered outside the bounds of an official search should be collected, and the above information recorded, but "Incidental" should be written into the notes area. These will not be used in the calculation of site mortality rates, but may (depending on species) be used in searcher efficiency or carcass removal trials. Bats within the *Myotis* family are difficult to differentiate, and should not be used for scavenging rate or searcher efficiency trials. These carcasses should be frozen and given to the ODNR Division of Wildlife at a prearranged date. If a state or federal threatened or endangered species is located, the ODNR Division of Wildlife and U.S. Fish & Wildlife Service must be contacted within 48 hours. At that time arrangements will be made for turning over the carcass to the appropriate agency. If a larger than expected mortality event occurs, ODNR Division of Wildlife and the U.S. Fish & Wildlife Service must be notified within 24 hours. For our purposes a significant mortality event will be defined as >5 birds/bats at an individual turbine, and/or >20 birds and/or bats across the entire facility.

Note: ODNR suggests individuals involved in collecting mortalities under turbines take the same precautions as those individuals handling live bats during mist-netting operations (i.e., leather gloves and maintain up-to-date rabies vaccinations).

Mitigation measures

The ODNR, Division of Wildlife (DOW) recognizes that it is unreasonable to expect wind turbine facilities in Ohio to have no impact on wildlife; however, wildlife impacts from wind energy and other "green" development projects should be minimized. Ultimately, the DOW will use Ohio-specific data from wind energy facilities to define typical or expected versus unacceptable levels of mortality to wildlife from the operation of land-based wind turbines. Those data, however, do not exist at this time. Thus, the DOW will review all available post-construction mortality data from regional wind energy facilities in landscapes with habitats similar to what is found in Ohio's commercially viable wind resource areas. Data from sites and studies deemed relevant to Ohio, as determined by the DOW, will be used to define mortality rates for birds and bats that will be considered acceptable, of concern, and unacceptable.

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[8] Contact the Ohio Division of Wildlife District office nearest to the site for area wildlife rehabilitators (Fig. 3)

[9] If the species in question is a state or federally protected species the appropriate agency must be contacted before the individual is euthanized.

If operation of wind turbines at a permitted facility in Ohio results in mortality rates at or below the regional average for comparable landscapes, the DOW will not recommend additional post-construction monitoring or use of mitigation measures. When mortality rates are within 1 standard deviation (SD) above the regional average, mitigation measures should be employed to curtail impacts to Ohio's wildlife resources and bring the mortality rate for the facility to the regional average or below. While the DOW will require the facility to take action and monitor the results, specific mitigation measures will not be mandated. Rather, the DOW will work collaboratively with the facility operators to develop an economically tenable mitigation strategy with a reasonable likelihood of reducing mortality rates to the regional average or below. Mitigation measures for consideration include, but are not limited to, those listed within the National Wind Coordinating Collaborative's Mitigation toolbox[10]. The collection of additional data to better define the spatial or temporal extent of observed mortality rates or test specific mitigation measures may be considered as part of an overall mitigation strategy. If mortality rates exceed the regional average by more than 1 SD, mitigation measures must be employed to curtail impacts to Ohio's wildlife resources and bring the mortality rate for the facility to the regional average or below. The DOW will require that unacceptable mortality to bats, at a minimum, must include seasonal curtailment as defined under Section 1.3 (*Bat acoustic monitoring*), unless the DOW and facility operators agree to an alternative strategy based on site-specific conditions showing that the temporal and/or spatial distribution of mortality can be reduced effectively with the application of other mitigation measures or new technologies in a more economically viable manner for the facility.

Future definition of normal or acceptable mortality rates for birds and bats due to operation of commercial-scale wind energy facilities in Ohio, as well as mortality rates of concern and those that are unacceptable, will be based on Ohio-specific data. If revised trigger points are more favorable for operators of wind energy facilities in Ohio, we will also apply them to all previously permitted sites. If revised trigger points become more stringent, the trigger points in use at the time a facility was permitted will continue to be applied to that site during its operating lifetime.

Neither the federal Migratory Bird Treaty Act nor the Ohio Revised Code differentiates between the taking of species of migratory non-game birds based upon abundance; thus, relative abundance of impacted bird species will not be a factor in the application of trigger points noted above. However, any mortality to federal or state-listed wildlife species attributed to operation of wind energy facilities in Ohio will require development and implementation of mitigation measures in cooperation with the DOW (and U.S. Fish & Wildlife Service for federal trust species).

[10] http://www.nationalwind.org/publications/wildlife/Mitigation_Toolbox.pdf

Finally, while the currently accepted metric for defining mortality at wind energy facilities is number of birds (or bats) killed per turbine (or megawatt, MW) per year, the use of this metric does not imply that the need for mitigation and its application will be targeted at individual turbines within a permitted facility. Rather, just as an entire facility is proposed for permitting, and pre-construction wildlife monitoring recommendations are based on the landscape containing the proposed facility, a mortality rate for birds and similar rate for bats will be calculated using all relevant data for the entire facility. Unless the average mortality rate for the entire facility is of concern or unacceptable, mitigation measures will not be recommended or required. Thus, it is possible that a subset of individual turbines could have uncharacteristically high mortality rates while the overall rate for the permitted facility is within the acceptable or "normal" range for similar sites in Ohio or the region. We would expect the facility operator to exercise good faith in dealing with mortality rates in such situations. On the other hand, if a facility's mortality rate for birds, bats or both is of concern or unacceptable, we will use the best available data to define the temporal and spatial extent of the problem and work with the facility operators to target mitigation measures to the individual turbines and/or time periods that contribute disproportionately to the overall rate. Where possible, the goal is to find a workable solution for minimizing mortality to wildlife while having as small an impact on the site's economic viability as possible.

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Table 1. Endangered and threatened birds and bats of Ohio*

Endangered

Indiana myotis [E]	*Myotis sodalis*
American bittern	*Botaurus lentiginosus*
Northern harrier	*Circus cyaneus*
King rail	*Rallus elegans*
Sandhill crane	*Grus Canadensis*
Piping plover [E]	*Charadrius melodus*
Common tern	*Sterna hirundo*
Black tern	*Chlidonias niger*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Bewick's wren	*Thryomanes bewickii*
Loggerhead shrike	*Lanius ludovicianus*
Golden-winged warbler	*Vermivora chrysoptera*
Kirtland's warbler [E]	*Denroica kirtlandii*
Lark sparrow	*Chondestes grammacus*
Trumpeter swan	*Cygnus buccinator*
Snowy egret	*Egretta thula*
Cattle egret	*Bubulcus ibis*

Threatened

Upland sandpiper	*Bartramia longicauda*
Black-crowned night-heron	*Nycticorax nycticorax*
Yellow-crowned night-heron	*Nyctanassa violacea*
Barn owl	*Tyto alba*
Dark-eyed junco	*Junco hyemalis*
Hermit thrush	*Catharus guttatus*
Least bittern	*Ixobrychus exilis*
Least flycatcher	*Empidonax minimus*
Bald eagle	*Haliaeetus leucocephalus*
Peregrine falcon	*Falco peregrinus*
Osprey	*Pandion haliaetus*

[E] Federally listed endangered
*Updated 13 May 2008.

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Figure 1. Survey effort.

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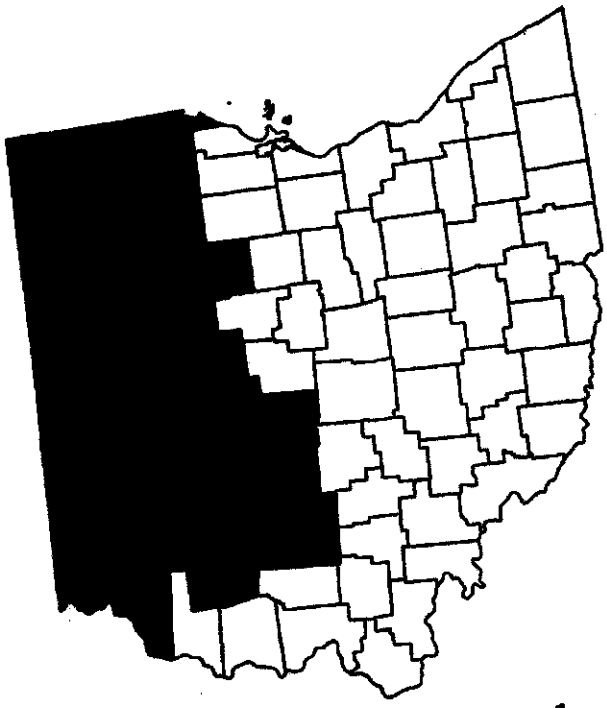
Figure 2. Counties or areas where additional surveying for either sandhill cranes or barn owls may be recommended.

Sandhill crane



Barn owl

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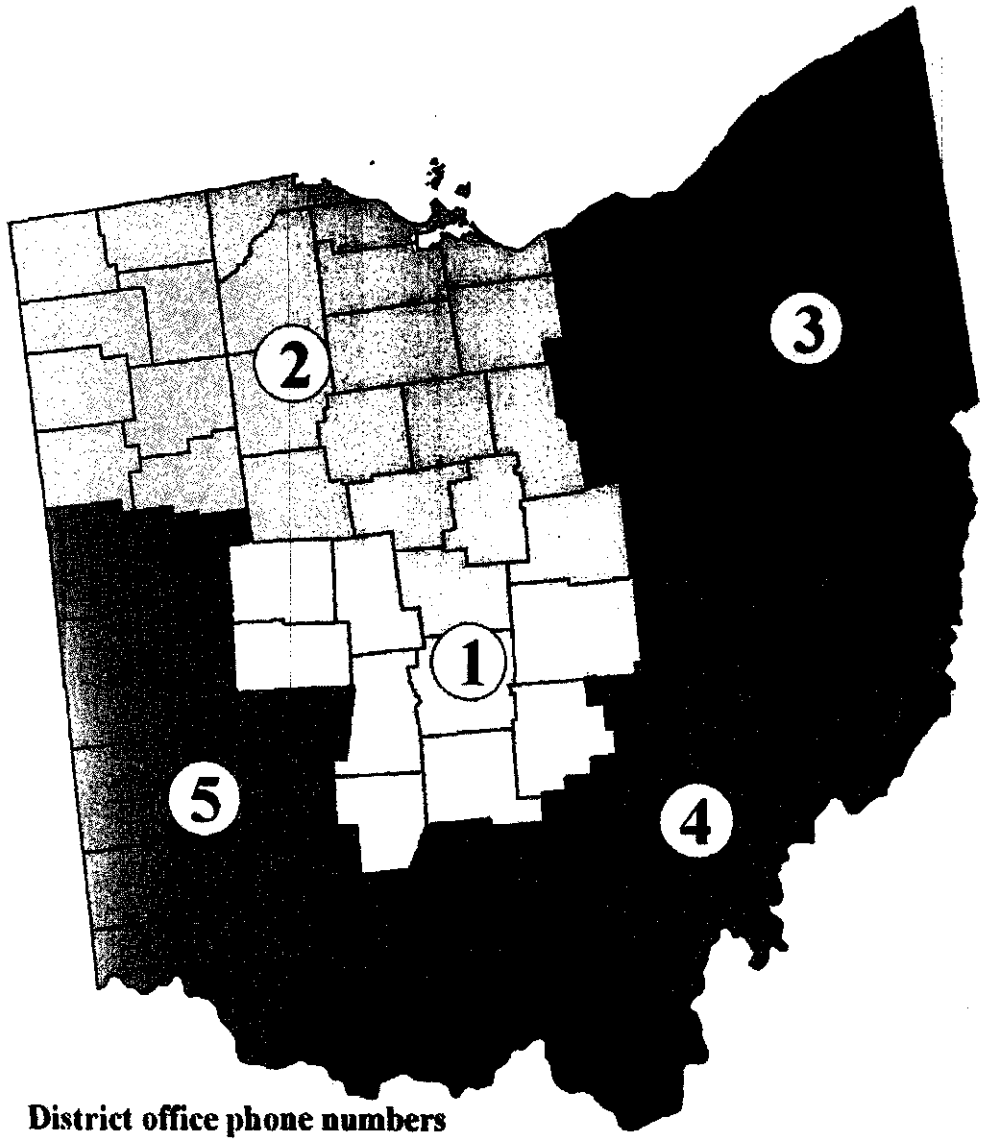
Figure 3. Ohio Department of Natural Resources district offices.



District office phone numbers

District

1 (614) 644-3925
2 (419) 424-5000
3 (330) 644-2293
4 (740) 589-9930
5 (937) 372-9261

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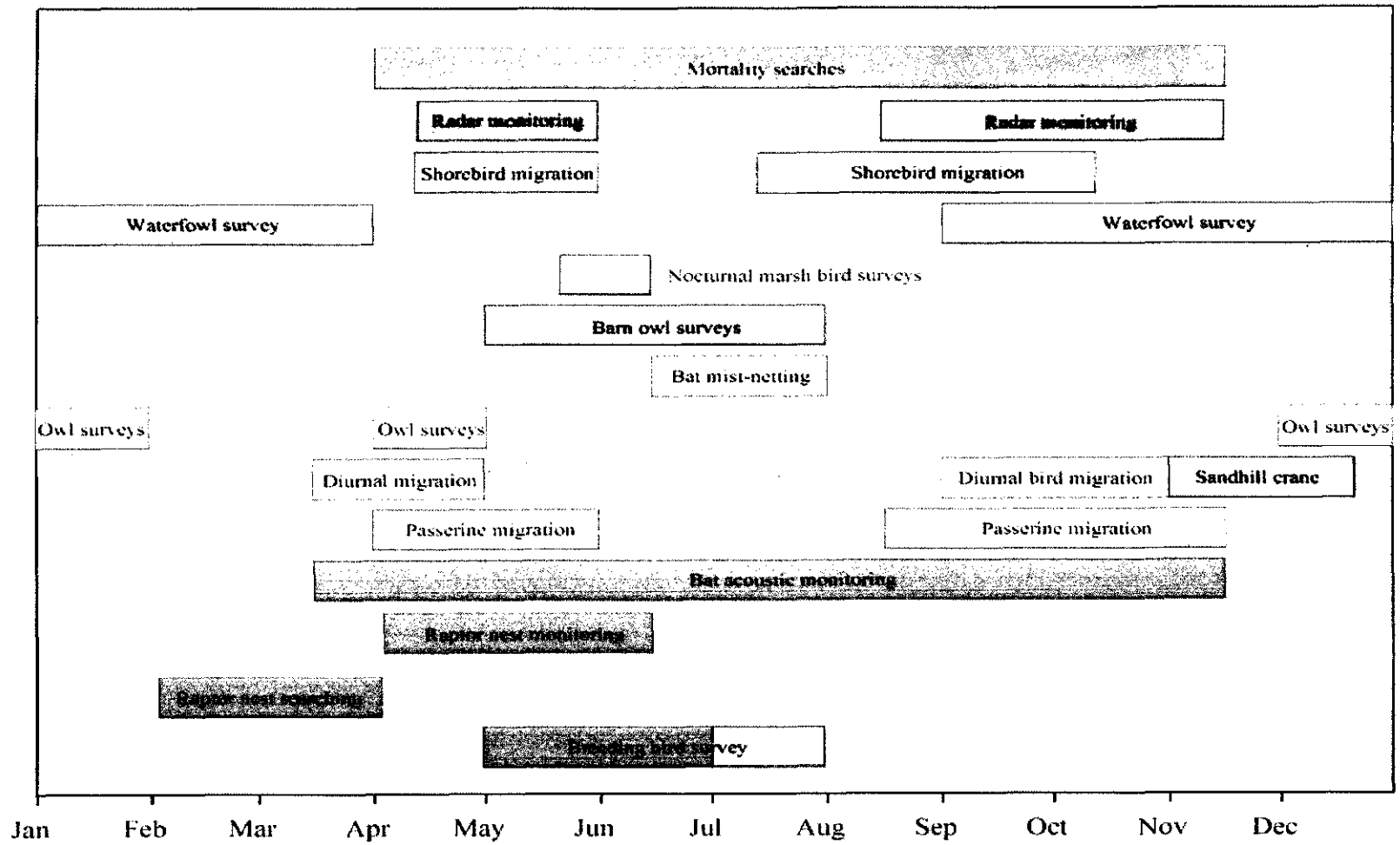
Appendix A. Timing of surveying effort. Colors correspond to the general effort categories; minimum (green), moderate (yellow), where applicable (orange), and extensive (red).



Wildlife Monitoring Survey Forms

FORM WD01 OHIO DEPARTMENT OF NATURAL RESOURCES Page __ of __
6/27/08 DIVISION OF WILDLIFE

BIRD SURVEY LOCATION FORM

Project Name:________________________________ Total Number of Points:____

Type of Survey:________________________________

One form should be provided for each type of survey conducted (*breeding/migration, owl, marsh bird, waterfowl, raptor, or shorebird*). Coordinates should be recorded in UTM NAD83, Zone 17 North. Do not use Lat/Lon.

Point Number	Easting	Northing	Habitat type

Point Number	Easting	Northing	Habitat type

FORM WD02 OHIO DEPARTMENT OF NATURAL RESOURCES
6/27/08 DIVISION OF WILDLIFE

BIRD SURVEY FORM

Project Name:________________ Survey type:______________ Date:____________

Observer:______________ Start time:__________ (*military time*) Stop time:________

Point number:______ Temp (°C):______ Wind speed (m/s):______ Cloud cover___%

Species	Estimated distance (m)	Direction (bearing)	Flyover # in flock	Behavior/notes

FORM WD02 OHIO DEPARTMENT OF NATURAL RESOURCES Page__ of__
6/27/08 DIVISION OF WILDLIFE

Observer:________________Start time:___________(*military time*) Stop time:________

Point number:_______ Temp (ºC):_______Wind speed (m/s):_______Cloud cover___%

Species	Estimated distance (m)	Direction (bearing)	Flyover # in flock	Behavior/notes

FORM WD03
6/27/08

OHIO DEPARTMENT OF NATURAL RESOURSES
DIVISION OF WILDLIFE

DIURNAL MIGRATION SURVEY FORM

Company:_____ Project name:_____ Date:_____ Point number:_____

Survey period: Morning Afternoon Evening Start time:_____ End time:_____

Weather Temp (°C):_____ Wind speed (m/s):_____ Cloud cover_____%

Observer:_____ Notes:_____

Species	#	Time	Age	Observation		Circling (yes/no)	Entered project area (yes/no)	Estimated time within rotor area
				Height	Direction			
Total:								

#: Number in flock or kettle.
Heights: 1) 0-40m, 2) 40-180m, 3) > 180m.
Direction: Compass direction the bird is heading (e.g. SSW).

FORM WD03
6/27/08

OHIO DEPARTMENT OF NATURAL RESOURSES
DIVISION OF WILDLIFE

Project name:_____ Date:_____ Point number:_____

Species	#	Time	Age	Observation		Circling (yes/no)	Entered project area (yes/no)	Estimated time within rotor area
				Height	Direction			
Total:								

FORM WD04 OHIO DEPARTMENT OF NATURAL RESOURCES
6/27/08 DIVISION OF WILDLIFE

NIGHTLY BAT SURVEY SUMMARY FORM

Project Name:_____ Date:_____

Surveyors:_____

Survey Type: Hibernacula Summer

Site description:_____

_____

Time and Weather

	Time	Temp (°C)	Wind speed (m/s)	Cloud cover (%)
Start				
End				

Notes:_____

Trap type and location

Set #	Trap type (harp trap or mist net)	Size (note if stacked mist nets)	Location (*UTM NAD83 Zone 17N*)	
			Easting	Northing
1				
2				
3				
4				
5				
6				
7				

Total net area:_____

Notes:_____

FORM WD04 OHIO DEPARTMENT OF NATURAL RESOURCES
6/27/08 DIVISION OF WILDLIFE

Project Name:_____ Date:_____

Capture summary

Species	Adult		Juvenile		Subtotal
	Male	Female	Male	Female	
Big brown					
Evening					
Silver-haired					
Eastern red					
Hoary					
Tri-colored bat					
Little brown					
Northern					
Small-footed					
Indiana					
Rafinesque's big-eared					
Other:					
				Total:	

Notes:

FORM WD05
6/27/08

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE

BAT SURVEY FORM

Project Name:_____ **Date:**_____

Species	Time *(military)*	Sex	Reproductive status	Measurements (millimeters and grams)				Net #	Recapture/Band #
				Forearm	Ear	Tragus	Weight		

Species code: Big brown (EPFU), Silver-haired (LANO), Red (LABO), Hoary (LACI), Tri-colored (PESU), Rafinesque's big-eared (CORO)[1,2], Little brown (MYLU), Northern (MYSE), Small-footed (MYLE)[1], and Indiana (MYSO)[1,2].
Radio-telemetry, and documentation photographs required[1]. Banding required[2].

FORM WD05
6/27/08

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE

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Species	Time *(military)*	Sex	Reproductive status	Measurements (millimeters and grams)				Net #	Recapture/Band #
				Forearm	Ear	Tragus	Weight		

FORM WD06
6/27/08

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE

FATALITY REPORTING FORM

Date:_____ Turbine #:_____ Searcher:_____

Total number of fatalities found during search:_____ Start time:_____ End time:_____

Carcass ID[1]:			Transect Information			From Turbine	
Time	Turbine #	Carcass #	Transect #	Perp. Dist[2](m)	Obs. Dist[3](m)	Distance (m)	Bearing
Species	Age[4]	Sex[5]	Condition	Alive / Dead	Estimated time on ground[6]		
			Euthanized	Yes / No			
GPS file:			Scavenged	Yes / No	Veg. Height	% Cover	
Photo ID			Notes				

Carcass ID:			Transect Information			From Turbine	
Time	Turbine #	Carcass #	Transect #	Perp. Dist. (m)	Obs. Dist. (m)	Distance (m)	Bearing
Species	Age	Sex	Condition	Alive / Dead	Estimated time on ground		
			Euthanized	Yes / No			
GPS file:			Scavenged	Yes / No	Veg. Height	% Cover	
Photo ID			Notes				

[1] Carcass ID = MMDDYYYY - Turbine # - Fatality number for that search
[2] Perpendicular distance from transect
[3] Distance from which the searcher detected the carcass
[4] Adult / Juvenile / Unknown
[5] Male / Female/ Unknown
[6] Last night / 2 – 3 days / 4 – 7 days / 7 – 14 days / > 2 weeks / Unknown

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OHIO DEPARTMENT OF NATURAL RESOURCES
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Carcass ID:			**Transect Information**			**From Turbine**	
Time	**Turbine #**	**Carcass #**	**Transect #**	**Perp. Dist. (m)**	**Obs. Dist. (m)**	**Distance (m)**	**Bearing**
Species	**Age**	**Sex**	**Condition**	Alive / Dead	**Estimated time on ground**		
			Euthanized	Yes / No			
GPS file:			**Scavenged**	Yes / No	**Veg. Height**	**% Cover**	
Photo ID			**Notes**				

Carcass ID:			**Transect Information**			**From Turbine**	
Time	**Turbine #**	**Carcass #**	**Transect #**	**Perp. Dist. (m)**	**Obs. Dist. (m)**	**Distance (m)**	**Bearing**
Species	**Age**	**Sex**	**Condition**	Alive / Dead	**Estimated time on ground**		
			Euthanized	Yes / No			
GPS file:			**Scavenged**	Yes / No	**Veg. Height**	**% Cover**	
Photo ID			**Notes**				

Carcass ID:			**Transect Information**			**From Turbine**	
Time	**Turbine #**	**Carcass #**	**Transect #**	**Perp. Dist. (m)**	**Obs. Dist. (m)**	**Distance (m)**	**Bearing**
Species	**Age**	**Sex**	**Condition**	Alive / Dead	**Estimated time on ground**		
			Euthanized	Yes / No			
GPS file:			**Scavenged**	Yes / No	**Veg. Height**	**% Cover**	
Photo ID			**Notes**				

FORM WD07
6/27/08

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE

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SEARCHER EFFICIENCY FORM

Carcass ID	Date	Species	Easting[1]	Northing	Veg. height	Percent cover	Detected (yes/no)
Turbine #:		Distance (m)		Direction		Photo ID	

Carcass ID	Date	Species	Easting	Northing	Veg. height	Percent cover	Detected (yes/no)
Turbine #:		Distance (m)		Direction		Photo ID	

Carcass ID	Date	Species	Easting	Northing	Veg. height	Percent cover	Detected (yes/no)
Turbine #:		Distance (m)		Direction		Photo ID	

Carcass ID	Date	Species	Easting	Northing	Veg. height	Percent cover	Detected (yes/no)
Turbine #:		Distance (m)		Direction		Photo ID	

---

[1] Coordinates should be recorded in UTM NAD83, Zone 17 North. Do not use Lat/Lon.

FORM WD07
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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE

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Carcass ID	Date	Species	Easting	Northing	Veg. height	Percent cover	Detected (yes/no)
Turbine #:		Distance (m)		Direction		Photo ID	

Carcass ID	Date	Species	Easting	Northing	Veg. height	Percent cover	Detected (yes/no)
Turbine #:		Distance (m)		Direction		Photo ID	

Carcass ID	Date	Species	Easting	Northing	Veg. height	Percent cover	Detected (yes/no)
Turbine #:		Distance (m)		Direction		Photo ID	

Carcass ID	Date	Species	Easting	Northing	Veg. height	Percent cover	Detected (yes/no)
Turbine #:		Distance (m)		Direction		Photo ID	

B Ohio Department of Natural Resources Survey Effort Letter (May 14, 2009)

Ohio Department of Natural Resources

TED STRICKLAND, GOVERNOR — SEAN D. LOGAN, DIRECTOR

Division of Wildlife
David M. Graham, Chief
2045 Morse Rd., Bldg. G
Columbus, OH 43229-6693
Phone: (614) 265-6300

May 14, 2009

To all interested parties,

Based upon the revised project boundary map received on 11 May 2009, the Ohio Department of Natural Resources Division of Wildlife (DOW) has augmented the previous survey recommendations (sent 26 August 2008) to reflect the increase in scope for the Black Fork project located in Crawford and Richland Counties.

Though this project area encompasses portions of the Sandusky River, which had previously been identified as a potential migratory corridor, the habitat within the proposed project would not be what the DOW considers high quality stopover habitat. Based upon the project area map provided and the site visit conducted on 4/27/09, the DOW has determined that this proposed facility would be classified as a "moderate" site under the current monitoring protocols (Fig. 1). The newly proposed project area is approximately 3.5 times greater than the original. This revised project area also encompasses significantly more forest area (Fig. 2), increasing the associated migratory bird point count locations and bat mist-netting sites.

The table below was created based upon the project maps provided and summarizes the types and level of effort recommended by the DOW. Results from these studies will help the Department of Natural Resources assess the potential impact these turbines may pose, and influence our recommendations to the Ohio Power Siting Board. Monitoring should follow those criteria listed within the "On-shore Bird and Bat Pre-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio."

	Project
Survey type	**Black Fork (Revised 5/11/09)**
Breeding bird	Breeding bird surveys should be conducted at all sites. The number of survey points may be based on the amount of available habitat, or twice the maximum number of turbines proposed for the site. Because agricultural land is not considered to be suitable nesting habitat for most species of bird, turbines placed within these types of habitat are exempt of this recommendation.

Raptor nest searches	Nest searches should occur on, and within a 1-mile buffer of the proposed facility.
Raptor nest monitoring	There are currently no known raptor nests that occur on or within 2-miles of the proposed project area. Should a nest of a protected species of raptor be located during nest searches, monitoring should commence as outlined in the on-shore protocols.
Bat acoustic monitoring	The current monitoring protocols recommend acoustic monitoring at all meteorological towers. This helps to determine spatial variability, species distribution, and correlates the level of surveying recommendations with the size of the project boundaries. Based upon a review of habitat within the project boundaries the DOW is modifying that recommendation for this project. In consultation with the U.S. Fish & Wildlife Service, the DOW are asking for only those met towers within the revised project boundary which are associated with larger forest patches to be monitored (Fig. 3) to be monitored, in addition to those already equipped.
Passerine migration (# of survey points)	16
Diurnal bird/raptor migration (# of survey point)	1
Sandhill crane migration (same points as raptor migration)	NS
Owl playback survey points	3
Barn owl surveys	NS
Bat mist-netting (# of survey points)	29
Nocturnal marsh bird survey points	NS
Waterfowl survey points	NS
Shorebird migration points	NS
Radar monitoring locations	NS

NS = Not required based on the lack of suitable habitat.

If you have any questions, please feel free to contact me.

Keith

cc: Mr. Stuart Siegfried, Ohio Power Siting Board
Ms. Megan Seymour, United States Fish and Wildlife Service

Figure 1.

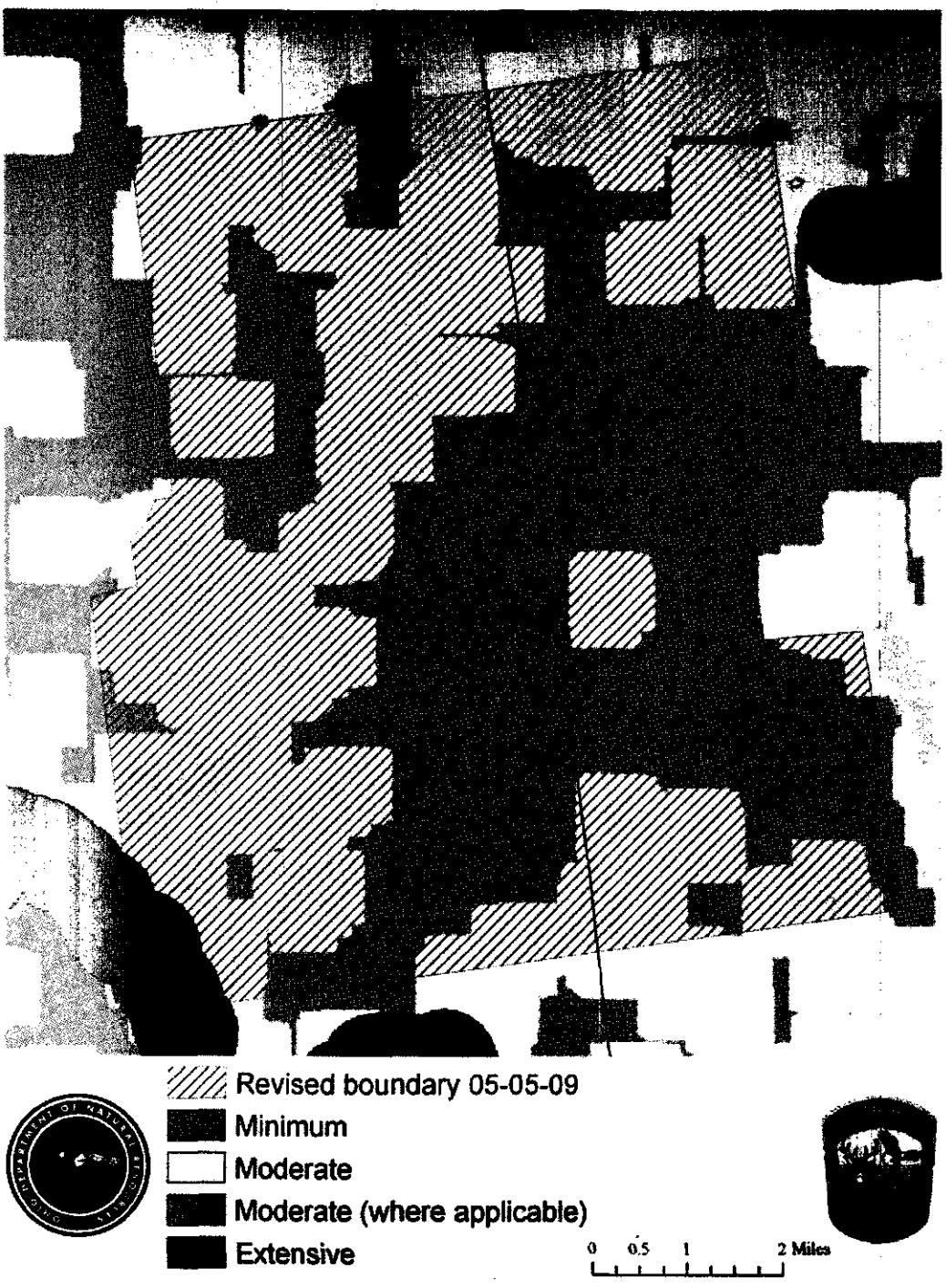

Revised boundary 05-05-09
Minimum
Moderate
Moderate (where applicable)
Extensive
0 0.5 1 2 Miles

Figure 2.

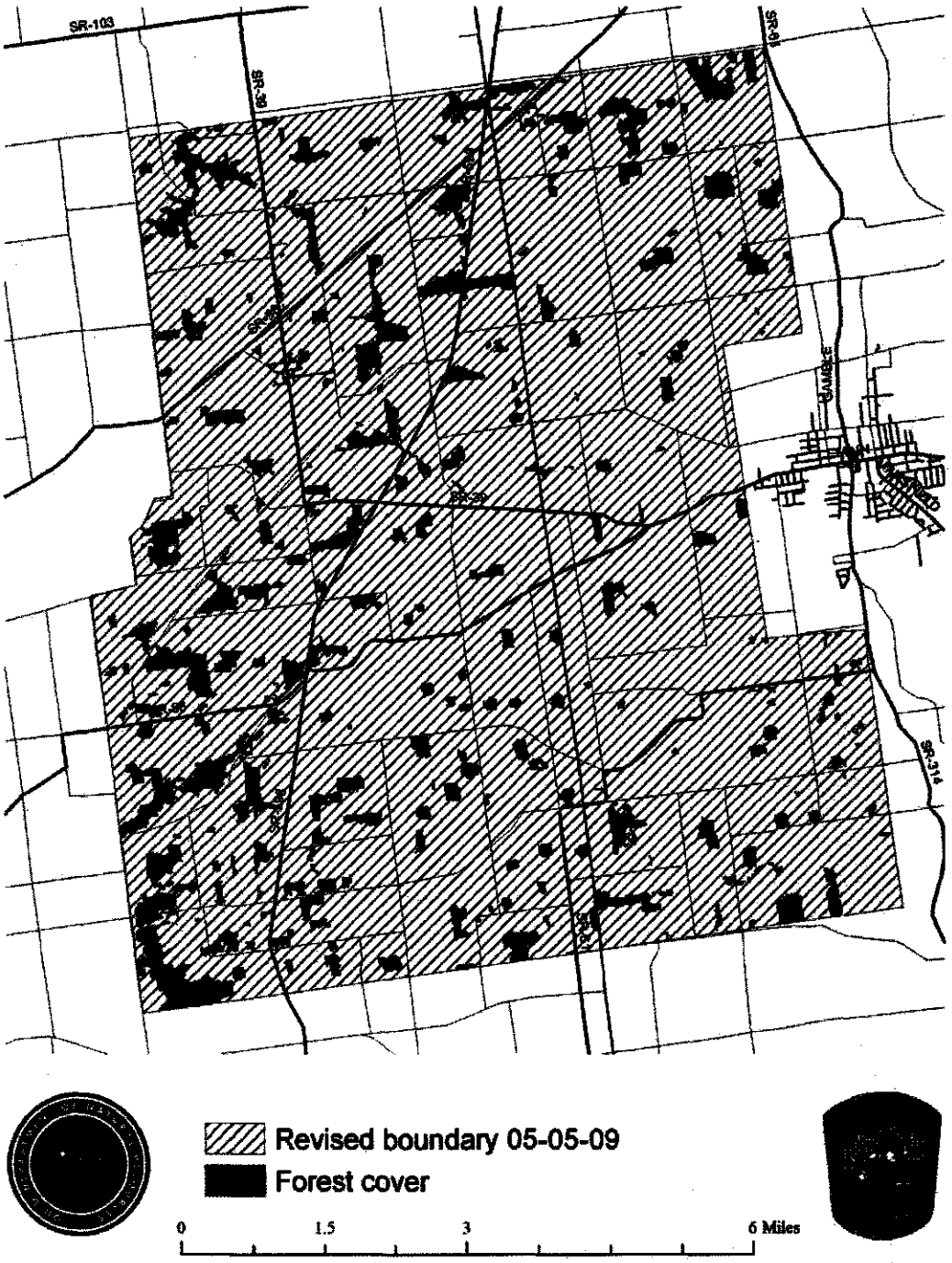
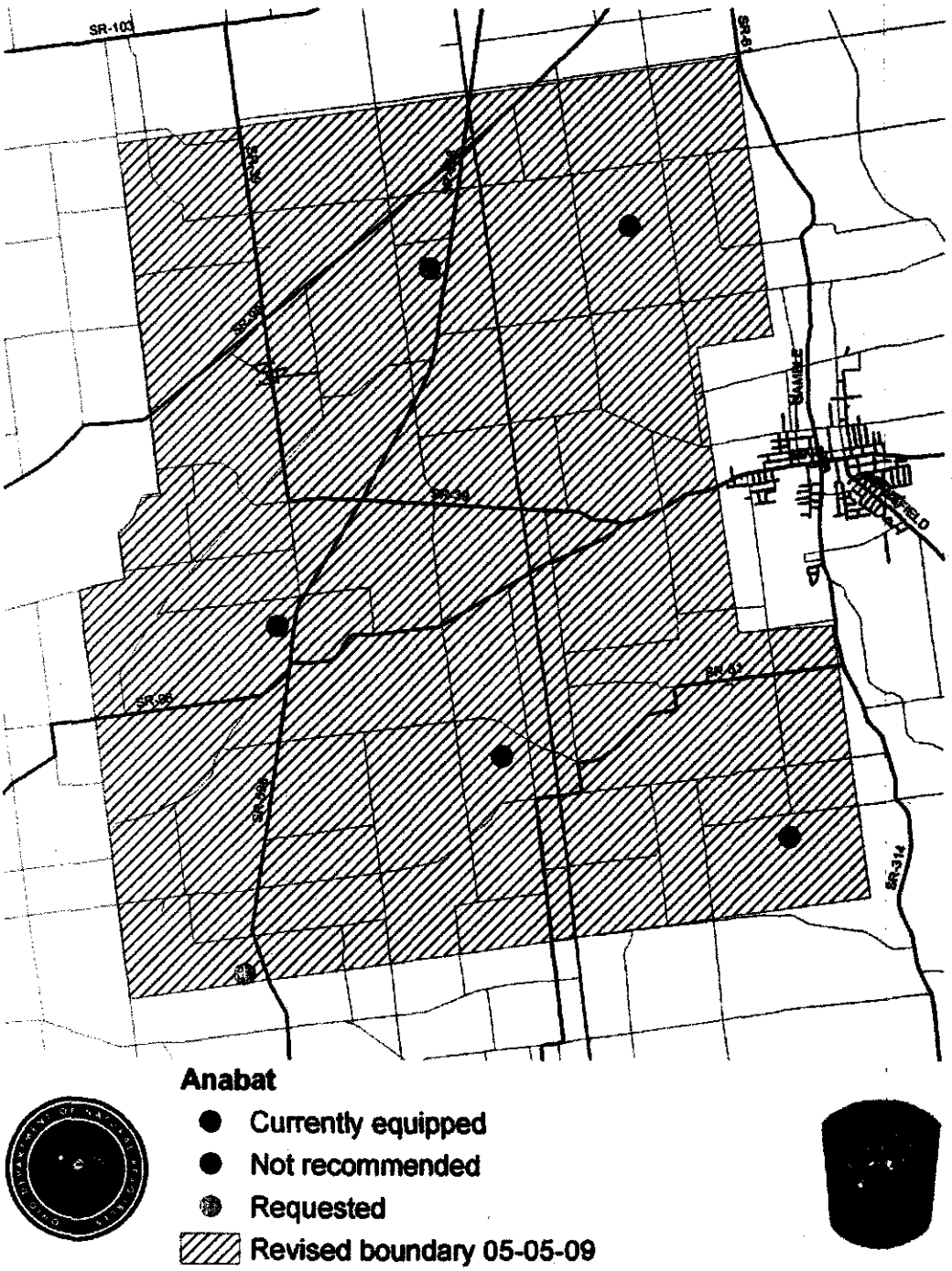

SR-103
SR-101
SR-401
SR-4
SR-314
Revised boundary 05-05-09
Forest cover
0
1.5
3
6 Miles

Figure 3.


SR-103
SR-61
SR-95
SR-314
Anabat
Currently equipped
Not recommended
Requested
Revised boundary 05-05-09

C Weather Conditions

Table C-1 Weather Conditions for the Passerine Surveys

Date	Mean Temp. (°F)	Mean Wind Speed (mph)	Average Sky Conditions
Fall 2008			
9/3/2008	75	5	0% Cloud Cover
9/9/2008	16	5	100% Cloud Cover
9/17/2008	10	0	0% Cloud Cover
9/21/2008	16	0	0% Cloud Cover
10/2/2008	39	4	5% Cloud Cover
10/5/2008	39	10	0% Cloud Cover
10/17/2008	40	4-7	10% Cloud Cover
10/19/2008	39	0	0% Cloud Cover
10/31/2008	35	0-5	0% Cloud Cover
11/2/2008	42	0-5	0% Cloud Cover
11/14/2008	52	0-5	100% Cloud Cover
Spring 2009			
4/17/2009	44	0	0% Cloud Cover
4/19/2009	50	0	100% Cloud Cover
4/28/2009	n/a	1-3	75-100% Cloud Cover
4/29/2009	n/a	1-3	50% Cloud Cover
4/30/2009	n/a	4-12	50% Cloud Cover
5/8/2009	52	0	100% Cloud Cover
5/9/2009	60	0-10	100% Cloud Cover
5/10/2009	53	0-5	40% Cloud Cover
5/11/2009	62	0-5	50% Cloud Cover
5/21/2009	65	0-5	0% Cloud Cover
5/22/2009	65	0-5	50% Cloud Cover
5/28/2009	n/a	1-3	30% Cloud Cover
5/29/2009	n/a	4-7	75% Cloud Cover
Fall 2009			
8/15/2009	68	0	31% Cloud Cover
8/16/2009	68	2	0% Cloud Cover
8/29/2009	67	8	71% Cloud Cover
8/30/2009	58	6	65% Cloud Cover
9/12/2009	60	0	14% Cloud Cover
9/13/2009	57	0	0% Cloud Cover
9/26/2009	62	2	100% Cloud Cover
9/27/2009	58	7	99% Cloud Cover
10/10/2009	48	2	100% Cloud Cover
10/11/2009	42	1	53% Cloud Cover
10/24/2009	50	11	99% Cloud Cover
10/26/2009	47	2	0% Cloud Cover
11/7/2009	41	12	30% Cloud Cover

Table C-1 Weather Conditions for the Passerine Surveys

Date	Mean Temp. (°F)	Mean Wind Speed (mph)	Average Sky Conditions
11/8/2009	55	3	5% Cloud Cover

Minimum and Maximum temperatures were only recorded during the survey period and do not include temperature and wind speeds that may have occurred after approximately 10:00 a.m. Temperatures were taken from the vehicle's thermometer, and wind speed and cloud cover conditions were estimated by the surveyor.

Table C-2 Weather Conditions for the Diurnal Surveys

Date	Mean Temp. (°F)	Mean Wind Speed (mph)	Wind Direction	Average Sky Conditions
Fall 2008				
9/4/2008	84	5	E	5% Cloud Cover
9/5/2008	84	15	n/a	100% Cloud Cover
9/6/2008	75	10	n/a	75% Cloud Cover
9/7/2008	72	5	N	100% Cloud Cover
9/8/2008	89	5	N	10% Cloud Cover
9/9/2008	70	5	NW	100% Cloud Cover
9/17/2008	72	5	NW	0% Cloud Cover
9/18/2008	72	5	E	0% Cloud Cover
9/20/2008	75	5	W	30% Cloud Cover
9/21/2008	64	0-5	W	20% Cloud Cover
9/22/2008	61	0-3	W	10% Cloud Cover
9/23/2008	79	0-10	W	0% Cloud Cover
10/2/2008	55	10	W	75% Cloud Cover
10/3/2008	65	0	W	100% Cloud Cover
10/4/2008	75	5	W	0% Cloud Cover
10/5/2008	50	0-5	n/a	0% Cloud Cover
10/6/2008	45	0-10	n/a	85% Cloud Cover
10/7/2008	51	0-10	n/a	0% Cloud Cover
10/16/2008	61	5	W	100% Cloud Cover
10/17/2008	54	10-15	NE	80% Cloud Cover
10/18/2008	42	0	n/a	0% Cloud Cover
10/19/2008	41	0-5	n/a	10% Cloud Cover
10/20/2008	42	0-10	n/a	100% Cloud Cover
10/21/2008	34	0-5	n/a	0% Cloud Cover
10/30/2008	40	0-10	n/a	0% Cloud Cover
11/1/2008	50	0-5	n/a	0% Cloud Cover
Spring 2009				
3/17/2009	50	0-10	n/a	0% Cloud Cover
3/18/2009	58	5-15	n/a	50% Cloud Cover
3/19/2009	62	5-10	n/a	25% Cloud Cover
3/26/2009	40	5-10	N	100% Cloud Cover
3/27/2009	50	5-15	n/a	50% Cloud Cover
3/28/2009	65	5-10	n/a	100% Cloud Cover
3/29/2009	43	10-20	n/a	100% Cloud Cover
3/30/2009	40	5-10	W	25% Cloud Cover
3/31/2009	60	5-10	n/a	0% Cloud Cover
4/6/2009	30	10-15	SW	100% Overcast
4/7/2009	45	5-10	S	0% Cloud Cover
4/8/2009	50	5-10	SW	0% Cloud Cover

Table C-2 Weather Conditions for the Diurnal Surveys

Date	Mean Temp. (°F)	Mean Wind Speed (mph)	Wind Direction	Average Sky Conditions
4/16/2009	55	0-5	E	0% Cloud Cover
4/17/2009	45	0	n/a	0% Cloud Cover
4/18/2009	54	5	n/a	0% Cloud Cover
4/19/2009	50	0	n/a	100% Cloud Cover
4/20/2009	51	5	n/a	100% Cloud Cover
4/21/2009	43	10	SW	60% Cloud Cover
4/28/2009	n/a	0-5	W	50% Cloud Cover
4/29/2009	n/a	5-10	NE	50% Cloud Cover
4/30/2009	n/a	5-15	SE	50% Cloud Cover

Minimum and Maximum temperatures were only recorded during the survey period and do not include temperature and wind speeds that may have occurred before approximately 10:00 a.m. Temperatures were taken from the vehicle's thermometer, and wind speed and direction and cloud cover conditions were estimated by the surveyor.

D Summary of Fall 2008 Passerine Survey

Table D-1 Summary of Fall 2008 Passerine Survey

Species	9/3/08	9/9/08	9/17/08	9/21/09	10/2/08	10/5/08	10/17/08	10/19/08	10/31/08	11/2/08	11/14/08	Total
Canada Goose				1		2	1			50		54
Wild Turkey											2	2
Red-tailed Hawk			2								1	3
American Kestrel										1		1
Killdeer				1	1	2		1	10	2		17
Mourning Dove			2	1								3
Red-bellied Woodpecker			1	2	2	2	2	3	2	1		15
Downy Woodpecker			1		1	1		2	2	1	2	10
Hairy Woodpecker	1			2								3
Northern Flicker		1	2	1		1	1	1	1			8
Eastern Wood-Pewee	1											1
Blue Jay	3	3	1	3	3	3	1	2	5	3	5	32
American Crow	3	2	2	2	1	1	51	2	4	7	3	78
Carolina Chickadee					1							1
Black-capped Chickadee						1	1					2
Tufted Titmouse							1					1
White-breasted Nuthatch			2	1								3
Carolina Wren	1				1							2
American Robin			1	1		1				3	2	8
Gray Catbird	2	1	2	1								6
Brown Thrasher			1		1							2
European Starling										55		55
Field Sparrow	1											1
Song Sparrow						1	1					2
Northern Cardinal		1										1
Red-winged Blackbird										50		50
Purple Finch	1											1
Total Birds	**13**	**8**	**17**	**15**	**11**	**13**	**58**	**11**	**24**	**123**	**15**	**362**
Species Count	**8**	**5**	**11**	**11**	**8**	**10**	**8**	**6**	**6**	**10**	**6**	
Total Species*	**27**											

*Species count does not include unidentified birds.

Table D-2 Summary of Fall 2008 Passerine Survey

Species	BF-01	BF-02	BF-03	Total
Canada Goose	2		52	54
Wild Turkey		2		2
Red-tailed Hawk			3	3
American Kestrel			1	1
Killdeer		13	4	17
Mourning Dove	1	1	1	3
Red-bellied Woodpecker	5	5	5	15
Downy Woodpecker	5	4	1	10
Hairy Woodpecker	1	1	1	3
Northern Flicker	3	3	2	8
Eastern Wood-Pewee		1		1
Blue Jay	11	12	9	32
American Crow	59	13	6	78
Carolina Chickadee		1		1
Black-capped Chickadee	1		1	2
Tufted Titmouse		1		1
White-breasted Nuthatch	1	1	1	3
Carolina Wren	1		1	2
American Robin	2		6	8
Gray Catbird	2	1	3	6
Brown Thrasher	1	1		2
European Starling	30		25	55
Field Sparrow		1		1
Song Sparrow		2		2
Northern Cardinal		1		1
Red-winged Blackbird		50		50
Purple Finch			1	1
Total Birds	**125**	**114**	**123**	**362**
Species Count	**15**	**19**	**18**	
Total Species*				**27**

*Species count does not include unidentified birds.

Table D-3 Fall 2008 Passerine Migratory Survey, September 3, 2008

Species	BF-01	BF-02	BF-03	Total
Hairy Woodpecker			1	1
Eastern Wood-Pewee		1		1
Blue Jay	1	1	1	3
American Crow	1	1	1	3
Carolina Wren			1	1
Gray Catbird	1		1	2
Field Sparrow		1		1
Purple Finch			1	1
Total Birds	**3**	**4**	**6**	**13**
Species Count*	**3**	**4**	**6**	
Total Species				**8**

*Species count does not include unidentified birds.

Table D-4 Fall 2008 Migratory Bird Survey, September 9, 2008

Species	BF-01	BF-02	BF-03	Total
Northern Flicker		1		1
Blue Jay	1	1	1	3
American Crow	1	1		2
Gray Catbird			1	1
Northern Cardinal		1		1
Total Birds	**2**	**4**	**2**	**8**
Species Count*	**2**	**4**	**2**	
Total Species				**5**

*Species count does not include unidentified birds.

Table D-5 Fall 2008 Migratory Bird Survey, September 17, 2008

Species	BF-01	BF-02	BF-03	Total
Red-tailed Hawk			2	2
Mourning Dove		1	1	2
Red-bellied Woodpecker			1	1
Downy Woodpecker	1			1
Northern Flicker	1		1	2
Blue Jay	1			1
American Crow	1	1		2
White-breasted Nuthatch	1	1		2
American Robin			1	1
Gray Catbird	1		1	2
Brown Thrasher		1		1
Total Birds	**6**	**4**	**7**	**17**
Species Count*	**6**	**4**	**6**	
Total Species				**10**

*Species count does not include unidentified birds.

Table D-6 Fall 2008 Migratory Bird Survey, September 21, 2008

Species	BF-01	BF-02	BF-03	Total
Canada Goose			1	1
Killdeer		1		1
Mourning Dove	1			1
Red-bellied Woodpecker	1	1		2
Hairy Woodpecker	1	1		2
Northern Flicker		1		1
Blue Jay	1	1	1	3
American Crow	1	1		2
White-breasted Nuthatch			1	1
American Robin	1			1
Gray Catbird		1		1
Total Birds	**6**	**7**	**3**	**16**
Species Count*	**6**	**7**	**3**	
Total Species				**11**

*Species count does not include unidentified birds.

Table D-7 Fall 2008 Migratory Bird Survey, October 2, 2008

Species	BF-01	BF-02	BF-03	Total
Killdeer		1		1
Red-bellied Woodpecker	1		1	2
Downy Woodpecker	1			1
Blue Jay	1	1	1	3
American Crow		1		1
Carolina Chickadee		1		1
Carolina Wren	1			1
Brown Thrasher	1			1
Total Birds	**5**	**4**	**2**	**11**
Species Count*	**5**	**4**	**2**	
Total Species				**8**

*Species count does not include unidentified birds.

Table D-8 Fall 2008 Migratory Bird Survey, October 5, 2008

Species	BF-01	BF-02	BF-03	Total
Canada Goose	1		1	2
Killdeer		1	1	2
Red-bellied Woodpecker	1	1		2
Downy Woodpecker		1		1
Northern Flicker	1			1
Blue Jay	1	1	1	3
American Crow		1		1
Black-capped Chickadee			1	1
American Robin			1	1
Song Sparrow		1		1
Total Birds	**4**	**6**	**5**	**15**
Species Count*	**4**	**6**	**5**	
Total Species				**10**

*Species count does not include unidentified birds.

Table D-9 Fall 2008 Migratory Bird Survey, October 17, 2008

Species	BF-01	BF-02	BF-03	Total
Canada Goose	1			1
Red-bellied Woodpecker	1		1	2
Northern Flicker		1		1
Blue Jay	1			1
American Crow	50		1	51
Black-capped Chickadee	1			1
Tufted Titmouse		1		1
Song Sparrow		1		1
Total Birds	**54**	**3**	**2**	**59**
Species Count*	**5**	**3**	**2**	
Total Species				**8**

*Species count does not include unidentified birds.

Table D-10 Fall 2008 Migratory Bird Survey, October 19, 2008

Species	BF-01	BF-02	BF-03	Total
Killdeer			1	1
Red-bellied Woodpecker	1	1	1	3
Downy Woodpecker	1	1		2
Northern Flicker	1			1
Blue Jay	2			2
American Crow	1	1		2
Total Birds	**6**	**3**	**2**	**11**
Species Count*	**5**	**3**	**2**	
Total Species				**6**

*Species count does not include unidentified birds/

Table D-11 Fall 2008 Migratory Bird Survey, October 31, 2008

Species	BF-01	BF-02	BF-03	Total
Killdeer		10		10
Red-bellied Woodpecker		1	1	2
Downy Woodpecker	1	1		2
Northern Flicker			1	1
Blue Jay	1	1	1	3
American Crow	1	1	1	3
Total Birds	**3**	**14**	**4**	**21**
Species Count*	**3**	**5**	**4**	
Total Species				**6**

*Species count does not include unidentified birds.

Table D-12 Fall 2008 Migratory Bird Survey, November 2, 2008

Species	BF-01	BF-02	BF-03	Total
Canada Goose			50	50
American Kestrel			1	1
Killdeer			2	2
Red-bellied Woodpecker		1		1
Downy Woodpecker	1			1
Blue Jay	1	1	1	3
American Crow	1	4	2	7
American Robin	1		2	3
European Starling	30		25	55
Red-winged Blackbird		50		50
Total Birds	**34**	**56**	**83**	**173**
Species Count*	**5**	**4**	**7**	
Total Species				**10**

*Species count does not include unidentified birds/

Table D-13 Fall 2008 Migratory Bird Survey by Location, November 14, 2008

Species	BF-01	BF-02	BF-03	Total
Wild Turkey		1		1
Red-tailed Hawk			1	1
Downy Woodpecker		1	1	2
Blue Jay	1	2	2	5
American Crow	2		1	3
American Robin			2	2
Total Birds	**3**	**4**	**7**	**14**
Species Count*	**2**	**3**	**5**	
Total Species				**14**

*Species count does not include unidentified birds.

E Summary of Spring 2009 Passerine Survey

Table E-1 Summary of Spring 2009 Passerine Survey by Date

Species	4-17-09	4-19-09	4-28-09	4-29-09	4-30-09	5-08-09	5-09-09	5-10-09	5-11-09	5-21-09	5-22-09	5-28-09	5-29-09	Totals
Canada Goose	2		4	4	4	7	3							**24**
Great Blue Heron					1									**1**
Turkey Vulture							1							**1**
Red-tailed Hawk			1		2				2	3	1			**9**
Wild Turkey											1			**1**
Killdeer			5	5	4	6	10	9	8	7	4	7	2	**67**
Rock Pigeon					1									**1**
Mourning Dove			9	3	7	12	12	4	7	8	7	3	4	**76**
Yellow-billed Cuckoo												2		**2**
Chimney Swift													3	**3**
Red-bellied Woodpecker	1	3	2	3	3	5	1	2	6	4	8	2	1	**41**
Downy Woodpecker													1	**1**
Northern Flicker		1	2	2	4	2	2	1	1	1	1			**17**
Pileated Woodpecker	1								1			1		**3**
Eastern Wood-Pewee			1			1		1					1	**4**
Eastern Phoebe						1						1		**2**
Great Crested Flycatcher			1			1			2			1		**5**
Eastern Kingbird								1		1	1			**3**
Red-eyed Vireo								1	1	6	3	8	5	**24**
Yellow-throated Vireo									1					**1**
Blue Jay		1	3	9	9	10	4	3	9	4	2	4	7	**65**

Table E-1 Summary of Spring 2009 Passerine Survey by Date

Species	4-17-09	4-19-09	4-28-09	4-29-09	4-30-09	5-08-09	5-09-09	5-10-09	5-11-09	5-21-09	5-22-09	5-28-09	5-29-09	Totals
American Crow		2	5	3	12	5	7	8	2	7	6	22	21	**100**
Horned Lark			14	11	19	12	9	4	1	6	10	13	16	**115**
Barn Swallow				2	1	2	1	26	3	25	22	1	1	**84**
Tree Swallow								6	4	7	1			**18**
Black-capped Chickadee							1			1				**2**
Brown Creeper		1												**1**
Tufted Titmouse			4	6	5	5	3	4	1	2	2	1	3	**36**
Red-breasted Nuthatch						1			1	1				**3**
House Wren					1									**1**
Carolina Wren													1	**1**
Eastern Bluebird			1	1		1		2	2	3	1			**11**
Wood Thrush			1	3	2	3							1	**10**
American Robin	7	3	19	18	11	14	8	17	10	11	11	19	14	**162**
Gray Catbird												1		**1**
Northern Mockingbird			1						1		2	5	7	**16**
Brown Thrasher							12		1					**13**
American Pipit					2									**2**
European Starling			1									1	1	**3**
Yellow Warbler					1		2		4		4			**11**
Chestnut-sided Warbler							1			10				**11**
Yellow-rumped Warbler			3	11	3	7		4	3					**31**
Yellow-throated Warbler										1	2			**3**
Black-and-White Warbler									1					**1**
Prothonotary Warbler													1	**1**

Table E-1 Summary of Spring 2009 Passerine Survey by Date

Species	4-17-09	4-19-09	4-28-09	4-29-09	4-30-09	5-08-09	5-09-09	5-10-09	5-11-09	5-21-09	5-22-09	5-28-09	5-29-09	Totals
Common Yellowthroat													2	**2**
Kentucky Warbler												1	1	**2**
Hooded Warbler													1	**1**
Scarlet Tanager										1				**1**
Summer Tanager												1		**1**
Dickcissel						7	7	2	9	8	14			**47**
Rose-breasted Grosbeak								2						**2**
Indigo Bunting							3	1	1	1	4	6	9	**25**
Northern Cardinal	3	3	7	7	11	4	5	1		2	2	1	4	**50**
Eastern Towhee		1				1			2	2				**6**
Chipping Sparrow			5	2	5		6	6	6	5	2			**37**
Field Sparrow	2	1	7	2	3		2	16	16	13	1	31	10	**104**
American Tree Sparrow							1	8	6					**15**
Vesper Sparrow										2	2			**4**
Grasshopper Sparrow	1	1			1				1	2	3			**9**
Song Sparrow	1	1	8	5	10	9	4	6	2	3	2			**51**
White-throated Sparrow					1		1			1				**3**
Baltimore Oriole									1	2		1		**4**
Eastern Meadowlark							3							**3**
Red-winged Blackbird	1		17	36	26	11	14	25	14	13	29	34	16	**236**
Common Grackle			13	14	3	16	2	6	11	8	5	6	3	**87**
Brown-headed Cowbird	1		7	3	2		6	1	8	3	3	6	7	**47**
House Sparrow				3	1			1		1		3	8	**17**

Table E-1 Summary of Spring 2009 Passerine Survey by Date

Species	4-17-09	4-19-09	4-28-09	4-29-09	4-30-09	5-08-09	5-09-09	5-10-09	5-11-09	5-21-09	5-22-09	5-28-09	5-29-09	Totals
American Goldfinch			13	5	2			3	3	5	3	5		**39**
Total Birds:	**18**	**18**	**154**	**158**	**157**	**143**	**131**	**171**	**152**	**180**	**159**	**187**	**151**	**1,781**
Species Count*:	**10**	**11**	**26**	**23**	**30**	**24**	**28**	**29**	**36**	**36**	**31**	**28**	**28**	
Total Species:														**69**

Points BF- 01 through BF-03 were surveyed 7 times while BF-04 through BF-18 were surveyed 5 times each. This is a result of the Project area growing in size, which took place after the first two surveys were already conducted. As a result, survey dates 4/17/09 and 4/19/09 have noticeably fewer species and individuals observed than the following surveys.
*Species count does not include unidentified birds.

Table E-2 Summary of Spring 2009 Passerine Survey by Survey Point

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose	3	2	3						7		2	3				2	2		24
Great Blue Heron																	1		1
Turkey Vulture															1				1
Red-tailed Hawk	1				2				1					1	1	3			9
Wild Turkey															1				1
Killdeer	1	3	4	6	5	9	4		3	3	5	7	2	5	3		4	3	67
Rock Pigeon																		1	1
Mourning Dove	5		1	5	12	4	5	1	2	5	8	3	3	6	5	4	1	6	76
Yellow-billed Cuckoo								2											2
Chimney Swift			2															1	3
Red-bellied Woodpecker	6	4	3	1		1	2	4	1		2	1	2	2	3	3	3	3	41
Downy Woodpecker		2	3	1				2				1		1			1		11
Northern Flicker	1	1	1				4	1		1		1	3	1	2	1			17
Pileated Woodpecker			1									1		1					3
Eastern Wood-Pewee		1						1							1				3
Eastern Phoebe			1	2			1										1	1	6
Great Crested Flycatcher		2										1	2						5
Eastern Kingbird													3						3
Red-eyed Vireo	1	2	1	1				4	2	2	1	1	1		3	1	1	3	24
Yellow-throated Vireo																	1		1
Blue Jay	3	4	8	1	1		4	5	5	2	4	4	3	3	5	6	6	1	65
American Crow	4	5	6	8	4	8	10	2	7	3	5	4	1	6	5	8	7	7	100
Horned Lark	1	3	5	18	7	8	7		4	6	11	4	4	13	7	4	3	10	115
Barn Swallow				1	15	3	35			1	3	1		8	2		15		84

Table E-2 Summary of Spring 2009 Passerine Survey by Survey Point

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Tree Swallow	2	1			5	5							1		4				18
Black-capped Chickadee	1															1			2
Brown Creeper		1																	1
Tufted Titmouse	1	3	5	1	1		5	4	1	1		2	2	1	3	3	1	2	36
Red-breasted Nuthatch		1					1									1			3
House Wren																	1		1
Carolina Wren																1			1
Eastern Bluebird	1				1							1							3
Wood Thrush	1	2					1	2	1			1					2		10
American Robin	20	9	5	6	18	11	10	13	9	17	5	11	4	3	7	3	5	6	162
Gray Catbird	3	1	1	1		1	4	2	4	2	2	7	2	2	3	3	5	4	47
Northern Mockingbird		1		2	2	2	2	2								1	1	3	16
Brown Thrasher													1	12					13
American Pipit																	1	1	2
European Starling	7	6		6	2	29	4	3	2	3	19	10	3	2		1		7	104
Yellow Warbler														7			2	2	11
Chestnut-sided Warbler								2	8							1			11
Yellow-rumped Warbler	1	2	11	7		2		2					1	1	3		2	1	33
Yellow-throated Warbler								1											1
Black-and-White Warbler																	1		1
Prothonotary Warbler															1				1
Common Yellowthroat																	2		2

Table E-2 Summary of Spring 2009 Passerine Survey by Survey Point

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Kentucky Warbler										1							1		2
Hooded Warbler	1																		1
Scarlet Tanager	1																		1
Summer Tanager										1									1
Dickcissel																1			1
Rose-breasted Grosbeak							1	1											2
Indigo Bunting	5	2	1					1	2		1	1	1		5	5	1		25
Northern Cardinal	5	4	3	4	3		1	2	1	2	1	6	2	1	7	1	6	1	50
Eastern Towhee	2		1															1	4
Chipping Sparrow	1		1	2	5		3	2	2	5	3	4	1	4	1		2	1	37
Field Sparrow	2			1					1			1	1		1	1	1		9
American Tree Sparrow				3		1	1		3	1	2	2		1		1			15
Vesper Sparrow	1						1				2								4
Grasshopper Sparrow														1					1
Song Sparrow	7	2	2	2	1	2	5	4	4	2	1	1	3	4	1	2	6	2	51
White-throated Sparrow	1														1	1			3
Baltimore Oriole	2												1		1				4
Eastern Meadowlark			1			1													2
Red-winged Blackbird	9	11	12	6	10	12	33	3	14	20	22	5	24	11	18	9	7	10	236
Common Grackle	2	4		7	6	6	11	1	12	8	3	10	4	2	4	4	1	2	87
Brown-headed Cowbird	1		2			3	2	2	4	7	3	2	2	8	4	4	1	2	47
House Sparrow		1		4	3		2		1			3						3	17

Table E-2 Summary of Spring 2009 Passerine Survey by Survey Point

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
American Goldfinch	3	4	2	2		2		2	7	8	1	2	3	3					39
Total Birds:	**106**	**84**	**86**	**98**	**103**	**110**	**159**	**71**	**108**	**101**	**106**	**101**	**80**	**110**	**103**	**76**	**95**	**84**	**1,781**
Species Count*:	**34**	**28**	**26**	**25**	**19**	**19**	**26**	**27**	**26**	**22**	**22**	**30**	**27**	**27**	**29**	**28**	**33**	**26**	
Total Species:																			**69**

Points BF- 01 through BF-03 were surveyed 7 times while BF-04 through BF-18 were surveyed 5 times each. This is a result of the Project area growing in size, which took place after the first two surveys were already conducted.

*Species count does not include unidentified birds.

Table E-3 Spring 2009 Migratory Bird Survey, April 17, 2009

Species	BF-01	BF-02	BF-03	Total
Canada Goose	1		1	2
Red-bellied Woodpecker		1		1
Pileated Woodpecker			1	1
American Robin	5	1	1	7
European Starling	1	1		2
Northern Cardinal	1	1	1	3
Field Sparrow	1			1
Song Sparrow		1		1
Red-winged Blackbird			1	1
Brown-headed Cowbird	1			1
Total Birds	**10**	**5**	**5**	**20**
Species Count*:	**6**	**5**	**5**	
Total Species				**10**

*Species count does not include unidentified birds.

Table E-4 Spring 2009 Migratory Bird Survey, April 19, 2009

Species	BF-01	BF-02	BF-03	Total
Red-bellied Woodpecker	1	1	1	3
Northern Flicker			1	1
Eastern Phoebe			1	1
Blue Jay			1	1
American Crow	1		1	2
Brown Creeper		1		1
American Robin	1	1	1	3
European Starling	1			1
Northern Cardinal	1	1	1	3
Field Sparrow	1			1
Song Sparrow	1			1
Total Birds:	**7**	**3**	**7**	**18**
Species Count*:	**7**	**4**	**7**	
Total Species:				**11**

*Species count does not include unidentified birds.

Table E-5 Spring 2009 Migratory Bird Survey, April 28, 2009

Species	BF-01	BF-02	BF-04	BF-05	BF-06	BF-10	Total
Canada Goose	2	2					4
Red-tailed Hawk	1						1
Killdeer			2		2	1	5
Mourning Dove	1		3	4		1	9
Red-bellied Woodpecker	1	1					2
Downy Woodpecker		1					1
Northern Flicker	1					1	2
Eastern Wood-Pewee		1					1
Great Crested Flycatcher		1					1
Blue Jay	2					1	3
American Crow	1	1	1		2		5
Horned Lark		1	6	1	3	3	14
Tufted Titmouse		2	1			1	4
Wood Thrush		1					1
American Robin	4	2	2	3	7	1	19
Northern Mockingbird					1		1
European Starling		2			4	1	7
Yellow-rumped Warbler	1	2					3
Northern Cardinal	1		2	3		1	7
Eastern Towhee	1						1
Chipping Sparrow				4		1	5
Song Sparrow	2		1	1	2	2	8
Red-winged Blackbird	5	3	4		3	2	17
Common Grackle			3	3	4	3	13
Brown-headed Cowbird					1	6	7
American Goldfinch	2	4			1	6	13
Total Birds:	**25**	**24**	**25**	**19**	**30**	**31**	**154**
Species Count*:	**14**	**14**	**10**	**7**	**11**	**15**	
Total Species:							**26**

*Species count does not include unidentified birds.

Table E-6 Spring 2009 Migratory Bird Survey, April 29, 2009

Species	BF-03	BF-07	BF-08	BF-09	BF-11	BF-12	Total
Canada Goose	2				2		4
Killdeer	2			1	1	1	5
Mourning Dove					3		3
Red-bellied Woodpecker		1		1	1		3
Downy Woodpecker	1						1
Northern Flicker		2					2
Blue Jay	1	2		1	2	3	9
American Crow				2	1		3
Horned Lark	3	3		1	3	1	11
Barn Swallow					1	1	2
Tufted Titmouse	2	2	1			1	6
Wood Thrush			2			1	3
American Robin	1	2	6	2	2	5	18
European Starling			1		1		2
Yellow-rumped Warbler	9		2				11
Northern Cardinal		1	1	1	1	3	7
Chipping Sparrow			1			1	2
Song Sparrow		1	1	1	1	1	5
Red-winged Blackbird	3	12	3	7	8	3	36
Common Grackle				4	3	7	14
Brown-headed Cowbird	1			2			3
House Sparrow						3	3
American Goldfinch	1		1	2	1		5
Total Birds:	**24**	**26**	**19**	**25**	**31**	**31**	**156**
Species Count*:	**11**	**9**	**10**	**12**	**15**	**13**	
Total Species:							**23**

*Species count does not include unidentified birds.

Table E-7 Spring 2009 Migratory Bird Survey, April 30, 2009

Species	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose				2	2		4
Great Blue Heron					1		1
Red-tailed Hawk		1		1			2
Killdeer			1			3	4
Rock Pigeon						1	1
Mourning Dove	1		1	3		2	7
Red-bellied Woodpecker			1	1	1		3
Northern Flicker	2	1	1				4
Blue Jay	1	2	2	3	1		9
American Crow	1	2	3	2	1	3	12
Horned Lark	2	6	2	2	1	6	19
Barn Swallow			1				1
Tufted Titmouse	1		2	1		1	5
House Wren					1		1
Wood Thrush					2		2
American Robin	2	2	3	2	2		11
American Pipit					1	1	2
European Starling				1		2	3
Yellow Warbler					1		1
Yellow-rumped Warbler	1				2		3
Northern Cardinal	2	1	4	1	2	1	11
Chipping Sparrow		1	1		2	1	5
Field Sparrow				1			1
Song Sparrow	1	2		2	3	2	10
White-throated Sparrow			1				1
Red-winged Blackbird	6	2	6	6	4	2	26
Common Grackle			3				3
Brown-headed Cowbird		2					2
House Sparrow						1	1
American Goldfinch		2					2
Total Birds:	**20**	**24**	**32**	**28**	**27**	**26**	**157**
Species Count*:	**11**	**12**	**15**	**14**	**16**	**13**	
Total Species:							**30**

*Species count does not include unidentified birds.

Table E-8 Spring 2009 Migratory Bird Survey, May 8, 2009

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	Total
Canada Goose									7	7
Killdeer				3	2	1				6
Mourning Dove	1				6	2	3			12
Red-bellied Woodpecker	1	1	1					2		5
Downy Woodpecker			1							1
Northern Flicker							1	1		2
Eastern Phoebe				1						1
Great Crested Flycatcher		1								1
Blue Jay		3	2	1				2	2	10
American Crow		1	2		1			1		5
Horned Lark				6		3			3	12
Barn Swallow						2				2
Tufted Titmouse		1					2	1	1	5
Red-breasted Nuthatch							1			1
Wood Thrush		1					1		1	3
American Robin	6	2			2		2		2	14
Gray Catbird	1						3	1	2	7
Yellow-rumped Warbler			2	3		2				7
Northern Cardinal	2	1						1		4
Eastern Towhee			1							1
Song Sparrow	4		2					3		9
Eastern Meadowlark			1							1
Red-winged Blackbird	2		2		6		1			11
Common Grackle				3		2	10	1		16
Total Birds:	**17**	**11**	**14**	**17**	**17**	**12**	**24**	**13**	**18**	**143**
Species Count*:	**7**	**8**	**9**	**6**	**5**	**6**	**9**	**9**	**7**	
Total Species:										**24**

*Species count does not include unidentified birds.

Table E-9 Spring 2009 Migratory Bird Survey, May 9, 2009

Species	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose			3							3
Turkey Vulture						1				1
Killdeer		2	3	2		1		2		10
Mourning Dove	1	3		1	4	1	1		1	12
Red-bellied Woodpecker							1			1
Northern Flicker						1	1			2
Eastern Kingbird				3						3
Blue Jay			1		1		1	1		4
American Crow	2	3						2		7
Horned Lark		2	2	1	2				2	9
Barn Swallow						1				1
Black-capped Chickadee							1			1
Tufted Titmouse			1				1	1		3
American Robin	2	1	1	2		1			1	8
Gray Catbird	1	2	1				2	1		7
Brown Thrasher				1	11					12
European Starling				2						2
Yellow Warbler									2	2
Chestnut-sided Warbler							1			1
Indigo Bunting							3			3
Northern Cardinal	1		2			2				5
Chipping Sparrow	2		1	1	2					6
American Tree Sparrow					1					1
Song Sparrow				1	1			2		4
White-throated Sparrow							1			1
Red-winged Blackbird		1		4	2	3	1		3	14
Common Grackle	1			1						2
Brown-headed Cowbird	1			2	3					6
Total Birds:	**11**	**14**	**15**	**21**	**27**	**11**	**14**	**9**	**9**	**131**
Species Count*:	**8**	**7**	**9**	**12**	**9**	**8**	**11**	**6**	**5**	
Total Species:										**28**

*Species count does not include unidentified birds.

Table E-10 Spring 2009 Migratory Bird Survey, May 10, 2009

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	Total
Killdeer		2			3	2	2			9
Mourning Dove					1	1	1		1	4
Red-bellied Woodpecker	1							1		2
Downy Woodpecker			1					1		2
Northern Flicker		1								1
Red-eyed Vireo									1	1
Blue Jay		1						1	1	3
American Crow	1	1		1	1	1			3	8
Horned Lark		1	1		2					4
Barn Swallow						1	25			26
Tree Swallow	1					5				6
Tufted Titmouse	1		1				1	1		4
Eastern Bluebird	1									1
American Robin	1	2	1	2	3		3	3	2	17
Gray Catbird		1							1	2
European Starling	3	3		1	1	5	3			16
Yellow-rumped Warbler				4						4
Rose-breasted Grosbeak							1	1		2
Indigo Bunting	1									1
Northern Cardinal			1							1
Eastern Towhee	1									1
Chipping Sparrow				1			3	1	1	6
American Tree Sparrow				3		1	1		3	8
Song Sparrow		1		1			2		2	6
Red-winged Blackbird	2	5	1	1	4	7	2		3	25
Common Grackle		3							3	6
Brown-headed Cowbird						1				1
House Sparrow		1								1
American Goldfinch				2					1	3
Total Birds:	**13**	**22**	**6**	**16**	**15**	**24**	**44**	**9**	**22**	**171**
Species Count*:	**10**	**12**	**6**	**9**	**7**	**9**	**11**	**7**	**12**	
Total Species:										**29**

*Species count does not include unidentified birds.

Table E-11 Spring 2009 Migratory Bird Survey, May 11, 2009

Species	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Red-tailed Hawk							2			2
Killdeer	1		2		3	1		1		8
Mourning Dove	1	1	1		1	1		1	1	7
Red-bellied Woodpecker		1		1		1	1	1	1	6
Downy Woodpecker					1			1		2
Northern Flicker				1						1
Pileated Woodpecker			1							1
Eastern Phoebe								1	1	2
Great Crested Flycatcher				2						2
Red-eyed Vireo									1	1
Yellow-throated Vireo								1		1
Blue Jay	1	2		2		1	1	1	1	9
American Crow	1								1	2
Horned Lark								1		1
Barn Swallow					3					3
Tree Swallow						4				4
Tufted Titmouse									1	1
Red-breasted Nuthatch							1			1
American Robin	1	1	1		1	2		2	2	10
Gray Catbird			2		1		1	3	2	9
Northern Mockingbird							1			1
Brown Thrasher					1					1
European Starling		6	10							16
Yellow Warbler					4					4
Yellow-rumped Warbler						3				3
Black-and-White Warbler								1		1
Indigo Bunting							1			1
Chipping Sparrow	2	3	1							6
Field Sparrow				1						1
American Tree Sparrow	1	2	2				1			6
Song Sparrow				1				1		2
Baltimore Oriole						1				1
Red-winged Blackbird	2	3		2		5	1		1	14
Common Grackle	3			1	2		4	1		11
Brown-headed Cowbird					3	2	3			8
American Goldfinch	1			1	1					3
Total Birds:	**14**	**19**	**20**	**12**	**21**	**21**	**17**	**16**	**12**	**152**
Species Count*:	**10**	**8**	**8**	**9**	**11**	**10**	**11**	**13**	**10**	
Total Species:										**36**

*Species count does not include unidentified birds.

Table E-12 Spring 2009 Migratory Bird Survey, May 21, 2009

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	Total
Red-tailed Hawk					2				1	3
Killdeer	1	1	1			3			1	7
Mourning Dove	1		1	1	1	1	1	1	1	8
Red-bellied Woodpecker	1		1	1				1		4
Downy Woodpecker		1		1				1		3
Northern Flicker							1			1
Eastern Phoebe				1			1			2
Red-eyed Vireo		2	1	1				2		6
Blue Jay	1		1		1			1		4
American Crow		1	2		2	2				7
Horned Lark				1	2	1	2			6
Barn Swallow					15		10			25
Tree Swallow	1	1			5					7
Black-capped Chickadee	1									1
Tufted Titmouse			1					1		2
Red-breasted Nuthatch		1								1
Eastern Bluebird					1					1
American Robin	2	1	1	1	1	2	1	1	1	11
Gray Catbird	2		1	1		1	1	1	1	8
European Starling	2			1		10				13
Chestnut-sided Warbler								2	8	10
Yellow-throated Warbler								1		1
Scarlet Tanager	1									1
Indigo Bunting	1									1
Northern Cardinal				2						2
Chipping Sparrow	1		1	1	1				1	5
Field Sparrow				1					1	2
Vesper Sparrow	1						1			2
Song Sparrow							2		1	3
White-throated Sparrow	1									1
Baltimore Oriole	2									2
Red-winged Blackbird		1	2				9		1	13
Common Grackle	2	1		1	1		1		2	8
Brown-headed Cowbird							1	1	1	3
House Sparrow					1					1
American Goldfinch	1		1			1			2	5
Total Birds:	**22**	**10**	**14**	**14**	**33**	**21**	**31**	**13**	**21**	**179**
Species Count*:	**17**	**9**	**12**	**13**	**12**	**8**	**12**	**11**	**13**	
Total Species:										**36**

*Species count does not include unidentified birds.

Table E-13 Spring 2009 Migratory Bird Survey, May 22, 2009

Species	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Red-tailed Hawk						1				1
Wild Turkey						1				1
Killdeer	1	1			1			1		4
Mourning Dove	1		1	1	1	1			2	7
Red-bellied Woodpecker			1	1	2	1		1	2	8
Downy Woodpecker			1							1
Northern Flicker			1							1
Red-eyed Vireo						1		1	1	3
Blue Jay						2				2
American Crow		1	1		1	1			2	6
Horned Lark	2	2			2	3		1		10
Barn Swallow		2			5			15		22
Tree Swallow				1						1
Tufted Titmouse				1		1				2
Eastern Bluebird			1							1
American Robin	6	1	1			1		1	1	11
Gray Catbird	1		4	2	1	3		1	2	14
Northern Mockingbird									2	2
European Starling	1									1
Yellow Warbler					3			1		4
Yellow-rumped Warbler					1				1	2
Indigo Bunting						4				4
Northern Cardinal								2		2
Chipping Sparrow			1		1					2
Field Sparrow			1			1		1		3
Vesper Sparrow		2								2
Song Sparrow					1	1				2
Red-winged Blackbird	10	5	1	6	5			1	1	29
Common Grackle	1			2		1			1	5
Brown-headed Cowbird		3								3
American Goldfinch	1			2						3
Total Birds:	**24**	**17**	**14**	**16**	**24**	**23**	**0**	**26**	**15**	**159**
Species Count*:	**9**	**8**	**11**	**8**	**12**	**15**	**0**	**11**	**10**	
Total Species:										**31**

*Species count does not include unidentified birds.

Table E-14 Spring 2009 Migratory Bird Survey, May 28, 2009

Species	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	Total
Killdeer	1	2		1		1	1		1	7
Mourning Dove					1	1	1			3
Yellow-billed Cuckoo			2							2
Red-bellied Woodpecker	1	1								2
Pileated Woodpecker									1	1
Eastern Wood-Pewee			1							1
Great Crested Flycatcher							1			1
Red-eyed Vireo			2	1	2	1	1	1		8
Blue Jay		2	1	1						4
American Crow	3	10	2	1			3		3	22
Horned Lark	1	2			1	4	1	1	3	13
Barn Swallow					1					1
Tufted Titmouse									1	1
American Robin	2	2	3	2	7		3			19
Northern Mockingbird	1	2	2							5
European Starling	10	1	2	2	1	12		1	2	31
Kentucky Warbler					1					1
Summer Tanager					1					1
Indigo Bunting			1	2		1	1	1		6
Northern Cardinal							1			1
Grasshopper Sparrow									1	1
Baltimore Oriole								1		1
Eastern Meadowlark	1									1
Red-winged Blackbird	2	9		3	6	5	1	6	2	34
Common Grackle				3			3			6
Brown-headed Cowbird	1	1	1	1			2			6
House Sparrow		2		1						3
American Goldfinch			1	2			2			5
Total Birds:	**23**	**34**	**18**	**20**	**21**	**25**	**21**	**11**	**14**	**187**
Species Count*:	**10**	**11**	**11**	**12**	**9**	**7**	**13**	**6**	**8**	
Total Species:										**28**

*Species count does not include unidentified birds.

Table E-15 Spring 2009 Migratory Bird Survey, May 29, 2009

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-15	BF-16	BF-17	BF-18	Total
Killdeer			1	1						2
Mourning Dove	2			1		1				4
Chimney Swift			2						1	3
Red-bellied Woodpecker	1									1
Eastern Wood-Pewee						1				1
Red-eyed Vireo	1					2	1		1	5
Blue Jay			3				1	3		7
American Crow	1	1	1	6		1	6	4	1	21
Horned Lark	1	1	1	5	2	2	2		2	16
Barn Swallow				1						1
Tufted Titmouse	1				1		1			3
Carolina Wren							1			1
Wood Thrush	1									1
American Robin	1			1	9		1		2	14
Northern Mockingbird		1		2	2			1	1	7
European Starling				4	1				5	10
Prothonotary Warbler						1				1
Common Yellowthroat								2		2
Kentucky Warbler								1		1
Hooded Warbler	1									1
Dickcissel							1			1
Indigo Bunting	3	2	1			1	1	1		9
Northern Cardinal		1				1		2		4
Eastern Towhee									1	1
Red-winged Blackbird		2	3	1		4	1	2	3	16
Common Grackle					2				1	3
Brown-headed Cowbird			1			2	1	1	2	7
House Sparrow				4	2				2	8
Total Birds:	**13**	**8**	**13**	**26**	**19**	**16**	**17**	**17**	**22**	**151**
Species Count*:	**10**	**6**	**8**	**10**	**7**	**10**	**11**	**9**	**12**	
Total Species:										**28**

*Species count does not include unidentified birds.

F Summary of Fall 2009 Passerine Survey

Table F-1 Summary of Fall 2009 Passerine Survey

Species	8-15-09	8-16-09	8-29-09	8-30-09	9-12-09	9-13-09	9-26-09	9-27-09	10-10-09	10-11-09	10-24-09	10-26-09	11-7-09	11-8-09	Total
Canada Goose			3	157	1	26	7	18	44	182		8	12	46	504
Double-crested Cormorant									720						720
Great Blue Heron			1		1		1								3
Turkey Vulture	1		8	5	40	1		3	20	5	7			1	91
Northern Harrier											1	3			4
Cooper's Hawk												1			1
Broad-winged Hawk				1											1
Red-tailed Hawk	2		3		3		1		1	1	1	4		3	19
American Kestrel		1						2	3				1		7
Killdeer	3	1	26		2	53	6	21	62	9	10	18	2	5	218
Ring-billed Gull														5	5
Rock Pigeon								2				3	1		6
Mourning Dove	11	18	29	32	7	6	3	13	5	17	14	2	13	5	175
Yellow-billed Cuckoo				1											1
Whip-poor-will												1	1	2	4
Chimney Swift		1													1
Red-headed Woodpecker	1	1	2	1	3	3									11
Red-bellied Woodpecker			2	2	1	1	2	2	1	2	1	1	1	1	17
Downy Woodpecker	5		2	2	4	1	3	3	6	2	2	6	1	8	45
Hairy Woodpecker				1		3		2	2	4	1	4		3	20
Northern Flicker	3	2	1		1	7	2	9	2	5	2	1	2	7	44
Pileated Woodpecker				1											1
Eastern Wood-Pewee	4	2	5	4		1	1					1	6	3	27
Least Flycatcher				1			1	1							3

Table F-1 Summary of Fall 2009 Passerine Survey

Species	8-15-09	8-16-09	8-29-09	8-30-09	9-12-09	9-13-09	9-26-09	9-27-09	10-10-09	10-11-09	10-24-09	10-26-09	11-7-09	11-8-09	Total
Eastern Phoebe			3											3	6
Great Crested Flycatcher			2	3	1			1							7
Eastern Kingbird	1	2		1								3			7
Warbling Vireo				1											1
Red-eyed Vireo				2			1	2				4	2		11
Blue Jay	8	7	3	12	12	15	16	18	19	14	12	15	4	9	164
American Crow	10	9	47	51	21	10	17	24	17	43	52	43	40	54	438
Horned Lark		1	2	9			4	9	3		28	48	48	64	216
Tree Swallow			32	12							5	13			62
Barn Swallow	13	22	69	37				5				2			148
Black-capped Chickadee	3			1	1	1			3	4	2	1		2	18
Tufted Titmouse			3	1			1	1	1					6	13
Red-breasted Nuthatch			3	3			1	3							10
White-breasted Nuthatch	3	6		2	3	5	1	7	7	6	3	8	5	14	70
House Wren				1		2		2							5
Winter Wren					1				3	3					7
Ruby-crowned Kinglet										1					1
Eastern Bluebird	1	6	6	3	4	2		4	7	5	1				39
Veery							1								1
Swainson's Thrush					1	1									2
Hermit Thrush					1										1
American Robin	4	5	3	1	1	3	6	8	6	4	14	21	9	13	98
Gray Catbird	4	1	7	6	3	5	2	7	2	1	3	4	1	6	52
Northern Mockingbird								1							1
Brown Thrasher				1											1
European Starling	108	83		98	8	92	26	99			118	57	105	173	967
American Pipit									12	4					16

Table F-1 Summary of Fall 2009 Passerine Survey

Species	8-15-09	8-16-09	8-29-09	8-30-09	9-12-09	9-13-09	9-26-09	9-27-09	10-10-09	10-11-09	10-24-09	10-26-09	11-7-09	11-8-09	Total
Cedar Waxwing	1	9		1	3								10		24
Blue-winged Warbler								1							1
Tennessee Warbler				1											1
Yellow Warbler				5			1	2							8
Black-throated Blue Warbler				2											2
Yellow-rumped Warbler							1					10			11
Palm Warbler									1						1
Common Yellowthroat			2					3				2			7
American Tree Sparrow			2					11				1			14
Chipping Sparrow		4	4	2	2	1	1	1	3	3	1	2	2	2	28
Field Sparrow	4	5	16	2	1		9				2	1		1	41
Vesper Sparrow							3								3
Grasshopper Sparrow														2	2
Fox Sparrow				1											1
Song Sparrow	5	4	2	1		1	9	5	4	5		15			51
White-throated Sparrow							1		1	1		3			6
White-crowned Sparrow												4			4
Dark-eyed Junco									1					3	4
Scarlet Tanager													1		1
Northern Cardinal	8	5	1	2	5	3	1	1	3	2		1		2	34
Indigo Bunting	5	2	11	2			3								23
Red-winged Blackbird		10	50	17					77	141	61	20	4	9	389
Eastern Meadowlark										1	1				2
Common Grackle			1	8			1	1			1	5	2	8	27

Table F-1 Summary of Fall 2009 Passerine Survey

Species	8-15-09	8-16-09	8-29-09	8-30-09	9-12-09	9-13-09	9-26-09	9-27-09	10-10-09	10-11-09	10-24-09	10-26-09	11-7-09	11-8-09	Total
Brown-headed Cowbird			2	3	1							4			10
Baltimore Oriole		1	2		1				2	1		1			8
House Finch												1			1
American Goldfinch	21	18	2	6	10	14			15	11		3			100
House Sparrow											1				1
Total Birds	**229**	**226**	**357**	**506**	**143**	**257**	**133**	**292**	**1053**	**477**	**344**	**345**	**273**	**460**	**5,095**
Species Count*	**24**	**25**	**34**	**45**	**28**	**23**	**31**	**34**	**31**	**27**	**25**	**39**	**23**	**29**	
Total Species															**81**

*Species count does not include unidentified birds.

Table F-2 Summary of Fall 2009 Passerine Survey

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose			1	36	18	2	12	3	63		52		1	2	154	139	19	2	504
Double-crested Cormorant									10					280	200			230	720
Great Blue Heron				1								1	1						3
Turkey Vulture					5	1	1		12	3	8	9	31	12	1	3	5		91
Northern Harrier	•			3		1													4
Cooper's Hawk																	1		1
Broad-winged Hawk					1														1
Red-tailed Hawk				1	1	1	1	2	2		3	3			1	1		3	19
American Kestrel							1		1		1	2	1			1			7
Killdeer				1	12	93	2		6	5	6	56		29			8		218
Ring-billed Gull																		5	5
Rock Pigeon										1				2	3				6
Mourning Dove		2		17	18	11	18	1	10	3	40	5	3	12	10	7		18	175
Yellow-billed Cuckoo													1						1
Whip-poor-will				2											1			1	4
Chimney Swift								1											1
Red-headed Woodpecker		1					1						6		1	1		1	11
Red-bellied Woodpecker	1			2			1	2					4		4	1	2		17
Downy Woodpecker	1			2	1		1	3	2	3		2	7	1	3	5	4	10	45
Hairy Woodpecker				1	1		1	3		3		1	1		2	1	1	5	20
Northern Flicker			1		4		4	3	3	2	1	1	10	1	5	2	2	5	44
Pileated Woodpecker														1					1
Eastern Wood-Pewee							2	5				1	3		3	5	5	3	27
Least Flycatcher	1						1								1				3

Table F-2 Summary of Fall 2009 Passerine Survey

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Eastern Phoebe				1				1								1		3	6
Great Crested Flycatcher		1						1						1	1		1	2	7
Eastern Kingbird													2	1		3	1		7
Warbling Vireo																1			1
Red-eyed Vireo								2		1			2			3	1	2	11
Blue Jay	1	1	1	6	11	4	12	15	14	11	9	17	14	7	7	14	10	10	164
American Crow	1	2	1	22	34	16	15	22	26	27	62	26	12	26	28	66	32	20	438
Horned Lark				6	21	36	16		26	14	23	15	5	41	3	2	8		216
Tree Swallow				30		2		10	2			5	12			1			62
American Goldfinch		1	1		3	1	14	1	14	5	9	8	5	4	13	6	4	11	100
American Pipit				1	5	2	2				4	2							16
American Robin				18	4	2	3	5	6	3	3	11	17	3	4	2	5	12	98
American Tree Sparrow							12						1				1		14
Baltimore Oriole					1		1		1					1			2	2	8
Barn Swallow				7	8	16	52	5	4	4		24	11	5	6	2		4	148
Black-capped Chickadee								2	1				1		2		3	9	18
Black-throated Blue Warbler																		2	2
Blue-winged Warbler													1						1
Brown Thrasher													1						1
Brown-headed Cowbird							1		2		1		2	2	1			1	10
Cedar Waxwing				7	2					4						1	3	7	24
Chipping Sparrow				2	1			1	2	2	1	1	2	3	5	1	2	5	28
Common Grackle				2				4	1	1			4	2	3	3	3	4	27
Common Yellowthroat										3					1	2		1	7
Dark-eyed Junco															1		1	2	4

Table F-2 Summary of Fall 2009 Passerine Survey

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Eastern Bluebird				1			9	1	1	1	2	1	6	2	9	6			39
Eastern Meadowlark						1												1	2
European Starling		2		77	60	91	42	97	91	124	65	17	75	47	42	12	68	56	966
Field Sparrow						15	1		1		2		4	1	9	4	4		41
Fox Sparrow														1					1
Grasshopper Sparrow										1		1							2
Gray Catbird	1		1	1	1		2	5	3	2	1		5		3	2	11	14	52
Hermit Thrush																	1		1
House Finch													1						1
House Sparrow															1				1
House Wren								1							2	1		1	5
Indigo Bunting							11		2	1	1		2	1	2	2	1		23
Northern Cardinal				4	1	2		4		3			1		2	3	6	8	34
Northern Mockingbird					1														1
Palm Warbler							1												1
Red-breasted Nuthatch							3	2	1							2	1	1	10
Red-winged Blackbird				30	19	2		9	43	74	3	18	90		52	38	6	5	389
Ruby-crowned Kinglet																1			1
Scarlet Tanager																1			1
Song Sparrow					1		3		14	1	4	2	13	8		2	3		51
Swainson's Thrush																1		1	2
Tennessee Warbler							1												1
Tufted Titmouse									5				2		2	2	1	1	13
Veery															1				1
Vesper Sparrow				1									2						3
Warbler Species												1							1

Table F-2 Summary of Fall 2009 Passerine Survey

Species	BF-01	BF-02	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
White-breasted Nuthatch		1	2	1	2		8	11	1	3	1	4	6		9	8	3	10	70
White-crowned Sparrow													4						4
White-throated Sparrow							1						4					1	6
Winter Wren						2		1				2	1			1			7
Yellow Warbler							1		1	1					1	3		1	8
Yellow-rumped Warbler													8			1		2	11
Total Birds	**6**	**11**	**8**	**283**	**236**	**301**	**257**	**223**	**371**	**306**	**302**	**236**	**385**	**496**	**599**	**364**	**229**	**482**	**5095**
Species Count**	**6**	**8**	**7**	**28**	**26**	**20**	**335**	**30**	**32**	**28**	**23**	**27**	**44**	**27**	**40**	**44**	**34**	**41**	
Total Species																			**81**

*Points 1 and 3 (BF-01 and BF-03) were only surveyed once, and point 2 (BF-02) was surveyed twice during the Fall 2009 survey season.

** Species counts do not include unidentified birds.

Table F-3 Fall 2009 Migratory Bird Survey, August 15, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Turkey Vulture									1							1
Red-tailed Hawk						1										1
Killdeer			3													3
Mourning Dove	1	2	1	1					1			3	1		1	11
Red-headed Woodpecker		1								1						2
Downy Woodpecker							1							1	3	5
Northern Flicker				1						1	1					3
Eastern Wood-Pewee					1				1	1			1			4
Eastern Kingbird										1						1
Blue Jay	1			1	1	1		1	1				1	1		8
American Crow	1											1	6	2		10
American Goldfinch			1	2	1	2	1	2	4	3	1	1		3		21
American Robin							1			2		1				4
Barn Swallow			1	1	3		1				1		2		4	13
Black-capped Chickadee										1				2		3
Cedar Waxwing							4								6	10
Eastern Bluebird				1												1
European Starling	1			5		3	4	1	2	36	21		4		31	108
Field Sparrow										2			2			4
Gray Catbird														3	1	4
Indigo Bunting							1	1		1			2			5
Northern Cardinal	2				1									2	3	8
Song Sparrow		1		1				2						1		5
White-breasted Nuthatch		1								1			1			3
Total Birds	**6**	**5**	**6**	**13**	**7**	**7**	**10**	**7**	**10**	**50**	**24**	**6**	**20**	**15**	**43**	229
Species Count*	**5**	**4**	**4**	**8**	**5**	**4**	**7**	**5**	**6**	**10**	**4**	**4**	**8**	**8**	**6**	
Total Species																**24**

*Species count does not include unidentified birds.

Table F-4 Fall 2009 Migratory Bird Survey, August 16, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
American Kestrel				1												1
Killdeer			1													1
Mourning Dove	1	2		1		4		6	1		3					18
Chimney Swift					1											1
Red-headed Woodpecker												1				1
Northern Flicker									1	1						2
Eastern Wood-Pewee					1					1						2
Eastern Kingbird										1				1		2
Blue Jay		1			3	1		1	1							7
American Crow	1		2					2	1			1	1	1		9
Horned Lark									1							1
American Goldfinch		2		2		4	1		1			3	3	1	1	18
American Robin										5						5
Baltimore Oriole						1										1
Barn Swallow		1		14	2					1	4					22
Chipping Sparrow	1					1	1		1							4
Eastern Bluebird												6				6
European Starling					1		40			1		1		40		83
Field Sparrow										2	1		2			5
Gray Catbird														1		1
Indigo Bunting						1				1						2
Northern Cardinal	1		2		1					1						5
Red-winged Blackbird	10															10
Song Sparrow				1				2						1		4
White-breasted Nuthatch				1	2				1			1			1	6
Total Birds	**14**	**6**	**5**	**20**	**11**	**12**	**45**	**11**	**8**	**14**	**8**	**13**	**6**	**45**	**8**	**226**
Species Count*	**5**	**4**	**3**	**6**	**7**	**6**	**4**	**4**	**8**	**9**	**3**	**6**	**3**	**6**	**3**	
Total Species																**27**

*Species count does not include unidentified birds.

Table F-5 Fall 2009 Migratory Bird Survey, August 29, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose		3														3
Great Blue Heron										1						1
Turkey Vulture			1	1		1		1	1		3					8
Red-tailed Hawk								2	1							3
Killdeer			25						1							26
Mourning Dove	11	2	1					1	1			1	1		11	29
Red-headed Woodpecker										2						2
Red-bellied Woodpecker	1											1				2
Downy Woodpecker										1				1		2
Northern Flicker												1				1
Eastern Wood-Pewee				1								1	1	2		5
Eastern Phoebe	1				1								1			3
Great Crested Flycatcher											1			1		2
Blue Jay								1					1	1		3
American Crow					3		2	2	1			3	35		1	47
Horned Lark		1										1				2
Tree Swallow			2													2
American Goldfinch				2												2
American Robin						1				1				1		3
American Tree Sparrow	30			2												32
Baltimore Oriole				1										1		2
Barn Swallow	3	4	15	32		1			13			1				69
Brown-headed Cowbird						1					1					2
Chipping Sparrow		1										2			1	4
Common Grackle											1					1
Common Yellowthroat							1								1	2
Eastern Bluebird				6												6
Field Sparrow			15											1		16
Gray Catbird	1				1	1				1				2	1	7
Indigo Bunting				10										1		11

Table F-5 Fall 2009 Migratory Bird Survey, August 29, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Northern Cardinal															1	1
Red-breasted Nuthatch													2	1		3
Red-winged Blackbird							50									50
Song Sparrow						2										2
Tufted Titmouse												1	2			3
Total Birds	**47**	**11**	**59**	**55**	**5**	**7**	**53**	**7**	**18**	**6**	**6**	**12**	**43**	**12**	**16**	**357**
Species Count*	**6**	**5**	**6**	**8**	**3**	**6**	**3**	**5**	**6**	**5**	**4**	**9**	**7**	**10**	**6**	
Total Species																**35**

*Species count does not include unidentified birds.

Table F-6 Fall 2009 Migratory Bird Survey, August 30, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose		2	2							1		150			2	157
Turkey Vulture		1											3	1		5
Broad-winged Hawk		1														1
Mourning Dove		10	1	10		1		8	1		1					32
Yellow-billed Cuckoo										1						1
Red-headed Woodpecker															1	1
Red-bellied Woodpecker					1					1						2
Downy Woodpecker													1		1	2
Hairy Woodpecker					1											1
Pileated Woodpecker											1					1
Eastern Wood-Pewee					3							1				4
Least Flycatcher												1				1
Great Crested Flycatcher					1										2	3
Eastern Kingbird											1					1
Warbling Vireo													1			1
Red-eyed Vireo														1	1	2
Blue Jay				2	1	2	1		1			2	1	1	1	12
American Crow	1		6		1	2	4	31	1		1		2	1	1	51
Horned Lark	2		2					2						3		9
Tree Swallow					10	2										12
American Goldfinch				1			3					2				6
American Robin									1							1
Barn Swallow	2	3				3	3		11	10		5				37
Black-capped Chickadee															1	1
Black-throated Blue Warbler															2	2
Brown Thrasher										1						1
Brown-headed Cowbird						1				1	1					3
Cedar Waxwing															1	1
Chipping Sparrow					1									1		2

Table F-6 Fall 2009 Migratory Bird Survey, August 30, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Common Grackle					3		1			1	1				2	8
Eastern Bluebird												3				3
European Starling	5		10			10	25			3		20		25		98
Field Sparrow								2								2
Fox Sparrow											1					1
Gray Catbird		1			2		1							1	1	6
House Wren					1											1
Indigo Bunting				1							1					2
Northern Cardinal														1	1	2
Red-breasted Nuthatch					2										1	3
Red-winged Blackbird							2			15						17
Song Sparrow										1						1
Tennessee Warbler				1												1
Tufted Titmouse															1	1
White-breasted Nuthatch												2				2
Yellow Warbler				1			1						2		1	5
Total Birds	**10**	**18**	**21**	**16**	**27**	**21**	**41**	**43**	**15**	**35**	**8**	**186**	**10**	**35**	**20**	**506**
Species Count*	**4**	**6**	**5**	**6**	**12**	**7**	**9**	**4**	**5**	**10**	**8**	**9**	**6**	**9**	**16**	
Total Species																**45**

*Species count does not include unidentified birds.

Table F-7 Fall 2009 Migratory Bird Survey by Location, September 12, 2009

Species	BF-02	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose													-	1			1
Great Blue Heron										1			-				1
Turkey Vulture							3		7	7	23		-				40
Red-tailed Hawk							1		1	1			-				3
Killdeer				2									-				2
Mourning Dove		1			1			1				1	-	1		2	7
Red-headed Woodpecker	1				1						1		-				3
Red-bellied Woodpecker											1		-				1
Downy Woodpecker					1						1		-		1	1	4
Northern Flicker						1							-				1
Great Crested Flycatcher	1												-				1
Blue Jay	1			1	1	2		2			1		-	2	1	1	12
American Crow	1	3						1					-	11	4	1	21
American Goldfinch	1				5						2		-	1		1	10
American Robin		1											-				1
Baltimore Oriole													-			1	1
Black-capped Chickadee													-			1	1
Brown-headed Cowbird									1				-				1
Cedar Waxwing			2										-	1			3
Chipping Sparrow							1					1	-				2
Eastern Bluebird								1			1	1	-	1			4
European Starling		1			2	1	1	1				1	-			1	8
Field Sparrow					1								-				1
Gray Catbird													-		1	2	3
Hermit Thrush													-		1		1
Northern Cardinal			1										-	2	1	1	5

Table F-7 Fall 2009 Migratory Bird Survey by Location, September 12, 2009

Species	BF-02	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Swainson's Thrush													-	1			1
White-breasted Nuthatch	1		1								1		-				3
Winter Wren													-	1			1
Total Birds	6	6	4	3	12	4	6	6	9	9	31	4		22	9	12	143
Species Count*	6	4	3	2	7	3	4	5	3	3	8	4	-	11	6	10	
Total Species																	29

*Species count does not include unidentified birds.

Table F-8 Fall 2009 Migratory Bird Survey, September 13, 2009

Species	BF-03	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose	1	-			12	1	3							8	1		26
Turkey Vulture		-													1		1
Killdeer		-		50			1		1						1		53
Mourning Dove		-	1	1			1			1	1		1				6
Red-headed Woodpecker		-									2			1			3
Red-bellied Woodpecker		-									1						1
Downy Woodpecker		-											1				1
Hairy Woodpecker						1		1								1	3
Northern Flicker	1	-	1			1	1				1		1	1			7
Eastern Wood-Pewee		-									1						1
Blue Jay	1	-	1		1	2	2	1			1	2	2		1	1	15
American Crow	1	-			2				2	1		2		1	1		10
American Goldfinch	1	-	1		1		1			1			1	1		7	14
American Robin		-								2					1		3
Black-capped Chickadee		-														1	1
Chipping Sparrow		-													1		1
Eastern Bluebird		-					1				1						2
European Starling		-			35		30	6	13				5	3			92
Gray Catbird	1	-			1				1						1	1	5
House Wren		-												1		1	2
Northern Cardinal		-						1							1	1	3
Song Sparrow		-									1						1
Swainson's Thrush		-														1	1
White-breasted Nuthatch	2	-					1							1		1	5
Total Birds	**8**		**4**	**51**	**52**	**5**	**41**	**9**	**17**	**5**	**9**	**4**	**11**	**17**	**9**	**15**	**257**
Species Count*	**7**	**-**	**4**	**2**	**6**	**4**	**9**	**4**	**4**	**4**	**8**	**2**	**6**	**8**	**9**	**9**	
Total Species																	**24**

*Species count does not include unidentified birds.

Table F-9 Fall 2009 Migratory Bird Survey, September 26, 2009

Species	BF-01	BF-02	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose				5				2										7
Great Blue Heron			1															1
Red-tailed Hawk			1															1
Killdeer						1					5							6
Mourning Dove		2												1				3
Red-bellied Woodpecker	1															1		2
Downy Woodpecker	1											2						3
Northern Flicker						1						1						2
Eastern Wood-Pewee														1				1
Least Flycatcher	1																	1
Red-eyed Vireo															1			1
Blue Jay	1		1			1	1	1		1	5	2			2	1		16
American Crow	1	1	1	4	1		1	2	1	1			1			2	1	17
Horned Lark			1		1											2		4
American Robin										1	1	3	1					6
Chipping Sparrow																1		1
Common Grackle												1						1
European Starling		2			20			3				1						26
Field Sparrow														9				9
Gray Catbird	1								1									2
Indigo Bunting								1						2				3
Northern Cardinal														1				1
Red-breasted Nuthatch								1										1
Song Sparrow											1	6	2					9
Tufted Titmouse																1		1
Veery														1				1
Vesper Sparrow			1									2						3

Table F-9 Fall 2009 Migratory Bird Survey, September 26, 2009

Species	BF-01	BF-02	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
White-breasted Nuthatch												1						1
White-crowned Sparrow						1												1
Yellow Warbler														1				1
Yellow-rumped Warbler															1			1
Total Birds	**6**	**5**	**6**	**9**	**22**	**4**	**2**	**10**	**2**	**3**	**12**	**19**	**4**	**16**	**4**	**8**		**132**
Species Count*	**6**	**3**	**6**	**2**	**3**	**4**	**2**	**6**	**2**	**3**	**4**	**9**	**3**	**7**	**3**	**6**	**1**	
Total Species																		**31**

*Species count does not include unidentified birds.

Table F-10 Fall 2009 Migratory Bird Survey, September 27, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose														18		18
Turkey Vulture														3		3
American Kestrel						1							1			2
Killdeer			2	1		1	1		1		12			3		21
Rock Pigeon											2					2
Mourning Dove				5		2		1		1	4					13
Red-bellied Woodpecker												1	1			2
Downy Woodpecker					1					1					1	3
Hairy Woodpecker				1								1				2
Northern Flicker		1				2				4		2				9
Least Flycatcher				1												1
Great Crested Flycatcher												1				1
Red-eyed Vireo					1								1			2
Blue Jay	1	2		1		2	1	1		3		1	2	2	1	17
American Crow	1	1	1	1	5	2	2	2	1	1	2			1	4	24
Horned Lark						3					6					9
American Robin	1	3		1					1			2				8
American Tree Sparrow				10						1						11
Barn Swallow				5												5
Blue-winged Warbler										1						1
Chipping Sparrow										1						1
Common Grackle										1						1
Common Yellowthroat												1	2			3
Eastern Bluebird										3			1			4
European Starling	5				25	4	2	30		3	25	5				99
Gray Catbird										1		2	2	1	1	7
House Wren												2				2
Northern Cardinal													1			1
Northern Mockingbird		1														1
Red-breasted Nuthatch				3												3

Table F-10 Fall 2009 Migratory Bird Survey, September 27, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Song Sparrow											3		2			5
Tufted Titmouse						1										1
White-breasted Nuthatch				3					1				2		1	7
Yellow Warbler						1							1			2
Total Birds	**8**	**8**	**3**	**32**	**32**	**19**	**6**	**34**	**4**	**21**	**54**	**18**	**16**	**28**	**8**	**291**
Species Count*	**4**	**5**	**2**	**11**	**4**	**10**	**4**	**4**	**4**	**12**	**7**	**10**	**11**	**6**	**5**	
Total Species																**34**

*Species count does not include unidentified birds.

Table F-11 Fall 2009 Migratory Bird Survey, October 10, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose								40			2	2				44
Double-crested Cormorant						10						200		280	230	720
Turkey Vulture						3	2			6	9					20
Red-tailed Hawk					1											1
American Kestrel								1	1	1						3
Killdeer		3	1						48		10					62
Mourning Dove	2	1	1									1				5
Red-bellied Woodpecker					1											1
Downy Woodpecker							1			1		1		1	2	6
Hairy Woodpecker									1						1	2
Northern Flicker							1								1	2
Blue Jay	1	1	3	1	1	2	2	2	1	1	3	1				19
American Crow			1	1		1	3	1	2	2				2	4	17
Horned Lark			3													3
American Goldfinch				1		1		6	2		1	4				15
American Pipit	1	3	2	1				3	2							12
American Robin		1								2				2	1	6
Baltimore Oriole		1												1		2
Black-capped Chickadee						1									2	3
Chipping Sparrow								1			2					3
Dark-eyed Junco												1				1
Eastern Bluebird				2	1			1	1	1	1					7
Gray Catbird															2	2
Northern Cardinal					1		1								1	3
Palm Warbler				1												1
Red-winged Blackbird					8	34			5	30						77
Song Sparrow									1	1				2		4
Tufted Titmouse										1						1
White-breasted Nuthatch				2	1		1			1					2	7
White-crowned Sparrow										1						1

Table F-11 Fall 2009 Migratory Bird Survey, October 10, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Winter Wren			1						1	1						3
Total Birds	**4**	**10**	**12**	**9**	**14**	**52**	**11**	**55**	**65**	**49**	**28**	**210**	**0**	**288**	**246**	**1,053**
Species Count*	**3**	**6**	**7**	**7**	**7**	**7**	**7**	**8**	**11**	**13**	**7**	**7**	**0**	**6**	**10**	
Total Species																**31**

*Species count does not include unidentified birds.

Table F-12 Fall 2009 Migratory Bird Survey, October 11, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose						50						2	130			182
Turkey Vulture		4										1				5
Red-tailed Hawk													1			1
Killdeer		1	3						1		2			2		9
Mourning Dove			1			1		14				1				17
Red-bellied Woodpecker												1		1		2
Downy Woodpecker						1			1							2
Hairy Woodpecker							1			1			1		1	4
Northern Flicker		1		1	1					1					1	5
Blue Jay	1	2		1		1	1	1	1	1	1		1	2	2	15
American Crow	3	1			6	5	4	3	1	4	3	9		1	3	43
American Goldfinch						6		1			2		1		1	11
American Pipit		2		1				1								4
American Robin										2			2			4
Baltimore Oriole														1		1
Black-capped Chickadee												1		1	2	4
Chipping Sparrow							1					1			1	3
Eastern Bluebird	1												4			5
Eastern Meadowlark															1	1
Gray Catbird															1	1
Northern Cardinal	1													1		2
Red-winged Blackbird						9				45		47	35	5		141
Ruby-crowned Kinglet													1			1
Song Sparrow				1			1			1	1			1		5
White-breasted Nuthatch	1								1			1	2		1	6
White-crowned Sparrow															1	1
Winter Wren			1		1				1							3
Total Birds	**7**	**11**	**5**	**4**	**8**	**73**	**8**	**20**	**6**	**55**	**9**	**64**	**178**	**15**	**15**	**478**
Species Count*	**5**	**6**	**3**	**4**	**3**	**7**	**5**	**5**	**6**	**7**	**5**	**9**	**10**	**9**	**11**	
Total Species																**26**

*Species count does not include unidentified birds.

Table F-13 Fall 2009 Migratory Bird Survey, October 24, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Turkey Vulture						5				2						7
Northern Harrier			1													1
Red-tailed Hawk									1							1
Killdeer		2	3			2	1				2					10
Mourning Dove			1		1			10				1	1			14
Red-bellied Woodpecker				1												1
Downy Woodpecker					1				1							2
Hairy Woodpecker															1	1
Northern Flicker										1			1			2
Blue Jay				2	2				4	3			1			12
American Crow	3	20	1	3	2	1	2	1	3	2	7	2	2	2	1	52
Horned Lark		4	6	3			3	3	3		3	2		1		28
Tree Swallow									5							5
American Robin					2	1			1			1		2	7	14
Black-capped Chickadee					2											2
Chipping Sparrow													1			1
Common Grackle													1			1
Eastern Bluebird								1								1
Eastern Meadowlark			1													1
European Starling	35		43		15		25									118
Field Sparrow														2		2
Gray Catbird					1					1					1	3
House Sparrow												1				1
Red-winged Blackbird	10	17					20	3	10					1		61
White-breasted Nuthatch					2										1	3
Total Birds	**48**	**43**	**56**	**9**	**28**	**9**	**51**	**18**	**28**	**9**	**12**	**7**	**7**	**8**	**11**	**344**
Species Count*	**3**	**4**	**7**	**4**	**9**	**4**	**5**	**5**	**8**	**5**	**3**	**5**	**6**	**5**	**5**	
Total Species																**25**

*Species count does not include unidentified birds.

Table F-14 Fall 2009 Migratory Bird Survey by Location, October 26, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose						8										8
Northern Harrier	3															3
Cooper's Hawk														1		1
Red-tailed Hawk				1	1							1			1	4
Killdeer		5	1			2	2	4			2			2		18
Rock Pigeon												3				3
Mourning Dove			2													2
Whip-poor-will	1															1
Red-bellied Woodpecker												1				1
Downy Woodpecker	1				1					1			3			6
Hairy Woodpecker	1						1					1		1		4
Northern Flicker															1	1
Eastern Wood-Pewee				1												1
Eastern Kingbird													3			3
Red-eyed Vireo							1			2					1	4
Blue Jay	1			1	1	1	1	1	2	1	1	1	3		1	15
American Crow	5	1	1	5		1	2	4	6		2	4	2	10		43
Horned Lark		10	5	2		2	5	5	4		11		2	2		48
Tree Swallow										10			1			11
American Goldfinch												2			1	3
American Robin	10		2		3			2	2						2	21
American Tree Sparrow										2				1		3
Baltimore Oriole															1	1
Barn Swallow	2															2
Black-capped Chickadee												1				1
Brown-headed Cowbird				1						1		1			1	4
Chipping Sparrow												2				2
Common Grackle										1		1		3		5
Common Yellowthroat							2									2
European Starling	25	10				10		6							6	57

Table F-14 Fall 2009 Migratory Bird Survey by Location, October 26, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Field Sparrow						1										1
Gray Catbird				1						1		1			1	4
House Finch										1						1
Northern Cardinal							1									1
Red-winged Blackbird	5								3			5	2		5	20
Song Sparrow						12				3						15
White-breasted Nuthatch				1	2					1		2	1		1	8
White-crowned Sparrow										4						4
White-crowned Sparrow										3						3
Yellow-rumped Warbler										8					2	10
Total Birds	**54**	**26**	**11**	**13**	**8**	**37**	**15**	**22**	**17**	**39**	**16**	**26**	**17**	**20**	**24**	**345**
Species Count*	**10**	**4**	**5**	**8**	**5**	**8**	**8**	**6**	**5**	**14**	**4**	**14**	**8**	**7**	**13**	
Total Species																**40**

*Species count does not include unidentified birds.

Table F-15 Fall 2009 Migratory Bird Survey, November 7, 2009

Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose	12															12
American Kestrel									1							1
Killdeer	1						1									2
Rock Pigeon							1									1
Mourning Dove	1	4	2				1			1	1		3			13
Whip-poor-will	1															1
Red-bellied Woodpecker	1															1
Downy Woodpecker		1														1
Northern Flicker								1						1		2
Eastern Wood-Pewee													3	3		6
Red-eyed Vireo					1								1			2
Blue Jay					1		1			1					1	4
American Crow	3		2	1	1	2	3	2		1	5	6	4	1	9	40
Horned Lark	1	2	11	3		1	5	5	5	2	13					48
American Robin	3			1			2		2					1		9
Cedar Waxwing	3													3		6
Chipping Sparrow															2	2
Common Grackle					1								1			2
European Starling	5	65	3				11	10	5	6						105
Gray Catbird					1											1
Red-winged Blackbird		2			1								1			4
Scarlet Tanager													1			1
White-breasted Nuthatch				1	2		1	1								5
Total Birds	**31**	**74**	**18**	**6**	**8**	**3**	**26**	**19**	**13**	**11**	**19**	**6**	**14**	**9**	**12**	**269**
Species Count*	**10**	**5**	**4**	**4**	**7**	**2**	**9**	**5**	**4**	**5**	**3**	**1**	**7**	**5**	**3**	
Total Species																**23**

*Species count does not include unidentified birds.

Table F-16 Fall 2009 Migratory Bird Survey, November 8, 2009

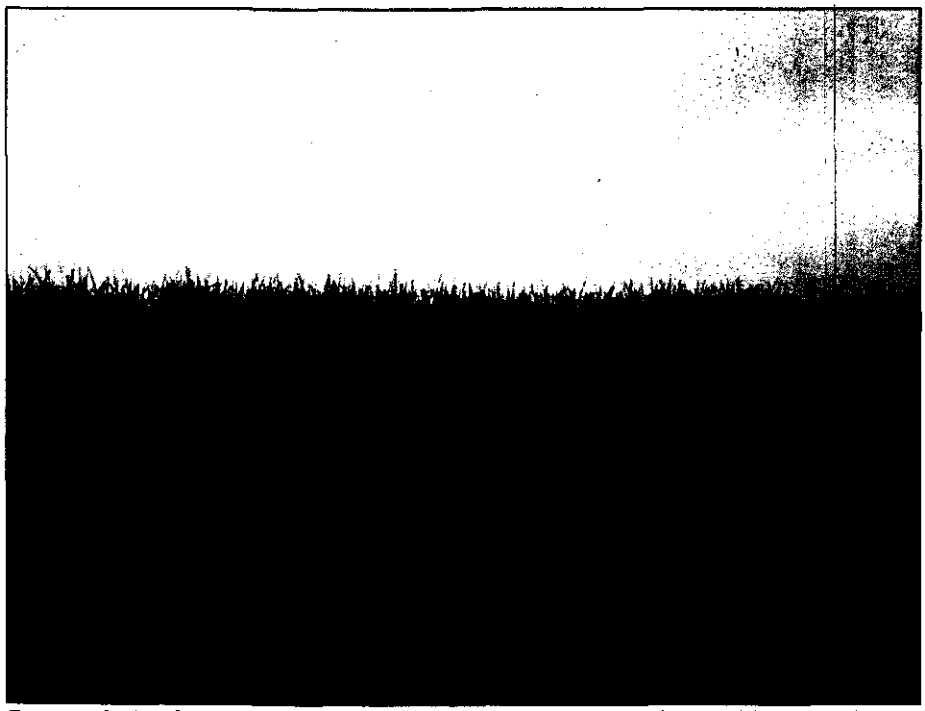
Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Canada Goose	24	8			2			12								46
Turkey Vulture							1									1
Red-tailed Hawk			1												2	3
Killdeer		1	2					1			1					5
Ring-billed Gull															5	5
Mourning Dove						1	1				2	1				5
Whip-poor-will												1			1	2
Red-bellied Woodpecker										1						1
Downy Woodpecker	1	1				1	1					1	1	1	1	8
Hairy Woodpecker		1			1										1	3
Northern Flicker		1		1			1					1		1	2	7
Eastern Wood-Pewee															3	3
Eastern Phoebe															3	3
Blue Jay		4				1	1		1						2	9
American Crow		1	1	2	3	10	3	11	9	2	1	2	2	6	1	54
Horned Lark	2	4	8	8		20	1	8	2	3	8					64
American Robin	3			1		4			1	2					2	13
Black-capped Chickadee															2	2
Chipping Sparrow	1									1						2
Common Grackle	2					1						2	1		2	8
Dark-eyed Junco														1	2	3
European Starling			16		55	30	10	5	10	25		11	5	3	3	173
Field Sparrow														1		1
Grasshopper Sparrow							1		1							2
Gray Catbird						2				1				1	2	6
Northern Cardinal					1							1				2
Red-winged Blackbird	5		2				2									9

Table F-16 Fall 2009 Migratory Bird Survey, November 8, 2009

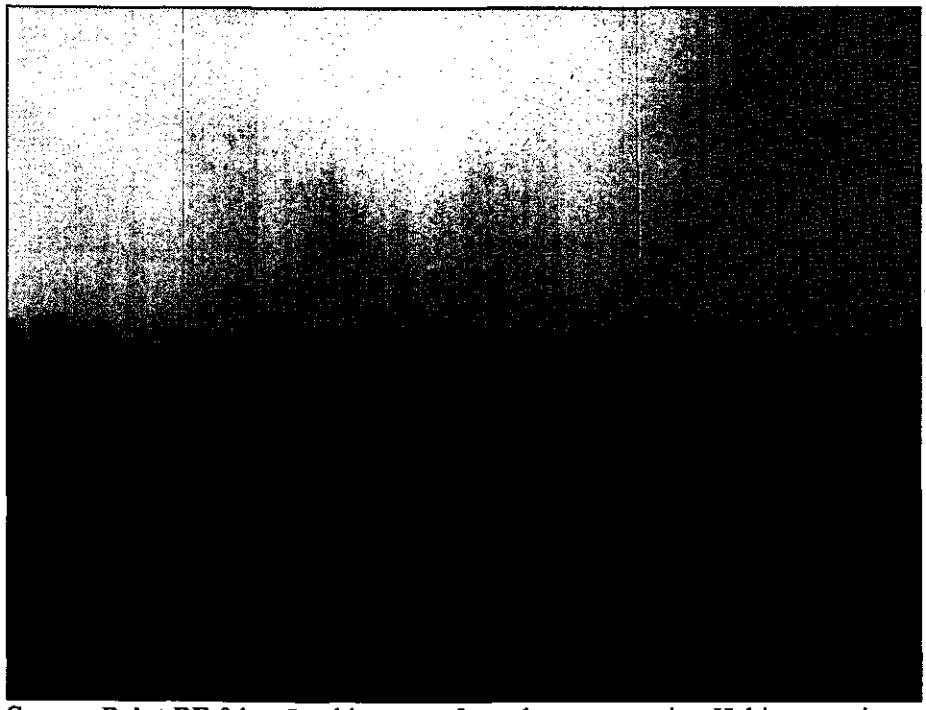
Species	BF-04	BF-05	BF-06	BF-07	BF-08	BF-09	BF-10	BF-11	BF-12	BF-13	BF-14	BF-15	BF-16	BF-17	BF-18	Total
Tufted Titmouse						4				1		1				6
White-breasted Nuthatch					2		1		1	1		3	1	3	2	14
Total Birds	**38**	**21**	**30**	**12**	**64**	**74**	**23**	**37**	**25**	**37**	**12**	**24**	**10**	**17**	**36**	**460**
Species Count*	**7**	**8**	**6**	**4**	**6**	**10**	**11**	**5**	**7**	**9**	**4**	**10**	**5**	**8**	**17**	
Total Species																**29**

*Species count does not include unidentified birds.

G Passerine Survey Points and Habitat Photos

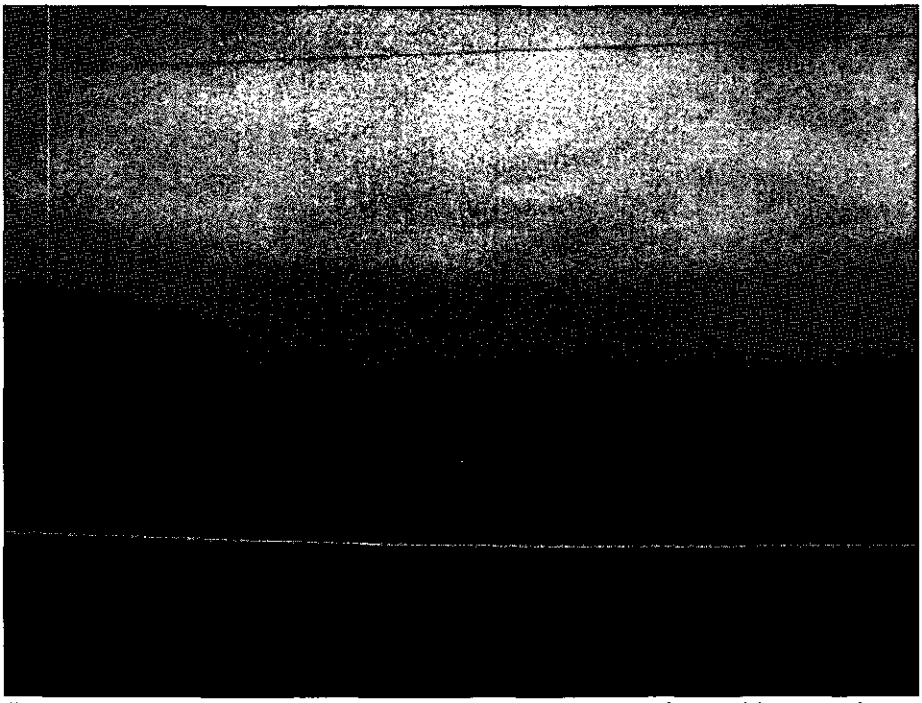


Survey Point BF-04: Looking east from the survey point. Habitat type is row-crop, planted with a corn crop to the east during 2009 survey season.



Survey Point BF-04: Looking west from the survey point. Habitat type is row-crop, planted with a soybean crop to the west during 2009 survey season.

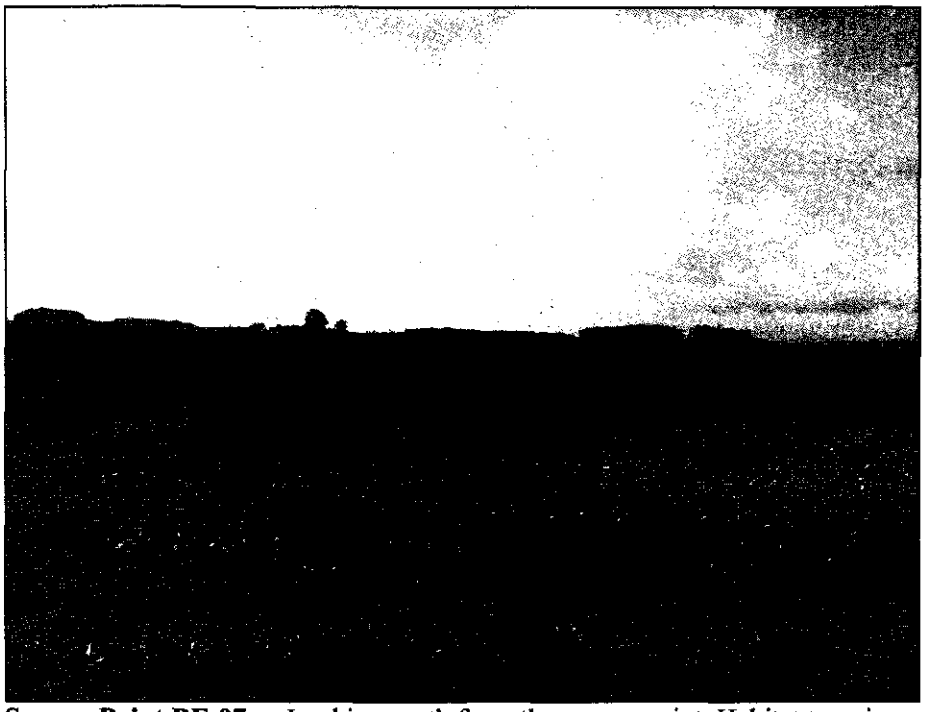
Survey Point BF-05: Looking east from the survey point. Habitat type is row-crop, planted with a soybean crop during 2009 survey season.



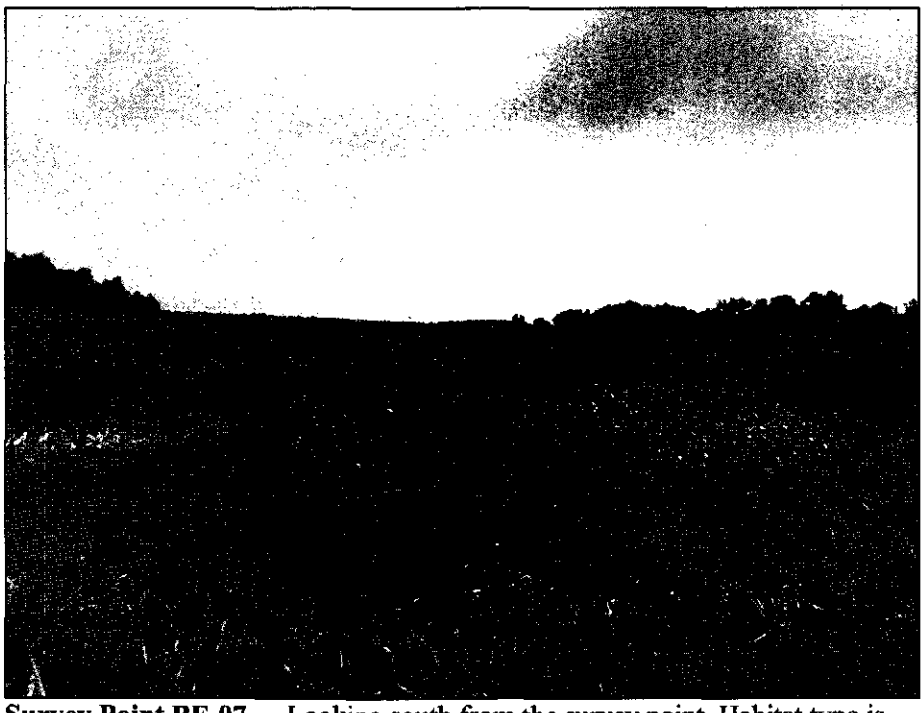
Survey Point BF-05: Looking west from the survey point. Habitat type is row-crop, planted with a soybean crop during 2009 survey season.

Survey Point BF-06 Looking east from the survey point. Habitat type is row-crop, planted with a soybean crop during 2009 survey season.

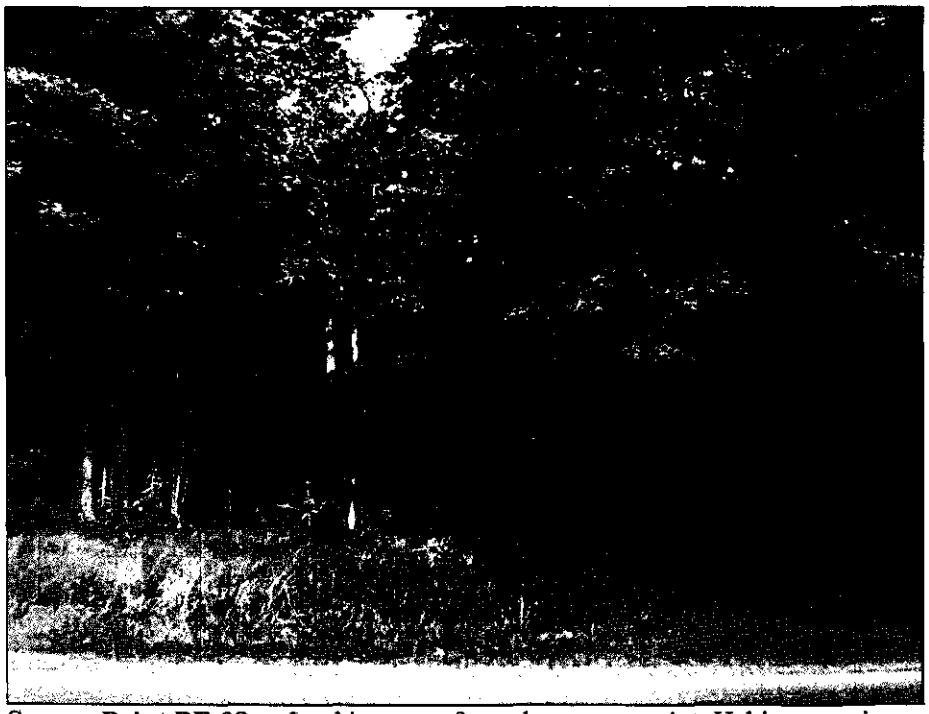
Survey Point BF-06 Looking west from the survey point. Habitat type is row-crop, planted with a soybean crop during 2009 survey season.



Survey Point BF-07 Looking north from the survey point. Habitat type is row-crop, planted with a soybean crop during 2009 survey season.



Survey Point BF-07 Looking south from the survey point. Habitat type is row-crop, planted with a corn crop during 2009 survey season. Drainage canal runs southwest along the edge of the corn field.



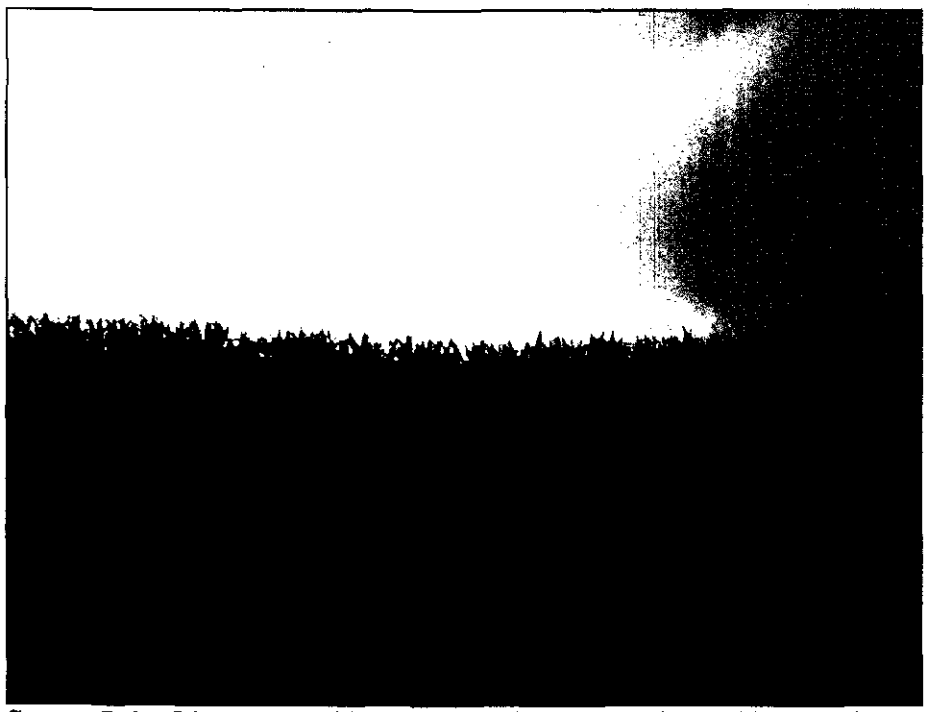
Survey Point BF-08 Looking west from the survey point. Habitat type is deciduous trees to the west.

Survey Point BF-08 Looking east from the survey point. Habitat type is deciduous trees to the east.

Survey Point BF-09 Looking west from the survey point. Habitat type is row-crops, planted with a soybean crop to the southwest, and a corn crop to the northwest during the 2009 surveys; with a deciduous forest patch approximately 350 meters to the west.

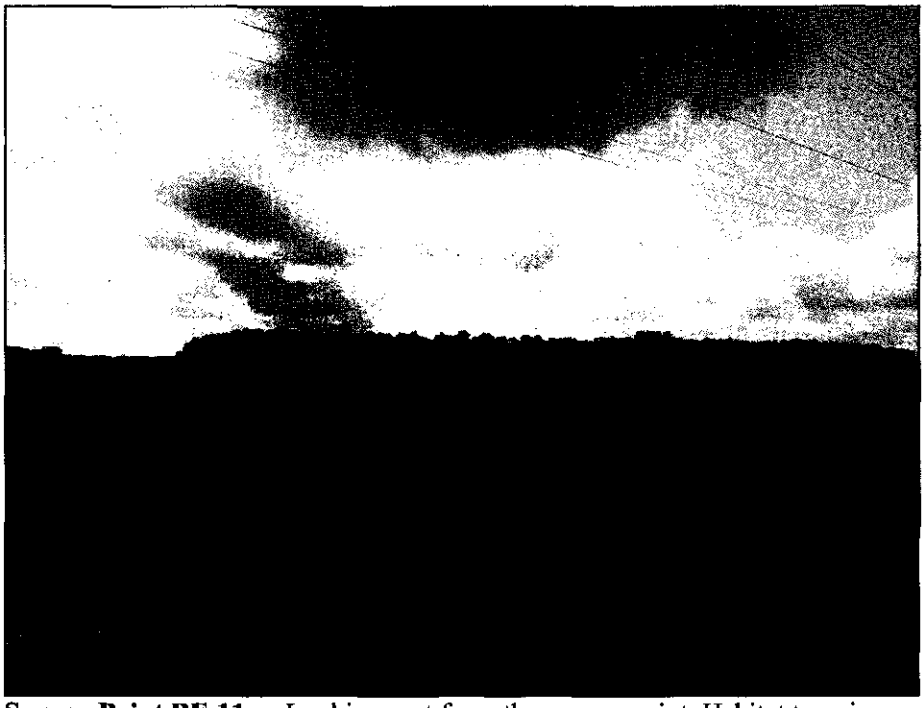
Survey Point BF-09 Looking east from the survey point. Habitat type is row-crop, planted with a corn crop during 2009 survey season.

Survey Point BF-10 Looking west from the survey point. Habitat type is row-crop, planted with a corn crop during 2009 survey season.

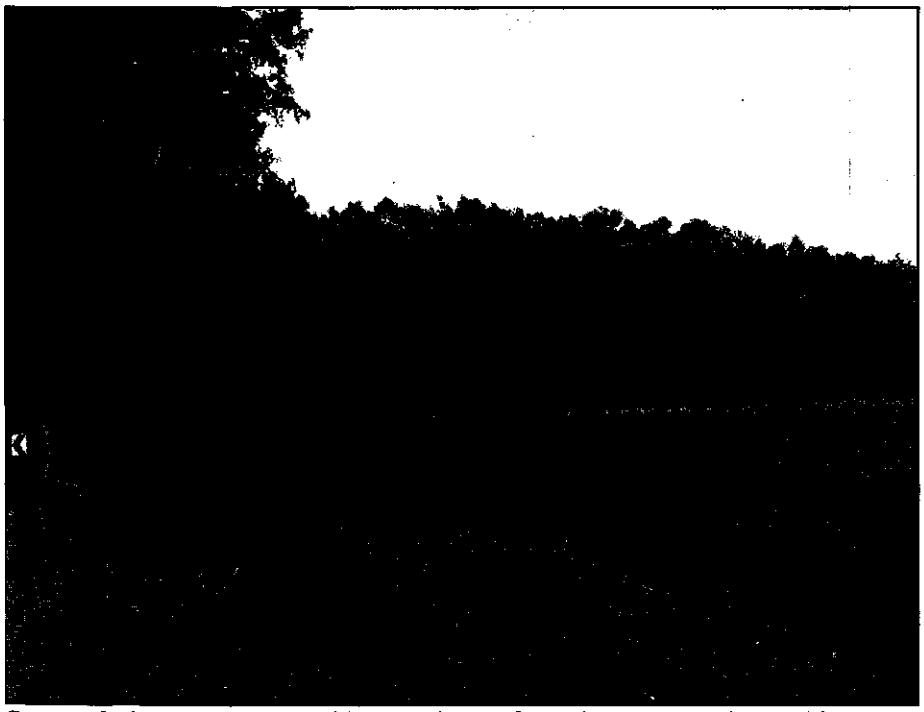


Survey Point BF-10 Looking east from the survey point. Habitat type is row-crop, planted with a corn crop during 2009 survey season.

Survey Point BF-11 Looking west from the survey point. Habitat type is row-crops, planted with a soybean crop to the west, with a hedgerow to the northwest.



Survey Point BF-11 Looking east from the survey point. Habitat type is row-crops, planted with a soybean crop during the 2009 survey season.

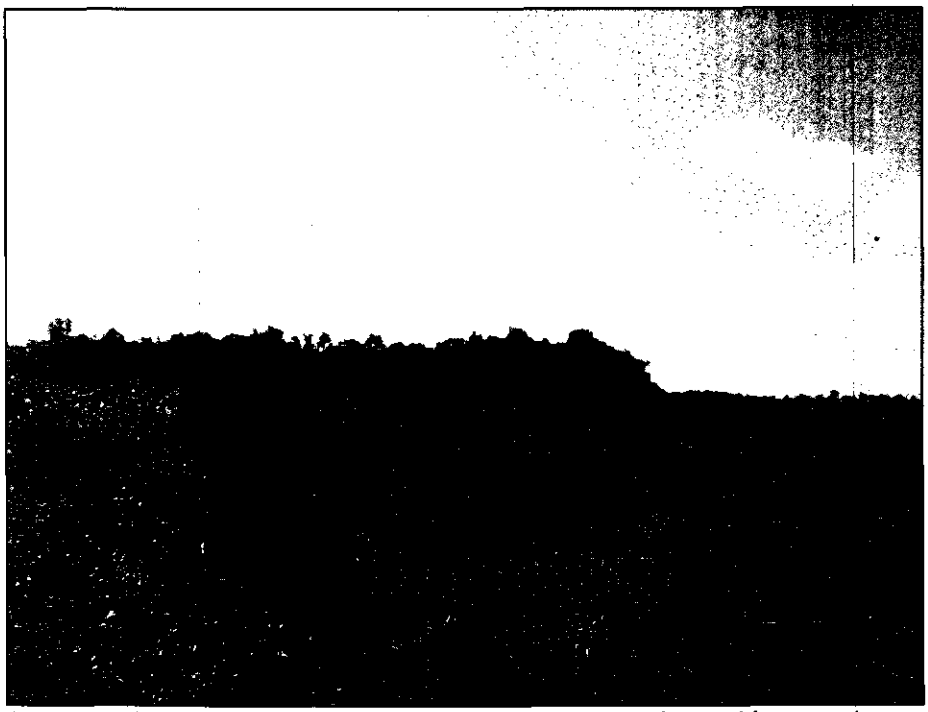


Survey Point BF-12 Looking southwest from the survey point. Habitat type is row-crops, planted with a soybean crop during the 2009 survey season, and a deciduous forested block to the south/southeast.

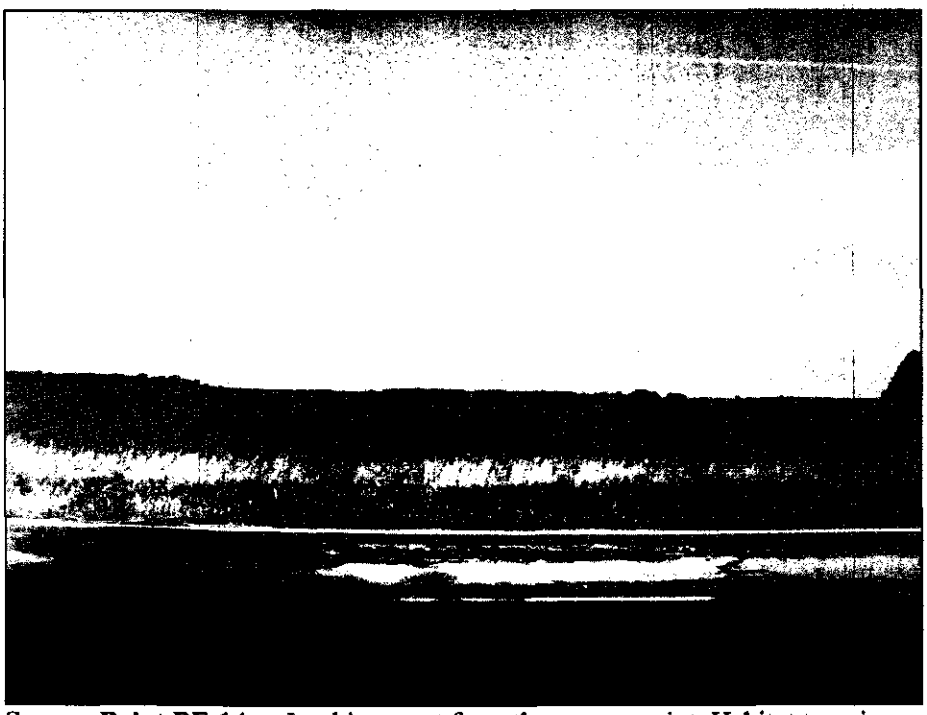
Survey Point BF-12 Looking northeast from the survey point. Habitat type is row-crops, planted with a soybean crop during the 2009 survey season.

Survey Point BF-13 Looking west from the survey point. Habitat type is row-crops, planted with a soybean crop to the west, and a corn crop to the northwest during the 2009 surveys.

Survey Point BF-13 Looking east from the survey point. Habitat type is an idle field to the northeast and a corn crop to the southeast, separated by a hedgerow.

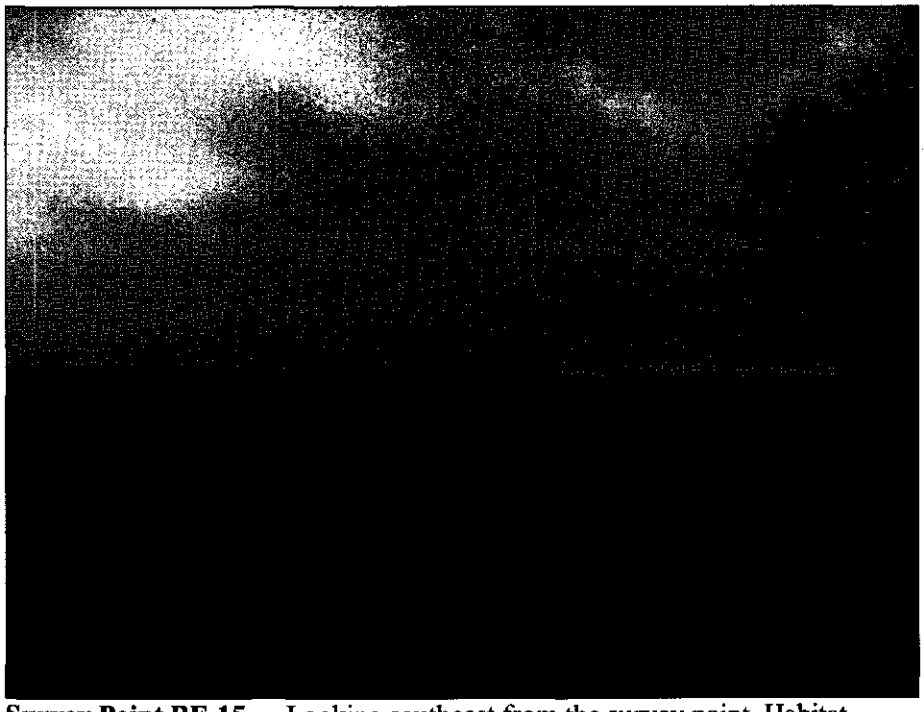


Survey Point BF-14 Looking east from the survey point. Habitat type is row-crops, planted with a corn crop to the southeast and a soybean crop to the southwest during the 2009 surveys.

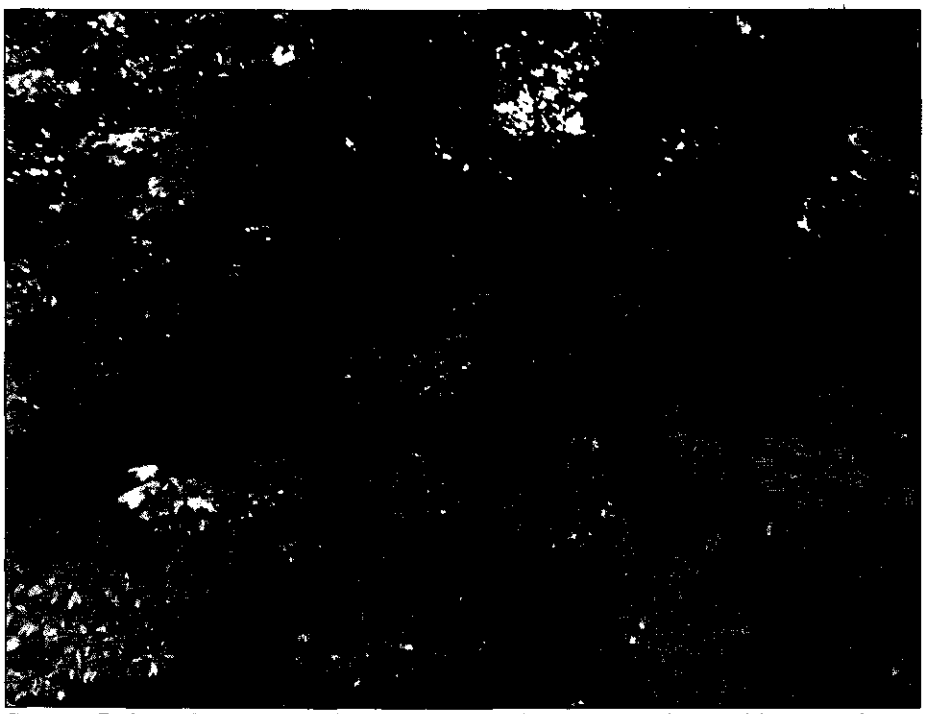


Survey Point BF-14 Looking west from the survey point. Habitat type is row-crops, planted with a soybean crop to the southwest during the 2009 surveys.

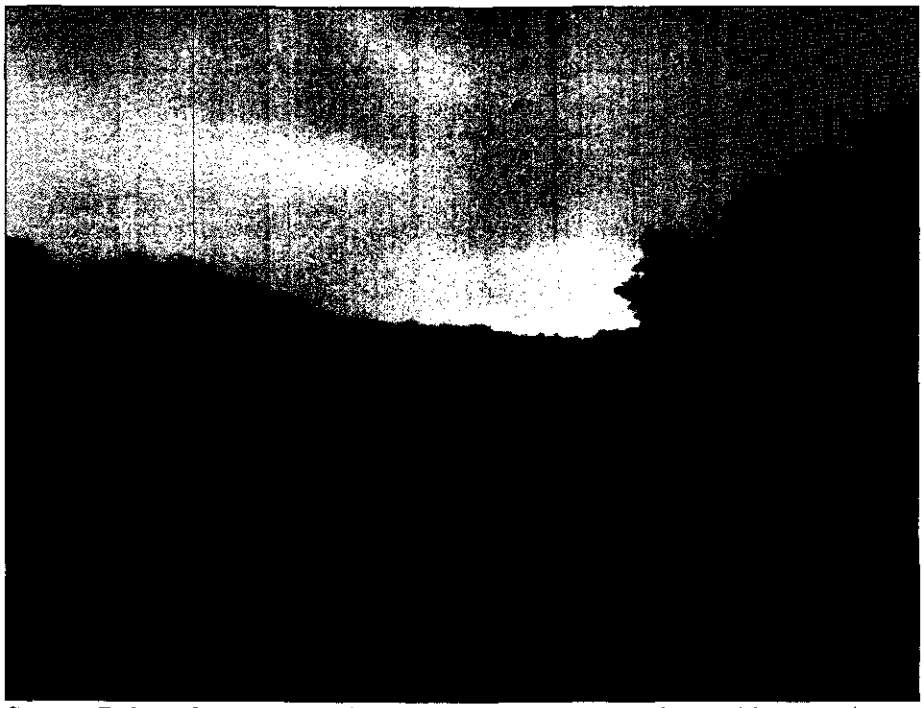
Survey Point BF-15 Looking northwest from the survey point. Habitat type is deciduous trees to the northwest and manicured lawn to the northwest.



Survey Point BF-15 Looking southeast from the survey point. Habitat type is deciduous trees to the southwest and manicured lawn to the southeast, and row-crop planted with corn to the south.

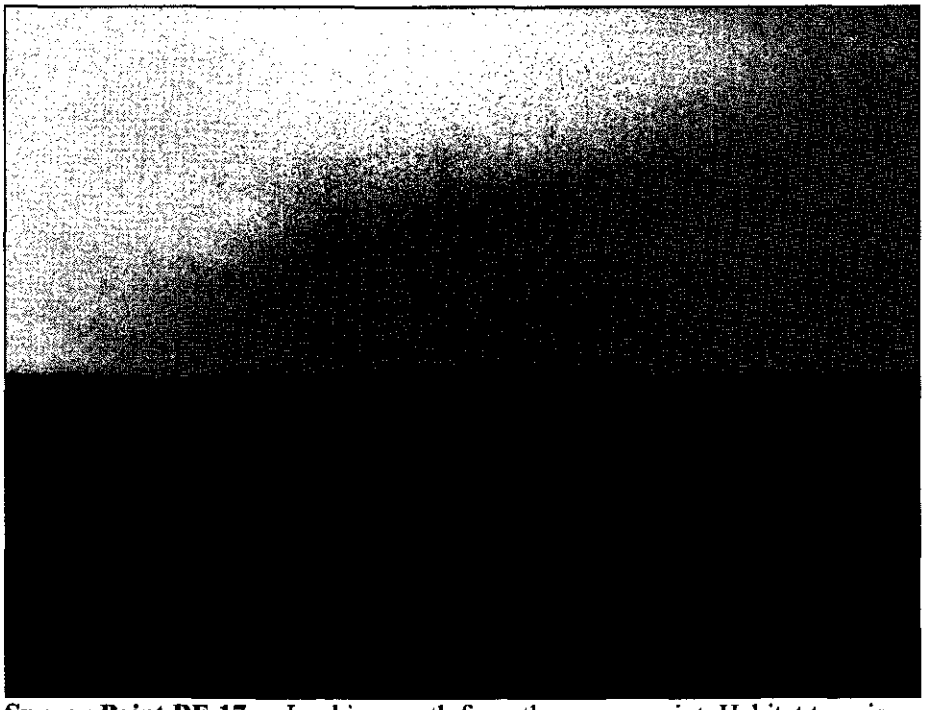


Survey Point BF-16 Looking west from the survey point. Habitat type is deciduous trees to the east.

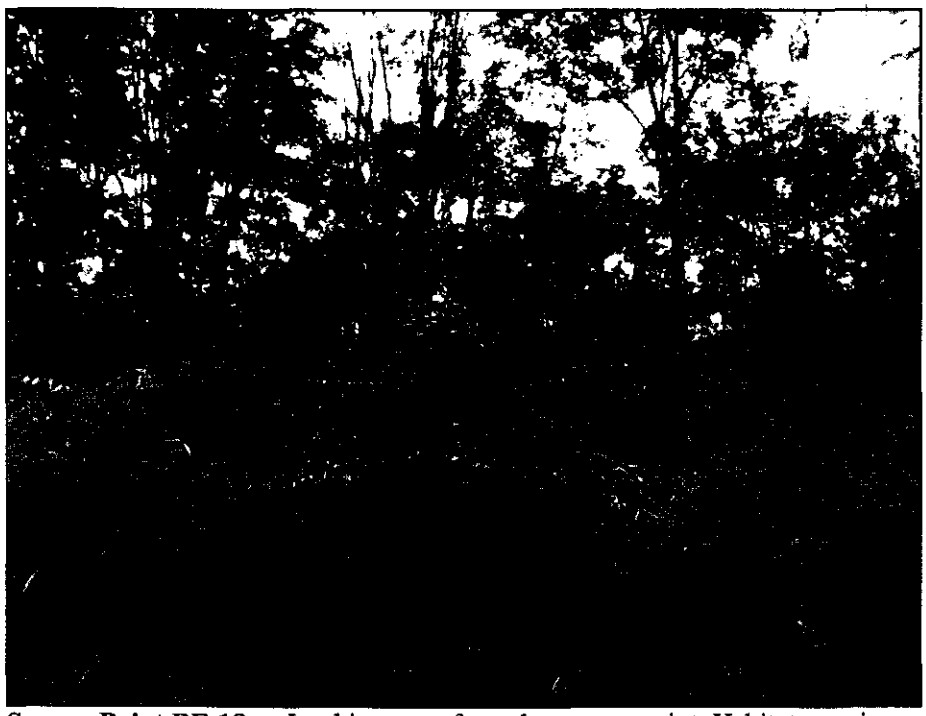


Survey Point BF-16 Looking east from the survey point. Habitat type is row-crop, planted with a corn crop to the south during 2009 survey season.

Survey Point BF-17 Looking north from the survey point. Habitat type is deciduous trees to the north.



Survey Point BF-17 Looking south from the survey point. Habitat type is row-crop, planted with a soybean crop to the south during 2009 survey season.



Survey Point BF-18 Looking west from the survey point. Habitat type is deciduous trees with hedgerow to the west.

Survey Point BF-18 Looking east from the survey point. Habitat type is deciduous trees to the east.

2741.BF08.02_CHI1288

Owl Playback Survey Report for Black Fork Wind Project Crawford and Richland Counties, Ohio

May 2010

Prepared for:

BLACK FORK WIND, LLC
1515 Wynkoop, Suite 700
Denver, CO 80202

Prepared by:

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33 West Monroe Street, Suite 550
Chicago, IL 60603

Table of Contents

List of Figures

List of Abbreviations and Acronyms

Black Fork	Black Fork Wind, LLC
E & E	Ecology and Environment, Inc.
MW	megawatt
ODNR	Ohio Department of Natural Resources
Project	Black Fork Wind Project
USFWS	U.S. Fish and Wildlife Service
Protocol	Onshore Bird and Bat Pre- and Post-construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio
OPSB	Ohio Power Siting Board
MPH	Mile per Hour
pm	Post Meridiem

1 Introduction

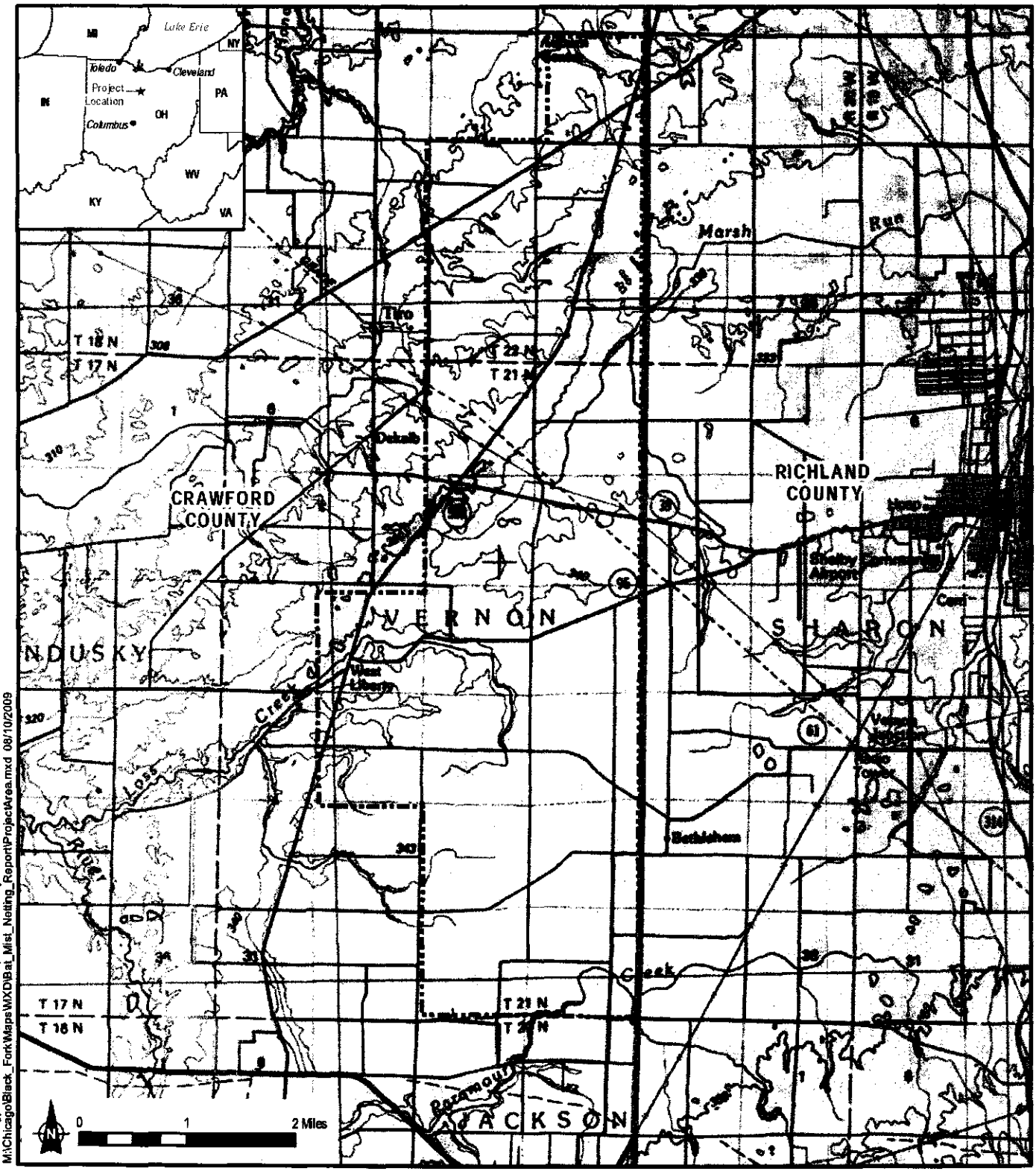
Black Fork Wind, LLC (Black Fork) proposes to construct and operate a commercial-scale wind energy facility (Project) in Richland and Crawford counties, north of Crestline and west of Shelby, Ohio (see Figure 1-1). The Project entails the development of a 201.6 megawatt (MW) wind farm, composed of 112 wind turbines. The Project area was expanded from approximately 12,000 acres to over 29,000 acres during the spring of 2009 (see Figure 1-1).

The owl playback survey was conducted based on recommendations and protocol established by the Ohio Department of Natural Resources (ODNR). On May 4 2009, the ODNR issued the *Onshore Bird and Bat Pre- and Post-construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio* (Protocol)). These monitoring protocols provide guidelines for conducting bird and bat studies in areas of proposed commercial wind energy projects. The scope and intensity for bird and bat surveys is based upon a three-tiered approach, where ODNR may recommend minimum, moderate, or extensive studies based on variables such as habitat and overlapping range to threatened and endangered species. The ODNR recommended moderate-level surveys for a minimum of one year of pre-construction for the Project in a letter dated May 14, 2009 (see Appendix A. This level of effort recommends that owl playback surveys be conducted in January, February, and March.

The data collected from the owl playback survey was used to document the presence of Great Horned Owl (*Bubo virginianus*), Barred Owl (*Strix varia*), and Eastern Screech-Owl (*Megascops asio*) in the Project area.

This report summarizes the results of the owl playback survey conducted during the winter of 2010. The purpose of this report is to support an application to the Ohio Power Siting Board (OPSB) to construct and operate the Project and to provide the results of these pre-construction surveys to the ODNR and United States Fish and Wildlife Service (USFWS) for further consultation.

Black Fork Wind, LLC - Project Area Location



© Ecology & Environment, Inc. GIS Department Project #002741.BF08.05
M:\Chicago\Black_Fork\Maps\MXD\Bat_Mist_Netting_Report\ProjectArea.mxd 08/10/2009

Proposed Project Area (08-14-09)

2008 Project Area (08-27-08)

County Boundary

Figure 1-1
Project Area Location
Black Fork Wind, LLC

Source: ESRI 2009; USGS 1981-83.

2 Habitat and Topography in the Project Area

2.1 Habitat in the Project Area

The Project area is located entirely on private land and is composed mainly of agricultural fields, which make up approximately 25,258 acres, or 85% of the Project area. The agricultural land is used for row crops, mostly corn, soybean, and wheat. A small number of fallow fields were observed within the Project area. A few small-scale farms and livestock operations are also present. The agricultural land does not provide quality habitat for birds due to a lack of structural diversity and, therefore, does not support a wide variety of bird species.

Forest lands within the Project area occur as scattered, fragmented woodlots and are classified as American Beech-Sugar Maple Glaciated Midwest Forests. There are only three locations within the Project area that contain a contiguous forested area over 50 acres in size. Forested lands comprise only 2,560 acres, or 9%, of the total Project area. Many of the forested areas are riparian areas for small headwater streams and larger perennial streams. Forested wetlands also occur within the forest blocks. The larger forested areas have increased structural diversity, and therefore greater likelihood for owl abundance and diversity.

According to the Ohio Wetland Inventory, there are 785 acres of wetlands within the Project area (ODNR 2000). This includes forested, shrub/scrub, and emergent wetlands. Aerial photography suggests, and field reconnaissance confirms, that many of the mapped emergent wetlands have been converted to cropland, thereby diminishing their value as habitat. The undisturbed wetlands are found within forested areas or adjacent to streams. There are no large wetland complexes located within the Project area or within a 5-mile radius of the Project area.

E & E conducted a wetland and surface water survey of the Project during the summer of 2009. From this survey a total of 49 streams, 35 of which were delineated, were identified within the Project area. Of the 35 delineated streams, 20 were classified as ephemeral or intermittent and 15 were determined to be perennial systems. Several streams, primarily the larger perennial ones, flow through the forested blocks or have vegetated or non-agricultural riparian zones

along their banks. Thus, these streams provide a travel corridor for wildlife through open agricultural fields to other habitats. Still, many streams have active agricultural lands present to the edge of both banks, diminishing the quality of habitat they provide.

3 Species Information

3.1 Great Horned Owl

Great Horned Owls are a large and powerful owl species known to occur throughout North America and Central America. Found in forested, desert, and grassland habitat the Great Horned Owl has the most extensive range and prey base of any American owl species. They are primarily, but not exclusively, nocturnal hunters. Great Horned Owls are known to prey upon small mammals, birds, reptiles, amphibians, and other invertebrates; however, their diet largely consists of mammals, supplemented with birds. In forested environments they are largely known as perch-pounce foragers, pouncing down upon prey from perching positions. Great Horned Owls are territorial birds, remaining year-round in the same area. Males and females locate each other by hooting and it is believed the male establishes the territory as he is the predominate vocalist between the two. Across their range nests sites are incredibly variable and are believed to have a wider range of nest sites than any bird in the Americas. In forested areas, such as those found in the Project area, nests are commonly located in tree cavities and snags. Males are presumed to hold a territory that includes a nest site where they are joined by females for several months before eggs are laid. The timing of egg laying varies by region, but for the latitude of the Project area clutches typically arrive between January and February. Clutches are most commonly two eggs, but can range from one to four or occasionally five eggs. Eggs are often laid 2 days apart, but can this can vary from one to seven days. Females will begin incubating the eggs immediately after laying, with incubation lasting approximately 30 to 37 days. Hatchlings are born typically in the same order in which the eggs were laid. The young will remain in the nest, where they are brooded by females continuously until about two weeks of age. By six weeks of age fledglings will move from the nests out to nearby branches and by seven weeks are capable of a few very short flights. Young will remain with their parents throughout summer and most of fall. Often after leaving their parents and nests the young will remain in the territory and will remain in close company with their siblings for several weeks, often roosting in the same tree or immediate vicinity. However by late fall the fledglings disperse and are often excluded from breeding territories by aggressive territorial owls. These young owls may remain non-territorial for several years. Great Horned Owls are thought to be the longest lived of all North American owls and through banding have been documented

living over 20 years old (Stuart et al. 1998). Given the habitat of the Project area, and the widespread distribution and adaptability of this species it is highly likely that Great Horned Owls are present within the Project area year round.

3.2 Barred Owl

Barred Owls are widely distributed in coniferous and deciduous forests throughout North America. The Barred Owl's range is widespread east of the Great Plains, into the eastern Rocky Mountains, and throughout British Columbia and the Pacific Northwest. It primarily relies on tree cavities for nesting and it is often found in mature and second-growth forests. Commonly recognized by it's "Who cooks for you?" call, the Barred Owl is a large gray-brown woodland owl with a well-developed facial disc, dark eyes, and a dark body and whitish bars across the head, neck and chest. Barred Owls are considered semi-nocturnal to nocturnal hunters, but will occasionally hunt during daylight hours. They are opportunist predators and will sit on an elevated perch waiting for prey to pass by. Prey consists of small mammals, birds, reptiles, amphibians, fish, and invertebrates. The Barred Owl is a monogamous and territorial bird, and will often remain in the same area year-round. Courtship calls between males and females begin in late winter, and becomes centered on the nest by early spring. Eggs are typically laid between March and April in northern regions. Clutch sizes are often one to five eggs, with individual eggs being often being laid between 24 and 72 hours apart (Mazur et al. 2000). Incubation typically begins after the second egg is laid, and lasts between 28 and 33 days (Bent 1938, Elderkin 1987, Johnsgard 1988). Females exclusively incubate, as males lack the brood patch (Elderkin 1987, Johnsgard 1988). The young are fed by the adults from late summer to early fall. During the brooding period the males will hunt for prey, delivering the prey to the female who tears it up and feeds it to the young. The young often leave the nest around 4-5 weeks of age. Although flightless at this time, the young will climb out of the nest and down the tree, eventually to the ground where they will climb a nearby leaning tree to perch (Bent 1938, Dunstan and Sample 1972, Elderkin 1987). By ten weeks of age the young can take short flights, and will acquire longer flight capabilities by twelve weeks of age (Soucy 1976). The young remain in close proximity to each other and their nest site, being fed by parents, until they acquire longer flight abilities. Sexual maturity typically is not reached until the second year of age (Mazur et al. 2000). Given the habitat of the Project area, particularly the second growth forested blocks near riparian areas, and the distribution of the Barred Owl it is likely that this species is present within the Project area year round.

3.3 Eastern Screech-Owl

The playback surveys targeted the Eastern Screech-Owl in March. The Eastern Screech-Owl is a small lowland forest owl species. Observed in two color morphs, rufous and gray, the Eastern Screech-Owl has most distinct plumage differences of any North American owl species. The range of the Eastern Screech-Owl extends from east of the Rocky Mountains, south of the Canadian

boreal forest south to the Tropic of Cancer in Mexico. Eastern Screech-Owls occur in coniferous and deciduous wooded areas below 1,500 ft in elevation. This species can be found permanently inhabiting rural as well as urban environments, and is known to nest in human-made cavities. Eastern Screech-Owls primarily forage within the forest understory and along forested edges and clearing (Gilbert 1984, Gehlbach 1994c, Sparks et al. 1994), feeding on aquatic and terrestrial invertebrates, songbirds, and rodents, and has the most varied diet of any North American owl species. The Eastern Screech-Owl often uses a perch and wait hunting method, striking down from their perch and capturing prey with their feet. The Eastern Screech-Owl is a monogamous and polygamous species; with pairs same aged birds inhabit small territories and alternate nest sites. Courtship displays vary by region, but typically take place from late January through late March. The timing of egg laying varies by region, but for the latitude of the Project area clutches of four to five eggs will typically arrive between April and May. Incubation often occurs immediately following the arrival of the first egg, and is done exclusively by the female. The incubation period typically lasts 30 days or longer depending on the clutch size. Nesting lasts for several weeks, during which the adult male owl brings prey to the female who dismembers the prey and feeds it to the young. After the young leave the nest, they will remain in close proximity to each other and the nest, depending on their parents for an additional eight to ten weeks (Gehlbach 1995). Sexual maturity is reached by the year one and most breed their first year (NatureServe 2009). Given the habitat of the Project area, and the widespread distribution and adaptability of this species it is highly likely that Eastern Screech-Owl are present within the Project area year round.

4 Methodology

The methodology used by E & E in conducting the owl playback surveys was consistent with ODNR's On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio (ODNR 2009).

4.1 Owl Playback Survey

Through consultation with the ODNR on May 14, 2009 it was determined that owl playback surveys be conducted at the three 100+ hectare forested blocks within the Project area.

As the guidelines recommended, surveys were conducted once a month for the appropriate species: January (Great Horned Owl), February (Barred Owl), and March (Eastern Screech-Owl). One playback sample point was established within each of the three 100+ hectare forested blocks in the Project area. Prior to beginning the first survey, the forested blocks were scouted in the daytime to identify the sampling point locations. All three of the sampling points are within close proximity (500 meters) to a stream. Riparian areas were not specifically targeted when the points were established; rather it is coincidental that the large 100+ hectare forested blocks have streams running through them.

Playback calls began approximately one half hour after sunset, and were played at maximum volume through a FoxPro NX3 MP3 wildlife caller. The FoxPro NX3 50 is a directional audio player which has the ability to emit sound from the front and back of the device individually or simultaneously. For the owl playback surveys, calls were played through both front and back speakers allowing calls to be projected in two directions at each sampling point. This allowed the calls to penetrate further into the forest, potentially reaching more owls. The "Smithsonian Field Guide to the Birds of North America" audio compact disc provided the calls files used for the surveys. At each sampling point the owl call was played for one-minute, and followed by four-minutes of listening. This was repeated three times, for a total of 15-minutes of surveying at each sampling point.

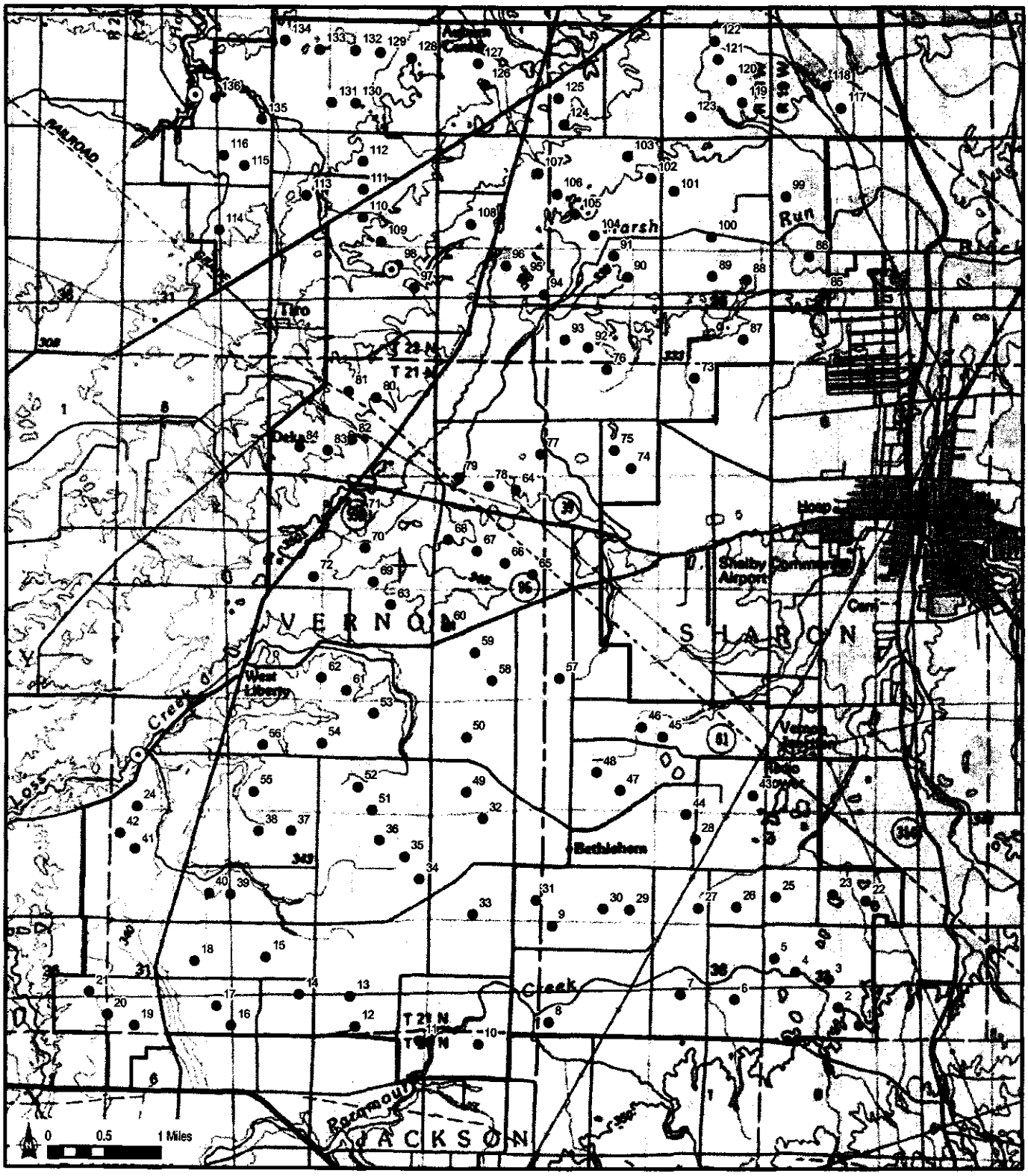
The latitude and longitude of each sampling point was collected using a Garmin HCX Vista hand-held global positioning system (GPS) device and recorded on the datasheet. These points were established prior to the first survey and were used for the three surveys thereafter. Surveys were conducted from within the forested habitat at locations with little ambient noise and were conducted on calm nights with little wind. Weather conditions, including temperature, wind direction and speed, cloud cover, precipitation, and the phase of the moon were recorded for each survey night. This weather data was obtained from wunderground.com, with Mansfield, Ohio being the location source for each survey to provide consistency.

The Great Horned Owl playback survey was conducted between 7:00 and 9:00pm on January 31, 2010. Sunset took place at 5:46 pm and civil twilight ending at 6:15 pm on January 31, 2010 at the Project Area (US Naval Observatory). The temperature remained steady at approximately 22° F, with a moderate wind of 10 mph out of the west-southwest during the 7:00pm to 9:00 pm survey period. The evening was clear, with no traceable precipitation, and the moon phase was a waning gibbous with over 90% of the moon's visible disk illuminated.

The Barred Owl playback survey was conducted between 7:00 and 8:46pm on February 24, 2010. Sunset took place at 6:15 pm and civil twilight ending at 6:43 pm on February 24, 2010 at the Project Area (US Naval Observatory). The temperature varied from 27 to 32°F, with a light wind of approximately 3 mph out of the west during the 7:00pm to 8:46 pm survey period. The sky was an estimated 80% overcast, with no traceable precipitation, and the moon phase was waxing with over 50% moon's visible disc illuminated.

The Eastern Screech-Owl playback survey was conducted between 7:46 and 9:59pm on March 10, 2010. Sunset took place at 6:31pm and civil twilight ending at 6:51 pm on March 10, 2010 at the Project Area (US Naval Observatory). The temperature varied from 47 to 52°F, with a moderate wind of approximately 8 mph out of the south-southeast during the 7:46pm to 9:59 pm survey period. The sky was clear, with no traceable precipitation, and the moon phase was in the first quarter; however, the moon hadn't risen during the survey period.

Black Fork Wind LLC



- Owl Playback Point
- Turbine (10-21-09)
- Project Area (10-21-09)

Figure 4-1
Owl Surveys
Black Fork Wind LLC

Source: ESRI 2009; OH DNR 2009

5 Results

5.1 Great Horned Owl Playback Surveys

The playback survey at survey point #1 began at 7:02 pm and concluded at 7:17 pm. No response calls were heard from this sample point. However, while scouting the forested block prior to sunset (5:00pm) a Great Horned Owl was observed flying within the forest near the survey point. This bird was not detected during the playback survey several hours later. The owl was either not present within that forested block at that time or chose not respond.

The playback survey at survey point #2 began at 7:52 pm and concluded at 8:09 pm. No owls responded to the calls when played. An Eastern Screech-Owl was heard in the forest, east of the survey point #2 prior to start of the playback survey. The surveyor waited several minutes from the last screech-owl vocalization before beginning the Great Horned Owl playback. The Great Horned Owl was not detected.

The playback survey at survey point #3 started at 8:35 pm and concluded at 8:51 pm. The Great Horned Owl was not detected.

From the Great Horned Owl survey conducted on January 31, 2010 no Great Horned Owls were detected during the playback survey; however, one was observed earlier in the day near survey point #1.

5.2 Barred Owl Playback Surveys

The playback survey at survey point #3 began at 7:00 pm and concluded at 7:15pm. At 7:11pm a Barred Owl was observed flying in from the north landing in a tree canopy (50 feet high) approximately 40 feet from the survey point. This bird remained in the tree for two more minutes before flying off to the north and out of visible range of the surveyor. Immediately following this bird's departure a total of three Barred Owls were heard calling from north of the survey point. It is presumed that one of these is the individual that flew in to investigate earlier.

The playback survey at survey point #2 began at 7:48 pm and concluded at 8:03 pm. At 7:51pm, three minutes after the first playback call was conducted, a single

Barred Owl was heard calling from the east at an estimated 450 feet from the survey point. Two minutes later, as the second playback was being conducted the owl was observed flying into a tree canopy (45 feet high) approximately 60 feet from the survey point. The individual remained at this perch for four minutes before flying over the surveyor's head and landing in a tree canopy (55 feet high) approximately 20 feet from the survey point, as the third playback was being conducted. This owl remained on this perch for the final four minutes of the survey.

The playback survey at survey point #1 started at 8:31 pm and concluded at 8:46pm. At 8:43pm, two minutes after the second playback call was conducted, a single Barred Owl was observed flying in from to north and landing in a tree canopy (40 feet high) approximately 30 feet from the survey point. This individual never vocalized and remained on this perch for two more minutes before flying off to the north out of visual range of the surveyor.

A total of five individual Barred Owls were detected during the playback survey conducted on February 24, 2010.

5.3 Eastern Screech-Owl Surveys

The playback survey at survey point #3 began at 7:46pm and concluded at 8:02pm. At 7:52pm, one minute after the second audio playback was made a Barred Owl was heard calling from far off (>1,000 feet) to the north of the survey point. One minute following this vocalization an Eastern Screech-Owl was heard calling from the north. This individual was estimated to be 500 feet from the survey point. Immediately following these vocalizations dogs in the area began barking and neither owl was heard again for six minutes. At 7:59, one minute after the third audio playback was conducted, a Barred Owl called from far off to the north again. It is assumed that this is the same individual that vocalized earlier, but this can't be confirmed. At 8:02, two minutes following the second Barred Owl call, an Eastern Screech-Owl called from the north. This vocalization was estimated to be 500 feet from the survey point, and is presumed to be same individual that called earlier.

The playback survey at survey point #2 began at 8:55pm and concluded at 9:10pm. At 8:58 pm, three minutes after the first audio playback call was conducted, a single Eastern Screech-Owl was heard calling from the north. This call was quite faint and believed to be from an owl greater than 1,000 feet away. No other vocalizations were heard until 9:10, when an Eastern Screech-Owl call was heard again from the north. Both of these calls were made from what sounded like the same area and are believed to be made from the same individual.

The playback survey at survey point #1 began at 9:43 and concluded at 9:59pm. At 9:45, two minutes after conducting the first audio playback a small to medium sized owl was observed flying from the south and landing in a tree canopy (45 feet high) approximately 20 feet of the survey point. The species could not be

positively identified; however, given its small size, it was likely an Eastern Screech-Owl. This individual remained on this perch for minutes before flying off to the south out of the visible range of the surveyor. At 9:56pm, two minutes after the third audio playback, two Eastern Screech-Owls were heard calling from the east. Both calls were clear and loud and the individuals were believed to be within 200 feet of the survey point, however neither bird could be seen. Both of these owls vocalized for the remaining three minutes of the survey.

A total of six Eastern Screech-Owl calls were heard during the Eastern Screech-Owl playback survey conducted on March 10, 2010. It is believed that the two calls heard at survey point #2 were made by one individual, and the two calls at survey point #3 were made one individual. Given this assumption, four Eastern Screech-Owls were detected during March playback survey. However, this is merely an assumption and can not be confirmed; therefore a total of six Eastern Screech-Owls may have been detected during the March survey. In Addition to the Eastern Screech-Owl detections a Barred Owl was heard calling twice during the playback survey.

6 Conclusions

The surveys targeted Great Horned Owl (*Bubo virginianus)*, Barred Owl (*Strix varia*), and Eastern Screech-Owl (*Megascops asio*) during the winter of 2010 in the Project area. The survey was designed to document the presence and distribution of these three owl species within the Project area. Barred Owl and Eastern Screech-Owl were identified at all three of the targeted forested blocks. The Great Horned Owl was not detected during the survey but was observed prior to the start of the January survey, at survey point #1.

The current occurrence of these three species in the Project area is not unexpected given the fragmented forested habitat and the relative abundance of these species, as all are considered 'common' in north-central Ohio.

In a review of avian fatalities reported in 31 post-construction studies, Erickson et al. (2001) found only 0.5% of the carcasses found outside of California were owls. More recent post-construction studies at wind energy facilities in the eastern United States have also had very few incidences of owl fatalities. As there is little to no construction planned in forested areas for the Project, there is a low risk of any substantial negative impact on habitat through loss, degradation, or displacement of the three owl species studied. No significant adverse impacts on owl species are anticipated from construction and operation of the Project.

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A Ohio Department of Natural Resources Consultation

Ohio Department of Natural Resources

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May 14, 2009

To all interested parties,

Based upon the revised project boundary map received on 11 May 2009, the Ohio Department of Natural Resources Division of Wildlife (DOW) has augmented the previous survey recommendations (sent 26 August 2008) to reflect the increase in scope for the Black Fork project located in Crawford and Richland Counties.

Though this project area encompasses portions of the Sandusky River, which had previously been identified as a potential migratory corridor, the habitat within the proposed project would not be what the DOW considers high quality stopover habitat. Based upon the project area map provided and the site visit conducted on 4/27/09, the DOW has determined that this proposed facility would be classified as a "moderate" site under the current monitoring protocols (Fig. 1). The newly proposed project area is approximately 3.5 times greater than the original. This revised project area also encompasses significantly more forest area (Fig. 2), increasing the associated migratory bird point count locations and bat mist-netting sites.

The table below was created based upon the project maps provided and summarizes the types and level of effort recommended by the DOW. Results from these studies will help the Department of Natural Resources assess the potential impact these turbines may pose, and influence our recommendations to the Ohio Power Siting Board. Monitoring should follow those criteria listed within the "On-shore Bird and Bat Pre-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio."

	Project
Survey type	**Black Fork (Revised 5/11/09)**
Breeding bird	Breeding bird surveys should be conducted at all sites. The number of survey points may be based on the amount of available habitat, or twice the maximum number of turbines proposed for the site. Because agricultural land is not considered to be suitable nesting habitat for most species of bird, turbines placed within these types of habitat are exempt of this recommendation.

Raptor nest searches	Nest searches should occur on, and within a 1-mile buffer of the proposed facility.
Raptor nest monitoring	There are currently no known raptor nests that occur on or within 2-miles of the proposed project area. Should a nest of a protected species of raptor be located during nest searches, monitoring should commence as outlined in the on-shore protocols.
Bat acoustic monitoring	The current monitoring protocols recommend acoustic monitoring at all meteorological towers. This helps to determine spatial variability, species distribution, and correlates the level of surveying recommendations with the size of the project boundaries. Based upon a review of habitat within the project boundaries the DOW is modifying that recommendation for this project. In consultation with the U.S. Fish & Wildlife Service, the DOW are asking for only those met towers within the revised project boundary which are associated with larger forest patches to be monitored (Fig. 3) to be monitored, in addition to those already equipped.
Passerine migration (# of survey points)	16
Diurnal bird/raptor migration (# of survey point)	1
Sandhill crane migration (same points as raptor migration)	NS
Owl playback survey points	3
Barn owl surveys	NS
Bat mist-netting (# of survey points)	29
Nocturnal marsh bird survey points	NS
Waterfowl survey points	NS
Shorebird migration points	NS
Radar monitoring locations	NS

NS = Not required based on the lack of suitable habitat.

If you have any questions, please feel free to contact me.

Keith

cc: Mr. Stuart Siegfried, Ohio Power Siting Board
Ms. Megan Seymour, United States Fish and Wildlife Service

Figure 1.

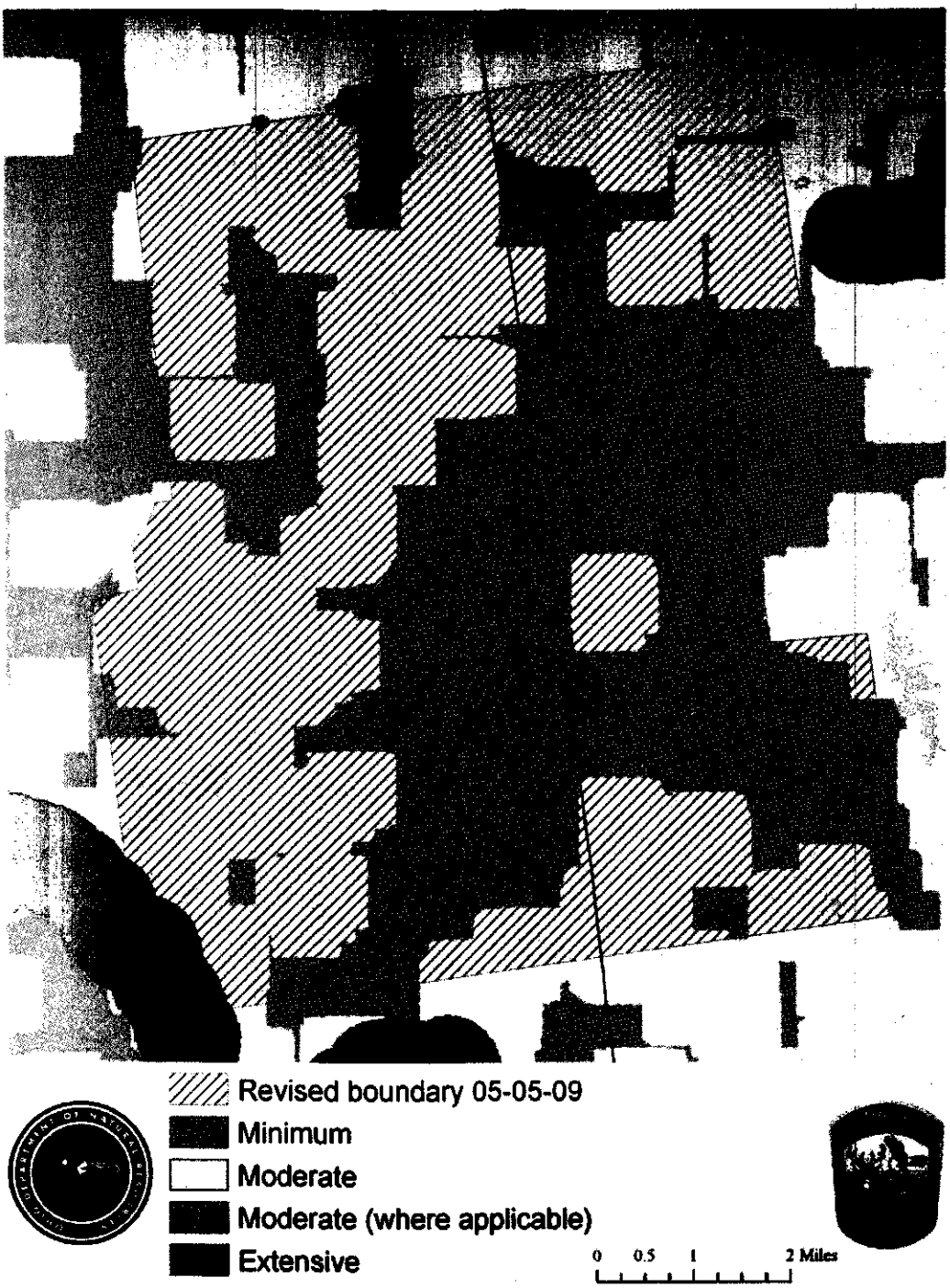

Revised boundary 05-05-09
Minimum
Moderate
Moderate (where applicable)
Extensive
0 0.5 1 2 Miles

Figure 2.

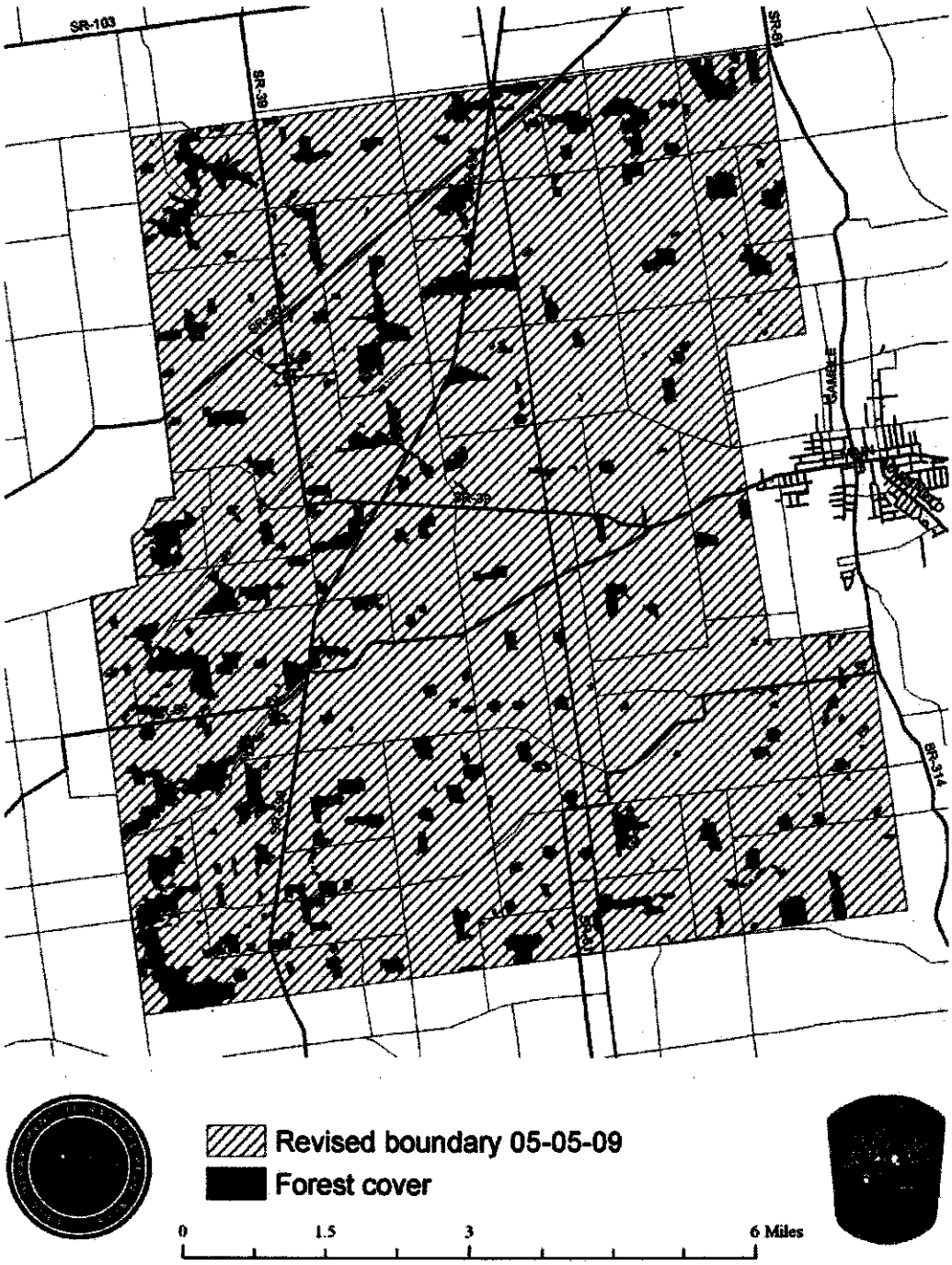
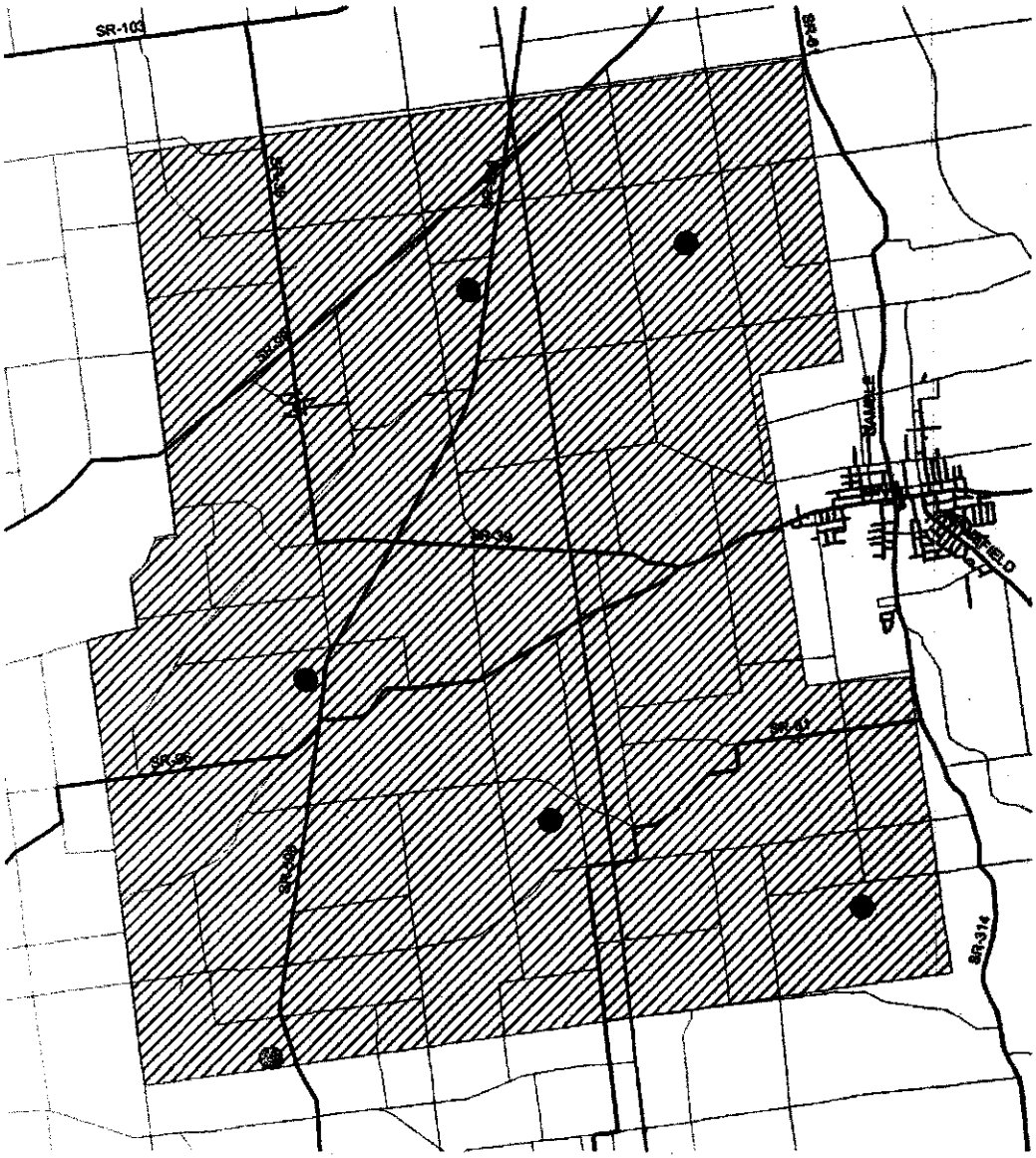

SR-103
SR-26
SR-6
SR-29
GAMBLE
BR-314
Revised boundary 05-05-09
Forest cover
0
1.5
3
6 Miles

Figure 3.


SR-103
SR-6
SR-39
SR-47
SR-314
Anabat
Currently equipped
Not recommended
Requested
Revised boundary 05-05-09

B Data Sheet

ecology and environment, inc.

Owl Playback Surveys

Project: _____ **Location:** _____

Date: _____ **Survey Start Time:** _____

Observer: _____ **Survey End Time:** _____

Target Species _____

Call File Used: _____

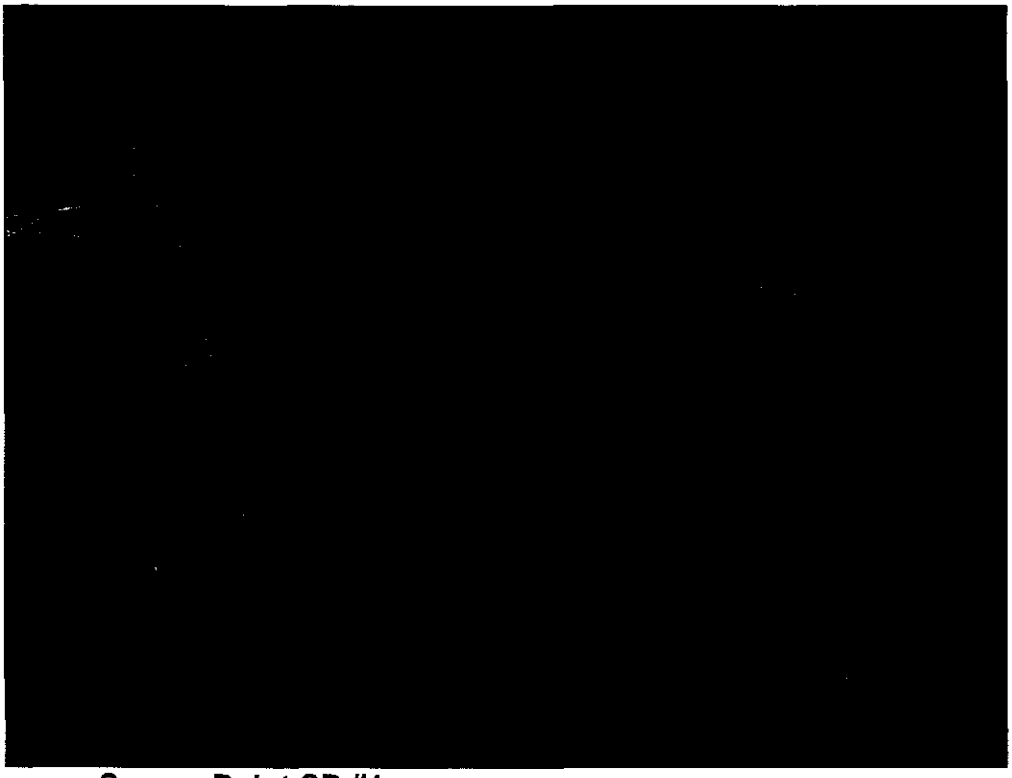
Conditions				
Temp	Precipitation	Moon Phase	Wind Speed/ Direction	Notes

Action:	Time	Response (y/n)	Comments:

C

2010 Owl Playback Survey Point Habitat Photographs

C. Survey Point Photographs



Survey Point SP #1

Survey Point SP #2

Survey Point #3

M Bat Reports

FINAL
Acoustic Bat Survey Report for Black Fork Wind Energy, LLC Crawford and Richland Counties, Ohio

November 2010

Prepared for:

BLACK FORK WIND ENERGY, LLC
400 Preston Ave, Suite 200
Charlottesville, VA 22901

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List of Abbreviations and Acronyms

Anabat	Anabat SD1
Black Fork	Black Fork Wind Energy, LLC
CF	Compact Flash
E & E	Ecology and Environment, Inc.
GIS	Geographic Information System
ha	hectares
kHz	kilohertz
km	kilometers
m/s	meters per second
met	meteorological
MW	megawatt
ODNR	Ohio Department of Natural Resources
Project	Black Fork Wind Energy project
Protocol	*Onshore Bird and Bat Pre- and Post-construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio*
USFWS	U.S. Fish and Wildlife Service
WNS	White Nose Syndrome

Executive Summary

To document the baseline bat activity at the proposed Black Fork Wind Energy, LLC project (Project), acoustical bat surveys were conducted at the Project site in Crawford and Richland counties, Ohio by Rodriguez (2008) during the fall of 2008, as well as by Ecology & Environment, Inc (E & E) during the spring, summer and fall of 2009, and the spring of 2010 at the Project site in Crawford and Richland Counties, Ohio. Acoustical monitoring was conducted to document the temporal (both nightly and seasonal) and spatial distribution of bat species group activity and diversity (as categorized by species grouping into low-frequency, mid-frequency, or *Myotis* species groups) in the Project Area.

The acoustical bat monitoring was conducted based on recommendations by the ODNR. On May 4 2009, the ODNR issued the final version of the *Onshore Bird and Bat Pre- and Post-construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio* (Protocol). Following the recommendations of ODNR prior to finalizing the protocol, Anabat SD1 bat detectors were installed on three meteorological towers within the Project Area in the fall of 2008. The Project Area was expanded from approximately 12,000 acres in the fall 2008 to over 29,000 acres by the spring 2009 and two additional meteorological towers were erected, which increased the Anabat monitoring effort to ten units installed on five meteorological towers at the Project.

The timing and abundance of bat activity levels observed at the Project during the E & E study were similar to those observed in other studies conducted in Ohio, the northeast, and Midwest. A total of 5,490 (2009: 5,324; 2010: 166) bat passes were recorded during the survey period, and 3,402 of these passes were identified to a species group. During the 2009 sampling season, the earliest bat pass was recorded on March 24 (ten days after Anabat deployment), while the latest bat pass was recorded on November 15, (two days prior to Anabat decommissioning). During the 2010 sampling season, the earliest bat pass was recorded March 20 (six days after Anabat deployment). The mean number of bat passes per detector night for all detectors throughout the 2009 and 2010 season was 2.8 bat-passes/detector night. Low-frequency bats, possibly including big brown bats, silver-haired bats, and hoary bats were the dominant species recorded and represented 69.7% of the identifiable bat passes.

1 Introduction

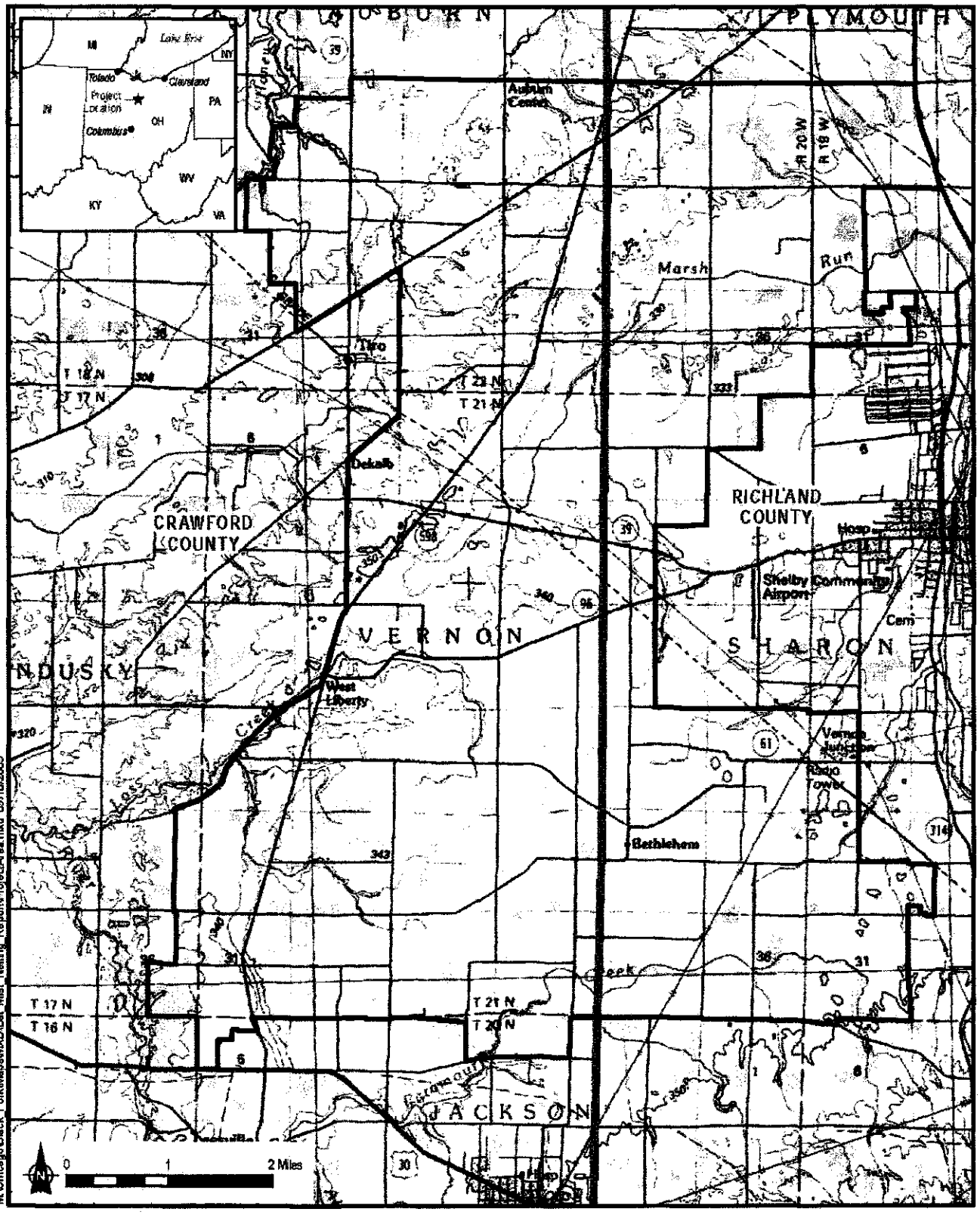
Ecology and Environment, Inc., (E & E) conducted acoustical bat surveys during the spring, summer, and fall of 2009, and the spring of 2010 for Black Fork Wind Energy, LLC (Black Fork) at the Black Fork Wind Energy, LLC project (Project) in Crawford and Richland Counties, Ohio (Figure 1-1). The 2009-2010 study was conducted as a follow-up to limited previous acoustic monitoring studies completed in the fall of 2008 (Rodriguez 2008; Appendix A). The Project involves the development of a 201.6-megawatt (MW) wind energy facility using 112, 1.8-MW Vestas V100 commercial wind turbines. While Black Fork anticipates utilizing Vestas V100 turbines, different turbines may be selected based on turbine availability.

The impact of operating wind energy developments on bats has become a recent concern due to an unexpectedly high number of bat fatalities found at wind facilities (Arnett 2005; Kunz et al. 2007). The concern is that populations of affected species will decrease in the long term due to the cumulative effects of wind farm operations throughout the U.S. (Kunz et al. 2007).

Because of concerns about the impact of wind energy development on birds and bats, the Ohio Department of Natural Resources (ODNR) coordinated with the U.S. Fish and Wildlife Service (USFWS) to develop pre-construction survey guidelines, which are outlined in the 2009 *On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio* (ODNR 2009). A summary of the bat species that potentially occur in the Project area is provided in Table 1-1 below (BCI 2010).

This report discusses the acoustical bat monitoring survey that was conducted at the Project to:

- Measure pre-construction bat activity levels near the ground and at the approximate rotor swept height;
- Identify the timing or seasonal pattern of bat activity; and
- Determine the general species composition (as categorized by species grouping into low-frequency, mid-frequency, or *Myotis* species groups).



Proposed Project Area (08-14-09)

County Boundary

Figure 1-1
Project Area Location
Black Fork Wind Project
Crawford and Richland Counties, Ohio

Source: ESRI 2009; USGS 1981-83.

The results of this study will allow Black Fork and the ODNR Division of Wildlife to assess potential impacts that the proposed wind farm may have on bats (ODNR 2009).

Table 1-1 Bat Species Potentially Occurring in the Project Area

Common Name	Scientific Name	Federal Listing Status
Big brown bat	*Eptesicus fuscus*	None
Eastern red bat	*Lasiurus borealis*	None
Evening bat	*Nycticeius humeralis*	None
Hoary bat	*Lasiurus cinereus*	None
Indiana bat	*Myotis sodalis*	Endangered
Little brown bat	*Myotis lucifugus*	None
Northern myotis	*Myotis septentrionalis*	None
Silver-haired bat	*Lasionycteris noctivagans*	None
Tri-colored bat	*Perimyotis subflavus*	None

Source: Bat Conservation International 2010

2 Project Habitat

The proposed Project is located in Crawford and Richland Counties in Ohio, and encompasses over 29,000 acres of private land within the townships of Auburn, Plymouth, Vernon, Sharon, Sandusky, and Jackson (Project Area) (Figure 1-1). Land-cover includes agricultural fields, pasturelands, and forest blocks (Figure 2-1). Approximately 82% of the land cover type within the Project Area is agricultural fields used for grain cultivation (e.g., corn, soybeans, and wheat). Approximately 7% of the land within the Project Area can be categorized as rural residential/developed. There are also small amounts (3%) of the Project Area allocated to cattle grazing and idle farm lands or "old fields."

Forested habitat represents approximately 8% of the Project Area and is composed mainly of deciduous upland forest blocks and forested riparian areas. The dominant tree species include American beech (*Fagus grandifolia*), American basswood (*Tilia americana*), sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), and white oak (*Quercus alba*). The presence of Ohio buckeye (*Aesculus glabra*) and basswood is considered an indicator of the mixed mesophytic forest type (Bailey 1995). The forested plant communities within the Project Area can be categorized as American Beech-Sugar Maple Glaciated Midwest Forest, and Bulrush- and Maple-Ash-Elm Swamp Forest (Faber-Langendoen 2001).

Water resources within the Project Area are comprised of perennial streams, drainage ditches, and small ponds. Several tributaries to the Sandusky River are located in the Project Area and include the headwaters of the Sandusky River, Loss Creek, and Paramour Creek in the south and Broken Sword Creek and Honey Creek to the north. An unnamed tributary to Marsh Run flows northeast from the central portion of the Project Area as part of the Huron River Watershed.

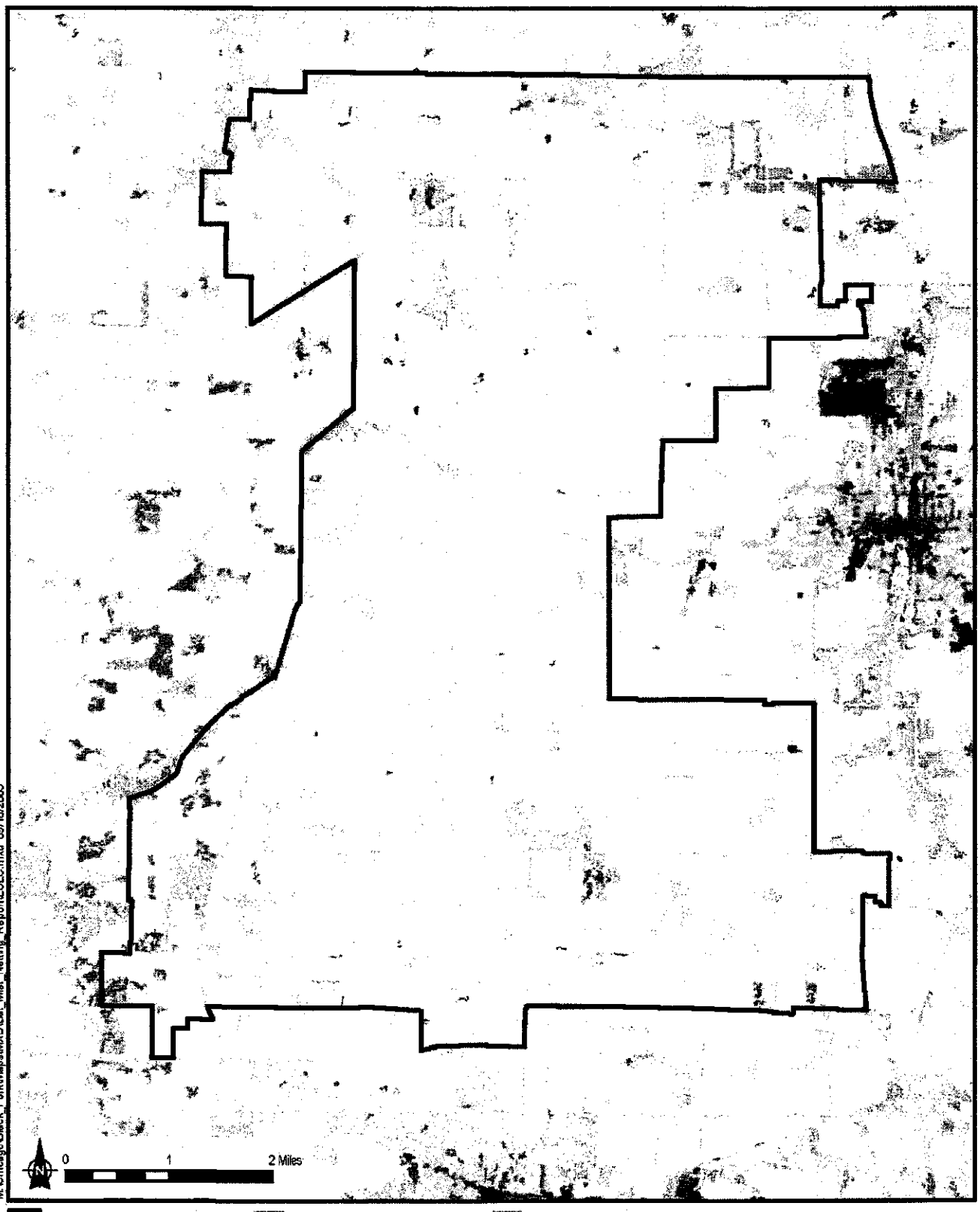


Figure 2-1
Land Use/Land Cover
Black Fork Wind Project
Crawford and Richland Counties, Ohio

3 Methods

3.1 Acoustic Monitoring

The scope and scale of required acoustic bat monitoring at proposed wind farms in Ohio is based upon ODNR's three-tiered approach using variables such as location, habitat quality, and overlapping range of threatened/endangered species. Depending upon these variables, ODNR may recommend a minimum, moderate, or extensive level of studies (ODNR 2009). Black Fork and E & E consulted with the USFWS and the ODNR beginning in August 2008 and continuing through May 2009, to discuss bat issues within the proposed Project Area. Through these discussions and based on the amount of contiguous forest in the Project Area as well as the historic Indiana bat records in Richland County (Lott 2009), it was recommended that Black Fork conduct a moderate-level effort of surveying. The moderate level requirements include one year of passive acoustic bat monitoring (March 15 – November 15) with additional mist netting surveys during the summer months (the results of the mist net surveys are discussed in a separate report - see Appendix B for Black Fork bat mist-netting survey report).

Acoustic monitoring was accomplished using Anabat SD1 (Anabat) bat detectors with detachable microphones mounted at two heights on meteorological (met) towers. At all outfitted met towers, two detectors were installed at the base of the tower with the microphone for one detector mounted at 5 meters above ground level (referred to as LO) and the microphone for the other detector mounted approximately 50-55 meters above ground level (referred to as HI). Detectors were named according to the tower number (e.g. 1, 2, 3, 4, 5) and height of the microphone (HI or LO).

Microphones for the low units were placed at a height of approximately 5 meters to record activity of bats flying near ground level. Microphones for the high units were placed at 50 to 55 meters on met towers to record bat echolocation calls at a height relatively near the potential turbine rotor sweep.

A bracket and pulley system was installed onto the met towers at a height of approximately 50 to 55 meters once the towers were lowered. The pulley system was used to raise the upper Anabat microphone. A telescoping painter's pole was used to mount the lower microphone (see Appendix C). The microphone was attached to one end of the extended painter's pole and the pole was attached to the

met tower. The length of the pole was wrapped in close-cell foam to reduce vibration and interference noise between the pole and the met tower. In all instances, the Anabat microphones were deployed using a bat-hat. A bat-hat is a protective microphone housing attached to a coaxial extension cable, which allows the microphone to be protected from the elements while being installed at a distance away from the Anabat detector. Microphones were placed pointing downward towards a Lexan polycarbonate plate mounted at a 45° angle to reflect sound from above into the microphone. This placement was used to assist in surveying a greater distance of airspace up towards the turbine rotor swept zone, although field tests showed that this system would also detect sound from all directions.

The Anabat detectors were housed in Pelican Cases modified to accommodate mounting brackets and to allow the coaxial cables to be fed through the base of the case. Two Anabat units and two 12 volt batteries (one to power each detector) were placed in each case and mounted to the base of the met tower.

A division ratio of 16 was used for all detectors and the sensitivity levels were set to detect a calibration tone at 20 meters using the Bat-Chirp Board (Tony Messina, Nevada Bat Technology, Las Vegas, NV), which is a microprocessor-controlled ultrasound signal generator that is used to ensure that Anabat recording equipment sensitivity is properly calibrated at a given distance (ODNR 2009). The Anabat units were set to continuously monitor the period from half an hour prior to sunset until half an hour after sunrise. This timing was adjusted throughout the monitoring period to correlate with expanding and contracting day/night cycles. Each Anabat was equipped with a 2 gigabyte compact flash (CF) card to store call data. Batteries and CF cards were rotated approximately every two weeks to ensure the units had adequate power and storage space throughout the monitoring period. The date, time, personnel, and CF card and battery identification numbers were also documented during each battery/card rotation to ensure quality control during the monitoring period. After battery/card swaps, CF cards were downloaded using CFCread software and the number of files downloaded from each card was tallied.

Anabat acoustical monitoring began in 2008, with six Anabat units employed on three met towers within the Project Area (Rodriguez 2008). Acoustical monitoring during that study spanned from October 1 to November 15, 2008. Early in 2009, the Project Area expanded from approximately 12,000 acres to over 29,000 acres and three additional met towers were erected. Through consultation with ODNR during the winter of 2009 it was recommend that an additional three met towers be equipped with Anabat detectors to accommodate the larger Project Area. It was proposed that 12 Anabat detectors, on all six met towers be deployed to passively monitor the bat activity during the spring, summer, and fall of 2009 (Lott 2009). An equipment failure in the spring of 2009 prevented one of the original three met towers from being fitted with Anabat detectors. The failure stemmed from a pulley system issue, which prevented the microphone from being

hoisted to the 50 to 55 meter height. This equipment failure was discussed with ODNR on March 12, 2009. As a result, five met towers were outfitted with a total of ten Anabat units in 2009.

Three of the five towers (Towers 1, 2, and 3) were equipped with Anabat units on March 3, 2009 but the remaining two towers (Towers 4 and 5) were not Anabat-equipped until May 20, 2009. To complete a full season of sampling, these towers were fitted again with Anabat units to record bat activity between March 15 and May 20, 2010. The location of the met towers equipped with Anabat detectors are provided in Figure 3-1. The met tower labeled "0" experienced a pulley system failure as previously described and is therefore not included in the results.

3.2 Anabat Data Analysis

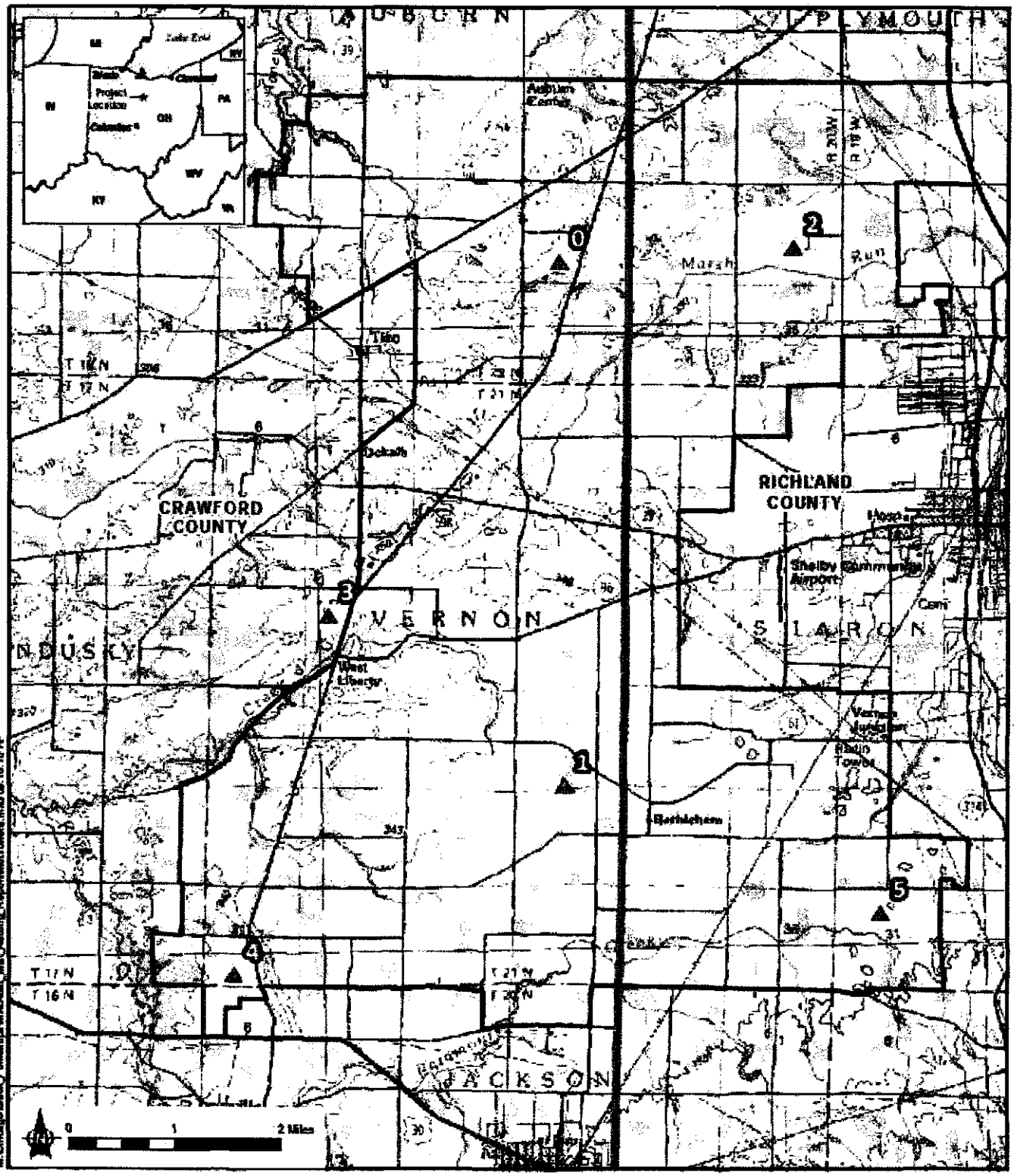
Analook DOS version 4.9j was used to manage and analyze the sound files recorded by the bat detectors. All sound files were scanned with a filter (adapted from Britzke and Murray 2000; see Appendix D) designed to remove files that contained noise (e.g., insects, wind, rain), so that only bat call files remained. A bat call file is synonymous with a bat pass and is defined as any file that contains two or more echolocation pulses (Baerwald and Barclay 2009, ODNR 2009).

Each echolocation pulse has characteristics such as slope and frequency that can be measured quantitatively and used to identify the call sequence to a species or species group. Although it is sometimes possible to distinguish species from characters in the echolocation calls, factors such as intraspecific variation and variation within a bat pass make reliable identification difficult (Murray et al. 2001).

Analysis of data collected from bat detectors was completed in two phases. The first phase included identifying the total number of bat passes recorded at each detector regardless of species; this phase is referred to as total bat activity. The second phase involved using a subset of the bat passes recorded (call files that were of sufficient quality [5 or more echolocation pulses]) to be identified to a species group to determine the relative composition of species recorded at each detector.

3.2.1 Total Bat Activity

Total bat activity (the number of bat passes containing two or more echolocation pulses) were tabulated for each detector for each successful detector night and are reported as the number of bat passes/detector night. One detector night is defined as the recording session from one-half hour prior to sunset to one half hour after sunrise the following morning. The mean total bat activity was also calculated for each detector by averaging the values from all successful detector nights. Additionally, monthly averages were calculated for each detector to further elucidate peaks in activity. These analyses were used to deduce trends in the level and timing of total bat activity.



Proposed Project Area (08-14-09)

County Boundary

▲ Bat Acoustical Monitoring Location (Met Tower)

Figure 3-1
Bat Acoustical Monitoring Locations
Black Fork Wind Project
Crawford and Richland Counties, Ohio