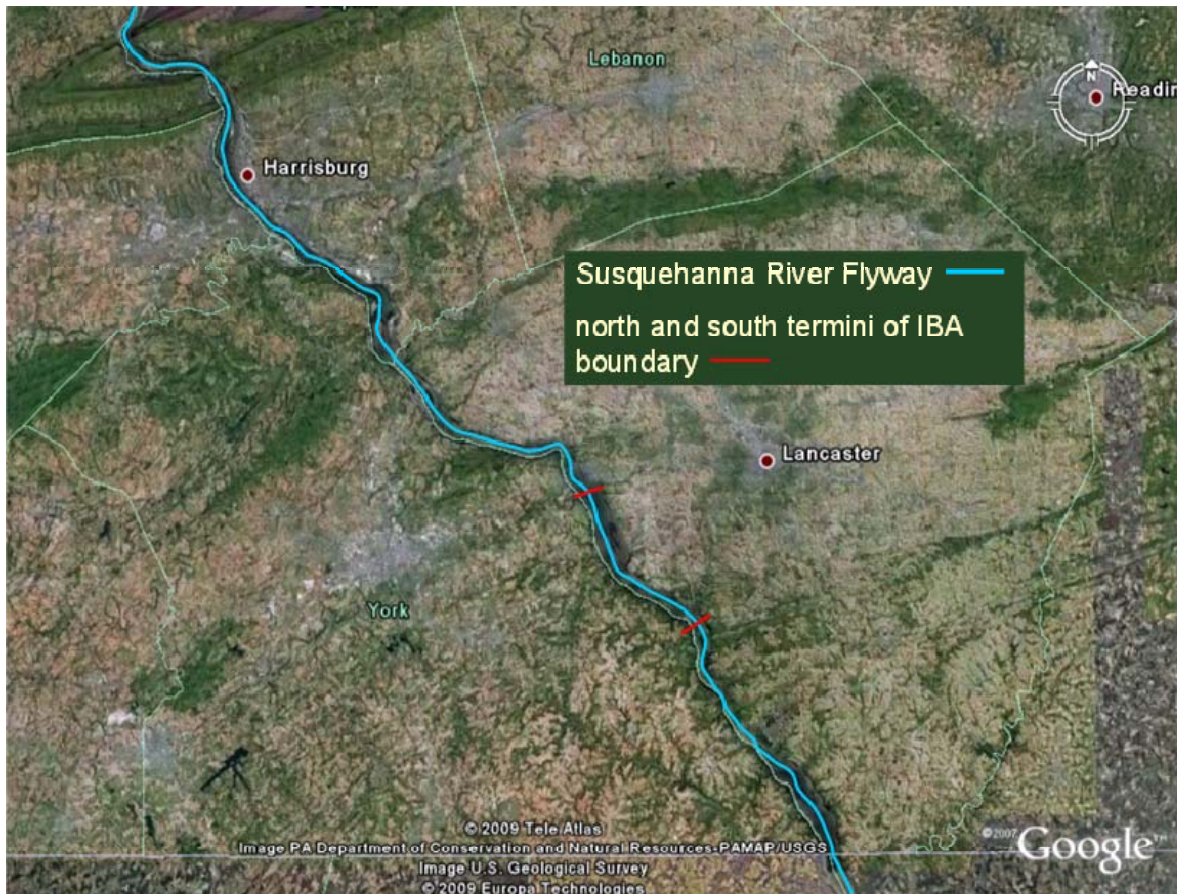


Conejohela Flats Important Bird Area is one of the most significant inland stopover sites in the eastern United States for tens of thousands of shorebirds. The Conejohela Flats IBA is located within the Susquehanna River Flyway (part of the Atlantic Flyway) a heavily used migration corridor for other bird species including thousands of migrating raptors, waterfowl, waterbirds, and passerines (including neotropical migrants). The map below shows the northern and southern termini of the Conejohela Flats Important Bird Area (IBA) in relation to the south central portion of the Susquehanna River Flyway in Pennsylvania.



The following comments are in response to the D.O.E. FONSI and EA 1737F statements made by consultants/biologists with the ARM Group, Lancaster County Solid Waste Authority, And the Frey Family Landfill (FFLF), United States Fish and Wildlife Service (USFWS), and Pennsylvania Game Commission (PGC) study recommendations and ARM Group responses to those recommendations.

Stewardship

Audubon PA Comment: Planting native grasses that will be regularly maintained to minimize raptor hunting:

Two Questions followed by comments

1. What species of native grasses will be planted on site?

How will maintenance of these grasses take place?

The stated plan to plant native grasses and maintain the plantings to minimize raptor hunting is vague and contradictory to the purpose of planting native grasses

The purpose of planting native grasses can be multifold but primarily is driven by the desire to practice sound land stewardship and to create habitat for grassland birds and other animal species associated with this type of habitat. Most native grasses grow to heights averaging 2-4 feet and provide excellent cover and food for certain species of birds, mammals, reptiles, insects, and arthropods. Native grasses are maintained as such and are mowed on a rotational basis once every one to three years after the breeding nesting season, depending on amount of acreage and surrounding habitat.

Problems

Planting native grasses could potentially attract foraging raptor species increasing the risk of collisions with the proposed industrial scale wind turbines (Johnson et al. 2002 and Osborn et al. 1998). Several rodent species found in grassy habitats will be attracted to the native grass plantings. These rodents are readily preyed upon by diurnal (hawks and falcons) and nocturnal (owls) raptors during migration and breeding/nesting seasons. In addition several raptor species will prey on reptiles and birds associated with this type of habitat while the American Kestrel, our smallest falcon, often forages upon grasshoppers during summer and fall.

There are a number of ground nesting grassland birds in this region of Pennsylvania that will be attracted to the grassy habitat. If this should occur then mowing poses a direct threat to these birds during breeding/nesting and rearing periods (early May through Late July/early August). Most of these birds are protected under the Migratory Bird Protection and several are listed as PA State Species of Conservation Concern.

The parties involved should not waste their time or the seeds involved in creating native grasslands to give the illusion of being good land stewards if their intent is to regularly mow. Instead they would be better off planting grasses like those used in parks and homeowner lawns that can be regularly mowed and not serve as an attractant for numerous wildlife species.

Audubon PA Comment:

Concerning Boundary of Conejohela Flats Important Bird Area (IBA) see map on following page

The indicated boundary of the Conejohela Flats Important Bird Area in documents submitted by the ARM Group and the subsequent D.O.E. EA is in serious error. The Conejohela Flats IBA is not a mile away from the site of the proposed turbines. The boundary of the Conejohela Flats IBA begins just south of the boroughs of Columbia and Wrightsville PA extending southward to Holtwood Dam. The east and west boundaries include the shores and forested slopes on both sides of the Susquehanna River and a small portion of the Frey landfill property (see map below). The boundaries were determined by habitat, observed site usage, and the known behavior of the assorted guilds of birds found inhabiting the area during migration, and breeding/nesting seasons.

Chapter 1 INTRODUCTION AND BACKGROUND

Section 1.3. Public and Agency Involvement

The public had at least 18 opportunities over more than 2 years to learn about the project and to provide comments to the LCSWMA and, on 2 occasions, to the Manor Township Zoning Board. LCSWMA conducts its business in open public meetings, providing a forum for ongoing reporting and comment on the project ranging from wind and bird studies, to progress on agreements with purchasers, to approving a wildlife assessment agreement with the PGC. The minutes from these meetings are available on the LCSWMA website at <http://www.lcswma.org/boardMeetings.asp>. These minutes do not identify any public opposition, controversy over resources that would be affected by this project, or suggestions to consider alternatives or mitigation actions not identified in this EA. In addition, no objections were received when the project was presented at the December 9, 2009, meeting of the Manor Township Zoning Hearing Board meeting, which was advertised to and open to the public.



During this period, the following agencies and organizations were contacted:
 U.S. Fish and Wildlife Service (USFWS)
 Federal Aviation Administration (FAA)
 U.S. Department of Commerce, National Telecommunications and Information Administration
 Pennsylvania Bureau for Historic Preservation
 Pennsylvania Game Commission
 Pennsylvania Department of Conservation and Natural Resources (PDCNR)
 Pennsylvania Fish and Boat Commission
 Manor Township
 Lancaster County Conservation District
 Sprint Nextel

Audubon PA Comment: Most of the above named entities were contacted regarding permits or to submit reports

From 2007 through 2009, LCSWMA gave 38 public presentations on the FFLF Wind Project to a wide variety of audiences, including industry affiliates, community groups, and private business. LCSWMA reports that it did not receive any objections to the proposed project at these public presentations.

Audubon PA Comment: We at Audubon Pennsylvania find it disconcerting that throughout the process none of the principals in this project and process attempted to contact us at any time or offer to make a presentation to us about this project even though they were fully aware of our connection to the site

including Lancaster County Solid Waste Authority, Pennsylvania Power and Light, Frey Farm Landfill, Turkey Hill Dairy or The ARM Group. This is disturbing in that almost every document pertaining to birds in the Arm Group reports, PGC documents, EA etc. acknowledge that Conejohela Flats is an Important Bird Area while several make direct reference to Audubon PA as having a vested interest in Conejohela Flats. In addition at least two of the biologists working for the ARM group Michele Cohen and Teresa Amitrone were fully aware of Audubon's ties to Conejohela Flats. Several years ago Ms. Cohen was contracted by Audubon Pennsylvania to write a number of conservation plans for numerous IBAs in central and SE PA including the one for Conejohela Flats. Ms. Amitrone had also worked collaboratively with Audubon PA staff in the past. No attempt was made by the ARM group to contact us.

A real public meeting where the general public and others with a vested interest (i.e. Audubon Pennsylvania, Lancaster Bird Club, York Audubon Society, Quittapihilla Audubon, and Appalachian Audubon) could attend never occurred. Instead the LCSWMA idea of public presentations was to a few Manor Twp meetings, small closed groups, clubs, out of state conferences or meetings, a WebEx meeting, or individuals which hardly represent a genuine meeting for the public at large beyond a twp. boundary.

The following is a list provided by LCSWMA:

1. 2007 Manor Twp. Annual update - Highville Fire department
2. Lancaster Hempfield Rotary
3. 2008 Commissioners meeting
4. Bob Simon, Staff Director, Senate Energy & Natural resources Committee
5. 2008 Citizens Advisory Committee Meeting-LCSWMA
6. Annual Municipal Recycling Coordinators meeting- LCSWMA
7. Columbia Rotary Club
8. 2008 Lancaster County Public Officials Meeting
9. 2008 Manor Twp. Annual update - Highville Fire department
10. Lampeter Strasburg Democratic Club
11. NJ SWANA, Atlantic City NJ
12. Board of Directors
13. Armstrong
14. Municipal Recycling Coordinators annual meeting
15. Masonic Village
16. Wasatch County, Utah Solid Waste Authority
17. Moravian manor
18. Citizens Advisory Committee Meeting-LCSWMA
19. DEP Secretary John Hanger
20. System overview – kellogs
21. RenoSam – Danish Association of intermunicipal Waste Management
22. Lancaster County Workforce Investment Board
23. Millersville Teachers Workshop
24. WASTECON Wind Energy, Long Beach CA
25. PA Municipal Authority Assoc.
26. Pictoral Update, Board of Directors Meeting
27. Lancaster Intermunicipal Committee
28. Pictoral Update, Board of Directors Meeting
29. Optimists Club of Lancaster
30. SWANA WebEx Wind Energy
31. 09 Hauler Meeting LCSWMA
32. 2009 Manor Twp. Annual update - Highville Fire department
33. Lancaster County Public officials Meeting
34. 2009 Citizens Advisory Committee Meeting
35. System Overview – Municipal Recycling Coordinators
36. AMBUCS Wind Energy – Hamilton Club, Lancaster
37. Sunrise Rotary Club, Armstrong Manor.
38. SWANA Executive Conference San Diego CA

12 day comment period and public meetings

DOE invited comments on the Draft EA for this project for a period of 12 days beginning with publication of a notice in the Lancaster *Intelligencer Journal* on Wednesday, January 27, 2010. A copy of the Draft EA was made available at the Columbia Public Library, 24 S. 6th Street, Columbia, PA 17512, and the Draft EA was available for download from the DOE NEPA Website (<http://www.gc.energy.gov/NEPA>). The public was encouraged to submit written comments regarding the proposed project to DOE by the close of the comment period on February 8, 2010. As of February 10, 2010, DOE had received no comments on the Draft EA. In addition, Pennsylvania published a notice requesting comments in the *Pennsylvania Bulletin* [40 Pa.B. 562] and the Harrisburg *Patriot-News* on January 23, 2010, and placed the Draft EA on the Pennsylvania Department of Environmental Protection website (<http://www.depweb>).

Audubon PA Comment: This was an extremely short period of time to solicit and receive public comments considering most federal public comment periods usually last for at least 30 days. By the time we learned of the DOE EA and the opportunity to submit public comments, the comment period had been closed.

BIOLOGICAL RESOURCES

Chapter 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

Bird Surveys

Audubon PA Comments: Numerous bird species are found at Conejohela Flats throughout migration, breeding, and over-wintering seasons including a number of *Pennsylvania State Species of Conservation Concern*. These birds are dependant on the habitats and abundant resources in and adjacent to the Susquehanna River in this area throughout the various times of the year. Those species considered to be species of conservation concern in the state are listed for a variety of reasons including state status as rare, locally distributed, or declining species that are representative of habitats in decline. Others may have strong population centers in the state or are undergoing declines range-wide. Others are sensitive to habitat fragmentation and edge effect. All PA State Species of Conservation Concern listed below have been documented as occurring at Conejohela Flats IBA during breeding, migration, and/or over-wintering seasons.

Immediate Concern

1. Piping Plover (Federally Endangered)
2. Upland Sandpiper
3. Short-eared Owl (Northeast Region priority species, PA State Endangered)

High Level Concern

1. American Bittern (Northeast Region priority species, PA state endangered, Global rank G4 State rank S1)
2. Bald Eagle (PA threatened, Global Rank G4)
3. Black tern (Endangered, Northeast Region Priority Species G4S1)
4. Cerulean Warbler (Northeast Region priority species, Partners in Flight Priority I species, Pennsylvania Watch List)
5. Northern Harrier (Global rank G5, State rank S3S4, PABS AT-risk species)
6. Peregrine Falcon (PA Endangered, Global rank 4)
7. Prothonotary Warbler (Partners in Flight planning and responsibility species)
8. Virginia Rail

Responsibility Species

1. Louisiana Waterthrush (Partners in Flight IIA and IIC Priority species, high quality riparian habitat indicator)

2. Scarlet Tanager (Partners in Flight IIA and IIB Priority species) PA has high responsibility for 17% of the global breeding population
3. Tundra Swan (approximately 25% of migrating population stops over in PA during migration)
4. Wood Thrush (Partners in Flight Priority I species, Pennsylvania Watch List species) Pennsylvania has high responsibility for almost 9% of the global breeding population.
5. Worm-eating Warbler (Partners in Flight Priority I species, Pennsylvania Watch List species) Pennsylvania has high responsibility for 10% of the global breeding population.

Pennsylvania Vulnerable

1. Black-crowned Night Heron
2. Common Tern
3. Great Egret
4. Green-winged Teal
5. Northern Goshawk (Rare resident species)
6. Osprey (Threatened species, Global rank G5)
7. Yellow-crowned Night Heron

Pennsylvania Maintenance Concern

1. Acadian Flycatcher ((Partners in Flight IIA Priority species, high quality habitat indicator)
2. Alder Flycatcher (limited range in Pennsylvania)
3. American Coot (PA rare species, habitat quality indicator)
4. American Woodcock (Partners in Flight Priority species, U.S. Shorebird Conservation Plan "species of high concern", Pennsylvania Watch List Species IIA)
5. Bank Swallow
6. Black-billed Cuckoo (Partners in Flight IIA Priority species)
7. Blackburnian Warbler (Partners in Flight IIC Priority species)
8. Black-throated Blue Warbler (Partners in Flight Priority I species)
9. Black-throated Green Warbler (quality conifer habitat indicator)
10. Broad-winged Hawk (large scale forest inhabitant, state is major migration corridor)
11. Chimney Swift (Partners in Flight IIA Priority species)
12. Common Moorhen
13. Common Nighthawk
14. Great-blue heron (Colonial nester, susceptible water quality issues)
15. Pied-billed Grebe (Rare, Northeast region Priority Species, Global rank G5, State rank S3)
16. Red-shouldered Hawk (high quality forest indicator) PIF list species
17. Ruddy Duck (Small localized breeding populations, environmental quality indicator)
18. Sharp-shinned Hawk (declines in nesting and migrating populations, may be an area sensitive forest species)
19. Solitary Sandpiper (Wetland habitats, representative wading birds migrating through state)
20. Willow Flycatcher (Partners in Flight priority I species)
21. Whip-poor-will
22. Winter Wren (High quality forest indicator)
23. Yellow-throated Vireo (Partners in Flight Priority IIA species)

It is strongly recommended that all pre-construction bird surveys be conducted for a minimum of two to three years before construction due to temporal and spatial variation in habitat use during breeding and migration seasons. Post-construction surveys should occur for at least the same length of time if not longer. If a turbine is found to be a problem to migrating or resident birds then it should be taken off line.

Documents cited in the DOE EA from information supplied to the agency are dated and written at a time when far fewer turbines existed and few peer-reviewed studies on bird turbine collisions were published. Therefore the numbers of bird killed per turbine per year should be viewed with measured scrutiny. In addition the Somerset Co. site in western PA that is referenced in the EA is located on an old reclaimed strip mine and not along a major raptor/bird migration corridor like Conejohela Flats so it is an invalid comparison.

According to the DOE EA that referenced documents produced by Strickland et al. (2001) and the BLM (2005) no eagles deaths have occurred due to bird/turbine collisions. That is no longer a valid statement because a death has occurred in eastern North America. A three year old Bald Eagle was recently killed when it collided with a turbine at the Erie Shores Wind Project in Ontario Canada. In addition a nesting pair of Bald Eagle within ½ mile of another turbine at the same project abandoned their nest after the turbines went into operation.

Migratory Bird Surveys

Spring and Fall Raptor Migration Surveys

PA Game Commission recommended *spring and fall raptor and waterfowl surveys following protocols found in the PGC Wind Energy Voluntary Cooperative Agreement (PGC requested a minimum of one full season of both spring and fall raptor migration surveys)*

Audubon PA Comments: Both USFWS and PA Game Commission recommended extending migration studies through 2010/2011 migration seasons. Audubon Pennsylvania concurs with these recommendations by both agencies. The excuse and rationale provided in the response to both agencies is weak and demonstrates that this project is driven by money and not responsible environmental stewardship.

One year of raptor migration surveys are seriously inadequate in assessing passage rates, flight behavior, and flight direction of migratory raptors due to annual spatial and temporal variation in migration patterns during spring and fall movements regardless of location (i.e. river corridors, ridge lines, etc.) Seasonal weather conditions including frontal passage (total number and strength of fronts), wind direction and speed, thermal formation, and precipitation events affect passage rates and species distribution throughout migration causing numbers to vary, sometime greatly, on a year to year basis (Van Fleet 1997). Height of flight can also vary and may affect the observer's ability to detect higher flying birds especially if they are inexperienced at identifying birds by flight morphology. Therefore it is imperative to conduct raptor migration surveys for a minimum of two to preferably three years in an area like this where higher numbers of raptors occur in migration. Also migration surveys should be conducted seven days a week 8 hours a day throughout the migration seasons.

Additionally only a moderate amount of effort was committed to raptor surveys considering the biologists only spent 3 days a week 8 hours a day in the field from Aug 15 through September 15, 2009 followed by 5 days a week 8 hours a day from September 16 through December 15 2009. During the spring they only conducted surveys through the Month of March 5 days a week 8 hours a day and therefore missed the majority of the spring migration season that extends through mid to late May. It is quite possible that numerous Broad-winged Hawk, American Kestrel and Bald Eagle were missed since they tend to migrate from mid August through mid September. The same holds true in the spring when greater numbers of Hawks pass through PA in April and May including Red-shouldered Hawk, American Kestrel, Merlin, Peregrine Falcon, Sharp-shinned and Cooper's Hawk. According to the Birds of North America species accounts Vulture migration begins in March and can extend to early June. The majority of Broad-winged Hawks pass through PA during late April to mid May.

The overall number of raptors representing 14 species were detected along the summit within the 200 m swath of all turbines proposed turbines and within the strike zone are extremely high (~ 80%) and unacceptable. The high number of Bald Eagle detected in this zone is particularly unsettling. Since two of the proposed turbines have been eliminated from the project and a setback has been determined an additional year of study examining the new configuration should be conducted to see if there are annual variations in where the birds are observed.

To quote DOE and Arm group "There is a possibility of an unavoidable, non-purposeful take of Bald Eagle from the operation of the proposed wind turbines."

Audubon PA Comments: By the nature of the statement all parties involved fully acknowledge that they recognize the probable threat the turbines pose to local breeding and migrating populations of Bald Eagle. The parties involved, knowing this, demonstrate their intent to put bald eagles and other birds at risk by intentionally siting the turbines in this area of high bird concentrations (migration corridor and stopover/staging area). They have disregarded documents and peer reviewed research recommending the avoidance of these types of locations [National Research Council of the National Academies (2007), the GAO report Wind Power: Impacts on Wildlife and government responsibilities for Regulating Development and Protecting Wildlife (2005), and the USFWS voluntary interim guidelines (2003)], and refused to do additional studies recommended by USFWS and supported by the PGC so that they would not miss out on the deadline for their free money.

Recent events at the Erie Shores Wind Project in Ontario Canada mentioned previously only supports the risk industrial scale wind turbines pose to bald eagles in eastern North America. Since the original studies and the issuance of the D.O.E. EA and FONSI another Bald Eagle nest has been documented in the area of Turkey Hill. We are gravely concerned that as the number of breeding pairs and non-breeding Bald Eagles increase in the area combined with the numbers that migrate along the river corridor during spring and fall, the risk of similar incidents taking place at Turkey Hill are inevitable and any bird that has the misfortune of colliding with a turbine will be written off as collateral damage.

Sadly both bird/turbine collisions and nest abandonment threats could be avoided if the parties involved would opt for a different form of alternative energy such as solar, photo-voltaic, or biomass. In light of the numerous recommended studies that were not conducted to thoroughly assess the potential for bird turbine conflicts and the additional recommendations regarding shorebird and landbird surveys by Audubon PA we believe there are numerous unresolved conflicts and that FFLF consider other alternatives.

Audubon PA Comment on Waterfowl Surveys

No Waterfowl surveys were conducted see below under additional surveys recommended by Audubon Pennsylvania

Breeding Bird Surveys

PGC recommended breeding bird surveys of entire project area following protocols found in PGC Wind Energy Voluntary Cooperative Agreement including point counts and area searches

Audubon PA Comments: Like the migratory waterfowl FFLF and their consultants deliberately neglected to conduct any of the PGC's recommended breeding bird surveys (point counts and area searches) once again demonstrating a disregard for the health and safety of numerous bird species associated with habitats of the Lower Susquehanna River. In particular they did not address the potential project impacts on two state species of conservation concern Prothonotary Warbler (PRWA), classified as High Level Concern) and Great Egret (GREG) classified as state endangered Both birds regularly occur in this area spring through fall.

It is strongly recommended that breeding bird surveys be conducted for a minimum of two to three years before construction is allowed with special attention focused on PRWA, GREG, and other PA State Species of Conservation Concern.

Bald Eagle Surveys

PGC request: Bald Eagle nesting survey following PGC protocol to document presence of nesting eagles within the surrounding area. PGC also supported USFWS request for summertime survey of Bald Eagle movement and usage including foraging activities, roosting activities, and identification of important roosting trees.

Audubon PA Comments:

Nesting surveys were conducted in a timely fashion and it would appear that within time and financial constraints they did an adequate job relative to aerial surveys. However since the time of their original surveys, an additional nesting pair of Bald Eagles has been documented and is active in the area thus further increasing the risk of bird turbine collisions.

Audubon PA Comments:

Audubon PA fully supports the recommendation by USFWS and the PGC to conduct seasonal movement surveys. General usage patterns based on recall are not acceptable as good science but instead are anecdotal at best. Summertime foraging and roosting behavior studies should be done according to approved peer reviewed scientific based protocols that result in measurable results and can be repeated by others. With a growing breeding population of Bald Eagles in the area it is critical to understand how they utilize local resources during their daily movements, how often they frequent particular areas including turbine sites, how human based activities might disturb or disrupt normal behaviors, and how they interact with other birds on both inter and intraspecific levels. This knowledge base would help to inform mitigation actions if necessary. By their own admission, the ARM group indicated their intent of non-action through the following remark "A summertime nest survey of Bald Eagle movement and usage within a four mile radius of nest sites, as well as other recommended surveys extending beyond March 2010 are not feasible due to grant funding schedule criteria and would effectively terminate this renewable energy project" Instead of a grant funding schedule, what should be the driving decision-making factor is the health and welfare of breeding Bald Eagles and other bird species.

Additional Migration Surveys Recommended by Audubon Pennsylvania

Shorebirds, waterfowl, and waterbirds

Many shorebirds embark on extremely long migrations twice a year so protection efforts for critical sites must be coordinated over vast distances. Shorebirds generally have low rates of reproduction, so it is difficult to reverse past declines and recover populations rapidly (US Shorebird Conservation Plan 2001). According to the US shorebird conservation Plan and the Manomet Center for Conservation Sciences the North Atlantic flyway region is one of the most heavily populated areas in the U.S. Furthermore many wetland habitats used by migrating shorebirds have been affected by development, causing wetlands loss, pollution, and increased human access leading to disturbance. Any additional anthropogenic disturbance or threat will only exacerbate the amount of stress already incurred by these migrating populations of birds.

The Susquehanna River and Conejohela Flats IBA are considered to be an important inland component of the Atlantic Flyway. The "Flats" serve as a migration stopover area for tens of thousands of migrating shorebirds including 2 National Audubon red list species and seven yellow list species as well as thousands of waterfowl (swans, geese, and ducks), waterbirds (grebes, terns, and gulls) and wading birds (herons, egrets, and rails). Two federally listed bird species have been documented as stopping over at Conejohela Flats during migration along the Susquehanna River including 8 occurrences of Piping Plover (through 2002) and more frequent and numerous occurrences of Least Tern.

The Pennsylvania Game Commission Voluntary Agreement provides guidance on recommended pre and post-construction studies for raptor and songbird populations and species. Unfortunately there is nothing in this agreement to conduct the same relative to other bird guilds defined by species associated with water/wetland habitat types such as shorebirds, waterbirds, and wading birds that occur in PA during migration, breeding, and over-wintering seasons; an obvious short-coming of the agreement. Due to the nature of the site and the high numbers of seasonal migrants representing these guilds, especially the tens of thousands of shorebirds, the PGC should have requested that additional studies be conducted to assess the probable impacts of the proposed industrial scale turbines on these birds. To their credit PGC did recommend that the consulting firm conduct waterfowl surveys however no attempt was ever made to survey migrating waterfowl.

It is Audubon Pennsylvania's opinion that shorebird migration and site use surveys be conducted, using standardized scientific protocols, during spring and fall for a minimum of two years to ascertain whether the proposed turbines pose a threat to shorebirds before construction is allowed. Site Studies should also include night surveys that employ both acoustic monitoring and marine radar in addition to daytime surveys. We also strongly recommend that migration surveys be conducted for waterfowl and wading birds. Anything less signifies a total disregard for the welfare of these seasonal residents and demonstrates poor judgment and stewardship on the behalf of the landowner, developers and future operators.

Migratory Songbirds

Conejohela Flats on the Susquehanna River is also recognized in part as an Important Bird Area for its importance to migrating song and land birds through the state. As with many other bird species songbirds, especially Neotropical migrants, embark on a long journey twice a year from their North American breeding grounds to wintering grounds in Central or South America during the fall and return to breeding grounds in the spring. Many songbirds travel in mixed flocks comprised of hundreds or thousands of birds. The majority of songbirds migrate at night and come down to rest and forage in the hours around dawn and depart in the hours around dusk. At these times their visual acuity is not as sharp as in daylight hours, they are flying at lower altitudes, and therefore are at greater risk of colliding with spinning rotor blades which can easily reach a tip speed greater than 200 mph at 20 revolutions per minute. Bird collisions have and continue to occur at many wind facilities here and abroad.

Other conditions that increase the risk of bird turbine collisions are certain weather events such as fog events or low cloud ceilings both of which commonly occur during spring and fall migration along the Susquehanna River in south central PA. Fog often forms along this river corridor due to seasonal weather conditions (air moisture and temperature), the physiography of the region, and river water temperatures during periods of time that coincide with large passage rates of migrating birds. Low cloud ceilings that often coincide with precipitation events are also frequent during these times.

Migrating song and land birds cannot see well in these conditions and will descend to land in trees and shrubs which is commonly referred to as migration fallout. If birds continue to fly it will be at much lower altitudes below the cloud ceiling where they closely follow the topography of the land. If migrating birds should descend in the vicinity of the turbines during either weather event and the turbine parts (spinning rotor blades, nacelle, or tower) are obscured from view by fog or low cloud ceiling, the likelihood of detection of these moving and stationary turbine parts by low flying birds is slim to none. As a result, large numbers of birds could fly directly into the turbine and rotor sweep area resulting in major bird kills.

Therefore it is critical that migrating song and land bird populations be monitored for at least two to three years during the spring and fall migration. It is also recommended that migration surveys be conducted using a combination of acoustic monitoring, visual, radar, and thermal imaging during all types of weather so that there is a clear understanding of how birds respond to varying weather and flight conditions in this area before allowing the project to move forward.

Aviation Lighting

Red or white strobes: Strobes are the most effective lighting to install to reduce potential bird and bat collisions. (Gehring, Kerlinger, and Manville 2009) The number of flashes per minute should be ~20 per minute with the strobe going out completely between flashes.