

DEQ Wind Energy Regulatory Advisory Panel (Wind RAP)

Work Session #5 - Wildlife Resources Part 2

December 21, 2009

Draft Meeting Minutes

Location: DEQ Central Office
629 E. Main Street
Richmond, VA 23219

Start: 9:42 am

End: 3:08 pm

RAP Lead/Facilitator: Carol Wampler, DEQ

Recorder: Debra Miller, DEQ

RAP Members Present:

Bob Bisha, Dominion

John Daniel, Troutman Sanders

Judy Dunscomb, TNC (by
teleconference)

Mary Elfner, Audubon

Larry Nichols, VDAC (alternate)

Ray Fernald, DGIF

James Golden, DEQ

Public Attendees:

Robert Hare, Dominion

Don Giecek, Invenergy (alternate)

Rick Reynolds, DGIF (alternate)

Hank Seltzer, BP Wind Energy

Emil Avram, Dominion (alternate)

Agenda Item: Welcome & Introductions

Discussion Leader: Carol Wampler

Discussion: The work session attendees were welcomed. The group was informed that Judy Dunscomb would be calling in later as she could not make the trip due to inclement weather. No objections were noted. Carol provided a summary of the work done in the other work sessions. The attendees were informed that the main topic for this work session is continuation of the discussions of the December 14, 2009 work session in order to provide further details and information regarding wildlife issues

Agenda Item: Discussion Draft Section 3.A

Discussion Leaders: Carol Wampler, DEQ

Discussion: The language of Section 3.A of the discussion document was reviewed (see Attachment A) and discussed as it related to wildlife issues. It was explained that the Living Resources subcommittee used a different definition for "project boundary" and that its use of "project boundary" was more in line with the current "disturbance zone" definition. Therefore, this section will be revised to change project boundary to disturbance zone. The definition of "disturbance zone" will now include a 100 foot buffer around the disturbed area as recommended at the December 17, 2009 work session. The group had no questions or concerns with the changes.

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During the review, it was noted that both Industry's and DGIF's preferred analysis section for wildlife have a lot of commonality. At this point, the work group did not offer any possible resolutions to the portions of Section 3.A where the two drafts differed. The work group noted that the final decision on what the regulation shall require will be DEQ's and DEQ will develop the guidance to complement the regulatory requirements; however, developer representatives cautioned that guidance is not an enforceable element and should not be used as such.

Discussion of Section 3.A.1.a

The group was asked if the use of project boundary was appropriate, and if not, what should be the boundary for this survey. For instance, shall we change Project Boundary to site for Section 3.A.1.a as the actual footprint for the project (disturbance zone) will not be known? The work group agreed to the use of site in Section 3.A.1.a.

Consensus: The work group agreed that site boundary was appropriate for the mapping requirements of Section 3.A.1.a.

The group then discussed the topic of bat hibernacula and why the mapping for the hibernaculum includes such a large area. The concern was how this data would be used for determining the mitigation trigger. For instance, if bat hibernaculum is found in this mapped area, will that be a trigger for mitigation? No, the bat hibernaculum in the area surrounding the project's disturbance zone is not a trigger for mitigation, only bat hibernaculum found to be located within the disturbance zone will be a trigger for mitigation. During the conversation, DGIF asked that the area to map be 5 miles for hibernaculum and 12 miles for maternity/bachelor colonies. There was no agreement by the group on this language being added but it was agreed that these larger areas to be mapped for the maternity/bachelor colonies was just for the mapping exercise and they would not be a mitigation trigger; therefore, no further concerns were noted.

Discussion of Section 3.A.1.b

The language provided by DGIF (see Attachment B) for Section 3.A.1.b considers the finding of Section 3.C as a relevant to wildlife resources impacts. The work group was reminded that the regulation cannot require mitigation of habitat impacts as the statute only authorizes DEQ to require mitigation for wildlife and historic resources. There was discussion regarding habitat and its effect on wildlife. It was noted that the statute makes a clear distinction between "wildlife and historic resources" and all of the "other" natural resources. The work group did not have any further suggestions, but was reminded that the regulation must comport with the provisions of the statute. Other natural

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resources, while important, cannot move forward to mitigation as there is no authority to do so, the statute only requires mitigation for historic resources and wildlife.

Discussion of Section 3.A.2 and 3.A.3

The issue of species of greatest conservation need (SGCN) was raised by DGIF and highlighted in their draft language (see Attachment B). DGIF's language added SGCN birds to these sections. The question put forward to the group was whether to include threatened and endangered (T&E) and SGCN for birds or just T&E? It was noted that SGCN would add 50 to 70 species for consideration. The question was put to a vote. Representatives for industry and developers voted for T&E only. Environmental advocacy groups representatives, DGIF, and VDACS voted for T&E and SGCN. It was further noted by the Audubon representative that we are limiting ourselves by only including breeding bird surveys. DGIF explained that, while it was true that this will be a concern for coastal avian resources, the reason to do breeding bird for non-coastal was availability of realistic mitigation options.

DGIF did recommend that migratory pathways be added for coastal avian surveys. Developer representatives asked if the applicant will be able to know via a desktop survey if fly ways exist on the site for coastal zone projects. There has been recent work on coastal zone avian impacts but this is not easily answered. It was further questioned if there is any merit in asking coastal zone project applicants to note known migratory pathways for birds on a map. And if so, where is this information to be obtained? It was noted that some of the information may exist in academia. The work group agreed to add desktop survey for coastal avian resources. Additionally, this issue will be discussed and followed up with DEQ's Coastal Zone Management Program.

The work group then began a discussion related to T&E plant and insect resources. Current practice would have developers go to DCR and DCR would send them to VDACS if it is a plant or insect issue was noted. VDACS has limited authority and does not have authority to act against someone on their own property. They work with the developers and recommend options but requiring measures to be taken is limited by their authority. There was a question raised on lease holders and if they would be defined as a "land owner" by VDACS. These issues will be discussed with VDACS for further clarification of the process and its requirements. T&E plants are habitat and are not wildlife. *Consensus: T&E plants and insects are part of the natural heritage resources and will be included under Section 3.C.*

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Agenda Item: Discussion Draft Section 4.A

Discussion Leaders: Carol Wampler, DEQ

Discussion: The proposed Section 4.A language from industry and from DGIF (see Attachment C) were reviewed and discussed in regards to wildlife issues. The work group was reminded of the agreements from last Monday. The main agreement for a significant adverse impact determination was bats observed or hibernaculum exists within the disturbance zone (which now includes 100' buffer around this area). This trigger for mitigation has been agreed to at the previous work session. The issue for today is the trigger for non-bat wildlife. Industry language noted only T&E wildlife as a trigger, while DGIF language included either SGCN or T&E as a trigger. The issues with the different drafts presented were reviewed and comments were noted.

Comments:

- Question on maternity/bachelor colonies - how do you determine their existence? Bats are not in these colonies 365 days a year. If there is documented evidence through mapping then there is no need to reverify through field studies.
- Will bat acoustic monitoring not find these colonies? It may or may not, depending on time of year.
- Need a way to differentiate species of concern from others but there will need to be some sort of adverse impact finding threshold to require mitigation.
- SGCN list was vetted to the public for comment; however, it is not regulatory. It is more like guidance.
- What data can developers rely on for determining significant impacts? DGIF offered to provide a list of SGCN and T&E in order for a comparison to be made.
- Need a more inclusive list for wildlife because T&E does not capture all.
- Is SGCN a trigger for other types of development projects?
- SGCN was captured in the Living Resources Subcommittee as an area for significant impact determination.

There was no consensus agreement on what criteria to use as a trigger to require mitigation for non-bat wildlife resources. However, all continue to agree that presence for bats or bats' hibernacula in the disturbance zone was an appropriate trigger due to the unique impacts that wind power turbines have on bats. For other wildlife resources, the trigger to require mitigation requires more than just presence. *Consensus: The work group agreed that presence for bats or bat hibernacula in the disturbance zone was an appropriate trigger for mitigation and recommended that the appropriate trigger for non-bat wildlife be resolved in the plenary session.*

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Agenda Item: Discussion Draft Section 5

Discussion Leaders: Carol Wampler, DEQ

Discussion: The language of Section 5 of the discussion document (see Attachment D) was reviewed and discussed as it pertains to wildlife issues.

Discussion of Section 5.B

This section provides specific mitigation measures for wildlife and includes a mitigation cap based on curtailment of the turbines. This curtailment cap is provided in hours per turbine per year. The work group reviewed the language and noted comments.

Comments:

- DGIF has concerns with the curtailment hours cap provided since more curtailment may be necessary.
- How were the hours calculated? Through back calculation from a monetary cap that had been recommended in the Living Resources Subcommittee.
- At less than 3.5 m/s wind speed these turbines do not make much money.
- What if the number of hours is not enough to mitigate the impacts?
- Why not just use the monetary cap? Previously, a monetary cap of \$5000 per turbine was included as there was agreement to limit financial exposure for mitigation and post-construction monitoring, and a monetary cap is easier to understand; however, a monetary cap may not be suitable for regulation.

The work group agreed on the basic premise of how to calculate curtailment hour caps; however, the group did not reach consensus on the actual number of hours to use as a "cap" for curtailment.

Discussion of Section 5.D

The work group was asked if they had any comments regarding this language. TNC representative asked that criteria for searcher efficiency and scavenger removal be added to the regulation and not just provided in guidance. The work group agreed that searcher efficiency and scavenger removal should appear in the regulation.

Discussion of Section 5.E

The work group reviewed the language for post-construction mitigation and management. It was noted that the subdivision on invasive plant species is not appropriate as invasive plant species are not wildlife and cannot be included in mitigation measures. This section will need to be removed.

The discussion returned to the cap language provided in Section 5.B.2:

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- How will we determine the effects of curtailment and efficacy? It was noted that many others are also grappling with this issue.
- Optimization of the mitigation is the key for amendments to the plan.
- The mitigation cap for hours of curtailment needs to also be included in Section 5.E as it is a consideration for post-construction monitoring and mitigation.

In summary, it was noted that as there is no meaningful limit for mitigation that can be utilized, the regulation uses a cap on curtailment as a proxy to insure that developers perform a reasonable degree of mitigation and post-construction monitoring, and also have a way to measure their financial obligations for mitigation and monitoring.

The meeting was adjourned.

Section 3. Analysis of the beneficial and adverse impacts of the proposed project on natural resources.

A. To fulfill the requirements of §10.1-1197.6 B.7 of the Code of Virginia, the applicant will conduct pre-construction wildlife analyses within the project boundary. The analyses shall include the following:

1. Mapping: The applicant shall attach detailed maps of the proposed Project Boundary providing the results of the Wildlife Analysis for: ~~1) habitat, and~~ 1) Wildlife.
 - a. ~~Habitat Mapping. The applicant will provide a map resulting from the desktop and field surveys within in the Project Boundary. The applicant shall have used the DCR's "The Natural Communities of Virginia, Classification of Ecological Community Groups, 2nd Approximation" (Fleming, Coulling, Patterson and Taverna, 2006) as the vegetation standard to describe and map the ecological community groups on the project area. Additional habitat features including Wildlife habitat (e.g., raptor nests, caves, mines), physiographic features (e.g., rock outcrops, cliffs, wetlands), unfragmented natural ecosystems that are Ecological Cores will be mapped. If any Invasive Plant Species are identified within the Project Boundary during the normal course of habitat mapping surveys, they will be flagged in the field and mapped. All Invasive Plant Species identified during the mapping exercise shall be managed given currently acceptable standards during construction activities.~~
 - a. Wildlife Mapping. The applicant will provide a report, including a map, of the desktop and field surveys conducted to determine the existence or potential existence of Wildlife. The applicant will obtain a list of Wildlife from the DGIF, the DCR, and the DACS for the proposed Project Boundary and attach it to this application. The Report shall provide relevant, available details of any Wildlife found onsite, including species, detection location(s), age, size, spatial distribution, evidence of reproduction.
2. Fixed-Point Bird Use Surveys: The applicant will provide a report of the fixed-point bird use surveys conducted to estimate seasonal use (relative abundance) of bird species in the project area, and in particular for raptors.

Methodologies:

- a. Surveys will include sampling during spring (April 1 – June 15) and fall (September 1 – November 15) migration, summer breeding (June 15 – August 30), and over-wintering (November 15 – March 31) use within the Project Boundary.
- b. Depending on the size of the proposed Project Boundary, one or more 800-m radius fixed point (circular plot) will be established within the Project Boundary where there is a good view along ridges or areas of interest. All birds seen during each survey will be recorded. The date, start, and end time of observation period, point number, species or best possible identification, estimated number of individuals, distance from plot center when first observed, closest distance, height above ground, activity, and habitat will be recorded. The habitat type over which or in which the bird was first observation will be identified. Weather information recorded for each survey will include temperature, wind speed, wind direction and cloud cover.
- c. Plot surveys will be scheduled to cover all daylight hours. During a survey day, plots will be visited once. Points should be visited at different times of day throughout a season.

- d. Data from the field surveys will be entered into a database and checked thoroughly for data entry errors. The number of raptors and other species seen during each point count survey will be standardized to a unit area and unit time searched. Use will be expressed as the mean number of observations of a species per 20-min survey per survey plot (800-m radius). Mean values and 90% confidence intervals will be calculated by season for all species observed and groups and sub-groups of species (e.g., passerines, raptors, *Buteos*)
 - e. The resulting avian use data will be compared to data collected at other wind resource areas using similar protocols.
 - f. The data gained from fixed-point bird use surveys will be used to assess the existence of avian species also considered to be Wildlife.
3. Raptor Migration Surveys: The applicant will provide a report resulting from one year of raptor migration surveys in the Project Boundary in both the spring and fall seasons, conducted to determine the relative abundance of migrant raptors moving within the proposed Project Boundary. The raptor survey will follow methods recommended by the Hawk Migration Association of North America (HMANA). The survey period will be based on existing information from established hawk migration sites in Virginia and/or adjacent states and will correspond with the 8-week period when the peak number of migrant hawks would be expected to move through the area. In the spring this period is expected to be approximately mid-March through mid-May and in the fall approximately beginning-September through beginning-November.

Methodologies:

- a. Surveys will be conducted one day each week in the spring and fall for a total of 16 surveys in each migration season. A survey station will be established within the Project Boundary that provides good visibility over long distances along the primary ridgeline or area of interest. The survey period each day will be at least 6 hours from approximately 10:00 AM to 4:00 PM. Observers will watch for migrant raptor continuously during the six hour survey period. Efforts will be made to schedule surveys on days when weather conditions are conducive to hawk migration (e.g., warm clear high pressure conditions). Data will be compiled by survey day and concurrent data from established hawk watch sites will be solicited from HMANA for comparison.
4. Bat Acoustic Surveys: The applicant will provide a report of bat acoustic surveys conducted to determine the presence of and level of bat activity and use within the proposed Project Boundary.

Methodologies:

- a. Bats will be surveyed within the proposed Project Boundary using currently available acoustic detectors (e.g. AnaBat® or accessible equivalent). It is recommended that the applicant use a pulley-mounted system, or employ a suitable alternative, in conjunction with a meteorological tower to install the acoustical detectors to maximize the reliability/maintainability of the equipment and data.
- b. A minimum of two acoustic detectors will be used during the study and sampling will occur from April 15 to October 15. To the extent possible while still maintaining protection of the equipment, the ground based acoustic detector will be tilted toward the sky to maximize the height at which bat calls will be detected. The second

- acoustic detector station will be established at a height of ≥ 30 m, or the highest practicable height. A high microphone system will be connected to this second unit and installed within the Project Boundary. Both acoustic units will sample concurrently. The applicant will take all reasonable measures to ensure that each detector achieves a data collection success rate of at least 50% per season during each surveying period.
- c. In addition to the index of overall bat activity within the Project Boundary, a relative index of activity by species or species group will also be determined. Bat calls will be identified to species when possible or to species group if call quality does not allow for positive species identifications. Calls will be identified by comparing visual metrics (e.g., minimum frequency, slope, duration) to reference calls of known bats.
5. Mist-Netting and/or Harp-Trapping Study: If the applicant identifies potential for State threatened or endangered bat species to occur within the Project Boundary, including the presence of roosting areas, bat hibernacula, the potential habitat for State threatened or bats, or if a State threatened or endangered bat is observed in the project area, the applicant will conduct a summer mist-netting and/or harp-trapping survey for bats on the site. The survey methods will follow applicable State and/or Federal guidance (e.g. the U.S. Fish and Wildlife Service) guidelines for mist-netting surveys in the Indiana Bat Recovery Plan). The number of sites will be based on the approximate size of the study area. The survey will be conducted during the summer season identified in the guidelines, May 15-August 15. Specific details of the survey will be determined by site conditions and survey timing. Netting and/or trapping locations will be determined in the field but will be within the proposed Project Boundary.
- a. Captured State Threatened or Endangered Bats: For all bats captured, standard data such as species, sex, age, reproductive condition, and other notes will be recorded. For every State threatened or endangered bat captured, a radio transmitter will be attached for radio telemetry. The radio telemetry survey will consist of re-locating each tagged bat for 1-5 days post capture (in consultation with the DGIF) to determine locations of roost trees used by the tagged bat. Each roost tree located will be mapped and identified to species. Approximate age, size, condition, and topographic position will be recorded for each roost tree. Exit counts at sunset will be made at each roost tree located, if possible.

Section 3. Analysis of the beneficial and adverse impacts of the proposed project on natural resources.

A. To fulfill the requirements of §10.1-1197.6 B.7 of the Code of Virginia, the applicant will conduct pre-construction wildlife analyses within the project boundary. The analyses shall include the following:

1. Desktop Surveys and Maps. The applicant will obtain and submit the following information from the designated sources:
 - a. From DGIF, a wildlife report and map generated from the Virginia Fish and Wildlife Information Service (FWIS) or Wildlife Environmental Review Map Service (WERMS) on wildlife species and habitats (e.g. trout streams, anadromous fish streams, Threatened and Endangered Species Waters, raptor nests) known or likely to occur within 2 miles of the Project Boundary, and known bat hibernacula within 12 miles of the Project Boundary.
 - b. From DCR, a report and map generated from the Natural Heritage Division of Natural Heritage Resources known or likely to occur within 2 miles of the Project Boundary, and known bat hibernacula within 12 miles of the Project Boundary.
 - c. From DCR, a map of the habitats and ecological community groups on the project area, derived from the DCR’s Virginia Natural Landscape Assessment. Additional wildlife habitat and landscape features to be mapped include known caves, mines, rock outcrops, cliffs, wetlands, and Ecological Cores.
 - d. From DCR, known occurrences of invasive plant species within the Project Boundary. Occurrences of invasive plant species observed during the normal course of habitat mapping surveys will be flagged in the field and mapped.
 - e. Synopses, excerpts, or interpretations of published and unpublished literature, if appropriate and pertinent to the subject application and project.
- ~~1. Mapping: The applicant shall attach detailed maps of the proposed Project Boundary providing the results of the Wildlife Analysis for: 1) habitat, and 2) Wildlife.~~
 - ~~f. Habitat Mapping. The applicant will provide a map resulting from the desktop and field surveys within in the Project Boundary. The applicant shall have used the DCR’s “The Natural Communities of Virginia, Classification of Ecological Community Groups, 2nd Approximation” (Fleming, Coulling, Patterson and Taverna, 2006) as the vegetation standard to describe and map the ecological community groups on the project area. Additional habitat features including Wildlife habitat (e.g., raptor nests, caves, mines), physiographic features (e.g., rock outcrops, cliffs, wetlands), unfragmented natural ecosystems that are Ecological Cores will be mapped. If any Invasive Plant Species are identified within the Project Boundary during the normal course of habitat mapping surveys, they will be flagged in the field and mapped. All Invasive Plant Species identified during the mapping exercise shall be managed given currently acceptable standards during construction activities.~~
 - ~~g. Wildlife Mapping. The applicant will provide a report, including a map, of the desktop and field surveys conducted to determine the existence or potential existence of Wildlife. The applicant will obtain a list of Wildlife from the DGIF, the DCR, and~~

Attachment B - Section 3.A from DGIF Draft

~~the DACS for the proposed Project Boundary and attach it to this application. The Report shall provide relevant, available details of any Wildlife found onsite, including species, detection location(s), age, size, spatial distribution, evidence of reproduction.~~

2. Breeding Bird Survey: If a state listed or SGCN bird species appears in either the VDGIF system report or the Natural Heritage Resources report as likely to occur within the project boundary during the species' breeding season, the applicant will conduct a breeding-bird survey to identify state listed and Species of Greatest Conservation Need (SGCN) birds occurring within the Disturbance Zone of a wind-energy facility during their breeding season.
 - a. For projects located more than 10 miles from the Chesapeake Bay or Atlantic Ocean shoreline, point counts shall be conducted in the habitats that are likely to support the target species, at least 3 times between May 1 and June 30, on dates at least 21 days apart. Points shall be placed 250-500 meters apart within the appropriate habitats for the target species, throughout the Disturbance Zone. At least one point shall be established per turbine and, to the extent possible, the points shall be located at the planned locations of the turbines.
 - b. For projects located within 10 miles of the Chesapeake Bay or Atlantic Ocean shoreline, point counts shall be conducted in the habitats that are likely to support the target species, at least 3 times between April 1 and June 15, on dates at least 28 days apart. Points shall be placed 250-500 meters apart within the appropriate habitats for the target species, throughout the Disturbance Zone. At least one point shall be established per turbine and, to the extent possible, the points shall be located at the planned locations of the turbines.
 - c. The point count protocol generally shall follow Ralph *et al.* 1995, except as modified herein. Point counts shall be conducted between sunrise and 10:00 a.m., for 5 minutes at each point. Each count shall be subdivided into an initial 3-minute count and a subsequent 2-minute count. All birds observed during the 5-minute counts shall be recorded. The observer shall walk between points, recording each additional occurrence of an SGCN or state-listed species seen or heard between points. When appropriate, playback techniques shall be used to enhance detection of the following rare or cryptic species: golden-winged warbler, loggerhead shrike, cerulean warbler, Bewick's wren, Henslow's sparrow, and Bachman's sparrow. Through the combined point counts and routes walked between points, the surveys should cover the entire area of suitable breeding habitat for the target species within the Disturbance Zone.
2. ~~Fixed Point Bird Use Surveys: The applicant will provide a report of the fixed-point bird use surveys conducted to estimate seasonal use (relative abundance) of bird species in the project area, and in particular for raptors.~~

Methodologies:

Attachment B - Section 3.A from DGIF Draft

- ~~a. Surveys will include sampling during spring (April 1—June 15) and fall (September 1—November 15) migration, summer breeding (June 15—August 30), and over-wintering (November 15—March 31) use within the Project Boundary.~~
 - ~~b. Depending on the size of the proposed Project Boundary, one or more 800-m radius fixed point (circular plot) will be established within the Project Boundary where there is a good view along ridges or areas of interest. All birds seen during each survey will be recorded. The date, start, and end time of observation period, point number, species or best possible identification, estimated number of individuals, distance from plot center when first observed, closest distance, height above ground, activity, and habitat will be recorded. The habitat type over which or in which the bird was first observation will be identified. Weather information recorded for each survey will include temperature, wind speed, wind direction and cloud cover.~~
 - ~~c. Plot surveys will be scheduled to cover all daylight hours. During a survey day, plots will be visited once. Points should be visited at different times of day throughout a season.~~
 - ~~d. Data from the field surveys will be entered into a database and checked thoroughly for data entry errors. The number of raptors and other species seen during each point count survey will be standardized to a unit area and unit time searched. Use will be expressed as the mean number of observations of a species per 20-min survey per survey plot (800-m radius). Mean values and 90% confidence intervals will be calculated by season for all species observed and groups and sub-groups of species (e.g., passerines, raptors, *Buteos*)~~
 - ~~e. The resulting avian use data will be compared to data collected at other wind resource areas using similar protocols.~~
 - ~~f. The data gained from fixed point bird use surveys will be used to assess the existence of avian species also considered to be Wildlife.~~
3. Raptor Migration Surveys: The applicant will conduct seasonal (fall and spring) raptor migration surveys following methods recommended by the Hawk Migration Association of North America (HMANA) as amended herein, to determine the relative abundance of migratory raptors moving through the proposed Project Boundary.
 - a. Raptor migration surveys will be conducted at least 1 day each week from 1 March through May 31 (spring) and 1 September through 31 December (fall). One survey station per ridgeline will be established within the Project Boundary that provides good visibility over long distances along the primary ridgeline or area of interest.
 - b. To the extent possible, surveys will be conducted on days when weather conditions are conducive to hawk migration (e.g., warm, clear, high pressure conditions). The survey period each day will be at least 6 hours from approximately 10:00 AM to 4:00 PM. Observers will watch for migrant raptors continuously during the six-hour survey period. The date, start, and end time of observation period, species or best possible identification of all raptors seen during each survey period, estimated number of individuals, height above ground, and activity will be recorded. Weather information recorded for each survey day will include temperature, wind speed, precipitation, wind direction and cloud cover. For each Golden Eagle, Bald Eagle,

and Peregrine Falcon observed, the additional data solicited on the VDGIF-modified HMANA data sheet also will be recorded.

- c. Data will be compiled by survey day, and concurrent data from established hawk watch sites will be solicited from HMANA for comparison.

~~3. Raptor Migration Surveys: The applicant will provide a report resulting from one year of raptor migration surveys in the Project Boundary in both the spring and fall seasons, conducted to determine the relative abundance of migrant raptors moving within the proposed Project Boundary. The raptor survey will follow methods recommended by the Hawk Migration Association of North America (HMANA). The survey period will be based on existing information from established hawk migration sites in Virginia and/or adjacent states and will correspond with the 8-week period when the peak number of migrant hawks would be expected to move through the area. In the spring this period is expected to be approximately mid-March through mid-May and in the fall approximately beginning-September through beginning-November.~~

Methodologies:

- a. ~~Surveys will be conducted one day each week in the spring and fall for a total of 16 surveys in each migration season. A survey station will be established within the Project Boundary that provides good visibility over long distances along the primary ridgeline or area of interest. The survey period each day will be at least 6 hours from approximately 10:00 AM to 4:00 PM. Observers will watch for migrant raptor continuously during the six-hour survey period. Efforts will be made to schedule surveys on days when weather conditions are conducive to hawk migration (e.g., warm clear high pressure conditions). Data will be compiled by survey day and concurrent data from established hawk watch sites will be solicited from HMANA for comparison.~~

4. Bat Acoustic Surveys: The applicant will conduct acoustic surveys to determine the presence and level of bat activity and use within the proposed Project Boundary.

- a. Bat acoustic sampling will occur from April 1 through October 31. For purposes of this survey, the seasons shall be spring - April 1 through June 15; summer - June 16 through July 31; and fall - August 1 October 31. Bats will be surveyed within the proposed Project Boundary using currently available acoustic detectors (e.g. AnaBat® or accessible equivalent). A minimum of two acoustic detectors per ridgeline or per met tower, whichever is greater, will be used during the study. The ground-based acoustic detector will be tilted toward the sky to maximize the height at which bat calls will be detected. The second acoustic detector will be established at a minimum height of 30 m above ground level, or the highest practicable height that allows sampling within the proposed turbine rotor-swept-area. A high microphone system will be connected to this second unit. All acoustic units will sample concurrently.

- b. The applicant will take all reasonable measures to ensure that each detector achieves a data collection success rate of at least 50% per season within each surveying period. In pursuit of this objective, the applicant is encouraged to use a pulley-mounted system or a suitable alternative to install the acoustical detectors, to facilitate periodic maintenance, repair, and retrieval of the equipment and data. If a data collection success rate of at least 50% per season is not achieved, and the desktop evaluations documented known or likely use of the Project Area by bats, then significant bat use within the Project Boundary shall be assumed. In addition to the index of overall bat activity within the Project Boundary, a relative index of activity by species or species group shall also be determined. Bat calls will be identified to species when possible or to species group if call quality does not allow for positive species identifications. Calls will be identified through visual or statistical (e.g., discriminant function) analysis by comparing metrics (e.g., minimum frequency, slope, duration) to reference calls of known bats.

4. ~~Bat Acoustic Surveys: The applicant will provide a report of bat acoustic surveys conducted to determine the presence of and level of bat activity and use within the proposed Project Boundary.~~

Methodologies:

- a. ~~Bats will be surveyed within the proposed Project Boundary using currently available acoustic detectors (e.g. AnaBat® or accessible equivalent). It is recommended that the applicant use a pulley-mounted system, or employ a suitable alternative, in conjunction with a meteorological tower to install the acoustical detectors to maximize the reliability/maintainability of the equipment and data.~~
 - b. ~~A minimum of two acoustic detectors will be used during the study and sampling will occur from April 15 to October 15. To the extent possible while still maintaining protection of the equipment, the ground-based acoustic detector will be tilted toward the sky to maximize the height at which bat calls will be detected. The second acoustic detector station will be established at a height of ≥ 30 m, or the highest practicable height. A high microphone system will be connected to this second unit and installed within the Project Boundary. Both acoustic units will sample concurrently. The applicant will take all reasonable measures to ensure that each detector achieves a data collection success rate of at least 50% per season during each surveying period.~~
 - c. ~~In addition to the index of overall bat activity within the Project Boundary, a relative index of activity by species or species group will also be determined. Bat calls will be identified to species when possible or to species group if call quality does not allow for positive species identifications. Calls will be identified by comparing visual metrics (e.g., minimum frequency, slope, duration) to reference calls of known bats.~~
5. Mist-Netting and/or Harp-Trapping Study: If the applicant, VDGIF Wildlife Report, or Natural Heritage Resources Report identifies potential for state-listed bats to occur within the Project Boundary through observation or documented occurrence of a listed species of bat, roosting areas, bat hibernacula, or potential habitat for state-listed bats, the applicant will conduct a summer mist-netting and/or harp-trapping survey for bats on the site.

Attachment B - Section 3.A from DGIF Draft

- a. The survey methods will follow applicable State and/or Federal guidance (e.g. the U.S. Fish and Wildlife Service guidelines for mist-netting surveys in the Indiana Bat Recovery Plan). The number of sites will be based on the approximate size of the study area or linear distance of proposed turbine/roads strings. The survey will be conducted during the summer season identified in the guidelines, May 15-August 15. Specific details of the survey will be determined by site conditions and survey timing. Netting and/or trapping locations will be determined in the field but will be within the proposed Project Boundary.
- b. For all bats captured, standard data such as species, sex, age, reproductive condition, and other notes will be recorded. For every state-listed bat captured, a radio transmitter will be attached for radio telemetry. The radio telemetry survey will consist of tracking each tagged bat for the duration of the transmitter (typically about 2 weeks) to determine nightly movements and locations of roost trees used by each tagged bat. Each roost tree located will be mapped and identified to species. Approximate age, size, condition, and GPS location of each roost tree will be recorded. Exit counts at sunset will be made at each roost tree located, if possible.

~~5. Mist Netting and/or Harp Trapping Study: If the applicant identifies potential for State threatened or endangered bat species to occur within the Project Boundary, including the presence of roosting areas, bat hibernacula, the potential habitat for State threatened or bats, or if a State threatened or endangered bat is observed in the project area, the applicant will conduct a summer mist netting and/or harp trapping survey for bats on the site. The survey methods will follow applicable State and/or Federal guidance (e.g. the U.S. Fish and Wildlife Service) guidelines for mist netting surveys in the Indiana Bat Recovery Plan). The number of sites will be based on the approximate size of the study area. The survey will be conducted during the summer season identified in the guidelines, May 15-August 15. Specific details of the survey will be determined by site conditions and survey timing. Netting and/or trapping locations will be determined in the field but will be within the proposed Project Boundary.~~

- ~~a. Captured State Threatened or Endangered Bats: For all bats captured, standard data such as species, sex, age, reproductive condition, and other notes will be recorded. For every State threatened or endangered bat captured, a radio transmitter will be attached for radio telemetry. The radio telemetry survey will consist of re-locating each tagged bat for 1-5 days post capture (in consultation with the DGIF) to determine locations of roost trees used by the tagged bat. Each roost tree located will be mapped and identified to species. Approximate age, size, condition, and topographic position will be recorded for each roost tree. Exit counts at sunset will be made at each roost tree located, if possible.~~

6. Wildlife and Natural Resources Report. The Applicant will provide to DEQ, with copies to DGIF and DCR, a Report summarizing the relevant findings of the desktop and field surveys conducted pursuant to 1-5 above. Concurrently with submission of the Wildlife and Natural Resources Report, all data developed and recorded pursuant to development of the Report shall be electronically submitted to the DGIF and DCR.

DGIF and Industry Language

DGIF Language:

Section 4. Determination of whether significant adverse impacts to wildlife or historic resources are likely.

A. The Department shall find that significant adverse impacts are likely whenever wildlife analyses indicate any of the following:

1. Wildlife Species of Greatest Conservation Need or State Threatened or Endangered Species are documented within 2 miles of the Project Boundary, or are determined likely to breed, forage, roost, or migrate within or across the Project Boundary;
2. Bats have been documented or are observed within the project boundary, or hibernacula are determined to occur within 12 miles of the project boundary.
3. Endangered or Threatened Species Waters, trout streams, colonial bird rookeries, or anadromous fish streams are documented within the project boundary.

Industry Language:

Section 4. Determination of whether significant adverse impacts to Wildlife or historic resources are likely.

A. The Department shall find that significant adverse impacts are likely whenever Wildlife analyses indicate any of the following:

1. State T&E Wildlife are found to occur within the Disturbance Zone;
2. Bats have been observed, or a hibernaculum exists, within the disturbance zone.

Section 5. Mitigation Plan.

A. If the Department determines that significant adverse impacts to Wildlife or historic resources are likely, the applicant shall prepare a mitigation plan. The mitigation plan shall include a description of the affected natural resource and the impact to be mitigated, a description of reasonable actions that will be taken to avoid and minimize the stated impact, and a plan for their implementation. To the extent the impact cannot reasonably be avoided, the plan shall include a description of actions that will be taken to minimize the stated impact, and a plan for their implementation.

B. Specific mitigation measures for Wildlife shall include:

1. For State T&E Wildlife, the Applicant shall take all reasonable measures to avoid significant adverse impacts, or shall demonstrate in the mitigation plan what significant adverse impacts cannot practicably be avoided, and why the additional proposed actions are reasonable.
2. For bats, the mitigation plan shall include measures to curtail operation of wind turbines on low wind speed nights when bats are likely to be active within the Project Boundary Disturbance Zone, and to monitor the efficacy of these measures. In those years where both efficacy monitoring and curtailment are performed, the total curtailment hours are capped at an average of 40 hours per turbine per year. In those years where only curtailment is performed, the total curtailment hours are capped at an average of 119 hours per turbine per year.

C. Specific mitigation measures for historic resources shall include:

1. If any identified VLR-eligible or listed archaeological site cannot be avoided or minimized to such a degree as to avoid a significant adverse impact, significant adverse impacts of the project will be mitigated through archaeological data recovery.
2. Significant adverse impacts to VLR-eligible or listed architectural resources shall be minimized, to all practicable extents, through redesign of project elements or the installation of vegetative or other screening.
3. For significant adverse impacts to VLR-eligible or listed architectural resources that cannot be avoided or minimized so as to avoid significant adverse impacts through project redesign or screening, the applicant shall develop a reasonable and proportionate mitigation plan that offsets the significant adverse impacts and has a demonstrated public benefit and benefit for the affected or similar resource.

D. Post-Construction Wildlife Monitoring

Post-construction monitoring shall be designed to achieve the following:

1. Estimate the level of avian and bat mortality associated with the wind project.
2. Investigate the correlation of bat fatalities with project operational protocols, weather-related variables, and the effectiveness of operational adjustments to reduce impacts.

E. Post-Construction Wildlife Mitigation and Management

1. Post-Construction Mitigation: After completing the initial one (1) year of Post-Construction monitoring, the applicant shall submit a plan consisting of its proposed monitoring and mitigation actions expected to be implemented for the remainder of the project's operating life. The combined annual cost of mitigation and post-construction monitoring shall not exceed the project's lost revenue as a result of curtailment for a total of 119 hours annually.

2. Amendment of Mitigation Plan: After three (3) years of post-construction mitigation efforts, the Operator of the facility may initiate a consultation with the Department to propose amendments to the mitigation plan. The Department may amend the mitigation plan if it determines that the proposed amendment will avoid or minimize adverse impacts to a demonstrably equal or greater extent as the mitigation measures being implemented at that time. Alternatively, the Department may amend the mitigation plan if the Operator demonstrates that: the mitigation measures being implemented at that time are not effectively avoiding or minimizing adverse impacts, and; the proposed amendments (for example, funding research or habitat preservation) are preferable methods to mitigate for ongoing adverse impacts.

~~3. Invasive Plant Species Management: Native plant species appropriate to the site will be utilized as part of the construction and landscaping process. In the ordinary course of construction or operation of the facility, if any Invasive Plant Species are identified, they will be managed following standard protocols for the particular species.~~