

**BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN**

Joint Application of American Transmission)
Company, ITC Midwest LLC, and Dairyland)
Power Cooperative, for Authority to Construct)
And Operate a New 345 kV Transmission Line)
From the Existing Hickory Creek Substation in)
Dubuque County, Iowa, to the Existing)
Cardinal Substation in Dane County,)
Wisconsin, to be Known as the Cardinal-)
Hickory Creek Project)

5-CE-146

**DIRECT TESTIMONY OF DONALD WALLER
ON BEHALF OF THE
DRIFTLESS AREA LAND CONSERVANCY
AND WISCONSIN WILDLIFE FEDERATION**

INTRODUCTION

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Q: Please state your name, business, and address.

A: Donald M. Waller, Professor of Botany & Environmental Studies
Dept. of Botany, 232 Birge Hall
430 Lincoln Drive
University of Wisconsin-Madison
Madison, WI 53706 USA

Q: Please summarize your relevant education and background.

A: I am the John T. Curtis Professor of Botany and Environmental Studies at the University of Wisconsin – Madison where I have taught ecology, evolution, and conservation since 1978. My AB and PhD degrees are in Biology and Population Biology, respectively, from Amherst College and Princeton University, followed by post-doctoral work at Harvard’s Gray Herbarium. My expertise is in population and community ecology,

1 evolutionary biology, and conservation biology. I and my students study the demography
2 and genetics of small populations (including many rare plants), trophic cascades, effects
3 of habitat fragmentation, and meta-population and meta-community dynamics. We
4 currently focus on the forces driving long-term declines and extinctions in native species,
5 biotic homogenization, and other forms of ecological change. Within Wisconsin, we have
6 documented how habitat fragmentation, aerial nitrogen deposition, nutrient loading in
7 streams, invasive species, and overabundant ungulates all act as important drivers of
8 ecological change.

9 **Q: Please describe your extensive experience as a conservation biologist.**

10 A: I co-established UW-Madison's MS program in Conservation Biology and Sustainable
11 Development in 1990 and serve as Chair of the undergraduate major in Conservation
12 Biology. I teach UW's Conservation Biology course (Botany / Zoology / Env. Studies /
13 Forest & Wildlife Ecology 651). I and my students have done extensive research in
14 Wisconsin including multiple studies within the Driftless Area. I have worked
15 throughout my career to communicate effectively with the public and to apply science to
16 improve forest, wildlife, and environmental management. I have served as editor or
17 associate editor for several journals and am an elected Fellow of the American
18 Association for the Advancement of Science. I have testified before the U.S. Senate and
19 the Wisconsin State Assembly on conservation and natural resource issues. I have
20 published 160+ scientific papers and reports, 19 book chapters, and two books: Wild
21 Forests: Conservation Biology and Public Policy (Island Press 1994) and The Vanishing
22 Present: Wisconsin's Changing Lands, Waters, and Wildlife (U. Chicago Press, 2008).

23 **Q: What is the purpose of your testimony?**

1 A: My testimony describes, evaluates, and provides expert opinion on the likely adverse
2 direct and potential indirect and cumulative impacts of building and operating the
3 proposed Cardinal-Hickory Creek high-voltage transmission line through the Driftless
4 Area in Wisconsin. I focus on those impacts that I know the most about, including edge-,
5 area-, and isolation-effects; threats to small populations; plant community dynamics; and
6 the biology and ecology of rare, threatened, and endangered species. My testimony also
7 discusses whether the proposed transmission line and towers is consistent with applicable
8 statutory standards.

9 **Q: Please summarize your testimony.**

10 A: My testimony includes and elaborates on the following points:

- 11 ➤ The 100+ mile route of the proposed Cardinal-Hickory Creek (CHC) transmission line
12 intersects a succession of natural and semi-natural habitats that are of regional and
13 national significance. It would also create both a potential hazard and obstacle to the
14 movement of many native species and a likely avenue that would accelerate the invasion
15 of multiple weedy non-native species. Accordingly, the proposed transmission line and
16 towers would cause undue adverse environmental impacts to the area.
- 17 ➤ Despite efforts to anticipate environmental impacts and plan a route using existing rights-
18 of-way, the construction and maintenance of the proposed CHC transmission line would
19 have multiple direct, indirect, and cumulative impacts on the natural ecosystems, species,
20 ecological relationships, and environmental quality of habitats within and adjacent to the
21 right-of-way. It would also adversely affect populations of multiple sensitive species
22 moving through or occurring in the vicinity of the right-of-way. The proposed routing,

1 design, and minimization efforts are not sufficient to avoid undue adverse impacts to
2 environmental values.

3 ➤ The particular habitats that would be strongly affected by the CHC transmission line
4 include the Upper Mississippi River National Wildlife and Fish Refuge, a key component
5 of the Mississippi Flyway, a migration route of continental significance for over 300
6 species of migrant birds. In addition to creating permanent obstacles and hazards to many
7 bird species nesting or flying through the National Refuge, sedimentation associated with
8 construction of the CHC transmission line and high towers would also threaten water and
9 habitat quality for bivalves and most other benthic aquatic life. This, in turn, would
10 seriously reduce habitat quality for many species of ducks and other birds and mammals
11 reliant on clean water and healthy benthic communities.

12 ➤ The proposed transmission line and high towers would have further serious impacts on
13 many natural areas and landscapes within the unglaciated Driftless Area of southwestern
14 Wisconsin. These include the many adverse indirect and cumulative impacts of clearing
15 and maintaining the right-of-way. These adverse indirect and cumulative impacts extend
16 considerably beyond the immediate right-of-way, considerably expanding the number of
17 habitats and species affected.

18 ➤ The proposed transmission line and high towers would have serious harmful impacts on
19 several ecological communities including Mississippi River benthic communities and
20 floodplain forests and grasslands, wetlands, and upland forests occurring in the Driftless
21 Area. Many of these impacts would extend considerably beyond existing and the
22 proposed new and widened rights-of-way.

1 ➤ Widely distributed and relatively abundant plant and animal species in the Midwest might
2 not be seriously affected (at the species level) by the CHC project. By contrast, many of
3 the rare and threatened habitat types and species occurring in this section of the Upper
4 Mississippi River valley and the Driftless Area are highly vulnerable to disturbances of
5 the type that the proposed CHC transmission line and high towers would cause to occur.
6 This includes multiple federally and state threatened or endangered species. Several of
7 these species are locally *endemic* – meaning that they are species that are highly restricted
8 in their geographic range, thus making them highly vulnerable to extinction. These
9 species could be at particular risk from impacts associated with this project.

10 ➤ Particular groups of organisms at risk include threatened and endangered species such as:
11 (1) the Whooping Crane (from collisions along migration routes); (2) river benthic
12 invertebrates and the birds and mammals that depend on them; (3) prairie plants and
13 some pollinator insects dependent on fire; (4) grassland birds tied to scarce habitats that
14 are threatened by their loss of area and natural disturbance (fire); and (5) forest interior
15 songbirds sensitive to logging and other human disturbances and at risk from nest
16 parasitism and nest predation which increases along edges habitats (as will occur along
17 the transmission line corridor).

18 **Q: What information and/or documents did you review in preparing this testimony?**

19 A: I reviewed these materials:

- 20 ○ Public Service Commission of Wisconsin / Wisc DNR – Cardinal-Hickory Creek
- 21 Transmission Line Draft Environmental Impact Statement, including Appendices
- 22 B, E, and (PSC Docket 5-CE-146, PSC REF#: 360500)

- 1 ○ Public Service Commission of Wisconsin - “Environmental impacts of
2 transmission lines” (32 pp) (available at
3 <https://psc.wi.gov/Documents/Brochures/Environmental%20Impacts%20TL.pdf>)
4 ○ Application for PSCW Certificate of Public Convenience and Necessity and
5 WDNR Utility Permit, Cardinal-Hickory Creek Transmission Line Project PSCW
6 Docket No. 5-CE-146 (Ex.-Applicants-Application)
7 ○ Biological Assessment, Wisconsin DEIS, Cardinal-Hickory Creek 345-kV
8 Transmission Line, Dane, Iowa, Grant, and Lafayette Counties, Wisconsin,
9 Clayton and Dubuque Counties, Iowa, Prepared for: Nov. 10, 2017, Revised
10 March 19, 2018. (Attachment to Response to Data Request 01.17)
11 ○ “Assessment of the impact to cranes from a newly constructed transmission line”
12 – Report, Phase 1, for Badger-Coulee transmission line (Attach. 7 to 02-DALC-
13 ATC-06, PSC REF#: 364499)
14 ○ Avian Power Line Interaction Committee (APLIC). 2012. *Reducing Avian*
15 *Collisions with Power Lines: The State of the Art in 2012*. Edison Electric
16 Institute and APLIC. Washington, D.C.
17 ○ ATC’s “Avian Risk Tool” - <https://www.atcllc.com/welcome/avian-tracking-tool/>
18 ○ Appendix J, Exhibit 1, Endangered Resource Review for the Proposed Cardinal-
19 Hickory Creek 345 kV Transmission Line Project in Dane, Iowa, Lafayette, and
20 Grant Counties, Wisconsin (Ex.-Applicants-Application-Appendix J, Exh. 1)
21 ○ Avian Risk Review (Stantec), Cardinal-Hickory-Creek 345-kV Transmission Line
22 project (provided by ATC) (DEIS, Appendix F, PSC REF#:360509)

- 1 ○ Badger Coulee 345 kV Transmission Line Project Post-Construction Monitoring
- 2 Report WDNR Permit #IP-WC/SC-2015-N20001 through N20273 (Att. to 02-
- 3 DALC-ATC-06, PSC REF#:361734)
- 4 ○ Direct testimony of Amy Lee – Docket No. 5-CE-146 (Direct-ATC-Lee)
- 5 ○ Testimony of Wisconsin’s Greenfire (Kerry Beheler), Dr. B. Peckarsky, Dr. J.
- 6 Zedler, and P. Trochlell.

7 **Q: Are you sponsoring any exhibits to your testimony?**

8 **A:** Yes, I am sponsoring the following Exhibits:

9 Ex.-DALC/WWF-Waller-1: Curriculum Vitae of Donald M. Waller

10 Ex.-DALC/WWF-Waller-2: Figure of power spectrum of noise associated with corona
11 discharge (Mujc̃ic et al. 2004)

12 Ex.-DALC/WWF-Waller-3: Comments of Dr. Joy Zedler on Federal DEIS

13 Ex.-DALC/WWF-Waller-4: Comments of Bobbi Peckarsky on Federal DEIS

14 Ex.-DALC/WWF-Waller-5: Comments of Dr. Patricia Trochlell on Federal DEIS

15 **Q: Are you familiar with the Driftless Area in southwest Wisconsin?**

16 **A:** Yes – I have visited, explored, and done multiple research projects in the Driftless Area
17 since 1979. In particular, I have supervised and/or collaborated with several MS and PhD
18 students who did relevant research in the Driftless Area. These include Margaret
19 Kuchenreuther whose PhD research (summarized in her 1991 thesis and Kuchenreuther
20 1996; see also Cole and Kuchenreuther 2001) focused on the distribution, autecology,
21 genealogical relationships, and conservation of Northern Monkshood (*Aconitum*
22 *noveboracense*) populations, usually restricted to algal talus slopes near the Applicants’
23 proposed corridor for the Cardinal-Hickory Creek transmission line (as discussed in the

1 DEIS Biological Assessment). Another is Dr. David Roger, with whom I studied plant
2 population and community dynamics in the upland forests of southern Wisconsin,
3 summarized in his 2006 thesis and our subsequent papers (Rogers et al. 2008, 2009;
4 Sonnier et al. 2014; Waller et al. 2016, 2017). I also collaborated with Dr. Amy Alstad in
5 her work describing accelerating ecological change and species losses from remnant
6 prairies in the Driftless Area (Alstad et al. 2016).

7 **Q: Please briefly describe the unique ecology and natural resources of the Driftless**
8 **Area and their value.**

9 A: The Driftless Area of southwest Wisconsin, southeast Minnesota, northeast Iowa and a
10 sliver of northwest Illinois is unique within the Upper Midwest in being geologically and
11 biogeographically far older than the region that surrounds it by virtue of having escaped
12 recent (Pleistocene) glaciation. Its steep forested ridges, deep-carved river valleys,
13 spring-fed waterfalls, cold-water trout streams, and karst (limestone) geology represent
14 unusual land forms in the Midwest. These features and its geological age support higher
15 plant and animal diversity (including several local endemic species) that are not often
16 found elsewhere in upper Midwest. The rolling terrain and dissected valleys are scenic
17 and physically beautiful. The exposed sandy or rocky bluffs, steep hillsides, meandering
18 rivers, and forest-shaded microclimates support a remarkable diversity of habitats and
19 species. Several of the species that grow in the Driftless Area there show closer affinity
20 to species in northern Wisconsin, New England, or the Rocky Mountains than to species
21 in glaciated areas of southern Wisconsin.

22 The Driftless Area has great intrinsic, scenic and aesthetic value for those who
23 have chosen to settle or visit there, as evidenced by Wyalusing, Governor Dodge, and

1 Wildcat Mountain State Parks; the artist's colony in Mineral Point; and Frank Lloyd
2 Wright's Taliesin architecture and American Players Theater near Spring Green. These
3 are known nationally and internationally. The Driftless Area's special value is also
4 reflected in the existence of multiple land trusts, lands owned and protected by The
5 Nature Conservancy, Driftless Area Land Conservancy and other organizations, and the
6 Midwest Driftless Area Restoration Effort, a multi-agency initiative to protect and restore
7 the landscape, as well as the U.S. Department of Agriculture's special five-year Driftless
8 Area Land Conservation Initiative.

9 **Q: Does the routing and design of the proposed Cardinal-Hickory Creek transmission**
10 **line through the Driftless Area minimize adverse environmental impacts?**

11 A: No, it does not. The Applicants claim to have given thought to environmental impacts in
12 their planning by routing the proposed transmission line and high towers along a
13 Preferred Route that uses some existing right-of-way and through the timing and methods
14 for the proposed construction. The Alternative Route would have appreciably greater
15 adverse environmental impacts by expanding further beyond existing rights-of-way,
16 clearing more forest land, and affecting more wetlands. It is unfortunate, however, that
17 the Applicants did not give more robust consideration of Alternative Transmission
18 Solutions and Non-Transmission Alternatives that are explained in other witnesses'
19 testimony. Moreover, it is unfortunate that the Applicants apparently did not give more
20 robust consideration to other alternative routes, e.g., above or below the Driftless Area –
21 from Minnesota into Wisconsin or from Iowa into Illinois at a point that would avoid
22 more of the Driftless Area and perhaps where the Mississippi River was less confined
23 (concentrating birds and thus strikes with the lines), and to avoid crossing through the

1 Upper Mississippi River National Wildlife and Fish Refuge. Finally, the documents I
2 reviewed frequently say that the CHC project will “mitigate impacts . . . to the extent
3 practicable, pursue “compensatory mitigation” for wetlands and other habitats, and
4 employ “best management practices” (BMPs) to further reduce environmental impacts.
5 These are all clearly intended to reduce adverse environmental impacts, but it is difficult
6 to judge how adequately they will do this without further details. For example, I could
7 not find information on the total area(s) directly affected, including access routes and
8 “laydown and staging” areas described in several documents including Appendix J,
9 Exhibit 1. Thus, despite the efforts described, constructing and maintaining this new
10 transmission line along the Preferred Route would still have substantial adverse
11 environmental impacts that are being overlooked and must be fully and fairly evaluated
12 and considered by comparison to other less harmful alternatives.

13 **Q: Please elaborate on what impacts are being overlooked.**

14 A: While the CHC’s plans and the reassurances expressed above discuss several probable
15 impacts, they fall short in elaborating the full scale of impacts this massive CHC
16 transmission line and high towers project will surely have during both its initial
17 construction phase and thereafter. The impacts of construction will likely last much
18 longer than indicated and extend physically farther beyond the right-of-way. That is, the
19 concerns and provisions for special ecological communities and the several threatened
20 and endangered species affected by this project were almost entirely limited to quite
21 nearby locations (often as “element occurrences” – single recorded observations of one
22 species). In some instances, the assurances lack specificity altogether (e.g., with
23 limitations if threatened bird species are found “within or near the Project Area” – p. 8,

1 ER Review #18-130). In other cases, prescriptions are more specific. For the Northern
2 Long-eared Bat (p. 8, ER Review), the Applicants are instructed to have a “qualified
3 biologist conduct surveys to determine if they are present.” The PSCW, DNR and the
4 public are not told what qualifies the biologist, what methods they will use, or how
5 extensively they will survey around the staging areas and rights-of-way.

6 If bats are discovered, the ER Review stipulates restrictions on logging – to not
7 remove trees closer than 150 feet from any known maternal roost trees (for a two-month
8 period in June & July) or trees within ¼ mile of a known hibernaculum. Once trees are
9 cut, however, even outside periods of activity for these bats, the bats will surely and
10 permanently lose potential nesting and roosting habitats that could still adversely affect
11 their populations. I saw no mention of these impacts in the ER Review. I am also
12 concerned about whether the noise emanating from the corona discharge around the
13 transmission lines, extending well up into ultrasonic frequencies would disrupt bat
14 echolocation and/or communication – another potential impact not discussed in the
15 documents I reviewed. There appears to be enough power in some of these ultrasonic
16 frequencies to interfere with echolocation, particularly under wet conditions. Exhibit B.

17 For **frogs**, the Applicants are instructed to avoid work with direct impacts: (1)
18 within 50-75 feet of water (for rare frogs); (2) within 300 feet of threatened **fish** and
19 **aquatic invertebrate** populations; and (3) within 200 meters of host plants supporting
20 threatened and endangered terrestrial invertebrates (like the **rusty patched bumble bee** -
21 p. 9, ER Review). These buffers are quite limited, however, and again ignore adverse
22 indirect and cumulative effects of losing habitat area and habitat quality. The buffer
23 extends to one mile for the **Ornate Box Turtle**, and might usefully be extended

1 downstream to similar distances for all aquatic species treated in the ER Review given
2 the likelihood that sedimentation and other effects are likely to travel at least this far.

3 Similarly, for the two endangered, eight threatened, and four special concern **bird**
4 species in the area, the only restrictions will be “to avoid all disturbances to these areas
5 during the nest avoidance periods” (generally Spring and Summer). Again, if forested
6 habitats are cut and recut to remain open, forest dwelling songbirds like the Cerulean,
7 Hooded and Kentucky Warbler permanently lose habitats. Similarly, existing grasslands
8 in the rights-of-way that support grassland birds will be come to be managed by mowing
9 and herbicides. This does not seem to provide habitats that will support populations of
10 the many grassland birds that are declining in the region. I saw no discussion about
11 whether rights-of-way management as proposed for the CHC transmission line project
12 will serve this purpose.

13 In sum, undue adverse impacts that extend over larger areas, or for further periods
14 of time, and many indirect and cumulative impacts on wildlife (and probably plant)
15 populations are being ignored in these planning and environmental assessment
16 documents.

18 **UNDUE ADVERSE IMPACTS ON WISCONSIN FORESTS**

19 **Q: What adverse, harmful and damaging ecological and environmental impacts would**
20 **construction of the proposed Cardinal-Hickory Creek transmission line and high**
21 **towers (including clearing of the rights of way) have on forests?**

22 **A:** In total, the rights-of-way along the Applicants’ Preferred Route would eliminate 5.2
23 acres of forested wetland and 182 acres of upland woodlands (Ex.-Applicants-

1 Application Appendix B Table 2A). In addition, building access roads associated with
2 constructing this proposed transmission line and high towers would eliminate an
3 additional 4.6 acres of upland forest (Ex.-Applicants-Application Appendix B Table 8A).
4 We can thus expect immediate adverse impacts to be at least proportional to these losses
5 of forested habitat (186+ acre). Such an area would encompass: (1) one to several home
6 ranges of most small to medium sized mammals; (2) multiple forest songbird territories;
7 and (3) large populations of most forest understory plant species.

8 However, the impacts of clearing this much forest land surely exceeds these
9 immediate impacts for several reasons. First, many species are susceptible to edge-,
10 area-, and isolation effects wherein impacts of progressive habitat loss and fragmentation
11 accumulate in an accelerating fashion. No forest patch below 40-50 acres will support,
12 for example, a pileated woodpecker. Likewise, many forest songbirds struggle to raise
13 nestlings in areas where opportunistic nest predators and parasites are common. Edge
14 habitats and proximity to edges greatly increases rates of nest predation and parasitism
15 because meso-predators like raccoons, skunks and bluejays, and nest parasites like
16 cowbirds, routinely patrol along edges. Because such effects penetrate 300+ feet into
17 forests, the impacts attributable to the edges created by this proposed transmission line
18 will affect far more acres than the number of acres of forest eliminated.

19 Research in my own group in southern Wisconsin has demonstrated that plant
20 populations are similarly sensitive to forest patch size and isolation. Local plant
21 diversity, floristic quality, and biotic differentiation among forest patches all decline
22 sharply in response to reductions in forest area, increases in road density, and proximity
23 to developed areas (Rogers et al. 2008, 2009). In addition, as populations of some

1 species decline and become scarcer in the region, they are less likely to re-colonize forest
2 patches that might otherwise be suitable, resulting in an indirect cumulative effect that
3 further reduces local and regional diversity (Waller et al. 2017). Finally, edges and open
4 habitats tend to boost local populations of white-tailed deer (as noted since Aldo
5 Leopold's classic wildlife biology textbook). Higher deer densities, in turn, reduce
6 seedling survival and thus the ability of oaks, maples, hickories, white pines, and several
7 other species to regenerate in our region (Waller 2014; Bradshaw & Waller 2016). These
8 impacts on forest composition are severe and long-lasting (many decades).

9 In sum, in the Driftless Area region where forested habitats usually occur in
10 relatively small patches and as isolated fragments, losing an additional 186+ acres of
11 forest will have a surprisingly disproportionate impact on forest dwelling birds, animals,
12 understory plants, and the tree composition of our forests.

13 **Q: If the proposed Cardinal-Hickory Creek transmission line is placed in service, what**
14 **adverse, harmful and damaging ecological and environmental impacts would**
15 **maintenance of the right-of-way and the transmission line and high towers have on**
16 **forests?**

17 A: Maintaining the rights-of-way under transmission lines requires maintaining motorized
18 access corridors to the 150' rights-of-way, regular mowing and/or tree cutting in the
19 rights-of-way, the regular application of herbicides to stumps and other woody
20 vegetation, the felling of dead, diseased or other trees near the rights-of-way that might
21 fall into it, and various other direct and indirect impacts associated with these
22 maintenance activities. The rights-of-way themselves represent a significant disturbance
23 that will affect many plant and animal species. In her PhD thesis aimed at assessing

1 effects of high-voltage power lines in Norway, Bartzke 2014 concluded that power lines
2 have many such effects (“disturbance and altered habitat use can induce barrier and
3 corridor effects, thereby influencing connectivity”). The maintenance of an open right-
4 of-way regularly disturbed by maintenance activities will also enhance and facilitate
5 invasions by weedy non-native species known to thrive along edges and in disturbed
6 areas including weedy plants, Eurasian earthworms that degrade soil conditions for many
7 native plants, and probably certain invasive animals as explained more below. The
8 felling of dead, diseased or other trees near the rights-of-way widens the impacts on
9 forests beyond the 186+ acres felled for the rights-of-way themselves. For example, the
10 elimination of dead trees as standing snags will reduce habitat and foraging opportunities
11 for woodpeckers and the many bird species that use woodpecker holes for nesting.
12 Felling trees may also reduce the amount or availability of coarse woody debris, reducing
13 habitat for other species.

14 **Q: Please discuss the extent to which these impacts will still occur if the proposed**
15 **transmission line follows existing utility or road rights of way.**

16 A: To accommodate the proposed CHC transmission line and high towers, at the very least,
17 existing rights-of-way will have to be considerably expanded, increasing the amount of
18 forest clearing required and the amount of repeated woody plant cutting and herbicide
19 applications necessary to maintain the ~150 foot wide corridor. Total impacts will
20 increase along with these expanded areas affected and may expand disproportionately for
21 some species as explained above.

1 **Q: Are the proposed mitigation and restoration measures identified in the Applicants’**
2 **application and direct testimony sufficient to successfully minimize adverse,**
3 **harmful and damaging impacts to forests?**

4 A: The Project, as designed, will necessarily carve a broad corridor near and through many
5 forested habitats affecting far more than the 186+ acres felled to provide the rights-of-
6 way.

7 **Q: Please discuss the degree or severity and the duration of the adverse, harmful and**
8 **damaging impacts on forests that you have described above.**

9 A: I consider the effects explained above to be significant, often severe, and to have very
10 long-lasting impacts on the biota of forests in our region. While local declines in
11 diversity may be reversible, the scarcity of mature woodlands coupled with the severity
12 and longevity of many of the effects noted above suggest that this proposed transmission
13 line would contribute to and accelerate region-wide patterns of decline in many native
14 plant and animal species.

15 **Q: Will the proposed routing of the transmission line through and near forested areas**
16 **in the Driftless Area have undue adverse impacts on environmental values, such as**
17 **wildlife habitat and/or ecological balance?**

18 A: Yes. For the reasons described above, the ecological and wildlife value of woodlands in
19 the Driftless Area would decline if the proposed transmission line is built.

20 **Q: To what extent is the proposed Cardinal-Hickory Creek transmission line consistent**
21 **with the goal, stated in Wis. Stat. § 1.12(3)(c), “to ensure a future supply of wood**
22 **fuel and reduce atmospheric carbon dioxide by increasing the forested areas of the**
23 **state”?**

1 A: Maintaining the open right-of-way corridor for the CHC project would clearly reduce the
2 amount of forested area in southwest Wisconsin and so go against this statute. The
3 amount of this impact would scale with the area of forest removed. Cutting trees releases
4 a pulse of CO₂ as organic material is oxidized, increasing greenhouse gases. In addition,
5 reduced the area of forest reduces the extent to which those trees removed could have
6 reduced greenhouse-gases by absorbing CO₂ and sequestering carbon above and below
7 ground. The extent of this impact is proportional to the area of forest removed.

8

9 **UNDUE ADVERSE IMPACTS ON GRASSLANDS AND PRAIRIES**

10 **Q: What adverse, harmful and damaging ecological and environmental impacts would**
11 **construction of the proposed Cardinal-Hickory Creek transmission line (including**
12 **clearing of the rights of way) and high towers have on grassland and prairie**
13 **ecosystems?**

14 A: In total, the right-of-way along the Preferred Route would eliminate 180.2 acres of
15 grassland habitat and further affect 303.5 acres of grassland already in an existing right-
16 of-way used by this Project (Ex.-Applicants-Application Appendix B, Table 2A). In
17 addition, building access roads associated with constructing this line would eliminate or
18 have strong impacts on an additional 27 acres of grasslands (Ex.-Applicants-Application
19 Appendix B Table 8A). These impacts would be most significant for remnant patches of
20 native prairie grasslands. Unfortunately, the summary statistics provided do not clarify
21 what fraction of these 200+ acres involves such prairies. Nevertheless, it's clear that both
22 prairies and grasslands have become quite scarce in the region and that appreciable
23 fractions of their biota are correspondingly rare or threatened local extirpation or even

1 extinction. Thus, any reduction in the areal extent of grasslands in the region is of
2 concern. In addition, as with the forest ecosystems discussed above, many of the impacts
3 of the proposed transmission line extend considerably beyond the immediate right-of-way
4 and associated access routes.

5 Grassland birds, for example, are also susceptible to the negative impacts of nest
6 predators and cowbird parasites that we expect to increase along the route of this
7 transmission line. Herkert et al. (2003) measured rates of nest predation and brood
8 parasitism in four grassland bird species (Grasshopper Sparrow, Henslow's Sparrow,
9 Eastern Meadowlark, and Dickcissel) in 39 prairie fragments. Losses were highest in
10 small (<100 ha) grassland fragments where most nests (78–84%) were lost to predation,
11 leading them to conclude that fragmentation of grassland habitats contributes to the
12 regional declines of grassland birds we observe. Given that most grassland habitats in this
13 region are small and the efforts to enlarge these via active restoration, this proposed CHC
14 transmission line would represent a step backward.

15 **Q: If the proposed Cardinal-Hickory Creek transmission line is placed in service, what**
16 **adverse, harmful and damaging ecological and environmental impacts would**
17 **maintenance of the right-of-way and the line have on grassland and prairie**
18 **ecosystems?**

19 **A:** Maintaining the right-of-way and transmission line is likely to have several adverse
20 effects on grassland and prairie ecosystems even though these appear superficially similar
21 in being open habitats that support a variety of grasses and forbs (non-grass flowering
22 plants) and a diversity of animal species. This superficial similarity, however, masks
23 considerable differences, particularly with natural prairies and savannas. These two

1 communities once dominated the landscapes of southwestern Wisconsin extending
2 uninterrupted for many miles and covering vast areas, but 99.9% of these areas have
3 disappeared. The plants and wildlife that depend on these ecosystems are
4 correspondingly rare, including the grassland birds discussed here in a separate section.
5 This makes any impacts of the CHC transmission line project on these grassland
6 ecosystems particularly significant. Many prairie and savanna plants are exceptionally
7 long-lived, meaning that they are slow to recolonize and re-establish after anthropogenic
8 disturbances, including soil excavation, movement, and compaction. They are also
9 highly vulnerable to invasions of both woody species (which often overtop and shade out
10 light-loving prairie species) and weedy invasive species (which can competitively
11 displace native species and often alter soil conditions in ways that inhibit the growth of
12 native plants).

13 On the other hand, most prairie and savanna species thrive in the presence of
14 natural disturbances, being adapted to and often highly dependent on regular fires. My
15 understanding is that fires, however, are not allowed in transmission line right-of-way
16 corridors, eliminating this important source of disturbance not only within the corridor,
17 but also nearby. This has the effect that otherwise suitable open- or grass-land adapted
18 species that depend on fire may not persist (including fire-dependent host-plant species
19 for rare invertebrate / insect species, including the lupine that feeds the federally
20 endangered Karner Blue Butterfly). The planned mowing and herbicide applications in
21 the right-of-way will serve, by design, to maintain open conditions, which will tend to
22 favor some grassland plants, but will not replicate fires in terms of other ecological
23 conditions and processes. In addition, the use of broad-spectrum herbicides to control the

1 growth of woody plants will also surely involve some “by-kill” via herbicide drip and
2 drift on breezes, regardless of whether these herbicides will be applied with care, and
3 primarily to stumps and woody vegetation. Such drip and drift will adversely affect
4 native plant species – again including host-plants for rare invertebrates and food sources
5 (e.g., for the federally endangered Rusty Patched Bumble Bee) that might otherwise
6 thrive in the corridor. Losses of these fire-adapted and herbicide-sensitive plant species
7 will have cascading negative effects on other species dependent on these plants including
8 phytophagous or pollinating insects and other animal and fungal associates.

9 **Q: Are the proposed mitigation and restoration measures identified in the Applicants’**
10 **application and direct testimony sufficient to successfully minimize adverse,**
11 **harmful and damaging impacts to grassland and prairie ecosystems?**

12 A: No, they are not. While the Applicants say that they will attempt to minimize some of
13 the harmful and damaging impacts that this transmission line would have on grassland
14 and prairie ecosystems, they do not suffice to eliminate them. For example: (1) fires will
15 be suppressed, (2) areas of undisturbed prairie will be reduced, (3) edge effects will
16 increase, and (4) invasions will be facilitated – all with damaging impacts on these
17 ecosystem types. Given the rarity of these grasslands, the extent to which they support
18 rare, threatened, and endangered species of plants and wildlife, and their sensitivity to
19 shifts in disturbance regimes, invasions, etc., any adverse impacts in the region represent
20 a significant threat to these ecosystem types.

21 **Q: Please discuss the extent to which these adverse impacts would still occur even if the**
22 **proposed transmission line follows existing utility or road rights-of-way in**
23 **particular places.**

1 A: Using existing right-of-way will clearly reduce damaging impacts to grassland and prairie
2 ecosystems by reducing the amount of new land dedicated to the new corridor associated
3 with the CHC transmission line. Nevertheless, because the right-of-way will need to be
4 substantially widened and extended to accommodate the proposed transmission line and
5 high towers, considerable additional land will be affected. The impacts of these broader
6 corridors will, in general, be proportional to the increases in area of these rights-of-way.
7 Many adverse impacts will still occur even where the proposed line truly does follow
8 existing utility or road rights of way given the enlarged size and extent of these rights-of-
9 way, and the number of natural and semi-natural plant and animal communities traversed.
10 That is, the impacts associated with existing rights-of-way would increase and such
11 increases would occur despite efforts to reduce and mitigate them. For example, smaller
12 rights-of-way may not attract as many opportunistic meso-predators as larger rights-of-
13 way, increasing the harmful impacts of the proposed transmission line over what occurs
14 now. In addition, the construction of the new pylons, roads, and pads for the
15 transmission line and the large high towers will disturb soils and wildlife in the vicinity
16 that may take years to recover. The existence of a broader corridor will enhance the
17 dispersal of invasive species along the corridor even in the presence of BMPs and
18 measures like washing down equipment because these species are very effective at
19 dispersing (e.g., via wind and on and in animals) and colonizing open and/or disturbed
20 lands. These impacts are of particular concern in wetlands, remnant native prairies, and
21 mature woodlands along the route.

1 **Q: Please discuss the degree or severity and the duration of the adverse, harmful and**
2 **damaging impacts to grassland and prairie ecosystems that you have described**
3 **above.**

4 A: It is quite difficult to fully forecast the severity and duration of these adverse impacts
5 given that many are indirect and cumulative and that their nature and severity has only
6 been studied in a few species. We do know that reductions in area and reductions in fire
7 management both greatly accelerate the rate at which remnant prairie grasslands in the
8 region lose species, the rate at which they are invaded, and the extent to which they
9 undergo biotic homogenization (Alstad et al. 2016). These impacts are not hypothetical,
10 and biologists may often underestimate their severity given the scarcity of relevant
11 research.

12 **Q: Would the proposed routing of the transmission line and high towers through and**
13 **near grassland and prairie ecosystems in the Driftless Area have undue adverse**
14 **impacts on environmental values, such as wildlife habitat and/or ecological balance?**

15 A: I expect that the proposed transmission line and high towers would diminish the number
16 and value of habitats for native wildlife in the region and potentially disrupt relationships
17 between rare, threatened, and endangered species and the many competitor and predator
18 species they must cope with.

19

20 **UNDUE ADVERSE IMPACTS: INVASIVE SPECIES**

21 **Q: What impacts would the construction and maintenance of the proposed Cardinal-**
22 **Hickory Creek transmission line and high towers, including clearing of and**
23 **maintaining the right of way, have on the spread of invasive species or diseases?**

1 A: The 100+ mile corridor, usually extending to 150 feet wide would substantially increase
2 the risk and rates of invasion by many non-native species. This would occur despite the
3 best efforts to minimize them as most invasive species have very effective means of
4 dispersal and are evolved to rapidly colonize areas that are open and disturbed, as will
5 occur during construction of this line. That is, BMPs like washing down trucks and
6 earth-moving equipment will not suffice to eliminate, or possibly even seriously reduce
7 in many cases, the amount of invasion by weedy, non-native species. In addition, the use
8 of broad-spectrum herbicides to control the growth of woody plants will also continue to
9 create openings and thus opportunities for invasive species to establish. Such herbicide
10 applications would also kill some non-target plants (via herbicide drip and drift on
11 breezes), reducing their ability to competitively displace invasive plants.

12 The clearing and maintenance of the right-of-way could also enhance the spread
13 or incidence of certain diseases by modifying habitats in ways that enhance populations
14 of disease vectors or hosts for disease. For example, if stagnant water occurs more often
15 within openings (relative to closed forests with more leaf litter and mulch), populations of
16 mosquitoes that carry West Nile virus or other diseases could increase. Openings and
17 edges are also known to increase deer use and densities, likely increasing local
18 populations of deer (black-legged) ticks that carry Lyme disease, Ehrlichiosis, Tick
19 Fever, and other diseases of humans and wildlife. Denser deer populations are also
20 associated with increases in the risk and rates of spread of Chronic Wasting Disease, a
21 prion disease that poses substantial risks to deer and possibly other wildlife and humans.

22 **Q: What is the basis for your opinion?**

1 A: I base my opinion on this and other responses below on my reading of the documents
2 listed above, my scientific understanding and reading of the literature, and my personal
3 experience doing research on the spread of invasive exotic plant species and factors
4 related to deer abundance and impacts (e.g., Waller et al. 2016).

5 **Q: Are the mitigation measures identified by the Applicants sufficient to minimize the**
6 **potential for spreading invasive species or diseases?**

7 A: No. The scale of the proposed CHC transmission line and high towers and the intensity
8 and extent of construction activities ensure that invasive species will increase along and
9 in the vicinity of the right-of-way corridor. Furthermore, mitigation-like efforts to
10 control invasives using herbicides could also adversely affect native plant species
11 including host-plants for rare invertebrates and food sources (e.g., for the federally
12 endangered Rusty Patched Bumble Bee). Invasives would also displace native plant
13 species with likely cascading negative effects on species dependent on these plants
14 including phytophagous or pollinating insects and other animal and fungal associates.
15 The mitigation measures would reduce, but not substantially eliminate, these impacts –
16 which would be considerable.

17 **Q: What mitigation measures, in addition to those identified by Applicants, would be**
18 **necessary to successfully minimize the potential for spreading invasive species or**
19 **diseases?**

20 A: Given the propensity for invasives to disperse widely and effectively colonize open and
21 disturbed habitats, I do not see any easy way for the Applicants to further reduce impacts
22 beyond the BMPs and practices they propose. This very large transmission line project
23 would necessarily create large impacts.

1 **Q: Please comment on the severity or degree of these adverse, harmful and damaging**
2 **impacts, as well as the expected duration.**

3 A: Invasive impacts often build over time. While I cannot forecast these in detail, I can
4 affirm that they would be substantial, long-lasting, and potentially synergistic in
5 facilitating the invasion of other non-native species and diseases (now termed an
6 ‘invasion cascade’).

7 **Q: Would the proposed Cardinal-Hickory Creek transmission line have undue adverse**
8 **impacts on native species by introducing or spreading invasive species or diseases?**

9 A: Yes, necessarily and inevitably.

10

11

UNDUE ADVERSE IMPACTS ON BIRDS

12 **Q: What is the current status of grassland bird populations in the Midwest?**

13 A: Grassland birds are declining at alarming rates through most of the Midwest including
14 southern Wisconsin and the Driftless Area in southwest Wisconsin where they are
15 declining faster than any other group of birds (Sauer et al. 2005; Sample and Mossman
16 2008). For example, there are declines of 1.8% to 11.2% *per year* between 1966 and
17 2004 in Bobolink, Eastern and Western Meadowlarks, and Henslow’s, Vesper,
18 Grasshopper, and Savanna sparrows. These declines reflect both major losses in wild
19 grassland (prairie and savanna) habitats and more extensive and intensive agricultural
20 practices in our region, which reduce the amount and suitability of the pastures and fields
21 they use to nest in; for example, more frequent mowing cycles interrupting their breeding
22 season and destroying nests. Like forest species, many grassland birds appear quite
23 sensitive to habitat area and edge effects (including cowbird nest parasitism), declining or

1 disappearing from smaller habitat patches (below 5 to 55 ha). Those impacts led Herker
2 (1994) to conclude that habitat fragmentation likely caused many Midwestern grassland
3 bird declines.

4 In Illinois, fragment area alone predicts mean bird species richness better than any
5 other variable ($r^2=0.84$), and 8 of 15 grassland bird species showed strong area effects
6 (Herker 1994). Aside from the disruption of habitats during construction, required new
7 roads and the 150-foot wide transmission line corridor will further fragment these
8 habitats by creating habitat that cannot be managed in larger blocks to favor these
9 declining, area-sensitive birds, e.g. by burning. Indeed, several landscape-scale projects
10 that have been set up in the region – for example, the Southwest Wisconsin Grassland
11 and Stream Conservation Area and Western Prairie Habitat Restoration Area –
12 specifically to protect and enhance habitat for area- and disturbance-sensitive grassland
13 birds (Penthorpe 2016).

14 **Q: Please explain what the Mississippi River flyway is and why it is important.**

15 A: The majority of birds that nest in the Midwest or farther north are neotropical migrants
16 that must depend on migration corridors to move between their summer and winter
17 habitats. Major migration corridors are termed flyways, and the Mississippi River flyway
18 is the largest and most important bird migration corridor in central North America. The
19 river corridor provides a clear visual cue and also lacks mountains and ridges to block
20 movement. Birds favor this route as well because it provides crucial water, food, and
21 cover for the huge numbers of birds that use it.

22 The Audubon Society notes that some 325 bird species use the Mississippi River
23 flyway including nearly half of the bird species and up to forty percent of the waterfowl

1 for all of North America. The many dams, locks and levees built along its length have
2 had heavy impacts on the hydrology and floodplain habitats of the Mississippi River with
3 less than 10% of the original floodplain remaining. These losses and threats led the U.S.
4 Fish & Wildlife Service and private organizations to try to protect this vital flyway by
5 protecting floodplain habitats up and down the river – including the Upper Mississippi
6 River National Wildlife and Fish Refuge that would be bisected by the proposed CHC
7 transmission line project. Audubon is currently focusing intensive conservation efforts
8 on 27 bird species in the Mississippi Flyway: Mottled Duck; Greater Prairie-Chicken;
9 Brown Pelican; Little Blue Heron; Reddish Egret; Swallow-tailed Kite; Clapper Rail;
10 Snowy Plover; Wilson’s Plover; Piping Plover; American Oystercatcher; Upland
11 Sandpiper; Ruddy Turnstone; Red Knot; Sanderling; Western Sandpiper; Short-billed
12 Dowitcher; Least Tern; Black Skimmer; Prothonotary Warbler; Swainson’s Warbler;
13 Cerulean Warbler; and these 5 grassland bird species: Grasshopper Sparrow; Henslow’s
14 Sparrow; Seaside Sparrow; Bobolink; and Eastern Meadowlark.

15 **Q: How would the proposed Cardinal-Hickory Creek transmission line and high**
16 **towers adversely impact birds?**

17 A: The proposed CHC transmission likely will have several adverse impacts on both
18 migratory and resident bird populations in the area. Most conspicuously, collisions with
19 transmission lines and towers are a leading source of bird mortality in the U.S., with
20 annual mortality estimates as high as 174-175 million. Adding another 100+ miles of
21 transmission lines and towers up to 175’ tall via the CHC project will clearly add to
22 hazards to the flight paths of many resident and migrant bird species. Furthermore, the
23 taller towers, and their proximity to the Upper Mississippi River National Wildlife and

1 Fish Refuge, other wetlands, and the bluffs along the River that funnel large number of
2 birds along the Mississippi flyway increases these hazards, particularly on foggy days
3 and at night. There should be particular concerns for the large numbers of Sandhill
4 Cranes in the area and the smaller number of federally endangered Whooping Cranes
5 migrating through or along the Mississippi River corridor and the National Wildlife and
6 Fish Refuge. Bald Eagles and large numbers of other waterfowl also use this route. The
7 “Assessment of the impact to cranes from a newly constructed transmission line” –
8 Report, Phase 1, for the Badger-Coulee transmission line (Att. 7 to 02-DALC-ATC-06,
9 PSC REF#: 364499) reports a huge number (25,000+) of relatively low-flying cranes in
10 mid- to late-Fall in that corridor near the Wisconsin River. The proposed CHC
11 transmission line towers would be higher and thus more dangerous. Collisions with lines
12 and towers are a significant cause of mortality for the endangered Whooping Crane.
13 The adverse impacts of the proposed CHC transmission line and high towers on birds
14 thus involve several mechanisms including:

- 15 • disrupting or eliminating migratory and/or nesting habitat during and after
16 construction; creating obstacles to migration via the lines and towers that could injure
17 or kill birds (e.g. such strikes represent a high source of mortality for storks in areas
18 of Europe that have gained HV electric lines – Moreira et al. 2017). The Avian Risk
19 Review (Part 1) (DEIS, Appendix F, PSC REF#: 36059) notes that “Transmission
20 lines located near high bird-use areas, concentrated flight paths, and topographic and
21 vegetation features may present increased collision risk.”
- 22 • potentially electrocuting very large birds (though the wide spacing of wires at
23 different heights should minimize this);

- 1 • reducing and fragmenting nesting and migratory habitats, reducing survival, nesting
2 success, population sizes, and population viability;
- 3 • creating additional edge habitats likely causing concomitant increases in the
4 populations of opportunistic nest predators like raccoons and nest parasites like
5 cowbirds, which hunt along edges;
- 6 • potentially locally disrupting the magnetic compass of birds and thus their ability to
7 navigate. I base this statement on the results of Burda et al. (2009) who found that
8 power lines disrupt the magnetic compass of deer, cattle, and presumably other
9 vertebrates to a distance of 100-150m (328 to 492 feet, far beyond the 75' to either
10 side of the line within the right-of-way).

11 The existence of 5 different Important Bird Areas along the route, an international
12 program to identify high priority sites to conserve and manage priority birds and habitats,
13 indicates both that many birds in the region are vulnerable or declining and that we have
14 a special opportunity in this region to protect and conserve birds. The fact that the CHC
15 transmission line project intersects or passes near these 5 IBA's implies a special
16 responsibility to protect and conserve birds along this route. Grassland birds are of
17 particular concern given how fast they are declining in the region, the many active efforts
18 in the region and along the route to protect and restore grassland habitats, and the
19 proximity of many prairie grasslands to this route.

20 **Q: What is the basis for your opinion?**

21 A: I base my opinion on my reading of the scientific literature, my experiences as an avid
22 birder since 1974, my conversations with ornithologists and professional colleagues, and
23 my professional judgment as a conservation biologist.

1 **Q: What is your opinion on the degree or severity and duration of these adverse,**
2 **harmful and damaging impacts?**

3 A: Some impacts associated with the clearing of the corridors, construction of the towers,
4 drawing of the lines, and associated access roads and activities would be temporary but
5 possibly severe, and they could extend over time. For example, no birds are likely to nest
6 in proximity to the noise, dust, and other disruptions accompanying construction.
7 Disturbance of wetland habitats during construction would also be severe. These impacts
8 would extent to include siltation of waters, precluding effective foraging by many
9 waterfowl and damaging benthic habitats and their ability to produce food for these birds
10 – possibly for a much longer period of time. Diving and dabbling birds would both be
11 susceptible to impacts from siltation that could make it difficult for them to forage or
12 reduce the amount of food available. Their duration is difficult for me to estimate as it
13 would depend on many factors and would likely vary a lot among species.

14 **Q: In your professional opinion, are the Applicants' measures to avoid and reduce**
15 **impacts to birds adequate?**

16 A: No, they are not. In my professional opinion, both the temporary and more lasting
17 harmful impacts of the CHC transmission line project on birds would be substantial and
18 excessive. That is, even best efforts to reduce and mitigate impacts will not suffice to
19 reduce or eliminate impacts on birds to a level that makes them acceptable, given
20 historical declines in bird habitat and abundance, the need to maintain and restore
21 remaining habitats in this region, and the ongoing threats these birds face.

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1 A: What I know about movements and habitat needs of salamanders and other herptiles is
2 from my reading of the literature, conversations with specialists, and serving on MS and
3 PhD Committees for graduate students doing research on these species.

4 **Q: What is your opinion on the degree or severity and duration of these adverse,
5 harmful and damaging impacts?**

6 A: That would require field survey data to fully answer. That is, we would need to know
7 current population sizes of turtles, snakes, and salamanders (and, by extension, other
8 species), typical movement and migration patterns in relation to habitat conditions, how
9 adverse they are to crossing 150-foot wide open areas, any increase in vulnerability to
10 predation they might experience in crossing the right-of-way, and how the construction
11 and maintenance of the right-of-way might affect the humidity levels and hydrology of
12 habitats critical for these species. These analyses have not yet been done for the
13 proposed CHC transmission line corridor to my knowledge.

14 **Q: In your professional opinion, are the Applicants' measures to avoid and reduce
15 impacts to herptiles, such as exclusion fencing, adequate?**

16 A: No. While that might work to keep most species away from a given area temporarily,
17 they do nothing to control predators, facilitate herptile movement, or reduce the long-
18 term adverse impacts of this project.

19

20 **UNDUE ADVERSE IMPACTS ON PROTECTED SPECIES**

21 **Q: Have you reviewed the Applicants' Endangered Resource Review (ER Review)
22 provided in Ex.-Applicants- Application-Appx. J: Ex. 1 and the follow-up actions it
23 requires for the project assuming that the species are present?**

1 A: Yes.

2 **Q: What is your professional opinion of the adequacy of this environmental review and**
3 **its proposed follow-up actions?**

4 A: This document first discusses particular habitat types (p. 4 et seq.) before going into
5 “Follow-up actions” (Section 3, p. 7) for particular species groups. We learn in the
6 habitat types section that limited field surveys were made in 1978 and that this document
7 is thus mainly based on a review of existing maps and data. We learn further of the many
8 sensitive habitats along the route (e.g., 78 wetlands and 89 waterways along rights-of-
9 way in the Preferred Route), the goal to avoid many of these, and the impacts on them
10 associated with heavy equipment “to the extent practicable”, the use of BMPs to
11 minimize impacts, and plans to mitigate, restore, monitor, and apply remedial measures
12 “as necessary” to reach “restoration goals.”

13 In sum, this “desktop” analysis tries to infer likely impacts in the absence of
14 detailed observations of the sites in the field. Aside from these strong limitations on the
15 data used, it is of further concern that impacts will need to be “further evaluated (p. 4),
16 and that procedures and standards are vague to the point of not really informing
17 decisionmakers and other policymakers, and the public much at all about just what
18 responsibilities the Applicants would take to these sensitive resources. What are the
19 specific restoration goals? What standards will be applied? Who will perform the
20 monitoring and assess its results? What will be deemed necessary under which
21 circumstances? In short, it is difficult to evaluate these vaguely-stated good intentions
22 without more specific and concrete information.

1 The “Follow-up actions” for particular species are similarly vague and often quite
2 limited. For the two endangered, eight threatened, and four special concern bird species
3 identified in the ER Review, only the most minimal of standards are being applied. If a
4 species is not found in suitable habitat “within or near the Project Area,” there are no
5 project restrictions or required actions (p. 8). This makes the biologically naïve
6 assumption that all or most impacts on these species will be local and immediate. If a
7 species is known or assumed to be present, further restrictions emerge, yet these mostly
8 involve trying to time construction activities so as to avoid direct impacts on nesting birds
9 (p. 7). No further restrictions would be applied if activities occur outside their
10 “Avoidance Period” (generally nesting times) – apparently, even if these include
11 destroying critical habitat needed by the species at other times of the year. And if
12 habitats need to be destroyed, the Applicant would need to obtain an Incidental Take
13 Permit.

14 Other species are treated in a similarly way by borrowing boilerplate text. Thus,
15 if Northern Long-eared Bat maternal colonies occur in or near the proposed right-of-way,
16 the Applicants are instructed not to fell those (or other nearby) trees – until Aug. 1
17 through May 31 at which time the document appears to see no threat to the bats. Yet
18 destroying habitat, however, will almost certainly reduce populations and thus increase
19 the risk of declines and extinction regardless of what time of the year these habitats are
20 destroyed. Such head-in-the-sand thinking will not ensure protection of these species and
21 populations.

22 Likewise, Blanchard’s cricket frogs are assumed to be protected if they do not
23 occur within 50-75 feet of the project at certain times of the year. The eight species of

1 aquatic mussels (including the federally endangered Higgin’s Eye Pearly Mussel) and ten
2 fish species get slightly more protection in that they are assumed to be safe if they are not
3 found within 300 feet of the project – at any time of the year. Such prescriptions do little
4 to minimize actual risk and nothing to protect the water quality these species depend on.

5 In sum, this environmental review and the proposed follow-up actions are
6 inadequate to protect, sustain, or enhance populations of these species. They need to be
7 strengthened to provide more in-depth analyses of the particular forces threatening each
8 species, to ensure the protection of adequate suitable habitat, and to anticipate how
9 potential future habitats may be needed and could be provided for within and near the
10 project area.

11 **Q: In your professional opinion, could the proposed Cardinal-Hickory Creek**
12 **transmission line’s expected adverse impacts to endangered and threatened species**
13 **be avoided or minimized and mitigated?**

14 A: The likely adverse impacts on endangered and threatened species from this proposed
15 CHC transmission line project can be partially reduced and mitigated, but only to a
16 limited extent. That is, a project this big, that traverses this many sensitive habitats and
17 affects this many species, and for which the harmful impacts often extend well beyond
18 the 150-foot corridor, will necessarily have multiple and substantial adverse impacts on
19 many of these species that can only be partially avoided and mitigated. I am particularly
20 concerned about likely impacts to: migratory birds including waterfowl and raptors along
21 the Mississippi River flyway; aquatic and semi-aquatic species sensitive to the impacts of
22 sediments; bird and other species dependent on benthic communities; rare species

1 sensitive to progressive and cumulative losses of habitat; and the many birds, insect, and
2 plant species dependent on the scarce grasslands and prairies present along the route.

3 **Q: Please explain the basis for your opinion.**

4 A: I base my opinion on reading of the documents listed above, my experience, my
5 understanding of principles of ecology and conservation biology, and my reading of the
6 scientific literature.

7 **Q: In your professional opinion, are the Applicants' proposed avoidance, mitigation,
8 and minimization measures adequate?**

9 A: No.

10 **Q: Please explain the basis for your opinion.**

11 A: As explained above, each threatened or endangered species requires analysis and review
12 to identify its critical habitat needs, the forces threatening its persistence, population and
13 meta-population dynamics in the region, and how the construction, maintenance and
14 existence of the proposed high-voltage transmission line and high towers would affect
15 these.

16 **Q: Would the proposed Cardinal-Hickory Creek transmission line have undue adverse
17 impacts on endangered and threatened species?**

18 A: I am very concerned that it could. Without more detailed information from the Applicant
19 and in the ER Review, it is impossible to make a determination that these species are safe
20 and will not be adversely affected by the Project.

21

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23

1 **GEOGRAPHIC SCOPE OF UNDUE ADVERSE IMPACTS**

2 **Q: Would environmental or ecological impacts be limited to the land directly within the**
3 **right of way of the proposed Cardinal-Hickory Creek transmission line?**

4 A: Certainly not – adverse impacts from this proposed transmission line and high towers
5 would extend considerably beyond the corridor itself. Construction and maintenance of
6 the right-of-way will disturb a much larger area and would have clear impacts on many
7 species that extend beyond the right-of-way. Erosion, sedimentation, and land-
8 disturbances would be associated with constructing the high towers and needed roads and
9 pads, affecting streams and rivers for some distance. The right-of-ways and large towers
10 would also intersect the flight and movement paths of birds and animals moving over a
11 much broader area. The rights-of-way would also create edge habitats that enhance
12 populations and foraging opportunities for opportunistic meso-predators and the impacts
13 they have in surrounding areas. The rights-of-way would also facilitate the spread of
14 invasive species that often migrate along open disturbed edge habitats. The noise, light,
15 and ionizing gases generated by the high-voltage lines would likely affect bats, birds,
16 deer, and other animals in the vicinity of the right-of-way, but the effects they have could
17 also continue to affect these animals even as they move away from it.

18 **Q: How widespread would environmental or ecological impacts from the proposed**
19 **Cardinal-Hickory Creek transmission line be?**

20 A: It would vary with the nature of the impacts, the habitat or ecological context, and with
21 the species affected. I expect several of these impacts to extend at least 1 km from the
22 line but it would take additional studies to demonstrate these.

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APPLICANTS' VEGETATION MANAGEMENT

Q: Have you reviewed the Applicants' revegetation plan (Attachment to Response to Data Request 01.123)?

A: Yes.

Q: What is your professional opinion on the adequacy of the revegetation plan?

A: The revegetation plan may represent a good-faith effort to do what is necessary to meet compliance with relevant laws, regulations, and mandated or expected BMPs, .but it does not suffice to compensate for the adverse impacts on the many natural and semi-natural wetland, lowland, and upland habitats from this proposed transmission line project.. Constructing and maintaining the transmission line and tall towers would destroy or seriously modify hundreds of acres of natural and semi-natural habitats. Standard revegetation efforts would not serve to fully or adequately restore these habitats to near-natural conditions. I reach these conclusions by reading monitoring reports following construction of the Badger-Coulee transmission line and from the comments of Dr. Joy Zedler. The monitoring report makes clear that revegetation typically achieves 70%-100% regenerated cover, but does not tell us what fraction of the habitats have lower percentages. It also celebrates the fact that these revegetation projects resulted in at least one native species in the restored area and that weedy invasive species are no more prevalent after the line was built than before. Having one native plant species present is a very low bar for assessing any restoration project and provides little assurance that this proposed CHC transmission line project would result in adequately restoring the native and semi-native habitats that would be destroyed. Having verbal statements that weedy

1 exotic species did not become more dominant or pervasive without any kind of
2 quantitative assessment also falls short in ensuring that adequate restoration, or adequate
3 efforts to eliminate weedy exotics, will occur along the proposed CHC transmission line.
4 Dr. Zedler's observations in the Waubesa wetlands suggest that constructing this
5 transmission line will have many, substantial, and long-lasting harmful impacts that will
6 not be adequately addressed. Professional restoration by companies that specialize in
7 ecological restoration often charge thousands to tens of thousands of dollars to achieve a
8 high-quality restoration.

9
10 **Q: Have you reviewed the comments on the federal Draft Environmental Impact**
11 **Statement written by Dr. Joy Zedler, Dr. Bobbi Peckarsky, and Patricia Trochlell**
12 **that address wetlands and vegetation impacts?**

13 A: Yes, I have.

14 **Q: Please discuss the concerns and issues raised in their comments with which you**
15 **agree.**

16 A: All three statements are by professional biologists whose biological knowledge and
17 judgement I respect. All make good points, and all question just what the BMPs will be
18 and just what they will accomplish. I found no fault or incorrect statements in any of
19 these statements. Dr. Zedler notes that newly established weedy plants have colonized
20 along the electric transmission corridor traversing the Waubesa wetlands south of
21 Madison. She observed that these plants particularly colonize the disturbed land around
22 the towers, and that efforts to reduce weed seeds, e.g. by treating the mats to avoid weed
23 seeds, are not effective at preventing these invasions. Her comment: "If you create a tire

1 rut, filling it with imported soil creates a second impact; it does not reverse the first
2 impact" makes clear that projects like these that introduce invasive species have many
3 substantial and lasting impacts. I also concur with Dr. Peckarsky in her expressed
4 concerns regarding using best management practices (BMPs) to address environmental
5 impacts associated with this Project. She notes that no details are provided on p. 125 on
6 how effective applying BMPs near streams will be to minimize erosion and prevent
7 sedimentation and asks that plans for erosion control be spelled out in detail in the DEIS
8 along with evidence of their effectiveness. Particular designs for erosion control should
9 be described and defended.

10 Finally, I also share Dr. Zedler's concern with the fact that BMPs will only be
11 implemented "when practical" or "when possible" and the need to monitor erosion and
12 runoff during extreme storm events. What matters here, to provide a particular example,
13 is not whether the Higgen's Eye Pearly Mussel is near the project area but whether it is
14 downstream and what sediments this project will produce.

15 **Q: Does this conclude your direct testimony?**

16 **A:** Yes. I include below citations to the studies I cite.

17
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