

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. EL19-027

**IN THE MATTER OF THE APPLICATION BY CROWNED RIDGE WIND II, LLC
FOR A PERMIT OF A WIND ENERGY FACILITY IN DEUEL, GRANT AND
CODINGTON COUNTIES, SOUTH DAKOTA, FOR CROWNED RIDGE II WIND
FARM**

Direct Testimony of Hilary Meyer
On Behalf of the Staff of the South Dakota Public Utilities Commission
December 5, 2019



1 **Q: State your name.**

2 A: Hilary Meyer

3

4 **Q: State your employer.**

5 A: State of South Dakota, Department of Game, Fish, and Parks

6

7 **Q: State the program for which you work.**

8 A: Division of Wildlife, Terrestrial Resource Section

9

10 **Q: State the program roles and your specific job with the department.**

11 A: The role of the Terrestrial Resources section is to study, evaluate, and

12 assist in the management of all wildlife and associated habitats.

13 Management includes game and non-game wildlife populations, habitat

14 management on public lands and technical assistance and habitat

15 development on private lands, population and habitat inventory, and

16 environmental review of local and landscape projects. As the

17 environmental review senior biologist, I coordinate reviews of various

18 development projects within the state of South Dakota to assist

19 developers with compliance with state wildlife laws and to serve as

20 stewards of our state's outdoor resources.

21

22 **Q: Explain the range of duties you perform.**

1 A: Duties include coordinating environmental review evaluations and
2 responses related to terrestrial and aquatic issues with department staff
3 and represent the Department on state and national committees.
4

5 **Q: On whose behalf was this testimony prepared?**

6 A: This testimony was prepared on behalf of the Staff of the South Dakota
7 Public Utilities Commission.
8

9 **Q: What role does the Department of Game, Fish and Parks have in the**
10 **permitting process of a wind energy development project?**

11 A: Game, Fish and Parks has no regulatory authority when it comes to
12 permitting wind energy development projects. The agencies role is to
13 consult with developers and provide recommendations and suggestions
14 on how to minimize or remove potential impacts to wildlife and associated
15 habitats or provide available information to make informed decisions as
16 related to natural resources.
17

18 **Q: Have you reviewed the Application and attachments? How else did**
19 **you learn details around the proposed project?**

20 A: Yes, relevant sections of the application and attachments and also
21 discussed project details with GFP biologists who have had direct
22 communications with the developer, or that have specialized expertise
23 related to wildlife species or the project location.

1 **Q: Did the GF&P provide comments and recommendations to Crowned**
2 **Ridge II about the project area? Please identify who provided those**
3 **comments and provide a brief summary of them.**

4 A: Game, Fish and Parks was initially contacted in October 2007 by
5 TetraTech to request a search of GFP listed threatened or endangered
6 species, and any additional environmental concerns for the project area. A
7 response was sent in December of 2007 by Silka Kempema, wildlife
8 biologist. During this initial contact, information about species of concern
9 and important or sensitive wildlife habitats in the project area were shared
10 with the applicant. Additionally, in November 2007, Doug Backland,
11 wildlife biologist provided a shapefile of threatened, rare, or endangered
12 species present within the project area (natural heritage database review).
13 In December 2009, TetraTech contacted GFP to request an additional
14 natural heritage database review. Game, Fish and Parks provided a list of
15 species occurrences for the project area. In November of 2010, Western
16 Area Power Administration (WAPA) contacted GFP with a scoping notice
17 for the Crowned Ridge Wind Energy Center in Codington County, South
18 Dakota. GFP replied to the WAPA scoping notice in January 2011 with a
19 letter describing important wildlife habitats (grasslands, wetlands, etc.),
20 information about rare, endangered or threatened species that could occur
21 in the project area as well as general wildlife survey guidelines. In March
22 2014, GFP provided historic grouse lek locations in and around the project
23 boundary. Game, Fish and Parks was contacted by TetraTech in February

1 2015 requesting information regarding ecologically significant areas and
2 listed endangered, threatened or special concern species at a potential
3 wind energy development site in Codington and Grant Counties, South
4 Dakota. Game, Fish and Parks staff replied to their request in March 2015
5 with a letter describing ecologically sensitive areas in the project area and
6 advising an up-to-date Natural Heritage database request, based on the
7 amount of time that passed since the previous request. Information was
8 also included about important wildlife habitats, avoidance of turbine
9 placement in and around public lands, recommendations on transmission
10 line construction and general wildlife survey guidelines for pre and post
11 construction surveys. In March 2017, GFP was first contacted by Nextera,
12 and Ms. Kempema recommended an in-person meeting for the
13 opportunity to review proposed turbine layout and wildlife surveys that had
14 been conducted to-date. In April 2017, a conference call with GFP,
15 USFWS and Nextera was conducted to share a project overview, as well
16 as results from wildlife surveys. During this conference call, Ms. Kempema
17 recommended Nextera avoid placing turbines in untilled grasslands and
18 wetlands, and recommended a 1 mile no-construction buffer around
19 grouse leks. Ms. Kempema also requested a copy of any wildlife survey
20 reports, and recommended a site-visit with GFP and USFWS. In July
21 2017, GFP received a request from SWCA Environmental Consultants to
22 request information regarding ecologically sensitive areas and federally
23 and state listed endangered, threatened or special concern species in the

1 Crowned Ridge project area. Results from a natural heritage database
2 search was provided to SWCA in August 2017. On April 3rd, 2019, SWCA
3 Environmental Consultants requested information regarding ecologically
4 sensitive areas and federally and state listed endangered, threatened or
5 special concern species in the Crowned Ridge project area. Results from
6 a natural heritage database search were provided to SWCA on April 26th
7 2019.

8

9 **Q: Do you agree with the comments and recommendations provided to**
10 **Crowned Ridge II by Ms. Kempema? If not, please explain.**

11 A: Yes. These are typical discussion topics and recommendations our
12 Department would share with wind power companies to identify, minimize,
13 or reduce impacts to wildlife and wildlife habitats, especially those projects
14 that are proposed in grassland and wetland habitats.

15

16 **Q: Based on the information provided in the Application, in your opinion**
17 **did Crowned Ridge II utilize the proper studies and wildlife surveys**
18 **necessary to identify potential impacts to the terrestrial**
19 **environment?**

20 A: Pre-construction wildlife survey data usually incorporates a small snap-
21 shot in time (ex. monthly large bird counts) but is used to assess risks for
22 the life of a project (~30 years) therefore, it is important to perform surveys
23 with a high degree of scientific rigor. The US Fish and Wildlife Service

1 (USFWS) Land-Based Wind Energy Guidelines (hereafter referred to as
2 USFWS guidelines) are intended to encourage scientifically rigorous
3 survey, monitoring, assessment and research designs, produce potentially
4 comparable data across the nation, and improve the ability to predict and
5 resolve effects of wind energy development locally, regionally and
6 nationally. These guidelines, along with GF&P siting guidelines
7 (https://gfp.sd.gov/userdocs/docs/SDSitingGuides_2018-10-17.pdf) are
8 voluntary suggestions (USFWS 2012).

9
10 Survey methods used by Crowned Ridge followed the USFWS guidelines,
11 and were reasonable and appropriate. Crowned Ridge conducted aerial
12 raptor nest surveys, avian use surveys, large bird use surveys, grouse lek
13 surveys, bat acoustic surveys, bat habitat assessments and an
14 endangered butterfly habitat assessment.

15

16 Q: **What are the potential impacts to wildlife as a result of the**
17 **construction of a wind project?**

18 A: Direct; birds and bats can be killed by turbines due to direct strikes.
19 Indirect; some species may be displaced from otherwise suitable habitat
20 around turbines and roads. A research project on the effects of wind
21 energy on breeding grassland bird densities in North and South Dakota
22 showed seven of nine species of grassland birds had reduced densities
23 around wind turbines over time (Shaffer and Buhl 2016).

1

2 **Q: What potential impacts to wildlife habitat can result from a wind**
3 **project?**

4 A: Permanent loss; habitat is permanently converted to turbine pads, roads
5 or buildings. This is often a small percent of the total project acreage (area
6 defined by wind easements or otherwise defined project boundary).

7 Temporary loss; habitat is disturbed for a time during construction (e.g.
8 widened roads, crane paths) but is restored. Fragmentation; habitat
9 fragmentation is the division of a block of habitat into smaller, and at times
10 into isolated patches. Habitat fragmentation can decrease the overall
11 value of the remaining habitat.

12

13 **Q: Can you suggest methods to address temporary and permanent**
14 **changes to habitat?**

15 A: Temporary impacts to habitat resulting from construction activities likely
16 can be reclaimed by restoring impacted areas by grading and reseeding.
17 Disturbed areas should be restored using native seed sources to reduce
18 the introduction of new or discourage encroachment of already present
19 exotic and/or invasive species.

20

21 For those areas that are permanently changed, lost grassland or wetland
22 acres could be addressed through consideration of mitigation options.
23 Disturbed areas again should be restored using native seed sources to

1 reduce the introduction of new or discourage encroachment of already
2 present exotic and/or invasive species. It would also be recommended
3 that if lost acres are replaced to carry out these replacement activities in
4 the closest possible proximity of the project.

5
6 **Q: Are there any other impacts besides temporary and permanent**
7 **habitat impacts that are likely to occur as a result of the project?**

8 A: Indirect habitat impacts are also a consideration. Potential indirect impacts
9 created by wind turbines and associated infrastructure raise concerns with
10 habitat fragmentation and potential displacement, especially with regards
11 to breeding grassland and wetland species. Research into the effects of
12 wind energy on habitat avoidance has shown that some species will not
13 use grassland or wetland habitat within a certain distance of a wind turbine
14 (Loesch et al. 2013, Shaffer and Buhl 2016).

15
16 **Q: Did GFP have any wildlife or habitat concerns regarding the**
17 **proposed Crowned Ridge II project? If yes, what are they?**

18 A: Yes. The area of primary interest is the potential impacts to the various
19 grassland habitats and associated wildlife.

20
21 **Q: Did GFP provide any recommendations to avoid wildlife and habitat**
22 **impacts from Crowned Ridge II? If yes, what were they?**

1 A: Yes. The primary recommendations were to site turbines and associated
2 infrastructure in cropland, minimize fragmentation, utilize existing
3 infrastructure and avoid siting turbines in grasslands, and completion of
4 post-construction surveys for bat and bird mortality which could be used in
5 assisting with operational adjustments in the future. Game, Fish and Parks
6 also recommended a 1 mile no surface occupancy buffer for placement of
7 project infrastructure near prairie grouse (greater prairie chicken and
8 sharp-tailed grouse) leks, and a 2 mile no construction buffer around leks
9 during the breeding season (1 March-30 June).

10

11 **Q: Are there different types of grasslands?**

12 A: Yes.

13

14 **Q: Please describe the following: native prairie, hayland, pasture, CRP,**
15 **and cropland.**

16 A: Grasslands are areas that contain plants species such as graminoids and
17 commonly used for grazing or set aside for conservation purposes. They
18 can also be areas which are planted to a mixture of grasses and legumes
19 for livestock grazing or feed. Native prairie is grassland upon which the
20 soil has not undergone a mechanical disturbance associated with
21 agriculture or any other type of development. Hayland is grassland that is
22 managed by frequent mowing and often contains non-native plant species
23 either intentionally or by encroachment. Pasture is grassland that may

1 contain non-native plant species either intentionally or by encroachment
2 and is managed by through grazing. In some instances hayland and
3 pasture could be native prairie; in other situations hayland and pasture in
4 particular could be land once cultivated and restored to grassland habitat.
5 Conservation Reserve Program acres (CRP) is grassland that occurs on
6 land that was once tilled and used for crop production and has now been
7 seeded to herbaceous cover to address soil loss, water quality, and
8 provide wildlife habitat. Cropland could be described as agricultural lands
9 cultivated and used to grow crops such as corn, soybeans, small grains,
10 and others.

11

12 **Q: Are there any areas of native prairie in the proposed project?**

13 A: Yes. Spatial analysis conducted by Bauman et al. (2016) has identified
14 potentially undisturbed lands within the proposed project boundary. This
15 is one of the best available spatial data sets representing the location of
16 untilled native grasslands. The applicant also identified within the
17 application an estimated 17,889 acres of untilled grassland within the
18 project area (pg. 49).

19

20 **Q: Do grasslands other than native prairie have conservation value?**

21 A: Yes. Given the loss of native prairie, working grasslands like pasture,
22 hayland, and conservation grassland plantings serve as surrogates for
23 native grasslands.

1 **Q: To your knowledge, are there grazed grasslands in the project area?**

2 A: Yes.

3

4 **Q: Do grazed grasslands have any conservation value and what is the**
5 **impact to grassland wildlife?**

6 A: All grasslands have a conservation value, including those managed
7 through grazing. Grassland birds require a diversity of grassland types
8 and structure to complete life-cycle requirements. Studies have shown
9 that grassland birds respond primarily not to variation in plant species
10 composition but to the structure that these plants provide. Grassland birds
11 have evolved with a gradation of grazing intensities. Grassland wildlife
12 diversity can be maximized by creating a heterogeneous landscape
13 comprised of short, medium and tall vegetation structures. Grazing
14 (haying and burning) management can provide this variation in vegetative
15 structure. Changes in land management and annual precipitation levels
16 can alter plant species composition and vegetation structure of grassland
17 within a short timeframe.

18

19 **Q: One of the GF&P's recommendations was that efforts should be**
20 **made to avoid placement of turbines and new roads in grasslands,**
21 **especially untilled native prairie. Based on the information in the**
22 **Application and the proposed turbine layout, did Crowned Ridge II**

1 **demonstrate efforts to address this recommendation? Please**
2 **explain.**

3 A: Data from the application indicates that approximately 11,599 acres of the
4 60,996 acre project area is native prairie habitat. From reviewing the
5 available maps within the application there were efforts to avoid placement
6 of turbines on untilled native prairie as approximately less than 20 of the
7 no more than 132 planned turbines appear to be positioned in native
8 prairie. A continued recommendation for wind development is to avoid
9 untilled native prairie habitat to the greatest extent possible. It appears
10 that multiple turbines are being planned in cultivated land (disturbed)
11 which from a wildlife perspective is a positive siting approach. Some
12 turbines will likely be placed on other types of grassland habitats (hay and
13 pasture) within the project area. Avoidance of all grassland habitat will be
14 challenging in this part of the state and in the project area as a high
15 proportion of the total area is some type of grassland/herbaceous habitat
16 as demonstrated by the application indicating that project construction
17 easement is approximately 22% grass/pasture (Table 11.1).

18

19 **Q: One of GF&P's concerns around wind farm development is the**
20 **fragmentation of contiguous blocks of grasslands. Why is**
21 **fragmentation a concern?**

22 A: Fragmentation results in the direct loss of habitat and diminishes the value
23 of remaining habitat. Habitat fragmentation is the division of large

1 contiguous blocks of habitat into smaller, and in some instances isolated
2 patches. Identification of contiguous blocks of habitat, especially in
3 predominantly non-habitat landscapes is an important component of
4 grassland and wetland bird conservation.

5
6 **Q: Are there any areas of contiguous grassland habitat in the proposed**
7 **project?**

8 A: Yes. Reviewing maps and figures provided with the application, it appears
9 that the northern tier and southeastern section of the project area have the
10 highest level of contiguous blocks of grassland habitat.

11

12 **Q: Based on the information available does the GF&P have concerns**
13 **over the placement of turbines and roads in contiguous blocks of**
14 **grassland?**

15 A: Based on reviewing available information, fragmentation of grassland
16 habitats were avoided/minimized in some of the project area through the
17 proposed layout of the infrastructure of the project. This is a result of
18 primarily utilizing tilled agricultural fields for turbine locations. There are
19 other locations of the project area which the placement of turbines will
20 likely create some level of fragmentation of smaller grassland blocks
21 (comprised of different grassland cover types: hay, pasture, etc.).

22

1 **Q. Does the state or GF&P have specific mitigation recommendations**
2 **that will minimize or compensate potential impacts from wind energy**
3 **development if they cannot be avoided?**

4 A. At the current time South Dakota does not have a state mitigation policy
5 that can be provided to wind energy developers. However, there are
6 resources available which can provide guidance and suggestions that can
7 be considered as well as self-imposed actions or activities that can
8 minimize natural resource impacts.

9

10 **Q: What are potential mitigation considerations?**

11 A: Mitigation can take multiple forms and can be accomplished in a multitude
12 of ways. It could be an approach which implements an applied
13 management activity/strategy on impacted lands which elevates these
14 lands to a more productive state or higher ecological state (example –
15 grazing management) to an approach which is more sophisticated and
16 detailed using tools developed to calculate acres of habitat to be restored
17 or created based on impacted acres and other relevant research data
18 (example – decision support tool). Examples that are available specifically
19 for wind energy projects is a decision support tool based off the research
20 conducted by Loesch et al. (2013) that considers breeding waterfowl and
21 another which focuses on breeding grassland songbirds resulting from
22 research findings of Shaffer and Buhl (2016). Additionally, Shaffer et al.

1 (2019) describes a standardized method to estimate offsets based on
2 results of Shaffer and Buhl 2016 and Loesch et al. 2013).

3

4 As stated earlier South Dakota does not have a state mitigation policy nor
5 does the state endorse these studies and resulting products, however it is
6 worthy of mentioning these tools demonstrating resources available to
7 developers and managers.

8

9 **Q: The GF&P recommended that turbines should not be placed in or**
10 **near wetland basins and special care should be made to avoid areas**
11 **with high concentrations of wetlands. Do you believe that Crowned**
12 **Ridge II's proposed turbine layout incorporates this**
13 **recommendation?**

14 A: The application mentions under the wetland and waterbody
15 impacts/mitigation section that project facilities have been sited to avoid
16 both temporary and permanent impacts to wetlands and waterbodies to
17 the extent possible. These are appropriate measures. Reviewing the
18 turbine layout and using NWI wetland information for the project area,
19 some turbines appear to be placed in areas of higher concentrations of
20 wetland basins (specifically in the central and southeastern portions of the
21 project). However, based on review of recent aerial imagery, many of
22 these wetlands appear to be converted to crop production or reduced in
23 size. It will be challenging to avoid areas of wetland concentrations and

1 other water bodies simply based on the total number different water
2 bodies present in this part of the state and project area.
3 Recommendations to avoid areas of higher concentrations of wetlands is
4 supported by findings from Loesch et al. (2013).

5
6 **Q: Are you aware of any other wind farms near this proposed project?**

7 A: Yes. I am aware of projects in the area by reviewing the map of wind
8 projects found on the PUC website indicating projects either in the status
9 of existence, proposed, pending, or under construction.

10
11 **Q: Does the GF&P have any thoughts regarding the potential for**
12 **cumulative impacts the Project may have?**

13 A: As projects are completed and based on location and proximity to other
14 projects, the question of cumulative impacts will become more apparent.
15 Knowing the importance of native prairie tracts and other forms of
16 grassland habitat to several grassland dependent species, continued
17 development on these types of lands could result in reduced or limited
18 habitat value. Placement of turbines in lands currently under cultivation
19 and avoiding where possible the different varieties of grassland and
20 wetland habitats will help minimize potential cumulative impacts.

21
22 Our agency will continue to work with wind developers and provide
23 recommendations that we believe will help minimize cumulative impacts.

1 No different than offered to this project, the focus could include, but not
2 limited to, recommendations on avoiding grassland habitats, in particular
3 native prairie remnants, avoidance of high wetland complex areas,
4 maximize the use of existing corridors for infrastructure, and pre and post
5 construction surveys to assess the proposed project area that may assist
6 in operational decisions.

7

8 **Q: Do any State threatened or endangered species have the potential to**
9 **be impacted by the wind farm?**

10 A: Two creeks (Stray Horse and Willow Creek) within the project boundary
11 are known Topeka Shiner streams. We have records of Topeka Shiners
12 within the project area, and immediately outside the project area,
13 According to the application, Crowned Ridge II will file a storm water
14 pollution prevention plan and put in place practices to reduce or eliminate
15 sedimentation. These actions will help reduce potential negative impacts
16 to Topeka Shiners that may be in or near the project area. Additionally,
17 Crowned Ridge II proposes to directionally bore under streams to reduce
18 impacts to streams, which will also reduce impacts to Topeka Shiners.

19

20 **Q: Are there any GF&P lands or other public lands that may be**
21 **impacted by the wind farm?**

22 A: At the time of the application, there were five walk-in-area parcels within
23 the project area; zero turbines are planned on these properties. These

1 properties are privately owned and an agreement with GFP opens them to
2 free public access for hunting. Should a Walk-In Area be temporarily
3 disrupted due to construction activities, GFP would ask we are notified to
4 determine whether any action is required from our agency to notify the
5 public.

6
7 No Game Production Areas are present within the project area and three
8 Game Production Areas are located immediately adjacent to the project
9 boundary. For clarification, Game Production Areas and Waterfowl
10 Production Areas are not private land leased by GFP. Game Production
11 Areas are owned by the State of South Dakota and managed by GFP.
12 Waterfowl Production Areas are federally owned public land and managed
13 by the US Fish and Wildlife Service.

14

15 **Q: Does the GF&P have any recommendations to protect those GF&P**
16 **lands or other public lands?**

17 A: The state does not have an established set-back policy or
18 recommendation for wind turbine placement in proximity to state
19 properties such as Game Production Areas. Set-back policies have been
20 established at local levels by local government entities and in some
21 instances have been suggested as the potential set-back distance from
22 state properties. At this time, it is the state's belief that these types of
23 policies be established at the local level and at the discretion of the PUC

1 Commission to impose such set-backs when considering wind energy
2 permits. Game, Fish and Parks is not aware of any local laws or
3 ordinances that establish set-back distances from state properties for this
4 project.

5
6 **Q: If the final turbine locations changed from those provided in the**
7 **proposed turbine layout, could the potential terrestrial environment**
8 **impacts change?**

9 A: Yes.

10

11 **Q: You mentioned the applicant requesting data from the Natural**
12 **Heritage Database. What is the South Dakota Natural Heritage**
13 **database? What type of information does it contain?**

14 A: The South Dakota Natural Heritage database tracks species at risk.
15 Species at risk are those that are listed as threatened or endangered at
16 the state or federal level or those that are rare. Rare species are those
17 found at the periphery of their range, those that have isolated populations
18 or those for which we simply do not have extensive information on.

19

20 This database houses and maintains data from a variety of sources
21 including site-specific surveys, research projects and incidental reports of
22 species that cover a time period from 1979 to the present. It is important to

1 note that the absence of data from this database does not preclude a
2 species presence in the proposed project area.

3

4 **Q: In a previous docket (Crowned Ridge), Game, Fish and Parks**
5 **recommendation related to post-construction prairie grouse lek**
6 **monitoring. Does Game, Fish and Parks have a similar**
7 **recommendation for the Crowned Ridge II project?**

8 A: Game, Fish and Parks recommended post-construction grouse lek
9 monitoring of confirmed leks less than 1 mile from any wind turbines in the
10 crowned ridge project. The Crowned Ridge II project had one GFP
11 documented lek reported for the project area. Although the Department
12 still has concerns over the effect of wind energy development on prairie
13 grouse, we are not recommending a similar permit condition for the
14 Crowned Ridge II project. Game, Fish and Parks is currently partnering
15 with Crowned Ridge (Nextera and Excel Energy) to design and implement
16 a prairie grouse telemetry study at the Crowned Ridge project to fulfill the
17 applicants permit condition. This study will be more robust, and will be
18 longer duration (3 year minimum vs. 2 years) as originally outlined in the
19 permit condition. Due to the willingness of the applicant (Nextera/Crowned
20 Ridge II) to undertake a more rigorous study on the potential impacts of
21 wind energy to prairie grouse, Game, Fish and Parks is not recommending
22 a similar permit condition for Crowned Ridge II.

23

1 **Q: In summary, does GF&P offer any specific permit recommendations**
2 **should the permit be granted?**

3 A: Game, Fish and Parks recommends that the applicant be required to
4 contact the department at least 60 days prior to the start of construction to
5 coordinate public access to walk-in areas that may be temporarily
6 disrupted due to construction activities. Game, Fish and Parks will then
7 determine if any action is required from our agency to notify the public of
8 any changes to public access. Possible actions by GFP include: updating
9 the public hunting atlas (if notified before May 1st of construction year),
10 updating the public access map in the GFP app and additional signage at
11 affected properties during construction activities. Providing up-to-date
12 information on timing of construction in or near walk-in areas will help
13 ensure the safety of construction crews and hunters.

14

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

16 A: Yes.

17

18 Bauman, P., B. L. Carlson, and T. Butler. 2016. Quantifying undisturbed (native)
19 lands in eastern South Dakota: 2013. South Dakota State University.

20 Loesch, C. R., J. A. Walker, R. E. Reynolds, J. S. Gleason, N. D. Niemuth, S. E.
21 Stephens, and M. A. Erickson. 2013. Effect of wind energy development
22 on breeding duck densities in the Prairie Pothole Region. The Journal of
23 Wildlife Management 77:587-598.

- 1 Shaffer, J. A., and D. A. Buhl. 2016. Effects of wind-energy facilities on breeding
- 2 grassland bird distributions. *Conservation Biology* 30:59-71.

3

Hilary A Meyer

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Education

2011 M.S. Wildlife and Fisheries Science-Fisheries Option. South Dakota State University (SDSU), Brookings, SD.

Thesis: Influence of Diet and Environmental Variation on Physiological Responses of Juvenile Pallid Sturgeon (*Scaphirhynchus albus*).

2009 B.S. Fisheries and Water Resources-Fisheries Option, and Biology with Aquaculture minor. University of Wisconsin-Stevens Point (UWSP), Stevens Point, WI.

Professional Experience

Environmental Review Senior Biologist

October 2018-present

SD Game, Fish and Parks, Pierre, SD

I review proposed development projects in the state of South Dakota. As part of the review process, I provide information on wildlife, wildlife habitat and work with developers to help them avoid or minimize conflicts with wildlife and wildlife habitat. I serve on the Interagency Review Team (IRT) for reviewing wetland mitigation projects and banking instruments. I work extensively with other state agencies to provide information and recommendations related to wildlife and provide expert opinion and testimony. I represent South Dakota on the Midwest Landscape Initiative Wind Energy Working Group and the Western Association of Fish and Wildlife Agencies (WAFWA) Crucial Habitat Assessment Tool Technical and Policy Committee.

Fisheries Biologist

April 2013 – October 2018

SD Game, Fish and Parks, Ft. Pierre, SD

I lead and assisted field crews to complete biological surveys on Lake Sharpe and Lake Oahe in central South Dakota. Biological surveys included deploying gear such as: mono and multifilament gill nets, boat electrofishing, trotlines, fyke nets and drifted trammel

nets. I was the project lead for conducting nighttime hydroacoustics surveys on Lake Oahe for coldwater prey fish (rainbow smelt and lake herring). I assisted with age-estimation of hard structures (otoliths, scales and fin rays), annual report review and preparation, manuscript preparation, manuscript reviews, creating presentations for public outreach, creating professional presentations and reviewing presentations for co-workers. I managed a multi-species acoustic telemetry database as part of multiple research projects on Lake Sharpe, SD. I wrote and reviewed research proposals to secure project funding. I hired, trained, supervised and mentored seasonal fisheries technicians (1-2 per field season) and assisted with mentoring and training numerous fisheries interns. I assisted with the development of new station projects, and performed data analysis as needs arose. I presented results of such analyses in the form of technical presentations to stakeholder groups and peer groups at professional meetings. I participated in and assisted in coordinating multiple outreach and education events throughout South Dakota.

Biological Science Technician (Fisheries)

December 2011 – April 2013

U.S. Fish and Wildlife Service, Columbia, MO.

I lead and assisted field crews to complete biological assessments on the lower Missouri River. Biological assessments include deploying gear such as the otter trawl, experimental mesh gillnets, trotlines, mini-fyke nets, drifted trammel nets, push trawl and electrofishing. I conduct and assist in data collection on field computers (tablets), and oversee data management/quality control. I conduct standardized sampling to monitor long-term pallid sturgeon population trends and long-term fish community trends. I have also lead electrofishing crews in the Chicago Area Waterway System (CAWS) to monitor for Asian carp presence, and assisted with environmental DNA (eDNA) sampling in the CAWS. I assisted the USFWS-Carterville office with reviewing Dual Frequency Identification Sonar (DIDSON) videos. I am responsible for writing annual reports, paper datasheet quality control, analyzing long-term datasets and maintaining multiple databases (Microsoft Access) for the Pallid Sturgeon Population Assessment Program. I participated in and assisted in coordinating multiple outreach and education events throughout the Columbia, Missouri area. I supervised and trained seasonal employees on Pallid Sturgeon Monitoring Protocols. I assisted with the development of new station projects, and performed data analysis as needs arose. I presented results of such analyses in the form of technical presentations to stakeholder groups and peer groups at professional meetings.

Graduate Research Assistant (M.S.)

June 2009 – November 2011

South Dakota State University, Brookings, SD.

I conducted research on pallid sturgeon physiology, including the effects of diet and temperature regime on growth, food consumption and metabolism. I maintained the U.S.G.S. cooperative research unit wet lab at SDSU, where we housed 48 federally

endangered pallid sturgeon and supervised and trained technicians. I presented the results of my research in the form of posters and technical presentations.

Fisheries technician

April - June 2009

Wisconsin Department of Natural Resources, Oshkosh, WI

I assisted with the spring lake sturgeon spawning assessment, including capturing and PIT tagging large spawning adults. I also embedded, sectioned, and aged otoliths for a Lake Winnebago System-wide research project.

Assistant Laboratory Manager

September 2004 – May 2009

Aquatic Biomonitoring Laboratory, UWSP, Stevens Point, WI

My primary job duties were to prepare slide mounts of Chironomidae larvae for identification, and sorting biotic index samples. I also prepared and updated laboratory protocols, tested new protocols, trained new personnel on laboratory protocols and participated in hiring and retention decisions. I identified aquatic insects to family level, assisted in quality control and assurance checks of sorted samples, and performed data transcription of sample information to proper log sheets.

Aquaculture Laboratory Assistant

January - May 2009

Aquaculture Laboratory, UWSP, Stevens Point, WI

I assisted in designing and conducting a compensatory growth study using juvenile yellow perch. Juvenile yellow perch were reared on three different feeding regimes, and growth was measured weekly. Duties included collecting and analyzing growth data, and general maintenance of aquaculture facilities.

Fisheries Genetics Researcher

September 2008 – May 2009

Molecular Conservation Genetics Laboratory, UWSP, Stevens Point, WI

I worked as an independent researcher identifying molecular markers for hybrid detection in *Morone* species. Job duties included DNA extraction from fin clips, polymerase chain reaction, microsatellite genotyping, data analysis and primer optimization.

Student Ambassador

May – August 2008

Nyumbani Village, Kitui, Kenya

Through the Global Environmental Management program at UWSP, I was selected to travel to Nyumbani Village, Kenya to assist in managing an organic farm. I created crop rotation, harvest, and planting schedules to maximize yields and reduce pest problems. Our overarching objective was to produce a surplus of food for the villagers

to sell in organic markets to bring income into the village. This position required collaboration with many different village officials, residents and farm laborers.

Fish Pathology Researcher

September 2007 – May 2009

Histology Laboratory, UWSP, Stevens Point, WI

I worked as an independent researcher, characterizing the pathology of “white-tail syndrome” in cultured yellow perch using histological methods including preparing and embedding specimens, sectioning specimens, reagent preparation, microtome sectioning and examination of specimens using light microscopy. As part of a two person team, I worked with a number of private aquaculturists in central Wisconsin to collect specimens and determine a cause for this uncategorized disease.

Hydrologic Technician

May – August 2007

Chequamegon-Nicolet National Forest, USDA Forest Service, Park Falls, WI

I conducted road-stream crossing inventories and fish passage surveys across the Chequamegon-Nicolet National Forest. I also assisted with hook and line surveys, remnant logging dam surveys, and stream crossing construction. I managed road-stream crossing data in Microsoft excel and access and used the program FishXing to identify possible fish passage barriers throughout the forest.

Hydrologic Technician

May – July 2006

Chequamegon-Nicolet National Forest, USDA Forest Service, Park Falls, WI

I performed road-stream crossing inventories, fish passage surveys and backpack electro-fishing across the Chequamegon-Nicolet National Forest. I also assisted biologists with hook and line surveys and remnant logging dam surveys. I managed road-stream crossing data in Microsoft excel and access and used the program FishXing to identify possible fish passage barriers throughout the forest.

Fisheries Technician / Intern

May – August 2005

Utah Division of Wildlife Resources, Vernal, UT

I performed extensive backpack electro-fishing in the Uinta Mountains. We used depletion-removal techniques to remove invasive brook trout and hybrid cutthroat trout to restore native and genetically pure Colorado River strain cutthroat trout. Other duties included riparian habitat improvements (i.e. - removing invasive plant species), trout egg collection and fertilization and various maintenance on stream sampling equipment.

Professional Affiliation

2004 – Present	American Fisheries Society Parent society (2009-Present) Fisheries Management Section (2013- 2018) Education Section (2010-2018) Genetics Section (2009-2018) Dakota Chapter (2009-present) South Dakota State University Student Sub-unit (2009-2011) Wisconsin Chapter (2008-2012) University of Wisconsin-Stevens Point Student Sub-unit (2004-2009)
2012 - 2018	North American Sturgeon and Paddlefish Society
2018-Present	The Wildlife Society South Dakota Chapter
2018-Present	Association of State Wetland Managers

Professional Service

Wind Energy Work Group Member	2019
Midwest Landscape Initiative	
Midwest Association of Fish and Wildlife Agencies	
Crucial Habitat Assessment Tool Technical Committee	2019
Western Association of Fish and Wildlife Agencies	
Crucial Habitat Assessment Tool Policy Committee	2019
Western Association of Fish and Wildlife Agencies	
AFS Professional Certification Committee	2017-Present
American Fisheries Society	
Website Manager	2015-2018
Dakota Chapter AFS	
Secretary	2015-2018
North Central Division AFS Walleye Technical Committee	

Poster Judge

February 2015

Annual Meeting, Dakota Chapter AFS, Bismarck, ND

Young Professional Committee Member

2013-2018

Fisheries Management Section

Committee Chair

2013-2014

North Central Division AFS Walleye Technical Committee

Peer Reviewer

September 2009 – November 2011

Fisheries Management and Ecology and Transactions of the American Fisheries Society.

Awards

2018 Outstanding Performance Award South Dakota Game, Fish and Parks

2018 Best Professional Poster Award Dakota Chapter AFS (co-author)

2017 Best Professional Poster Award Dakota Chapter AFS (co-author)

2017 Emerging Leader Mentorship Award American Fisheries Society

2016 Best Professional Poster Award Dakota Chapter AFS (lead author)

2016 Award of Merit American Fisheries Society Fish Management Section

2014 MICRA Sturgeon and Paddlefish Committee Travel Award

2011 American Fisheries Society John E. Skinner Memorial Award

2011 Honorable Mention for Best Student Poster Competition, 141st Annual Meeting of the American Fisheries Society, Seattle, WA.

2011 World Sturgeon Conservation Society-North American Chapter Student Travel Award

2011 2nd Place Oral Presentation, Missouri River Natural Resources Conference, Nebraska City, NE

2011 Graduate School Travel Award, South Dakota State University

2009 Clive A. David Memorial Research Scholarship, UWSP

2009 Royal Anderson Ecology Award 2009, UWSP

2009 Gerhardt Outstanding Water Student, UWSP

Publications

- Fincel, M., N. Kludt, **H. Meyer**, M. Weber and C. Longhenry. 2019. Long-term data suggest potential interactions of introduced walleye and smallmouth bass on native sauger in four Missouri River impoundments. *Journal of Fish and Wildlife Management*. In Press.
- Maahs, B.C., **H.A. Meyer**, N.D. Huysman, J.M. Voorhees and M.E. Barnes. 2018. Mortality of landlocked fall chinook salmon broodstock after electrofishing or ascending a fish ladder. *Jacobs Journal of Aquaculture and Research* 3:1-3.
- Huysman N., J.M. Vorhees, **H. Meyer**, E. Krebs and M.E. Barnes. 2018. Characteristics of landlocked fall chinook salmon producing either viable or completely non-viable eggs. *International Journal of Fisheries and Aquatic Sciences* 6: 86-88.
- Reese, S.E., A.J. Long, H.A. **Meyer** and M.E. Barnes. 2017. Landlocked fall chinook salmon sperm motility after short term milt storage. *International Journal of Innovative Studies in Aquatic Biology and Fisheries*, 3:9-13.
- Meyer**, HA, SR Chipps, BDS Graeb, and RA Klumb. 2017. Growth, food consumption and energy status of age-0 pallid sturgeon (*Scaphirhynchus albus*) fed a commercial or invertebrate diet. *Journal of Fish and Wildlife Management*.
- Kaemingk, MA, DJ Dembkowski, **HA Meyer**, and LM Gigliotti. 2013. Some insight for undergraduates seeking an advanced degree in wildlife and fisheries sciences. *Fisheries*.

Reports

- Meyer**, HA, RP Hanten, K Potter, MJ Fincel and MJ Smith. 2015. Annual Fish Population and Angler Use, Harvest and Preference Surveys on Lake Oahe, South Dakota, 2014.
- Meyer**, HA, CJ Wrasse, CJ Ridenour, WJ Doyle and TD Hill. 2012. Pallid sturgeon population assessment and associated fish community monitoring for the Missouri River: Segment 14 2011 annual report. U.S. Fish and Wildlife Service, Columbia Fish and Wildlife Conservation Office, Columbia, Missouri. Prepared for the U.S. Army Corps of Engineers Missouri River Recovery Program.
- Ridenour, CJ, **HA Meyer**, CJ Wrasse, WJ Doyle and TD Hill. 2012. Pallid sturgeon population assessment and associated fish community monitoring for the Missouri River: Segment 13 2011 annual report. U.S. Fish and Wildlife Service,

Columbia Fish and Wildlife Conservation Office, Columbia, Missouri. Prepared for the U.S. Army Corps of Engineers Missouri River Recovery Program.

Ridenour, CJ, CJ Wrasse, **HA Meyer**, WJ Doyle and TD Hill. 2012. Pallid sturgeon population assessment and associated fish community monitoring for the Missouri River: 2011 Contingency Sampling. U.S. Fish and Wildlife Service, Columbia Fish and Wildlife Conservation Office, Columbia, Missouri. Prepared for the U.S. Army Corps of Engineers Missouri River Recovery Program.

Presentations

Goble, C., H. **Meyer**, M. Fincel, C. Pasbrig and D. Turner. 2019. Using acoustic telemetry to re-establish historic fisheries. Midwest Fish and Wildlife Conference Annual Meeting, Cleveland, OH.

Meyer, H., C. Pasbrig and M. Fincel. 2018. Population dynamics and movement of shovelnose sturgeon in a Missouri River impoundment. North American Sturgeon and Paddlefish Society Annual Meeting, Columbia, MO.

Turner, D., H. Meyer, L. Pierce and D. James. 2018. Movement of hatchery-reared Age-0 paddlefish in Lake Sharpe, South Dakota (poster). North American Sturgeon and Paddlefish Society Annual Meeting, Columbia, MO.

Jungwirth, J., B. Miller, H. **Meyer**, J. Davis, M. Fincel and C. Longhenry. 2018. Selective removal of largemouth bass in small prairie impoundments (presenting author). North Central Division AFS Walleye Technical Committee Meeting, Spirit Lake, IA.

Fincel, M., R. Hanten, D. Jost, J. Jungwirth, H. **Meyer**, K. Potter and M. Smith. 2018. Success of stocking walleye (*Sander vitreus*) in select bays of a large Missouri River reservoir. Dakota Chapter of the American Fisheries Society Annual Meeting, Brookings, SD.

Maahs, B., H. **Meyer**, R. Hanten and M. Fincel. 2018. Comparison of short-term survival of electroshocked and ladder caught chinook salmon in Lake Oahe, South Dakota (poster). Dakota Chapter of the American Fisheries Society Annual Meeting, Brookings, SD.

Gravenhof, D., B. Maahs, H. **Meyer**, R. Hanten and M. Fincel. 2018. Catch raceway escapement of chinook salmon at Whitlocks Bay spawning station (poster). Dakota Chapter of the American Fisheries Society Annual Meeting, Brookings, SD.

Turner, D., D. James, L. Pierce, H. **Meyer**, N. Starzl and J. Powell. 2018. Acoustic tag retention and initial dispersal of hatchery-reared juvenile paddlefish. Dakota Chapter of the American Fisheries Society Annual Meeting, Brookings, SD.

Davis, J., N. Kludt, H. **Meyer** and M. Fincel. 2018. Feasibility of hydro-acoustic surveys to monitor Rainbow smelt (*Osmerus mordax*) and rainbow trout (*Oncorhynchus mykiss*) in Pactola Reservoir, South Dakota. Dakota Chapter of the American Fisheries Society Annual Meeting, Brookings, SD.

Meyer, H.A., M.J. Fincel and R.P. Hanten. 2017. Use of acoustic telemetry to assess over-winter survival of gizzard shad. American Fisheries Society Annual Meeting, Tampa, FL.

Stacy, W., K. Grohs, D. James, L. Pierce, H. **Meyer** and D. Shuman. 2017. Distribution and movement of translocated paddlefish: Implications for future sport fishery potential in Lake Sharpe, SD. Dakota Chapter of the American Fisheries Society Annual Meeting, Jamestown, ND.

Reese, S., T. Long, H. **Meyer** and M. Barnes. 2017. Effects of short term storage on chinook salmon sperm motility (poster). Dakota Chapter of the American Fisheries Society Annual Meeting, Jamestown, ND.

Meyer, HA, R.P. Hanten, M.J. Fincel. 2016. Movement of tagged gizzard shad in a large Missouri River reservoir. American Fisheries Society Annual Meeting, Kansas City, MO.

Meyer, H.A., R.P. Hanten, M.J. Fincel and J.L. Davis. 2016. Survival of gizzard shad after dummy transmitter implantation (poster). Dakota Chapter of the American Fisheries Society Annual Meeting, Spearfish, SD.

Greiner, M.J., R.P. Hanten, H.A. **Meyer**, and M.J. Fincel. 2016. Detection efficiency of acoustic transmitters in three reservoir habitats (poster). American Fisheries Society Annual Meeting, Kansas City, MO.

Meyer, HA, K Grohs, D Shumann and MJ Fincel. 2015. Movement of translocated paddlefish in Lake Sharpe, South Dakota. North American Sturgeon and Paddlefish Society Annual Meeting, Oshkosh, WI.

Meyer, HA and MJ Fincel. 2015. Fast food: movement of gizzard shad in Lake Sharpe, South Dakota. North Central Division of the American Fisheries Society, Walleye Technical Committee Annual Meeting, Brookings, SD.

Meyer, HA, MJ Fincel, WE Adams and CL Longmire. 2014. The business of fishing: use and satisfaction of anglers on a large reservoir. 144th Annual Meeting of the

Meyer, HA, CJ Ridenour, WJ Doyle and TD Hill. 2012. Influence of flow regime on the condition of blue suckers in the lower Missouri River. 142nd Annual Meeting of the American Fisheries Society, St. Paul, MN.

Meyer, HA, SR Chipps, BDS Graeb, and RA Klumb. 2012. Evidence for countergradient variation in pallid sturgeon physiology (Poster). Missouri River Natural Resources Committee Conference, Pierre, SD.

Meyer, HA, CJ Ridenour, and TD Hill. 2012. Seasonal resource selection by blue suckers in the lower Missouri River (Poster). Missouri River Natural Resources Committee Conference, Pierre, SD.

Meyer, HA, CJ Ridenour, WJ Doyle and TD Hill. 2012. Lateral distribution of *Scaphirhynchus* sturgeon during flood flows in the lower Missouri River: 2010 case study. Mississippi Interstate Cooperative Resource Association Sturgeon and Paddlefish Committee Annual Meeting, Kirkwood, MO.

Meyer, HA, SR Chipps, BDS Graeb, and RA Klumb. 2011. Latitudinal variation in pallid sturgeon physiology. 141st Annual Meeting of the American Fisheries Society, Seattle, WA.

Meyer, HA, SR Chipps, BDS. Graeb, and RA Klumb. 2011. Growth and energy status of age-0 pallid sturgeon fed a commercial or invertebrate diet (Poster). 141st Annual Meeting of the American Fisheries Society, Seattle, WA.

Meyer, HA, SR Chipps, BDS Graeb, and RA Klumb. 2011. Growth, metabolism and energy density of juvenile pallid sturgeon fed commercial and natural diets. Missouri River Natural Resources Committee Conference, Nebraska City, NE.

Meyer, HA, BL Sloss and R Franckowiak. 2009. Hybrid detection in four species of temperate basses (*Morone spp.*). 2009 College of Natural Resources Undergraduate Research Symposium, Stevens Point, WI.

Meyer, HA, and J Sheffy. 2009. Quantifying organic food production in Nyumbani village, Kitui, Kenya (Poster). 2009 College of Natural Resources Undergraduate Research Symposium, Stevens Point, WI.

Meyer, HA, AM Purdy, C Hartleb, and R Schmitz. 2009. Investigation of white-tail syndrome in yellow perch in Wisconsin. 2009 Wisconsin, Minnesota and Ottawa Tri-Chapter meeting of the American Fisheries Society, Duluth, MN.

Training Received

Mitigation Banking and In-Lieu Fee Program Interagency Review Team Training The Conservation Fund	June 2019
Writing and reviewing NEPA documents Shipley Group	March 2019
Overview of the NEPA Process Shipley Group	January 2019
Nationwide Permits Wetland Training Institute	January 2019
First Aid, Adult CPR Red Cross	August 2018
S.C.U.B.A.-Openwater Diving SSI	October 2017
Program MARK Workshop Iowa State University	July 2017
Sturgeon and Paddlefish tagging and age estimation North American Sturgeon and Paddlefish Society	October 2015
ATV Operation Training SDGFP	September 2014
R for Fisheries Scientists Michigan State University/American Fisheries Society	August 2013
Electrofishing Safety (FWS-CSP2202-OLT)	June 2012
Sturgeon Osmoregulation Workshop North American Sturgeon Conservation Society	July 2011
National Safety Council Defensive Driving Course Department of the Interior	January 2011

Motorboat Operators Certification Course
Department of the Interior

May 2010