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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEVADA

WESTERN WATERSHEDS PROJECT, CENTER FOR BIOLOGICAL DIVERSITY, CONFEDERATED TRIBES OF THE GOSHUTE RESERVATION, DUCKWATER SHOSHONE TRIBE, and ELY SHOSHONE TRIBE Plaintiffs, v. BUREAU OF LAND MANAGEMENT, Defendant.	Case No. 3:11-CV-53 **DECLARATION OF MERLIN D. TUTTLE**

I, Merlin D. Tuttle, declare:

1. My name is Merlin D. Tuttle. I am a professional biologist, specializing in bat behavior and ecology, with more than 50 years of experience in bat research and conservation. The following facts are based on my personal experience with bats and wind energy issues, and if called as a witness, I would and could truthfully testify thereto.

2. In this declaration, I address serious concerns regarding how the Spring Valley Wind Energy Facility could impact at least a million Brazilian free-tailed bats that rely on the nearby Rose Guano Cave as a critical migratory stopover site.

EDUCATION AND EXPERTISE

3. I earned my Ph.D. degree (with Honors) from the University of Kansas in 1974 with a dissertation on the population ecology and migrations of gray bats.

4. While serving as Curator of Mammals at the Milwaukee Public Museum in Wisconsin (1975-1986) my research on bat behavior and ecology was published in the world's leading science journals, and my achievements were acknowledged in 1986 by the Gerrit S. Miller Award, the highest international honor conferred by colleagues in the field of chiropteran biology.

5. In 1982, I founded Bat Conservation International, and for nearly 30 years served as its Executive Director, building it to include a staff of 32 biologists, educators and administrators supported by 11,000 members in 60 countries.

6. I have served on two endangered species recovery teams for bats for the U.S. Fish and Wildlife Service, as an Honorary Consultant to the Chiroptera Specialist Group of the International Union for Conservation of Nature and Natural Resources and as a Visiting Scholar at the University of Texas.

7. In 2003, in response to potentially unsustainable bat kills at wind energy facilities, I founded the Bats and Wind Energy Cooperative, a collaboration of Bat Conservation International with the American Wind Energy Association, the National Renewable Energy Laboratory of the U.S. Department of Energy, the U.S. Fish and Wildlife Service and leading scientists internationally. The goal is to collaboratively develop and test solutions to prevent or minimize bat kills at wind energy facilities. The group has jointly raised millions of dollars for research, has supported preeminent scientists and has discovered the most successful mitigation techniques so far documented in peer reviewed science journals.

8. I've been an invited speaker at America's most prestigious institutions of learning, including Harvard, Princeton, Yale and Cornell Universities, the Smithsonian and National Geographic headquarters and Chautauqua Institute. In 2010, I gave the keynote address at the International Bat Research Conference held in the Czech Republic.

9. I currently serve as Honorary Ambassador for the United Nations Environment Program's 2011-2012 Year of the Bat campaign.

10. I have been a leader in gaining protection for key roosts of the Brazilian free-tailed bat in the U.S. and Mexico, having instigated and led the successful campaign to purchase and protect a 700-acre nature reserve around Bracken Cave, home of the world's largest remaining colony of free-tailed bats, as well as gaining long-term protection for six other colonies of a million or more individuals each. I've also made numerous observations of free-tailed bat behavior and have extensive experience consulting on wind energy project impacts on bats.

11. I have published extensively on bat ecology in scientific journals. A full CV is attached to this declaration.

12. To prepare this declaration, I reviewed: the Spring Valley Wind Energy Facility Environmental Assessment and Avian and Bat Protection Plan, relevant scientific literature, and Pattern Energy's unpublished monitoring reports on the Texas Gulf Wind facility in Kenedy County, Texas.

IMPACTS OF THE SPRING VALLEY WIND ENERGY FACILITY AND INADEQUACIES OF ENVIRONMENTAL ASSESSMENT RELATIVE TO BRAZILIAN FREE-TAILED BATS

A. Background on Brazilian Free-Tailed Bats and their Vulnerability to Wind Development

13. Spring Valley is an important migratory flyway for Brazilian free-tailed bats. Rose Guano Cave supports a million or more Brazilian free-tailed bats at a time during annual migrations through the Spring Valley flyway (Sherwin 2009).

14. Brazilian free-tailed bats must forage for insects at night to replenish energy for further travel. Foraging movements for Brazilian free-tailed bats often cover 60 or more miles one way, and the species commonly flies hundreds to thousands of feet above ground (Cleveland et al.2006, Davis et al. 1962, Williams et al. 1973, McCracken and Westbrook 2002), making it especially vulnerable to wind turbines.

15. Fatality reports from wind turbine facilities have documented that the Brazilian free-tailed bat is one of America's most vulnerable species to mortality from wind developments (Kunz et al. 2007a, Arnett et al. 2007, Piorkowski and O'Connell 2010).

16. The apparent decline of Brazilian free-tailed bats reported in recent decades (Betke et al. 2008, Cochran 1970), adds special concern regarding the ability of this species to survive cumulative impacts of wind energy development. It is difficult to determine "acceptable" kill rates for a species that is already in decline.

17. Bats are killed in at least two different ways by wind turbines. Many bats are killed when struck by moving turbine blades (Horn et al. 2008). Others are killed by barotrauma. This results when a sharp, but undetectable drop in pressure occurs near fast-moving turbine blades. Such a drop in pressure causes the lungs of nearby bats to suddenly expand, fatally bursting surrounding capillaries (Baerwald et al. 2008). Barotrauma is a relatively newly discovered phenomenon in bats, as it was only described in literature for the first time in the late 2000's.

18. Since current survey techniques cannot account for potentially injured bats that may die days later, or for those removed by scavengers before investigators arrive in the morning, it is safe to assume that most estimates of mortality are quite conservative. In fact, most available studies have not adequately accounted for either searcher efficiency or scavenger removal and thus may be extremely misleading. Additionally, as discussed below, research has shown that bats are attracted to wind turbines.

19. For these reasons, predicting how many bats will be killed from any particular wind energy development, and the resulting impacts on a bat population, is a difficult and uncertain task.

B. Inadequacies of Spring Valley Environmental Assessment

20. **Lack of Data to Support Mortality Threshold**. The Environmental Assessment sets 192 bat deaths per year as an acceptable bat mortality threshold. (EA p. 97).The mortality threshold of 192 bats per year is based on a predicted 2.56 bat deaths per year for each of the 75 wind turbines (EA p. 97). This figure comes from Table 8 in the Avian and Bat Protection Plan, "Comparisons of 11 Operating Wind Projects with Habitat Types Similar to Spring Valley." However, there is no evidence that the 11 projects are in similar *bat* habitat to Spring Valley (a

major bat migration corridor, only a few miles from a major cave). This extrapolation is an unfounded guess.

Inadequacy of Pre-Construction Monitoring as Indication of Post-Construction Risk.

21. The Environmental Assessment also relies upon pre-construction surveys, particularly acoustic surveys to estimate the amount of bat activity in the area. Acoustic surveys of the rotor-swept zone were limited to one AnaBat microphone array installed on a single MET tower (ABPP p.7). The results reported by Arnett et al. (2006) demonstrate the inadequacy of reliance on Anabat detectors placed on a single met tower, or at ground level, to predict bat activity in the rotor-swept zones of 75 turbine locations. Anabat detectors generally do not detect bats unless they are within less than 100 feet, so even when positioned above the ground on a MET tower, they cannot fully cover the potential rotor-swept area of a single wind turbine—much less an entire facility with 75 turbines. Nor do Anabat detectors account for the fact that bats not originally present appear to be attracted to turbines, either visually or via operational sounds.

22. Further, Kunz et al. (2007a) found that pre-construction acoustic surveys are questionable indicators of post-construction risk. To date, pre-construction acoustic monitoring and analyses have not accurately predicted a single high risk site, as indicated by post-construction mortality monitoring. In other words, even wind facilities that have proven to be highly lethal to bats received a "clean bill of health" during pre-construction acoustic surveys. Therefore, use of a single raised assemblage of AnaBat microphones was not reliable or adequate to assess bat activity for the Spring Valley project.

23. Given the routine travel and feeding patterns of the Brazilian free-tailed bats in Spring Valley, as described by Sherwin (2009), it should be assumed that extraordinary numbers

will pass through this facility, if built. And flight patterns often change abruptly from night to night based on prey locations, weather and other poorly understood variables.

24. **Failure to Consider Bat Attraction to Turbines**. Bats are attracted to wind turbines (Horn et al. 2008, Ahlen et al. 2009), potentially from long distances (Cryan 2007, Cryan and Barclay 2009). The reasons are not fully understood, but may include that bats perceive them as potential roost sites or rest stops when migrating, or that the light-colored turbines attract insects, which bats feed on. This may explain why bat fatality at wind turbines is far higher than for birds (Kunz et al. 2007). The Spring Valley Environmental Assessment failed to consider this key source of increased risk. Instead, it states that migrating bats are "expected to simply fly around individual structures or around or over the facility site and continue their migratory movement" (EA p. 109, quoting a 2005 document). This statement ignores the science showing that bats are attracted to wind turbines and thus inaccurately downplays the risk to bats.

25. **Limited Recovery Potential and Severity of Cumulative Impacts is Inadequately Recognized**. Adult female Brazilian free-tailed bats produce just one pup per year (Davis et al. 1962), a far lower reproductive rate than is typical for other small mammals or birds. Despite such a key difference in reproductive rates and the fact that turbines kill bats at far higher rates than birds (Kunz et al. 2007a), the Environmental Assessment for the Spring Valley facility states that "cumulative impacts to bats are anticipated to be similar to those described for birds" (EA p. 152). This is an exceedingly naïve assertion!

26. Cumulative impacts can result from individually minor but collectively significant actions taking place over time. In the southwestern U.S., where particularly large aggregations of bats exist, "there is considerable risk of wind energy development" (NRC 2007). This is true

even within Spring Valley, where numerous wind energy projects are being planned in addition to the Spring Valley Wind Energy facility.

27. **Extreme Potential for Harm if Spring Valley Wind Development Plans Materialize is Inadequately Recognized**. The Environmental Assessment reports plans for "the addition of multiple wind energy facilities to the north and south of the Spring Valley Wind Energy Facility." It states that the 75 turbines planned for the Spring Valley facility account for only 7.5% of the total proposed for the area (EA p. 153). If these additional 6,937 turbines were built and caused the same kill rate as already documented at Pattern Energy's current turbines in Texas, the combined annual kill would add up to 119,212 bats in just the Spring Valley area alone. Given the low reproductive rate of bats, such heavy losses could contribute significantly toward threatened and endangered listings as well as to substantial environmental and economic harm. The EA does not recognize the potential for these extensive cumulative impacts to bats in Spring Valley.

28. **Potential Loss of Bat Benefits to American Agriculture is Not Recognized**. The potentially great value of Brazilian Free-Tailed Bats to agriculture was first reported nearly 50 years ago (Davis et al.1962), and those values are now becoming well documented. In just one small area near San Antonio, Texas, researchers recently reported average savings of $741,000 per year from an approximately $5 million annual cotton harvest due to bats. Each million of these bats can consume 10 tons of insects nightly, especially fall armyworm and corn earworm moths which attack a wide array of crops, preventing vast numbers of eggs from being laid. This greatly reduces demands for pesticides (Cleveland et al. 2006, McCracken and Westbrook 2002). Ongoing studies are now beginning to document similar values over much broader areas of the U.S. and Mexico. Even the free-tailed bats from Rose Guano Cave appear to

predominantly feed over agricultural lands (Sherwin 2009). Again, the EA does not recognize or discuss the impacts to local agriculture if bat populations decrease due to this project.

29. **Costs of Careless Planning**. All of the bats most frequently killed by wind turbines, including Brazilian free-tailed bats, are already believed to be in substantial decline, and careless planning of wind energy facilities has alarming potential to become the tipping point that pushes some into endangered status or extinction (Kunz et al. 2007b). For all concerned, this issue should be dealt with as soon as possible, as opposed to after population crashes are documented and endangered status is necessitated. The EA here does not adequately address impacts to bats from the Spring Valley Wind Energy facility, or the cumulative effects when combined with other planned wind projects in the valley, creating a threat of further bat declines.

C. The Avian and Bat Protection Plan is Poorly Designed With Too Many Unenforceable Loopholes

30. **Powerless Technical Advisory Committee (TAC)**. The ABPP relies heavily upon the creation of a TAC, which will make mitigation recommendations to supposedly offset impacts to bats. However, the TAC is only advisory with no authority beyond making recommendations. Those recommendations are acted upon (or rejected) by a single BLM Authorized Officer who has the authority to terminate the TAC. There are too few enforceable mandates to ensure that facility developers and owners will be required to comply appropriately with established threshold limits. The word “required” is used predominantly to protect Pattern Energy as opposed to bats.

31. **Reliance on Poorly Tested Radar System as Primary Means of Bat Protection**. The ABPP also relies upon the potential deployment of a DeTect “realtime” radar technology, a radar system intended to shut down turbines during high-risk periods for birds and bats, as a primary means to prevent bat kills at the Spring Valley site. However, this technology

is in fact highly experimental and has not been adequately tested on bats. There is no peer-reviewed literature on the efficacy of this system. Though such a system may hold promise for the future, until test results have been carefully reviewed by appropriate scientists, and preferably published in a peer-reviewed scientific journal, it should not be trusted to protect a million (or potentially millions) of bats. Prior to building in an area of extraordinary hazard, there should be a clear plan that is not based on untested technology.

32. In evaluating the adequacy of this system for the Spring Valley Wind facility, it is important to know what the criteria will be that activate the system to kick in, i.e., what events would trigger a shutdown. But the ABPP does not even include this basic information. Rather, it states that the triggering group size of birds or bats will be "determined through at least a year of radar studies." (ABPP, p.16).

33. Further, the unpublished results on this system are far less promising than implied. The Environmental Assessment states that this system "is currently in place along the south Texas coast in Kennedy County for a project with high migratory bird use, Texas Gulf Wind, and to date, mortality has been at or below projected levels." (ABPP p.15). Though the assertion implies this to be due to radar-triggered shut-downs and that they also protected bats such conclusions are not supported by Pattern Energy's own (unpublished) reports on this facility. Its report for March to May, 2010, admitted that only five radar-triggered curtailments had occurred and that only three of those were at night (Pattern Energy 2010a). For this project, curtailment criteria were designed for major avian migratory events under low-visibility conditions and were so narrow (Pattern Energy 2010b) that it is unlikely that even the few shut-downs that occurred had any impact on protecting bats.

34. **High Bat Kills Documented at Site Purported to be Protected by Pattern Energy's New Radar System**. Further, the Texas Gulf Wind facility, cited as evidence that its DeTect radar system could keep the annual bat kill at Spring Valley at or below 2.56 bats per turbine, failed to prevent much higher kills during its first year of operation in Texas. Company consultants reported on January 5 (Pattern Energy 2011) an annual fatality rate of 17 bats per turbine for 118 turbines at the Texas Gulf Wind facility. Thus, the Texas Pattern Energy-owned wind facility, cited as evidence that its DeTect radar system could keep the annual bat kill at Spring Valley at or below 2.56 bats per turbine, actually killed more than six times that number of bats per turbine when tested. Of killed bats identified to species, a large proportion were Brazilian free-tailed bats (Pattern Energy 2010b), despite the fact that the nearest large aggregations of this species are located more than 150 miles away.

35. Based on these results, it seems highly unlikely that the Spring Valley Wind Facility could meet its stated threshold fatality limit of 192 bats per year, and certainly not without far more stringent curtailment criteria than what it has planned here. At the Gulf Wind location kill rate, the 75 turbines in Spring Valley would kill an average of 1,275 bats annually, and even that number is based on the unlikely assumption that the presence of an adjacent aggregation of bats would not increase the risk. Prior to building in an area of extraordinary hazard, there should be a clear plan that considers all relevant factors and is not based on untested technology that, in Pattern Energy's only known test, failed to protect bats.

36. **Inappropriate Limits on Curtailment**. Regardless of the extent of bat kills, the Plan clearly states that the company cannot be required to curtail turbines for more than 744 to 1,080 hours per year, depending upon "mitigation phase," where curtailment of wind turbines in this case involves changing the cut-in speed. Cut-in speed is defined as the lowest wind speed at

which turbines generate power to the utility system, thereby reducing turbine operation during periods of low wind speeds. This limitation should not be tolerated, as it does not protect against high mortality to bats. A recently published study demonstrated that curtailment which reduced average nightly bat kills by 77% over a 75-night fall season cost less than 1% of total annual output for the facility (Arnett et al. 2010). Pattern Energy is well aware of the risk of building near a large bat aggregation, and must be held accountable for taking whatever mitigation actions are necessary in order to remain below the agreed upon threshold of bat mortality. The current limits on curtailment do not ensure that result.

37. **Arbitrary Dates for Curtailment are a Needless Hindrance to Bat Protection**. The Plan states that "curtailment of the turbines will be completed during the highest use periods of August 1 through September 31, from sunset to 4 hours after sunset." (ABPP p.17). However, bats do not arbitrarily migrate between August 1 and September 31. In Texas, I have seen Brazilian free-tailed bats vary migration times by up to a month, dependent on weather. Mitigation measures should be timed to the presence of bats, not to arbitrary dates. By relying on arbitrary dates, even the limited amount of planned curtailment could occur at inappropriate times with minimal success in preventing mortality.

38. **Potentially Harmful Use of Research**. Despite the availability of existing research documenting the most effective cut-in speeds (Baerwald et al. 2009, Arnett et al. 2010), the Spring Valley Plan permits Pattern Energy to conduct its own research to determine amounts of curtailment to be used at this facility. Most importantly, the company would be allowed to rely on the lowest cut-in speed which demonstrates a statistically significant reduction in bat kills. This facet of the plan permits the choice of an inappropriately low cut-in speed just because it produced a statistically significant, though potentially inadequate, reduction in kills.

Hypothetically, a speed that reduced mortality by just 5% could be chosen over one that gained a 70% reduction (both levels being potentially statistically significant).

39. **Failure to Monitor Population Trends at Rose Guano Cave Impedes Wise Management**. Much of this plan's decision-making will depend upon the results of ongoing mortality monitoring, but there is no requirement to monitor population trends at Rose Guano Cave. The more bats killed the easier it would be to remain below agreed upon threshold levels because there would be fewer and fewer bats left to kill. Measurements of population trends at Rose Guano Cave should be an essential factor in decision making. If facility bat kills decline, managers must know whether that is due to unsustainable population losses or to mitigation.

40. **Inadequacy of Mortality Surveys**. Mortality surveys should be conducted daily, yet it appears that most at Spring Valley are planned to be conducted only at two-week intervals. If so, this could lead to serious underestimation of bat mortality. Because most past investigations have not adequately accounted for scavenger removal or searcher inability to find bats, it is safe to assume that past mortality has been under-reported (Kunz et al. 2007a, NRC 2007). Arnett (2005), in the first study to fully evaluate these biases, reported searcher efficiency of just 25 and 44% at Meyersdale, Pennsylvania and Mountaineer, West Virginia respectively, meaning that up to 75% of killed bats were missed, even by searchers using well planned search protocols. Arnett also documented extremely high scavenger removal rates. At Mountaineer, 24% of bats that had been killed the previous night, and left where they fell, were removed during the following day, and 70% were removed by scavengers within 24 hours. Since most studies have failed to allow for such biases, it is reasonable to project detection of much higher mortality when biases are fully accounted for. Also, since the timing of migratory movements of bats is highly variable, with very large spikes occurring in just one or a few nights (Kunz et al.

2007a, Davis et al. 1962), daily searches for just seven days per season could prove highly misleading. Thus, the mortality surveys proposed for Spring Valley are not sufficient to accurately assess bat mortality.

41. **Research Meaningless Unless Accompanied by Strict Mitigation Enforcement**. Research could prove meaningless unless developers and subsequent owners are *required* to take remedial actions, to the extent needed, to stay within agreed upon thresholds. These must be strictly enforced, a fact that is mostly ignored in the current plan.

42. **Thresholds Cannot be Reset Every Time They are Exceeded.** The Plan indicates that each time a threshold is exceeded the count will start over at zero. This should not be permitted, as it does not protect against high mortality to bats. Counts should only be reset annually. If mitigation fails to lower the count sufficiently to comply with annual thresholds, then more mitigation should be required. If mitigation fails, shutting down the most problematic turbines must be an option. To the extent that Pattern Energy is confident in its plan it should not fear such requirements.

43. **Impacts on Populations not Addressed.** No currently available data are sufficient to reliably predict acceptable bat kill rates, i.e. those that do not threaten populations or species. Unlike most other small mammals or birds, Brazilian free-tailed bats produce just one pup annually per adult female (Davis et al. 1962). Mortality from wind energy facilities is additive among facilities all along migratory routes. The Rose Guano Cave bats may already face multiple facilities each time they migrate, and each one will have an impact. Even a facility kill rate that could be sustained if this facility were the only one these bats faced could become unsustainable as more facilities are brought on-line. Of great concern, we could already be

surpassing this species' limit, since it appears likely to be in substantial decline (Betke et al. 2008, Cockrum 1970).

44. It is critical that thresholds be carefully evaluated, monitored and enforced relative to their impact on population trends. Without major advances in mortality reduction techniques at wind energy facilities, cumulative impacts on at least some currently abundant species are likely to force them into endangered status or even extinction (Kunz et al. 2007b). For all concerned, this issue should be dealt with very carefully now, as opposed to after population crashes are documented and endangered status is necessitated.

CONCLUSION

The Spring Valley Wind Energy Environmental Assessment and Avian and Bat Protection Plan failed to adequately consider available science, relied on an unproven radar system that had already failed to prevent high bat kills in Texas and ignored clear potential for unsustainable cumulative impacts. Moreover, unacceptable restrictions were placed on mitigation, and vagaries and loopholes could render recommended actions unenforceable. Because of these deficiencies in the EA and the ABPP, the Spring Valley project is likely to cause harmful decline of Brazilian free-tailed bats. It is my opinion that, though advances are being made, we have not yet resolved the bat kill issue sufficiently to permit construction of a wind energy facility near such a large bat aggregation as the one using the Rose Guano Cave. I strongly concur with the U.S. Fish and Wildlife Service recommendation that wind energy facilities should not be built near major aggregations of bats.

I declare under penalty of perjury that the foregoing is true and correct.

Dated this 23 day of February, 2011.

Merlin D. Tuttle

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