Greater Sage-grouse and the Proposed Withrow Wind Farm

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Washington Department of Fish and Wildlife

Introduction

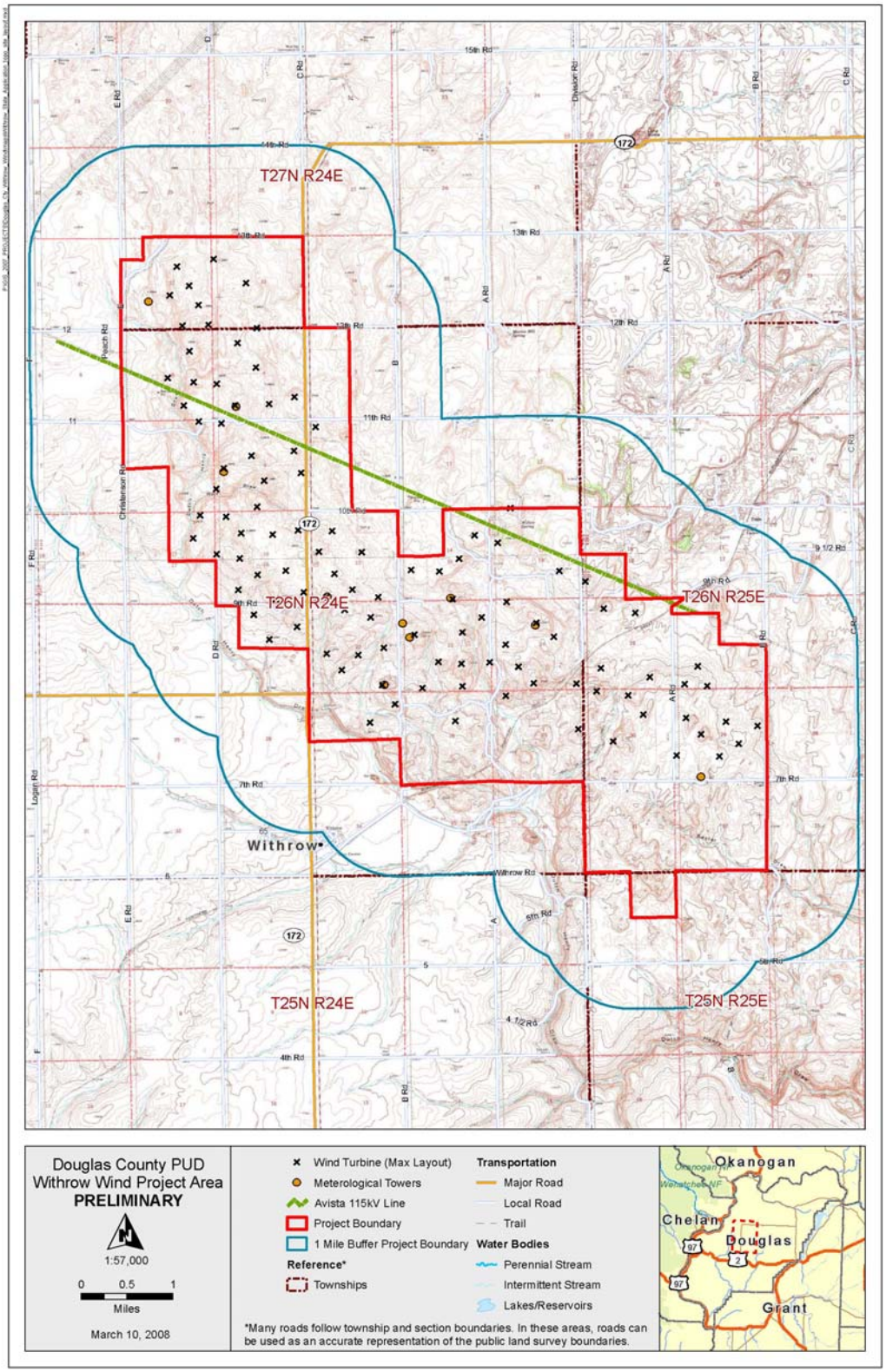
The need for additional energy sources, especially sources that are considered 'green', is an important development issue in the state of Washington. As the pressure to expand these developments into remnant areas of native habitat increases, it is important that we consider the potential impacts on our wildlife resources, especially those with large conservation and/or economic ramifications. The following report is designed to provide basic information about what is known and not known about the potential impacts of one of these proposed developments, the Withrow Wind Farm, on greater sage-grouse (*Centrocercus urophasianus*).

The Withrow Wind Farm is proposed for an area of about 15,000 acres north of the town of Withrow in Douglas County, Washington (Fig. 1). The proposed development of at least 100 turbines is designed to take advantage of moderately elevated topography associated with the terminal moraine of the Okanogan Lobe of the Cordilleran Ice Field.

The proposed project is entirely within the current distribution of greater sage-grouse in Douglas County (Schroeder et al. 2000). The Douglas County population of sage-grouse is the largest of two remaining populations in Washington. Because of the 92% decline of range occupied by sage-grouse in Washington, The Washington Department of Fish and Wildlife listed the greater sage-grouse as a 'threatened' species (Hays 1998). Because of regional declines of sage-grouse, the U.S. Fish and Wildlife Service federally classified the sage-grouse in Washington and northern Oregon as a 'distinct population segment' that warranted listing as a threatened or endangered species. However, in this case the listing decision was precluded by higher listing priorities (U.S. Fish and Wildlife Service 2001).

The Washington Department of Fish and Wildlife produced a management plan for sage-grouse in 1995. This management plan was followed up with a recovery plan (Stinson et al. 2004). The recovery plan addresses the potential impacts of wind power on sage-grouse in Washington in a general sense. In addition the Washington Department of Fish and Wildlife (2003) has published guidelines for wind project developments. Guidelines have also been recommended for wind power developments by the Wildlife Management Institute (Manes et al. 2002) and the U.S. Fish and Wildlife Service (2003). Cumulatively, these recommendations are often based on 'educated guesses' based on research on surrogate species (i.e., other species of prairie grouse) or on surrogate developments (i.e., roads and power lines). In general, there is a lack of published data on wind power development within the occupied range of sage-grouse in North America (Schroeder et al. 2004). This is due to a lack of wind development in 'prime' sage-grouse habitat and/or a lack of data to evaluate the potential effects.

Fig. 1. Preliminary layout of proposed Withrow Wind Power Project in Douglas County, Washington.



Potential impacts of wind power development on sage-grouse

There are three general types of potential impacts on sage-grouse from wind developments including mortality, habitat loss and degradation, and disturbance. These potential impacts are not mutually exclusive and they may have direct and indirect components. None have been researched to the extent needed to make a perfect assessment of risk.

Mortality

Most wind power development impacts have focused on collisions of birds and bats with turbines (Erickson 2002). Unlike bats or bird species, direct collision mortality with scattered obstacles (such as turbines) is likely not as much of an issue for sage-grouse as fences, guide-lines, and power lines. The primary reason for this is that the sage-grouse is a wide-ranging species that occupies habitats are relatively low densities. Hence, the risk of a collision is likely rare. There is only one known example of a sage-grouse that was killed by a turbine (Foote Creek Rim Wind Farm in Wyoming). In contrast, collisions with fences and power lines are relatively frequent and have been documented throughout the North American distribution (Schroeder et al. 1999, Schroeder et al. 2004), including Douglas County in Washington State. The primary mortality concerns associated with wind development are the indirect impacts due to increases in predation risk, perhaps those associated with increased habitat fragmentation (Schroeder and Baydack 2001) or the creation of additional raptor perches.

Habitat loss and degradation

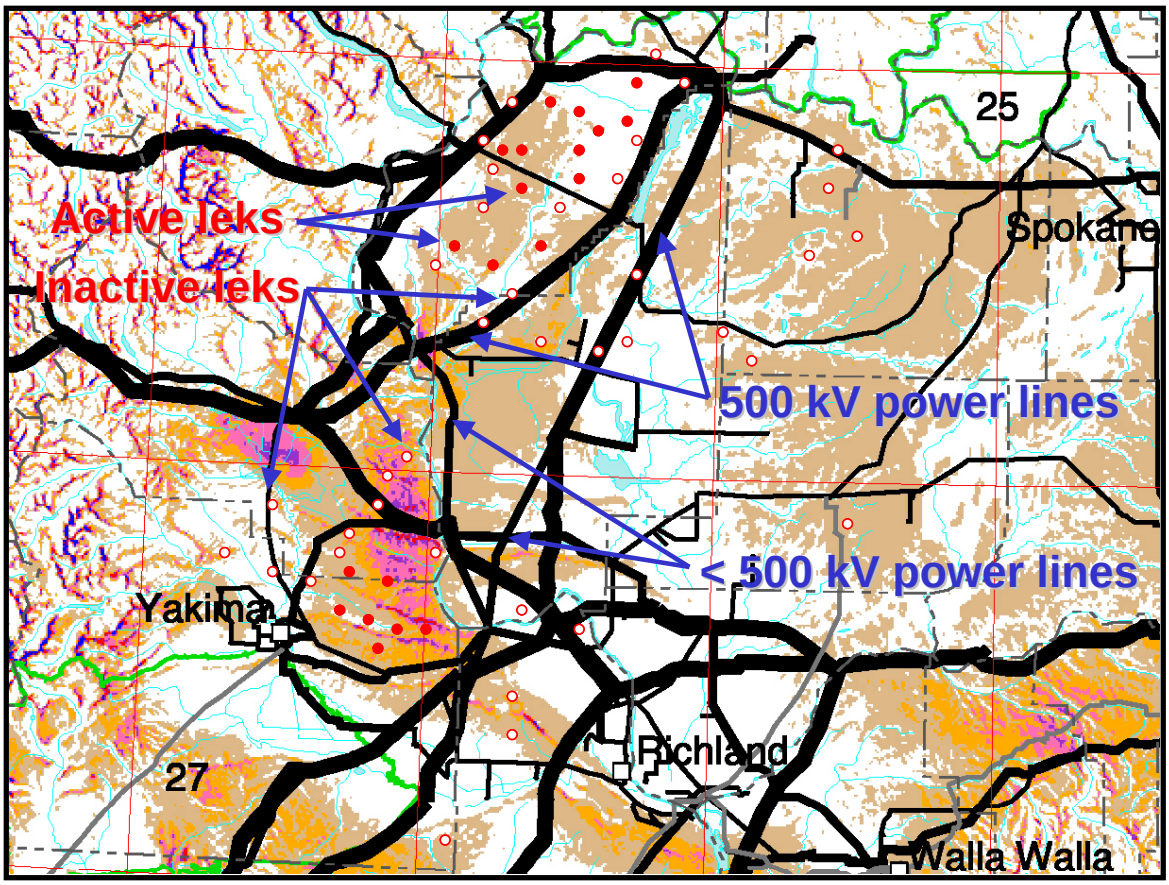
The direct impact of wind power developments can be relatively clear. For example, developers often consider the projects' 'footprint' to be the amount of habitat replaced with roads, towers, and other infrastructure. This direct footprint may be as little as 2% of the overall project area (Robel 2002). Despite the low estimate of habitat loss, development impacts have substantial potential to degrade habitats beyond the extent of the direct footprint. These impacts can occur through the establishment and expansion of noxious weeds and can be exacerbated through altered habitat functionality, such as increased fire risk.

Disturbance

The Washington Department of Fish and Wildlife's (Stinson et al. 2004) sage-grouse recovery plan focuses on the potential for behavioral avoidance of vertical structures like towers. This is consistent with other documents including the U.S. Fish and Wildlife Service (2003) interim wind power guidelines recommending avoidance of turbine placement "in habitat known to be occupied by prairie grouse" or "within 5 miles of known leks". The justification for this recommendation was the instinctive avoidance of prairie grouse of tall structures, even where anti-perching devices were used (Manes et al. 2002). In California, power lines resulted in sage-grouse lek abandonment and reduced lek attendance up to 3 miles away (Rodgers 2003; F. Hall, pers. comm.). In Washington, 19 of 20 leks (95%) documented within 7.5 km of 500 kV power lines are

now vacant, while the vacancy rate for leks further than 7.5 km is 59% (22 of 37 leks, Fig. 2).

Fig. 2. Distribution of power lines and greater sage-grouse leks in central Washington.



Adverse affects have also been documented for other types of development in the range of sage-grouse (Lyon 2000; Braun et al. 2002; Lyon and Anderson 2003; Connelly et al. 2004; Holloran 2005; Naugle et al. 2006a, 2006b). For example, Holloran (2005) documented decreased sage-grouse activity close to drilling rigs, gas wells, and haul roads. Overall, Holloran documented a negative affect of energy development on greater sage-grouse.

Connelly et al. (2004) documented a negative affect of Interstate 80 (I-80) on greater sage-grouse in southern Wyoming (Fig. 3). Of 802 leks identified within 100 km of I-80, there were no leks within 2 km of the highway, and very few within 4 km of the interstate; leks outside the I-80 corridor tended to be somewhat evenly distributed (Fig. 4). Leks relatively close to I-80 were also more likely to be inactive; 44% of the 34 leks found within 7.5 km of I-80 were active, compared with 67% of the 84 leks found between 7.5 and 15 km of I-80. One possible mechanism for the 'I-80 effect' is the never-ending noise, but this has not been tested.

Fig. 3. Distribution of greater sage-grouse leks in southern Wyoming in relation to Interstate 80 (adapted from Connelly et al. 2004). Only leks within 100 km of the highway are shown.

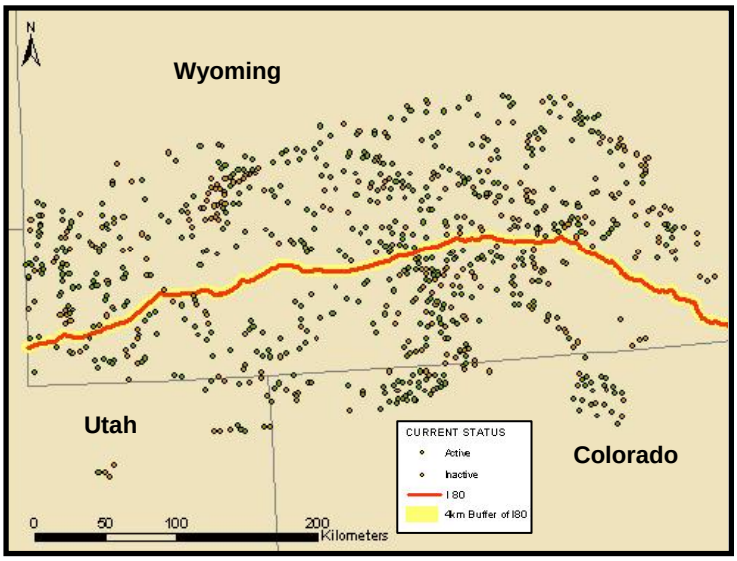
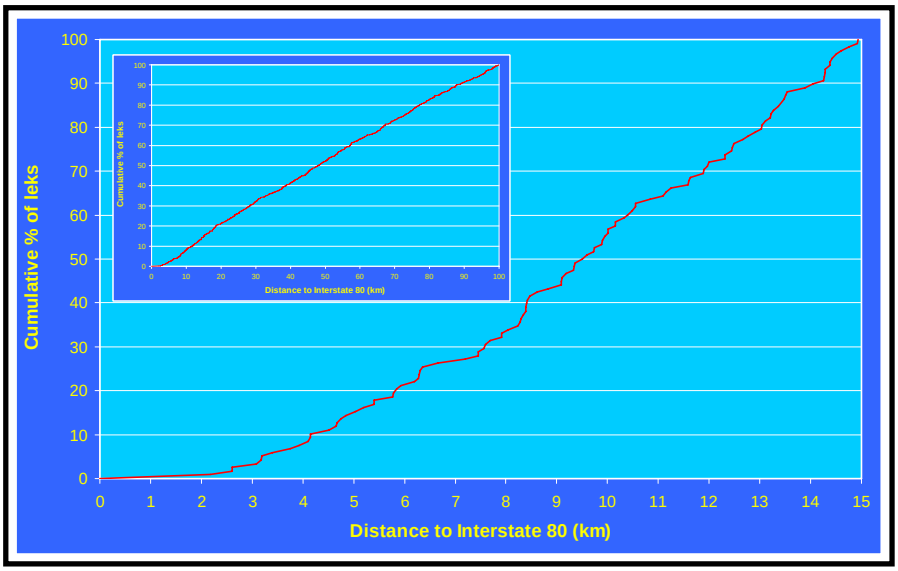


Fig. 4. Cumulative distribution of greater sage-grouse leks in relation to distance between the lek and Interstate 80 in southern Wyoming.



The observations of greater sage-grouse are similar to those for other species of prairie-grouse including the lesser prairie-chicken (*Tympanuchus pallidicinctus*) which avoids suitable habitat relatively close to residences, busy roads, and compressor stations (Robel 2002). Because of this observation, Robel (2002) argued that a proposed 8,000-acre wind development in the Flint Hills of Kansas, with about 80 turbines, would adversely impact the suitability of 15,000 to 18,000 acres of very good to excellent greater prairie-chicken (*Tympanuchus cupido*) nesting and brood-rearing habitat. Robel

argued that greater prairie-chickens have "a low tolerance for human disturbance" and would likely avoid areas within 1 mile of turbines. These observations were consistent with those of Hunt (2004) in New Mexico. Hunt found that development (gas wells, roads, power lines) had an adverse affect on occupancy by lesser prairie-chickens

Despite Robel's suggestion about the lack of nesting near turbines, a single greater sage-grouse nest was documented in 2007 at the Wild Horse Wind Farm (Jennifer Diaz, pers. comm.; Fig. 5). However, unlike the previous observations of statistically testable samples, the significance of a single nest is impossible to evaluate. For example, sage-grouse females are long-lived and display site fidelity to their nest sites (Schroeder and Robb 2003). Consequently, one possible explanation for the observation is that the newly constructed Wild Horse Wind Farm may have been completed after the female had established her nesting area, and she was unlikely to move to a 'new' location. Another possible explanation is that the nesting female was not affected by the disturbance associated with the wind farm. Neither explanation is testable at this stage.

Fig. 5. View of Wild Horse Wind Farm northeast of Ellensburg, Washington.

Despite these documented relationships between development and prairie grouse in general, and sage-grouse in particular, there is a great deal that is not known. For example, little is known about the specific relationships between grouse and environmental disturbances. Are grouse responding to habitat loss, auditory disturbance, visual distance, increased risk of predation, an unidentified factor, or a combination of factors? Identification of the specific relationships between sage-grouse and disturbance will be important so that suitable minimization and mitigation measures can be considered, where appropriate.

Management and assessment of risk

There is little doubt that the lack of fundamental information makes an assessment of risk very difficult. This lack of information includes the expected response of greater sage-grouse to specific development pressures associated with wind power development. Despite this lack of specific information, the general information and information on

surrogate species and management practices suggests that caution should be exercised with regard to sage-grouse and wind power. The need for caution is further supported by the extent of overlap between observations of radio-marked sage-grouse in Douglas County and the proposed Withrow Wind Farm. Between 1992 and 1999, radio telemetry research was conducted on 19 male and 88 female greater sage-grouse, resulting in 7,034 specific observations (Fig. 6). Approximately 850 of those observations (about 12%) were within the perimeter of the proposed wind farm (Fig. 7).

Fig. 6. Locations (7,034) of 97 radio-marked greater sage-grouse monitored during 1992-1999 in Douglas County, Washington.

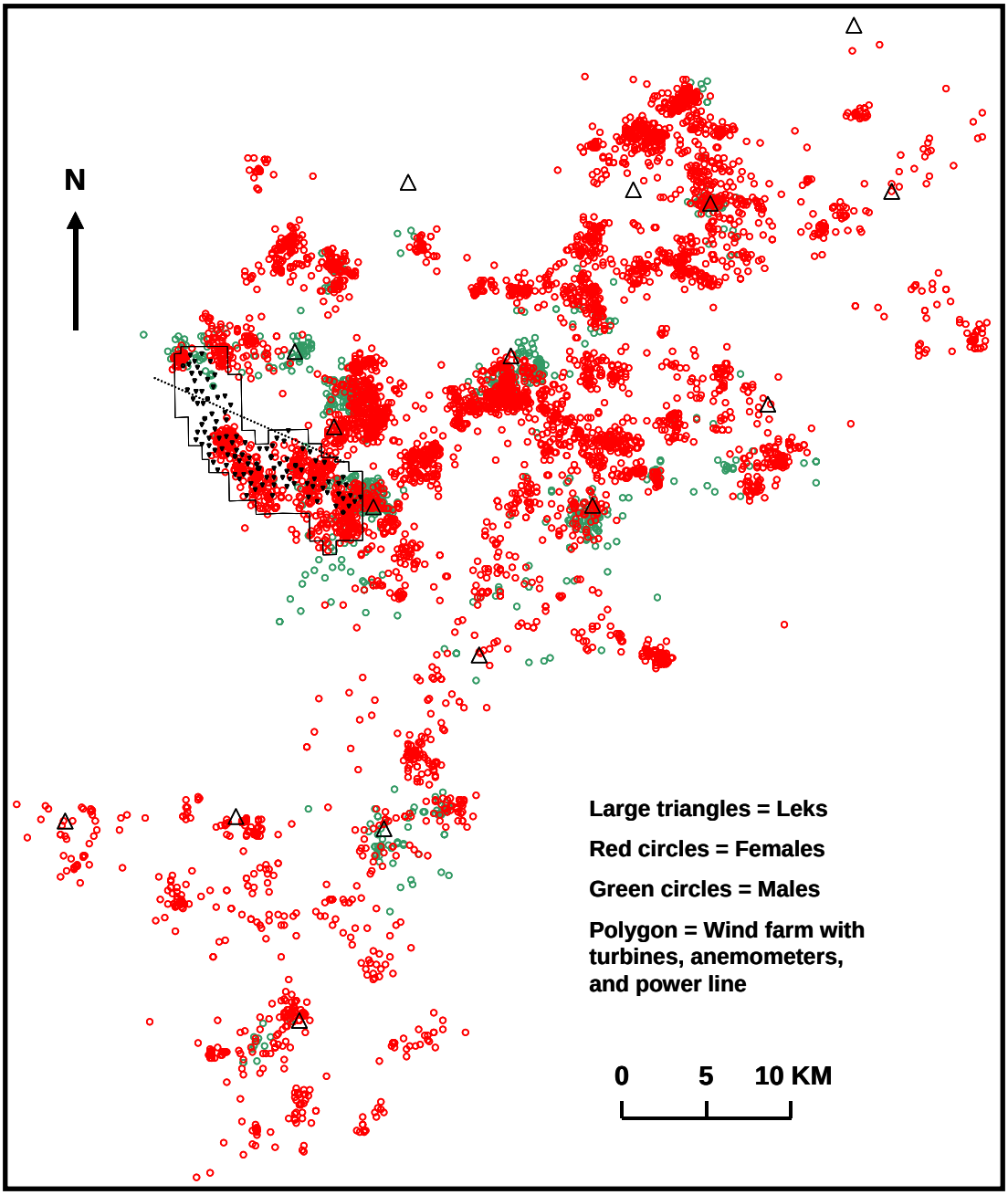
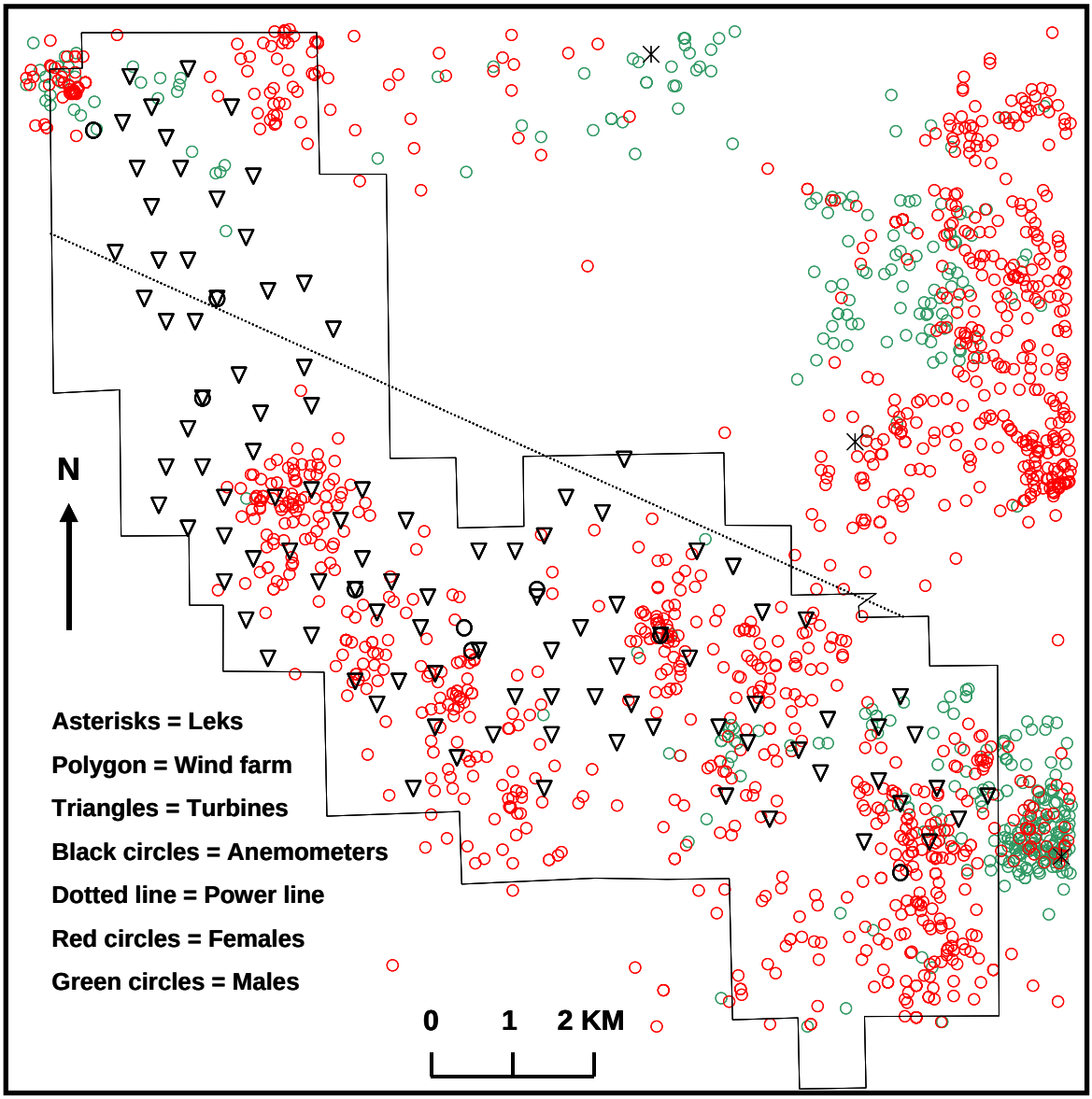


Fig. 7. Locations (about 1,700) of radio-marked greater sage-grouse monitored during 1992-1999 in the vicinity of the proposed Withrow Wind Farm in Douglas County, Washington (close-up of Fig. 6).



Trapping of greater sage-grouse for the purpose of telemetry is conducted on lek sites (traditional display locations). Because these sites are not randomly distributed and because trapping is not evenly distributed between leks, it is important to also consider the locations of individual birds rather than all locations. Consequently, Fig. 5 and 6 were re-analyzed (Fig. 8 and 9) by considering only general locations for each individual (e.g., nest locations, lek locations, and average winter location (Dec – Feb) for males and females). It is important to realize that areas without locations may, or may not be, good habitat (e.g., they may not have had radio-marked birds in the area). Two hundred four nests were found during the course of this study; 27 nests (13.2% of all nests) were documented within the perimeter of the proposed development (Fig. 9). Eight of 56

females (14.3%) and 2 of 12 males had winter ranges centered in the proposed development. The northern third of the project area was not used by wintering birds (deeper snow).

Fig. 8. Generalized locations of individual radio-marked greater sage-grouse monitored during 1992-1999 in Douglas County, Washington.

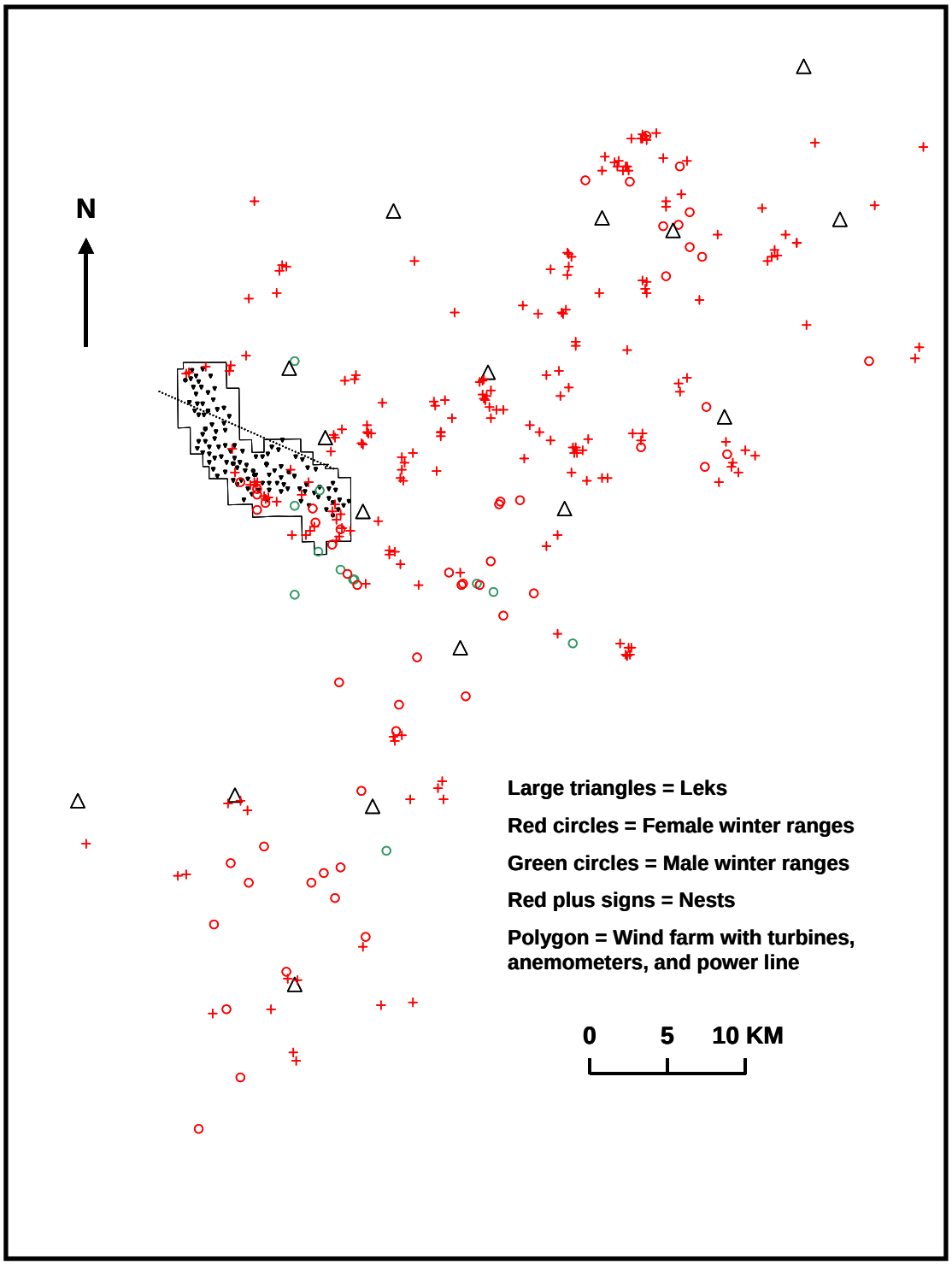
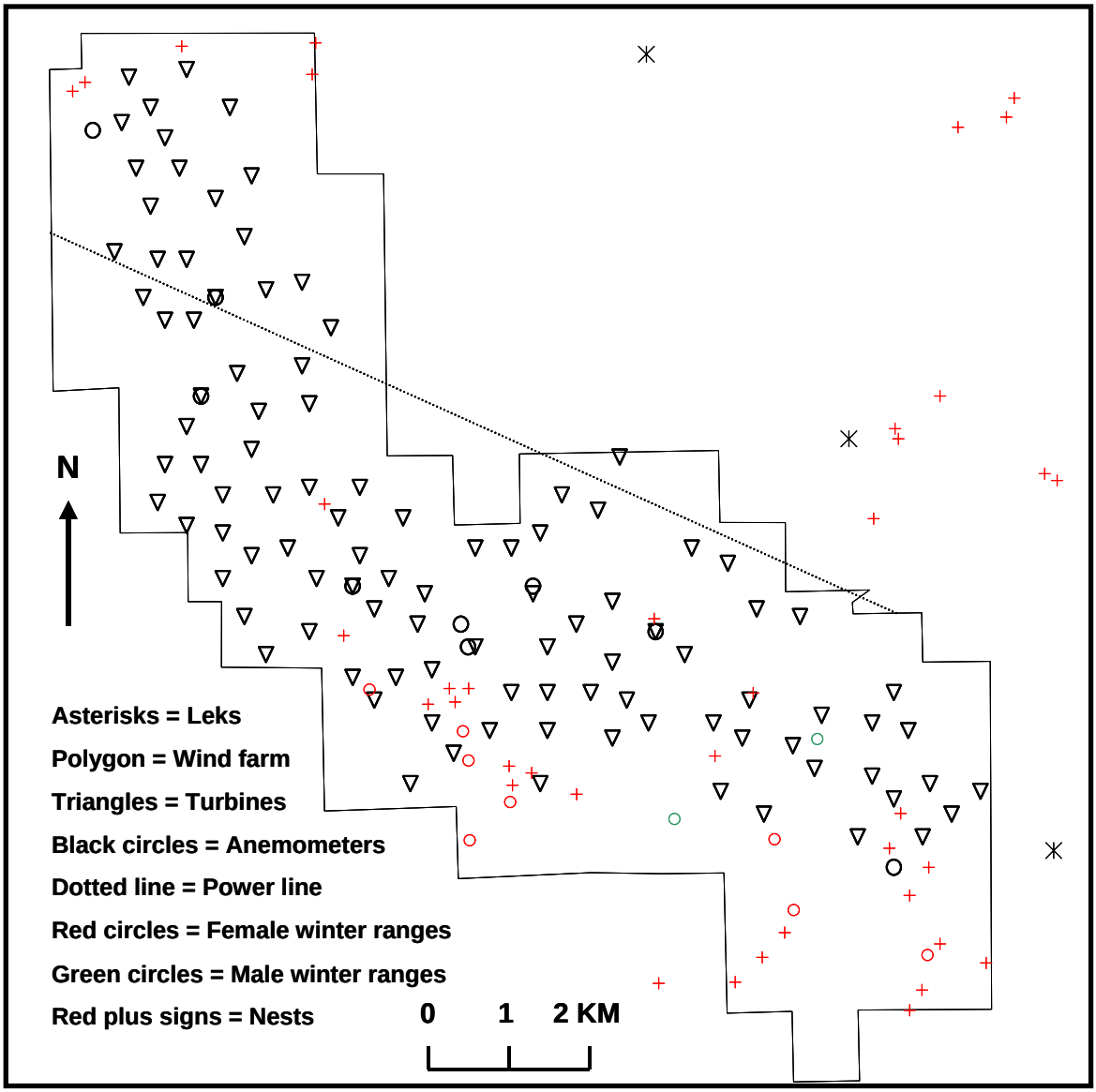


Fig. 9. Generalized locations of individual radio-marked greater sage-grouse monitored during 1992-1999 in the vicinity of the proposed Withrow Wind Farm in Douglas County, Washington (close-up of Fig. 8)



Finally, a fixed-kernal estimate was used to map 99% (general) and 50% (core) seasonal use areas in Douglas County (Fig. 10) and in the vicinity of the Withrow Wind Farm (Fig. 11). Centroids for each radio-marked sage-grouse were defined for 3 general seasons: spring (16 March – 30 June), summer (1 July – 30 September), and late autumn/winter (1 October – 15 March). Only birds with at least 5 locations per season were considered. As with the previous analysis, location of use areas was partly a function of trapping location.

Fig. 10. Fixed-kernal estimates of 99% (general) and 50% (core)seasonal use areas in Douglas, County, Washington, 1992-1999.

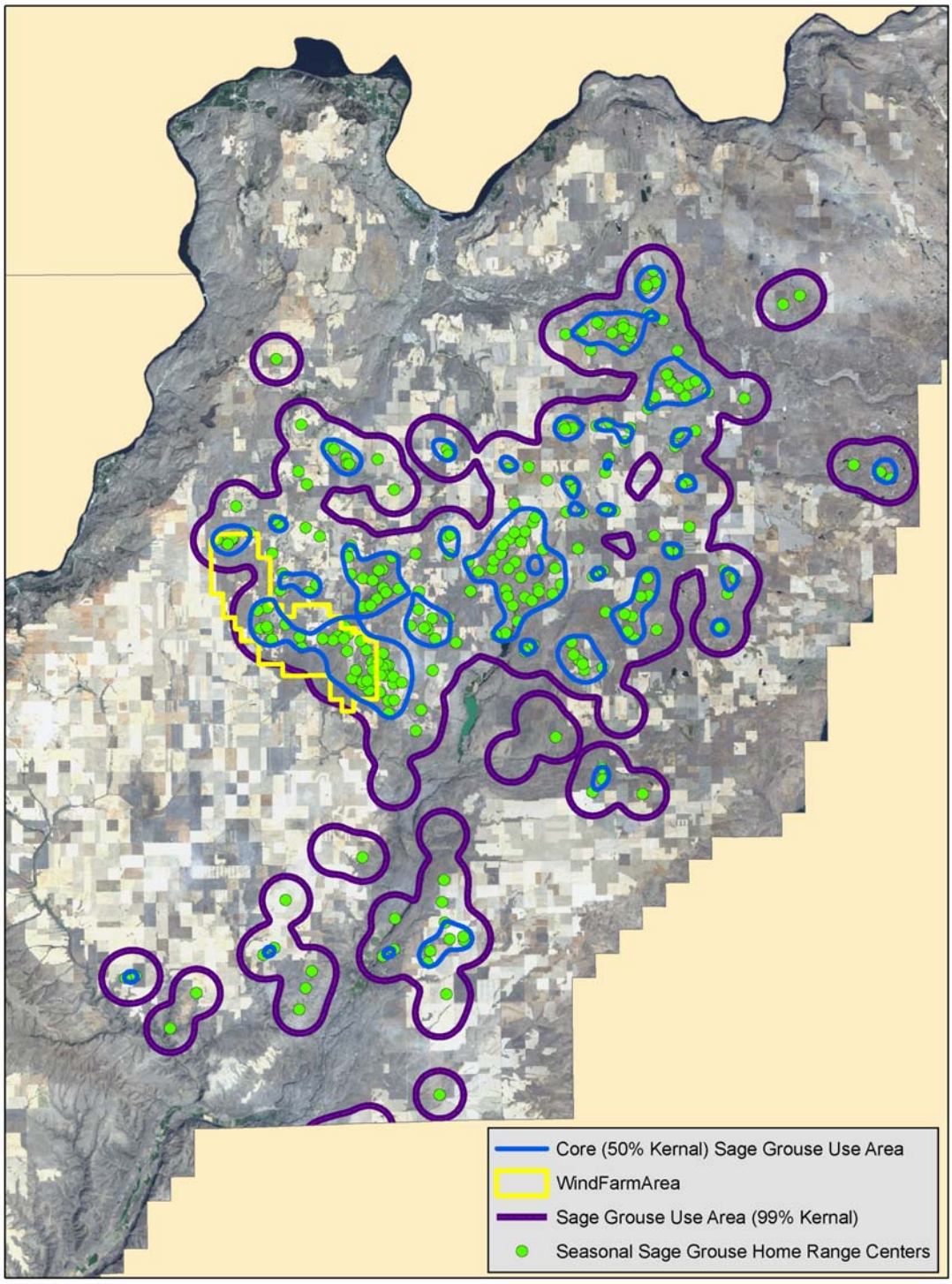
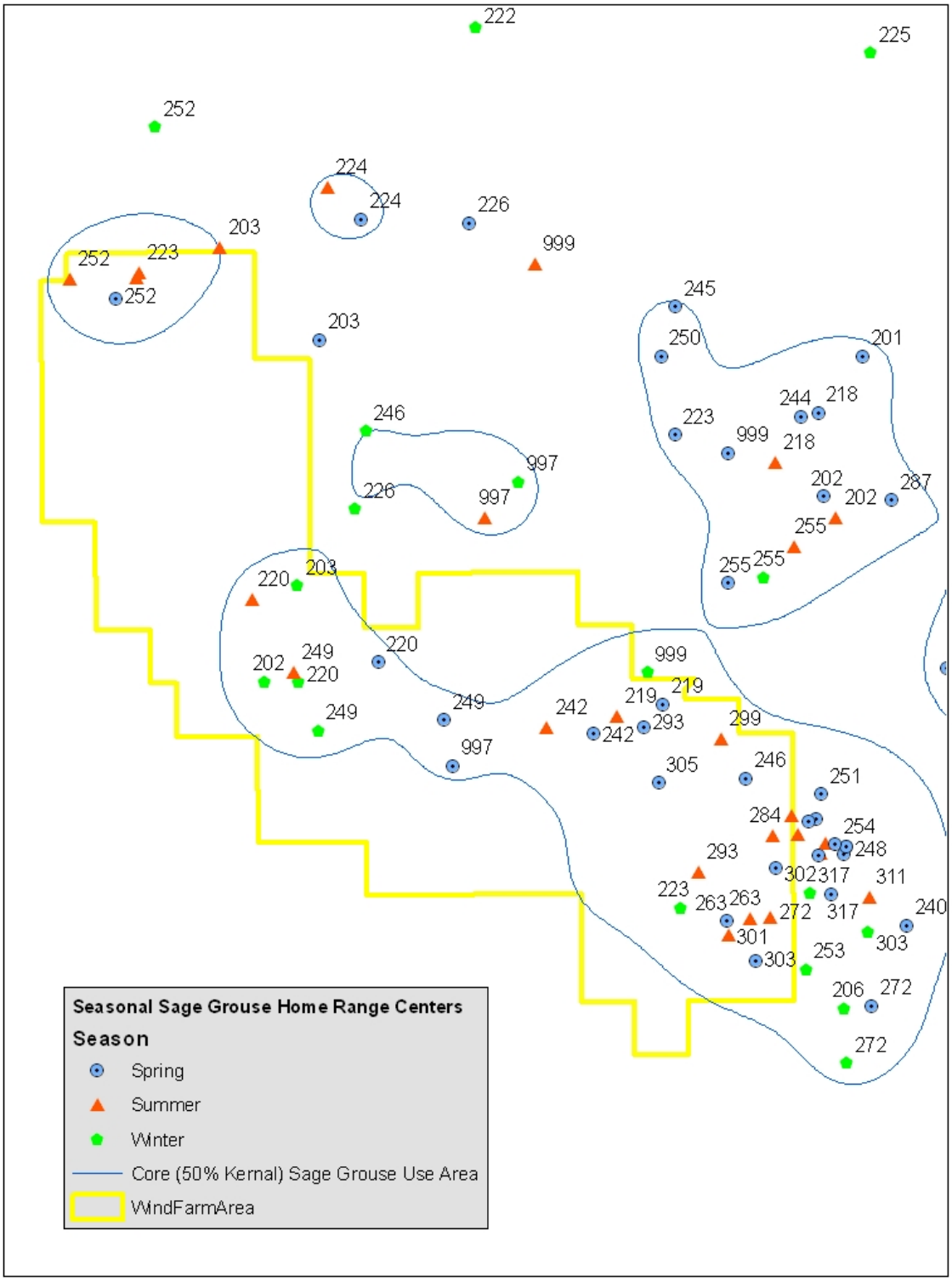


Fig. 11. Fixed-kernal estimates of core (50%) seasonal use areas in proximity of Withrow Wind Farm in Douglas, County, Washington, 1992-1999 (closup of Fig. 10). The band number for each bird is used to label the home range centers.



Discussion

Virtually every factor considered suggests that there is a substantial risk to sage-grouse with a wind power development in Douglas County. These risk factors include, but are not limited to, mortality, habitat loss and degradation, and disturbance. The fact that sage-grouse broadly overlap the proposed area of development increases the risk. Stinson et al. (2004) argued that the existing populations of sage-grouse in Washington are essentially not viable. It is likely that any factor that decreases the distribution and/or population of sage-grouse will also decrease their long-term viability. This carries a political risk as well, since the greater sage-grouse in Washington is already federally listed as 'warranted, but precluded', worth of classification as a threatened or endangered species.

Shrubsteppe habitat is a priority habitat in Washington. Not only does shrubsteppe support the greater sage-grouse, but it also supports other important species of wildlife. It is for that reason that the wind power guidelines for Washington (Washington Department of Fish and Wildlife 2003) discouraged developers from using or degrading high value habitat areas, especially shrubsteppe habitat, in excellent condition.

Literature Cited

Braun, C. E., O. O. Oedekoven, and C. L. Aldridge. 2002. Oil and gas development in western North America: effects on sagebrush steppe avifauna with particular emphasis on sage-grouse. Transactions of the North American Wildlife and Natural Resources Conference 67:337-349.

Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. Conservation assessment of greater sage-grouse and sagebrush habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming, USA. http://sagemap.wr.usgs.gov/conservation_assessment.htm.

Erickson, W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, K. Sernka. 2002. Synthesis and comparison of baseline avian and bat use, raptor nesting, and mortality information from proposed and existing wind developments. Prepared for Bonneville Power Administration, by West Inc., Cheyenne, Wyoming.

Hays, D. W., M. J. Tirhi, and D. W. Stinson. 1998. Washington State status report for the sage grouse. Washington Department of Fish and Wildlife, Olympia.

Holloran, M. J. 2005. Greater sage-grouse (*Centrocercus urophasianus*) population response to natural gas field development in western Wyoming. Dissertation. University of Wyoming, Laramie, USA.

Hunt, J. L. 2004. Investigation into the decline of populations of the lesser prairie-chicken (Tympanuchus pallidicinctus Ridgway) in southeastern New Mexico. Dissertation. Auburn University, Auburn, Alabama, USA.

Lyon, A. G. 2000. The potential effects of natural gas development on sage-grouse near Pinedale, Wyoming. Thesis, University of Wyoming, Laramie, USA.

Lyon, A. G., and S. H. Anderson. 2003. Potential gas development impacts on sage-grouse nest initiation and movement. Wildlife Society Bulletin 31:486-491.

Manes, R., S. Harmon, B. Obermeyer, and R. Applegate. 2002. Wind energy & wildlife: an attempt at pragmatism. Wildlife Management Institute, Washington D.C.

Naugle, D. E., B. L. Walker, and K. E. Doherty. 2006a. Sage-grouse population response to coal-bed natural gas development in the Powder River Basin: Interim progress report on region-wide lek-count analyses. Unpublished Report, Wildlife Biology Program, University of Montana, Missoula, USA.

Naugle, D. E., B. L. Walker, and K. E. Doherty. 2006b. Sage-grouse winter habitat selection and energy development in the Powder River Basin: Completion Report. Unpublished Report, Wildlife Biology Program, University of Montana, Missoula, USA.

Robel, R. J. 2002. Expected impacts on greater prairie-chickens of establishing a wind turbine facility near Rosalia, Kansas. Report prepared for Zilkha Renewable Energy. http://www.audubonofkansas.org/wind.php.

Rodgers, R. 2003. Wind Power Generation: Biological Concerns. Wind Energy Symposium April 10, 2003. Ft. Hays State University, Hays, Kansas.

Schroeder, M. A., and R. K. Baydack. 2001. Predation and the management of prairie grouse. Wildlife Society Bulletin 29:24-32.

Schroeder, M. A., and L. A. Robb. 2003. Fidelity of sage-grouse to breeding areas in a fragmented landscape. Wildlife Biology 9:291-299.

Schroeder, M. A., J. R. Young, and C. E. Braun. 1999. Sage grouse. In The birds of North America, No. 425 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, Pennsylvania.

Schroeder, M. A., D. W. Hays, M. F. Livingston, L. E. Stream, J. E. Jacobson, and D. J. Pierce. 2000. Changes in the distribution and abundance of sage grouse in Washington. Northwestern Naturalist 81:104-112.

Schroeder, M. A., C. L. Aldridge, A. D. Apa, J. R. Bohne, C. E. Braun, S. D. Bunnell, J. W. Connelly, P. A. Deibert, S. C. Gardner, M. A. Hilliard, G. D. Kobriger, S. M. McAdam, C. W. McCarthy, J. J. McCarthy, D. L. Mitchell, E. V. Rickerson, and S. J. Stiver. 2004. Distribution of sage-grouse in North America. Condor 106:363-376.

Stinson, D. W., D. W. Hays, and M. A. Schroeder. 2004. Washington State recovery plan for the greater sage-grouse. Washington Department of Fish and Wildlife, Olympia, Washington.

U.S. Fish and Wildlife Service. 2001. 12-month finding for a petition to list the Washington population of western sage grouse (Centrocercus urophasianus phaios). U.S. Fish and Wildlife Service. 66 Fed. Reg. 22984-22301 (May 7, 2001).

U.S. Fish and Wildlife Service. 2003. Interim guidelines to avoid and minimize wildlife impacts from wind turbines. Washington, D.C.

Washington Department of Fish and Wildlife. 1995. Washington State management plan for sage grouse. Washington Department of Fish and Wildlife, Olympia, Washington.

Washington Department of Fish and Wildlife. 2003. Wind power guidelines. Washington Department of Fish and Wildlife, Olympia, USA. http://wdfw.wa.gov/hab/engineer/windpower/index.htm.