

**EFFECTS OF WIND POWER ON THE DEMOGRAPHY AND POPULATION
GENETICS OF THE GREATER PRAIRIE-CHICKEN**

QUARTERLY REPORT

Submitted by:

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Presented to:

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NREL Subcontract Administrator:

Quarterly Report
Reporting Period: 1st Quarter 2008
Date: 1 April 2008

EXECUTIVE SUMMARY

Field.— Nearly all of our efforts during this quarter were field-based and focused on conducting lek attendance surveys, capturing and marking Greater Prairie-Chickens at the 3 research units, and gathering location data on radio-marked hens. As of 25 March, 117 lek surveys have been conducted at 53 leks during 28 February – 25 March. The mean number of prairie-chickens attending leks (2.9) at Unit 1 was significantly less than that at Units 2 (12.8) and 3 (11.7). Trapping via walk-in traps and drop nets occurred during 3 -25 March, resulting in 118 captures of 92 prairie-chickens (71 males, 21 females). Radio-transmitters were fitted to all females. We will continue to capture prairie-chickens until females stop visiting leks and we have banded > 80% of the males on each lek.

Laboratory.— Results of laboratory analysis remain unchanged since last quarter. Efforts in the lab over the last quarter have focused on hiring and training field crew for the upcoming trapping season. Thus far this year we have acquired blood samples from 118 newly captured prairie-chickens across all three research units and sampling is ongoing. Blood is being stored in Longmire's solution (storage lysis buffer) at -20 degrees C; extraction and amplification will begin at the completion of the trapping season in May.

Administration and Reporting.—We received new funding from BP Wind Energy which was used to purchase VHF radio collars for prairie-chicken chicks. In addition, our grant proposal for matching funds was accepted by the National Fish and Wildlife Foundation. We hired and trained 14 seasonal research technicians to conduct our spring and summer field seasons.

FIELD BASED HYPOTHESES

Hypothesis I) Lek Attendance: *Lek attendance on impact sites is not affected by wind-power development.*

Accomplishments Since Last Quarter

Leks were identified by field surveys at both the reference and impact areas at all 3 study units. The total number of males, females, and prairie-chickens of unknown sex was recorded, as well as the weather conditions (e.g., estimated temperature, wind speed, cloud cover) and time and date of observation. Birds were flushed from untrapped leks between 0600 and 0930. Alternately, the maximum number of prairie-chickens observed on the lek was recorded on trapped leks.

We located 53 leks during the quarter, and 117 lek surveys have been conducted at these leks during 28 February – 25 March. The mean (\pm SE) number of total prairie-chickens attending leks (lek size) during this time period was 8.3 ± 0.3 but differed among the three research units and differed among research units. The number of male prairie-chickens attending leks at Unit 1; $2.9 + 0.7$) was less than that at units 2 ($12.8 + 0.9$) and 3 ($11.7 + 1.0$).

Goals For Next Quarter

We will continue to conduct lek surveys during the upcoming quarter. A complete lek attendance analysis will be conducted to fully evaluate the effects of study areas and pre-construction treatment on lek attendance.

Hypothesis II) Avoidance of anthropogenic structures: *Prairie-chickens do not avoid wind-towers and/or other anthropogenic features on impact sites.*

Accomplishments Since Last Quarter

Wind power facilities have not yet been constructed at impact areas at this time. Effort this quarter was focused on capturing and radio-marking females at all sites and monitoring females to quantify pre-construction habitat selection and space use. Radio-

marked prairie-chickens were located ≥ 3 times/week from project trucks, an ATV, or on foot using portable radio receivers and handheld 3-element Yagi antennas. Bird locations were estimated from ≥ 2 triangulation bearings using a maximum-likelihood estimator in program LOCATE III or flush locations were recorded with a GPS. Plans are in place to conduct aerial searches using fixed-wing aircraft when birds are unable to be located from the ground for ≥ 14 days.

Trapping via walk-in traps and drop nets was conducted during 3 – 25 March, resulting in 118 captures of 92 prairie-chickens (71 males, 21 females). Radio-transmitters were fitted to 21 females. Unit-specific capture statistics as of 25 March are presented in Table 1. In addition, 34 hens fitted with transmitters in 2007 are currently being monitored. We have collected 345 locations of 55 females since 1 January.

Goals For Next Quarter

We will continue monitoring radio-marked prairie-chickens at all study sites. We will begin documenting the locations of wind power structures (turbines, roads, transmission lines, and buildings) and non-wind-related human structures with a handheld GPS unit at the Unit 3 impact site. Development will not occur at the other research areas in 2008.

Hypothesis III) Impacts on Fecundity Rates: *Wind development will not reduce nest success or chick survival.*

Accomplishments Since Last Quarter

Efforts this quarter focused on 1) hiring and training 6 additional research technicians, 2) capturing and radio-marking female prairie-chickens at all sites, and 3) intensive monitoring of radio-marked prairie-chickens to locate nests. Capture and handling of prairie-chickens occurred as described in our research proposal beginning 3 March. Captured females were fitted with necklace-style radio-transmitters. Radio-marked hens were located by triangulation or homing ≥ 3 times/week from project trucks, an ATV, or on foot. When females remain in an area and their estimated location does not change for 3 successive days, we use portable radio receivers and handheld Yagi antennas to locate and flush the bird so that the eggs can be counted and nest location recorded with a GPS unit.

As of 25 March, 92 prairie-chickens have been captured 118 times in 2008. Twenty-one females have been fitted with radio-transmitters. No nests have been documented at the time of this report.

Goals For Next Quarter

Efforts in the upcoming quarter will be focused on capturing prairie-chickens at all research units. Females will be monitored >4 times per week to assess nesting status. Nests will be identified and monitored remotely until hatch or fail. Nest survival will be estimated as described in the 2007 annual report. Vegetation structure will be quantified at each nest site within 3 days of hatching or failure (see previous quarterly report).

Chicks will be captured by hand within 3 days of hatch by locating and flushing the brood hen. Captured chicks will be measured and individually marked with numbered Monel metal tags clipped onto the patagium of the leading edge of the wing. Processed chicks will be placed in a second cloth sack. Initial brood size will be considered the number of chicks that were known to hatch based on nest observations. Systematic flush counts will be used to estimate pre-fledge (0-14 days) and post-fledge (14-60 days) survival. Because broods will not be observed daily, we will use the nest survival model type in Program MARK to evaluate daily brood survival probabilities. Covariates will include hen age, a forb:grass cover index, VOR, and average home range distance to closest anthropogenic feature.

Hypothesis IV) Impacts on Breeding Habitat: *Placement of wind-towers and related structures does not impact the habitat use of breeding greater prairie-chickens.*

Accomplishments Since Last Quarter

Radio-marked prairie-chickens were located ≥ 3 times/week from project trucks, an ATV, or on foot using portable radio receivers and handheld 3-element yagi antennas. Bird locations were estimated from ≥ 2 triangulation bearings using a maximum-likelihood estimator in program LOCATE III or flush locations were recorded with a GPS. Data collection was ongoing at the time of this report.

Goals For Next Quarter

We will continue to estimate the locations of radio-marked prairie-chickens ≥ 3 times per week. These data will be uploaded to a GIS platform and home ranges will be

estimated using Hawth's spatial analyst tools package. Females will be monitored regularly to assess nesting status. Nest locations will be identified as described in the previous annual report.

Hypothesis V) Impacts on Survival: *Wind-power development does not increase mortality rates of greater prairie-chickens.*

Accomplishments Since Last Quarter

Goals For Next Quarter

We will continue to focus our efforts on capturing and marking prairie-chickens at all research sites. Our objective is to capture and equip >1000 hens with radio-transmitters and band >80% of the males on each lek. Recaptures of marked birds will be recorded to estimate annual apparent survival via mark-recapture statistics.

LABORATORY BASED HYPOTHESES

Hypothesis I) Affects on breeding behavior: *There will be no change detected in the N_e/N .*

Accomplishments Since Last Quarter

No further analysis has been conducted with regards to this hypothesis since completion of the annual report.

Goals for Next Quarter

We will continue to collect blood samples from captured individuals across the study region, and begin extracting DNA from those samples.

Hypothesis II) Influence on Natal Dispersal: *There will be no differences detected in the dispersal patterns of prairie chickens pre and post wind-power development.*

Accomplishments Since Last Quarter

No further analysis has been conducted with regards to this hypothesis since completion of the annual report.

Goals for Next Quarter

We will continue to collect DNA samples from all captured chicken across the study site. Continue to monitor for chicks banded in 2007 to be returning to leks. When hens are located on nests we with their broods we will obtain DNA samples from chicks. Finally, we will begin extraction and amplification of collected DNA from both adult and juvenile samples.

Table 1. Numbers of Greater Prairie-Chickens captured at impact and reference sites in the Flint Hills of Kansas, 3-25 March 2008.

Unit	Impact		Reference		Total
	F	M	F	M	
1	0	0	0	5	5
2	0	2	3	26	31
3	5	27	13	37	82
Total	5	29	16	68	118