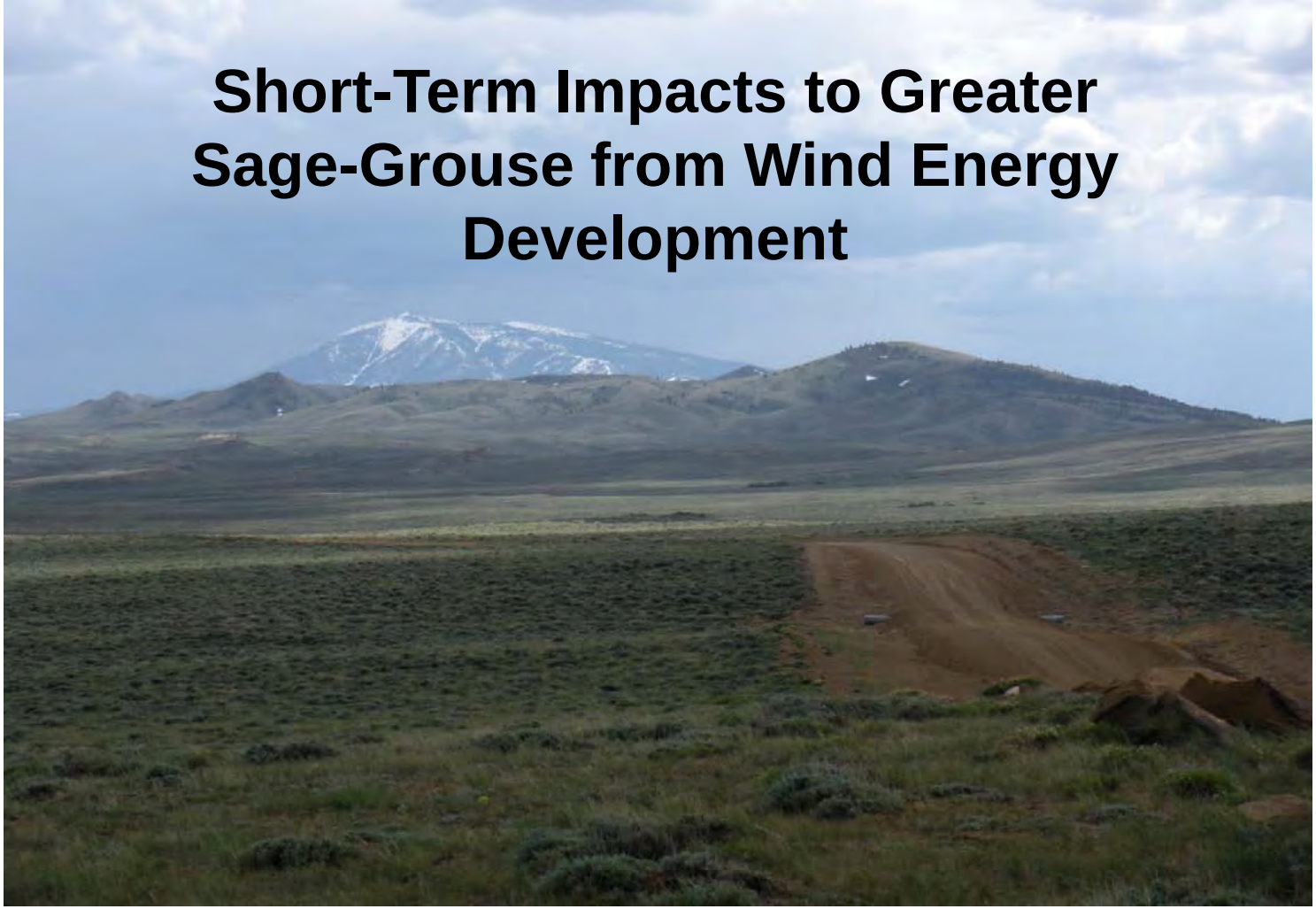
Short-Term Impacts to Greater Sage-Grouse from Wind Energy Development



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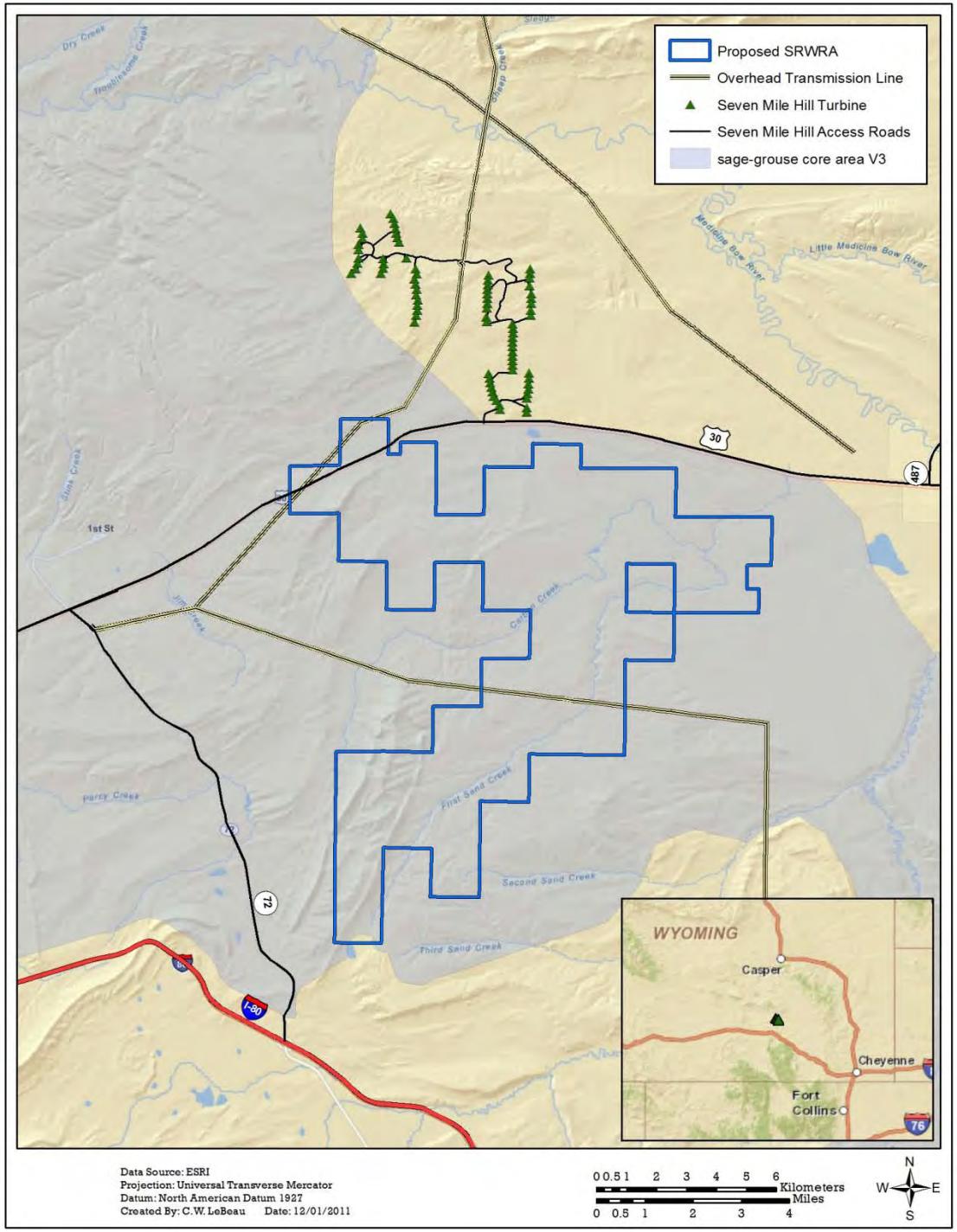
Study Purpose

- To evaluate the functionality and viability of greater sage-grouse habitat within the influence of a wind energy development

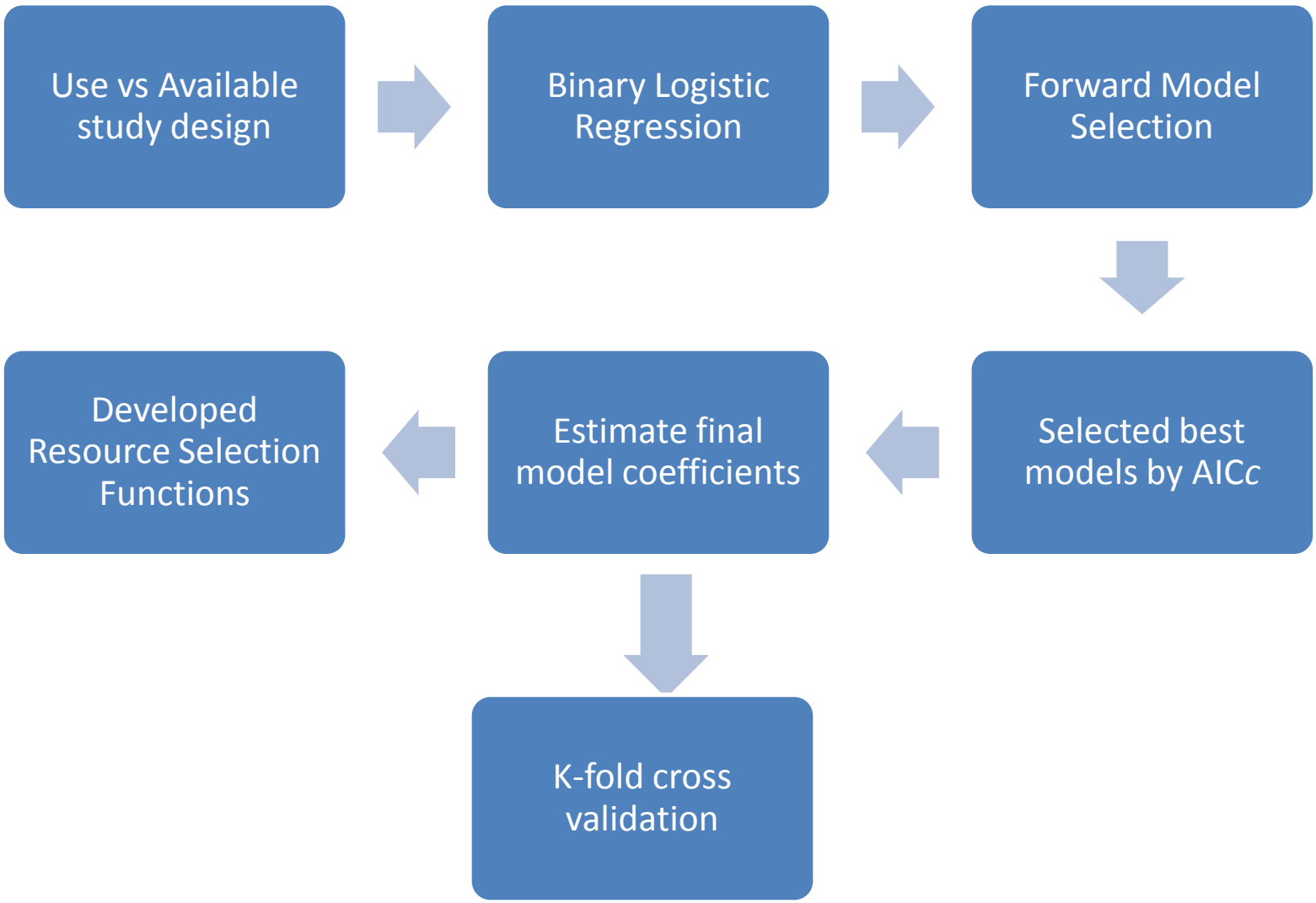
- Determine the short-term impacts of the wind energy development on greater sage-grouse habitat selection patterns, population demographics, and male lek attendance



Study Area

- Seven Mile Hill
  - Seven Mile Hill Wind Energy Facility (PacifCorp)
  - 79-GE 1.5-MW wind turbines
  - 29 km access roads
  - 8 km paved roads
  - 26 km Transmission line
- Simpson Ridge
  - No wind turbines
  - 50 km paved roads
  - 17 km transmission line

Resource Selection Analytical Methods

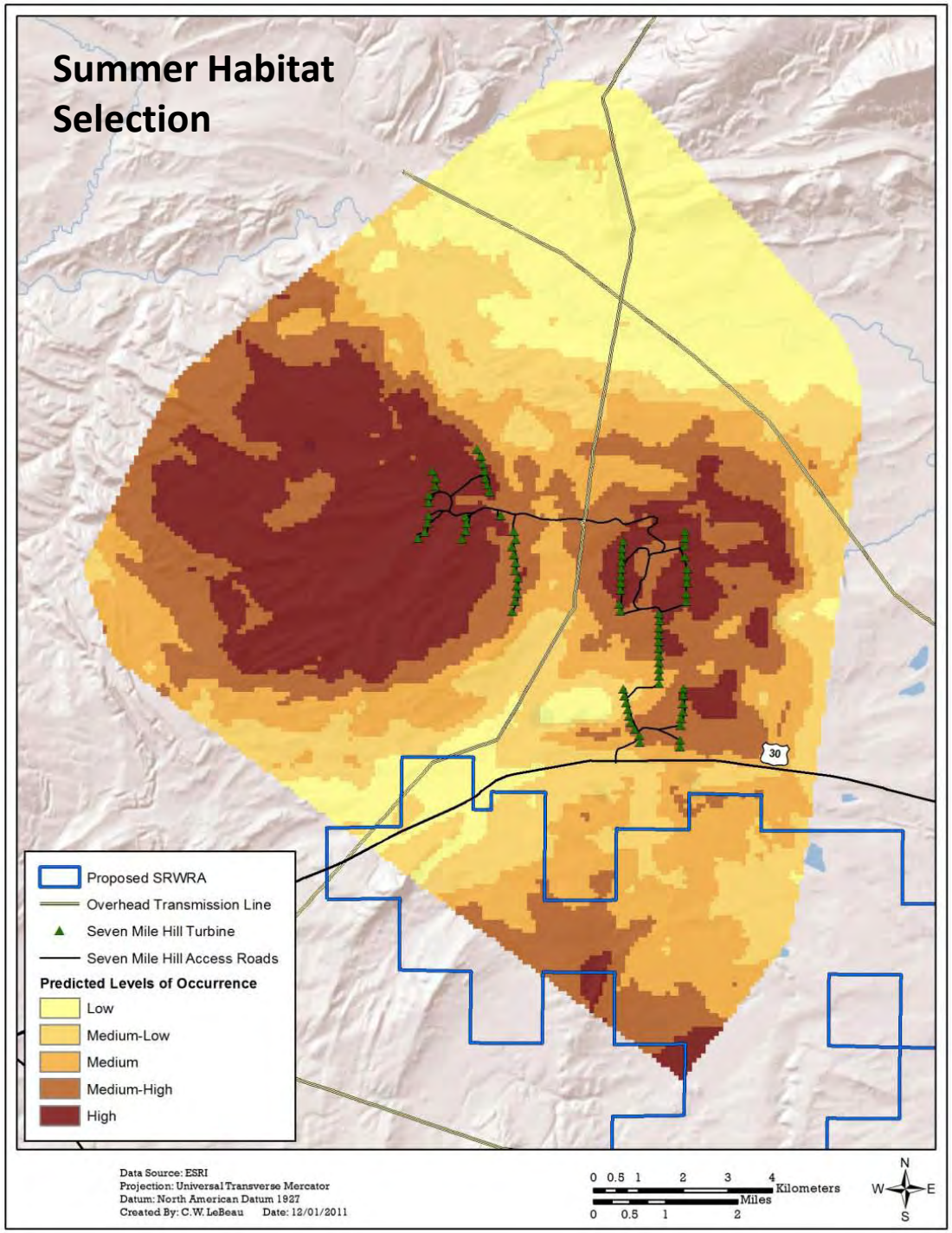


Summary

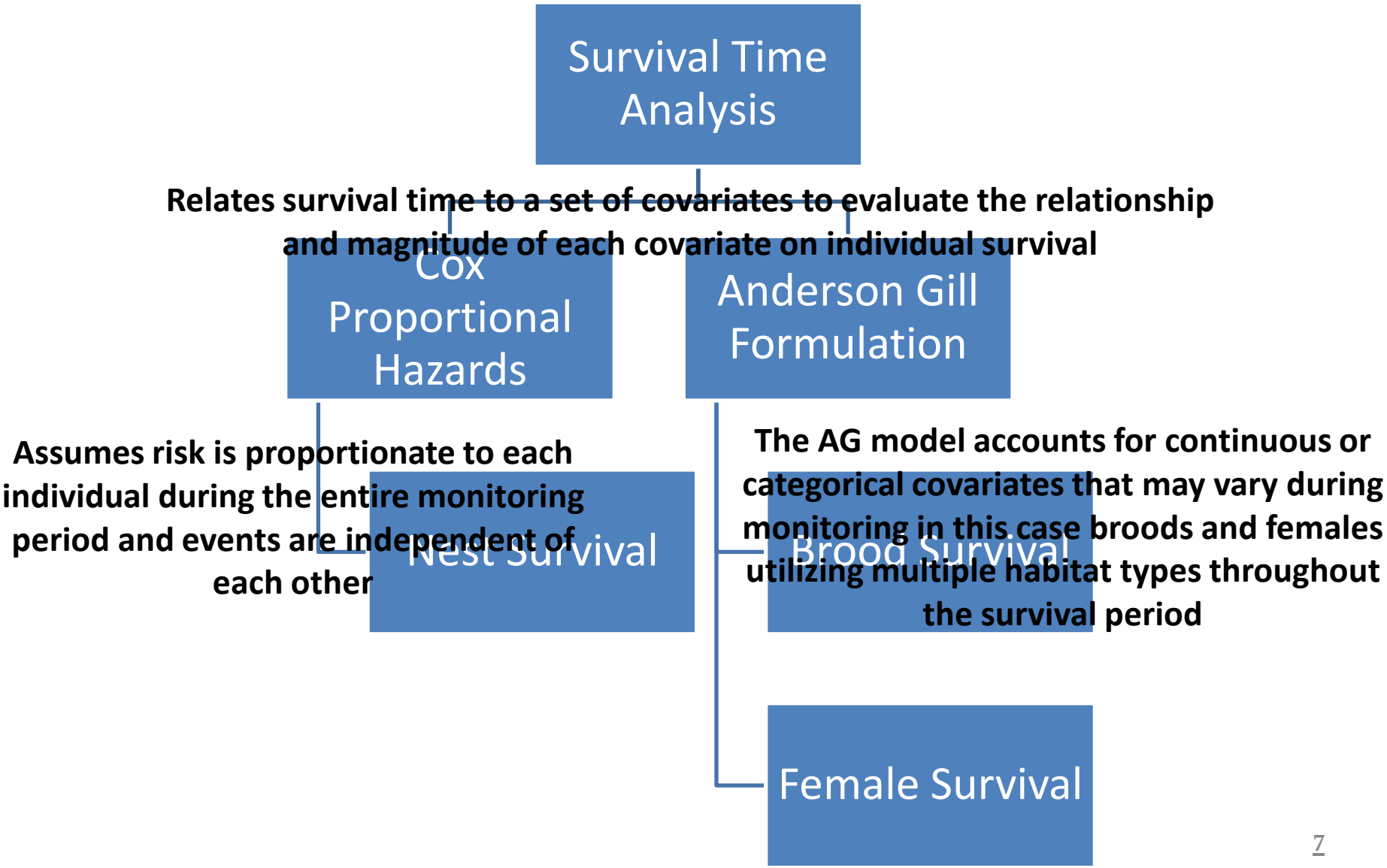
- Presence of turbines does not appear to affect female sage-grouse habitat selection during nesting or brood-rearing

- The relative probability of selection during the summer increased in habitats with close proximity to Seven Mile Hill wind turbines

- Site fidelity and time lag effects (Holloran 2005, Walker et al. 2007, Harju et al. 2010)

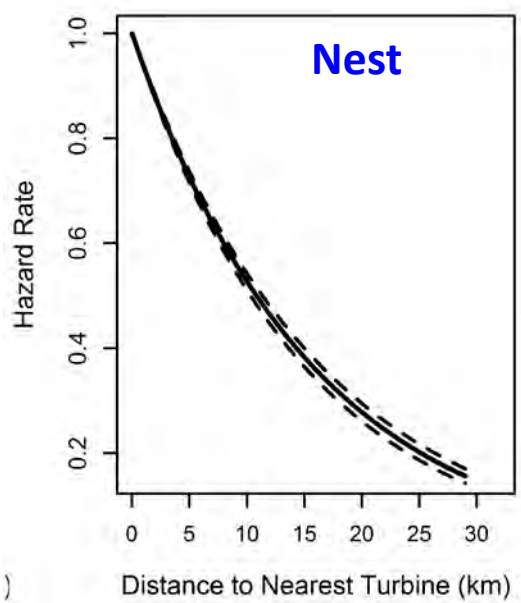

Summer Habitat Selection
30
Proposed SRWRA
Overhead Transmission Line
Seven Mile Hill Turbine
Seven Mile Hill Access Roads
Predicted Levels of Occurrence
Low
Medium-Low
Medium
Medium-High
High
Data Source: ESRI
Projection: Universal Transverse Mercator
Datum: North American Datum 1927
Created By: C.W. LeBeau Date: 12/01/2011
0 0.5 1 2 3 4 Kilometers
0 0.5 1 2 Miles
N
W
E
S

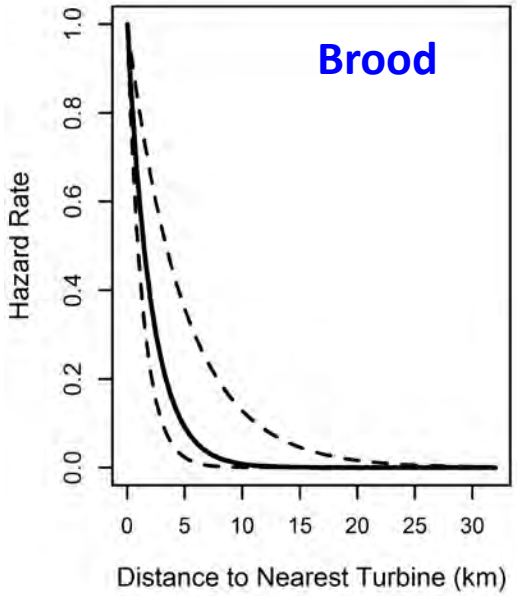
Nest, Brood, and Female Survival



Summary

- Presence of turbines negatively affected sage-grouse nest and brood survival



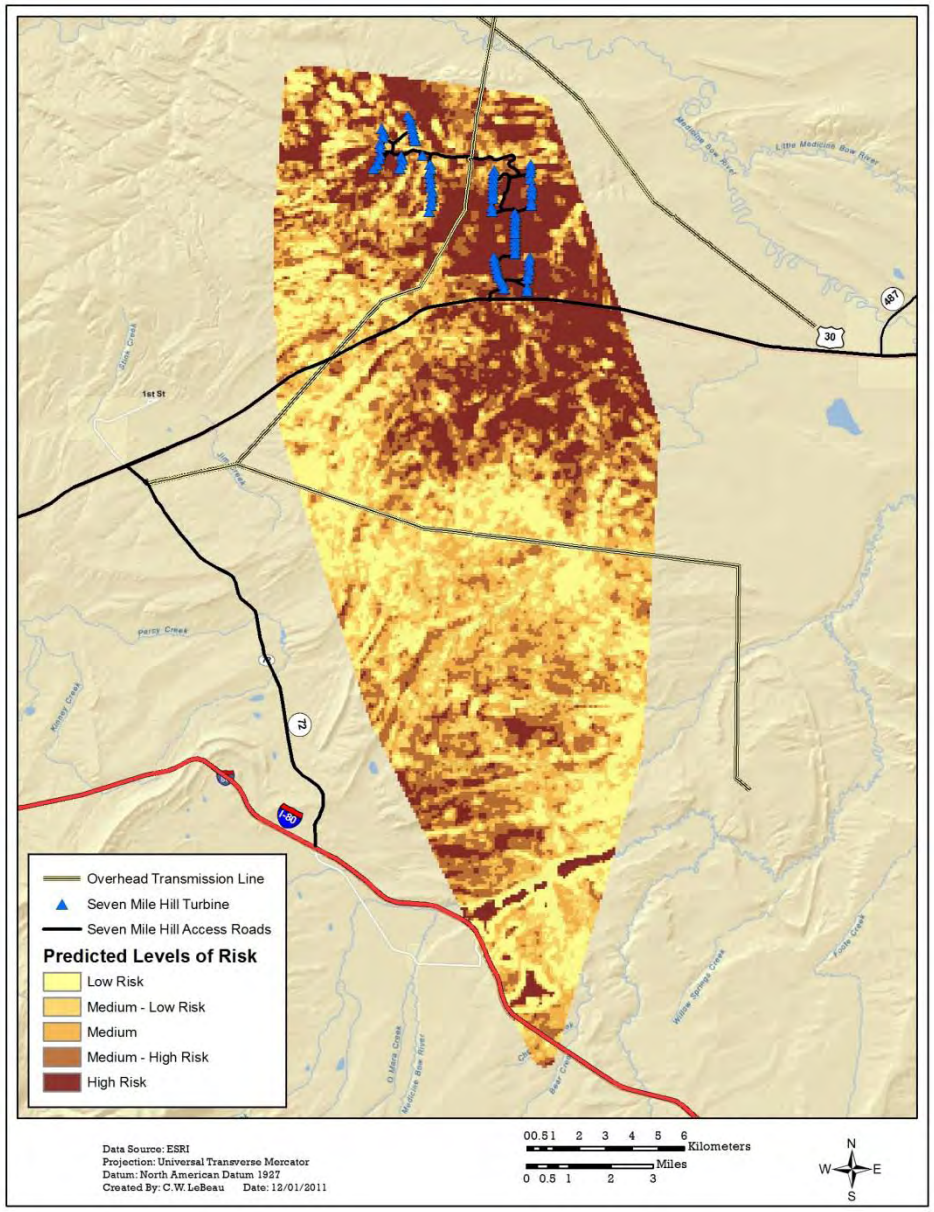


- Distance to major roads and transmission lines accurately predicted female survival; however, this model did not differ much from the null model

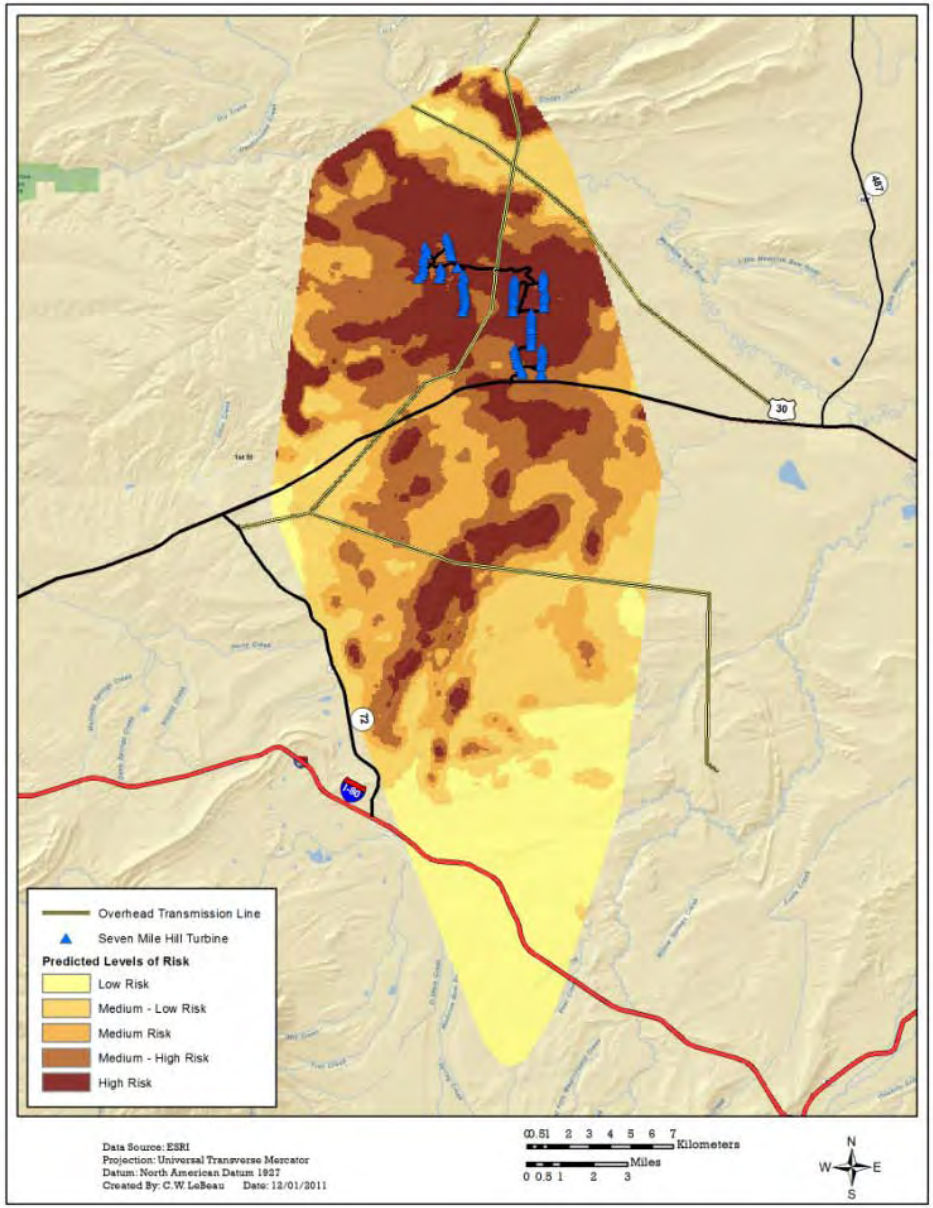
- Did not violate assumption of proportional hazards

- Decreased nest and brood survival may be attributed to increased predation as the result of edge effects (Batary and Baldi 2004, Coates and Delhanty 2010)

Nest Survival

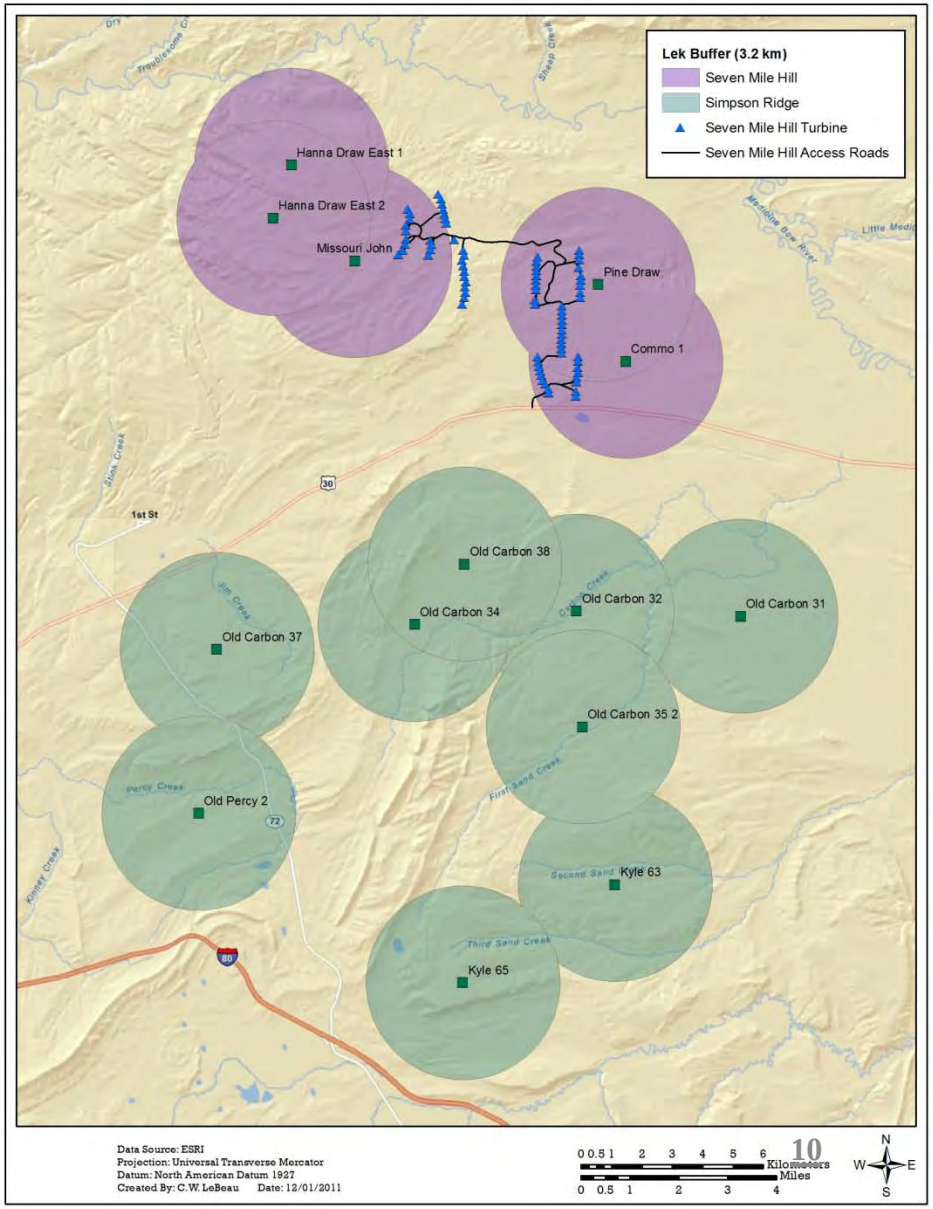


Brood Survival

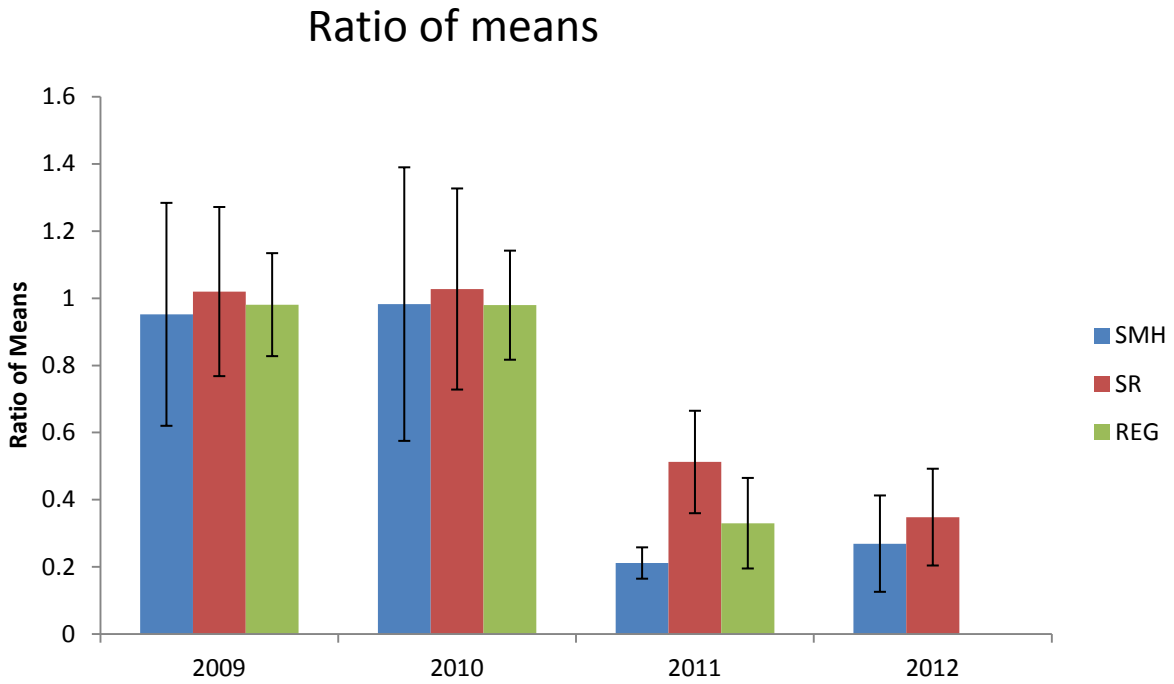


Male Lek Attendance

- Ground lek surveys
  - 2008-2012
  - 3 counts spaced 7-10 days apart
- Determined peak male lek attendance by the highest count (Beck and Braun 1980)
- Ratio of means and linear mixed-effects modeling



Summary



Linear mixed-effects model

- **Male lek attendance decreased on average by 25.6% (90% CI: 17.5–32.9%) every year from 2008 to 2012 within leks located at Seven Mile Hill and Simpson Ridge.**

Future and Current Research

- Two additional years of research under the NWCC Collaborative, 2011-2012
- Expected to continue another 3 years for a total of 7 years of research
- Estimate population demographics, habitat selection, and lek recruitment

Acknowledgments

- Funding provided by:
  - EDP Renewables (formerly Horizon Wind Energy)
  - Iberdrola Renewables
  - Shirley Basin/Bates Hole Local Sage-Grouse Working Group
  - United States Department of Energy
  - University of Wyoming School of Energy Resources
- PacificCorp for allowing access to the Seven Mile Hill Wind Energy Facility
- Study participants
  - Troy Rintz
  - Brandon Smith
  - Ariana Malone
  - Jamey Eddy
  - Greg Leighty
  - Victoria Poulton
  - Jason Herreman
- Burt and Kay Lynn Palm of Hi-Allen Ranch LLC for providing access to their private land

WEST Inc.

University of Wyoming

Horizon Wind Energy
An EDP Renewables Company

School of Energy Resources

Sage-grouse Research Collaborative (SGC)

- Subgroup of Grassland & Shrub Steppe Species Wildlife Workgroup
- Formed in 2010
- Selected 3 projects under competitive process
- Oversight committee
  - Academia, state and federal agencies, conservation organizations, and wind developers
- Develop a more comprehensive understanding of the impacts of wind power on sage-grouse across their range

Funded Projects

- **“Ecology of male Greater Sage-grouse in relation to wind energy development in Wyoming”**
  - University of Missouri; U.S. Forest Service, Rocky Mountain Research Station; Power Company of Wyoming; SWCA Environmental Consultants; Wyoming Game and Fish Department
- **“A study of the impacts of a wind energy development on Greater Sage-grouse populations in southeastern Wyoming”**
  - Wyoming Wildlife Consultants; University of Wyoming; WEST, Inc.
- **“Response of Greater Sage-grouse to wind power development”**
  - Idaho Department of Fish and Game (IDFG)
  - At end of 2012, project led by IDFG will go on hiatus as the proposed wind development is on hold

Funding

- SGC awarded $715,537 in funding in 2011
- SGC awarded $533,500 in funding in 2012
- Funds Distributed Through:
  - National Renewable Energy Laboratory
  - Western Association of Fish & Wildlife Agencies
  - National Fish and Wildlife Foundation
- Current Sources of Funding to Collaborative:
  - Bureau of Land Management
  - U.S. Department of Energy/National Renewable Energy Laboratory
  - U.S. Fish & Wildlife Service Landscape Conservation Cooperatives (Plains and Prairie Potholes LCC & Great Northern LCC)