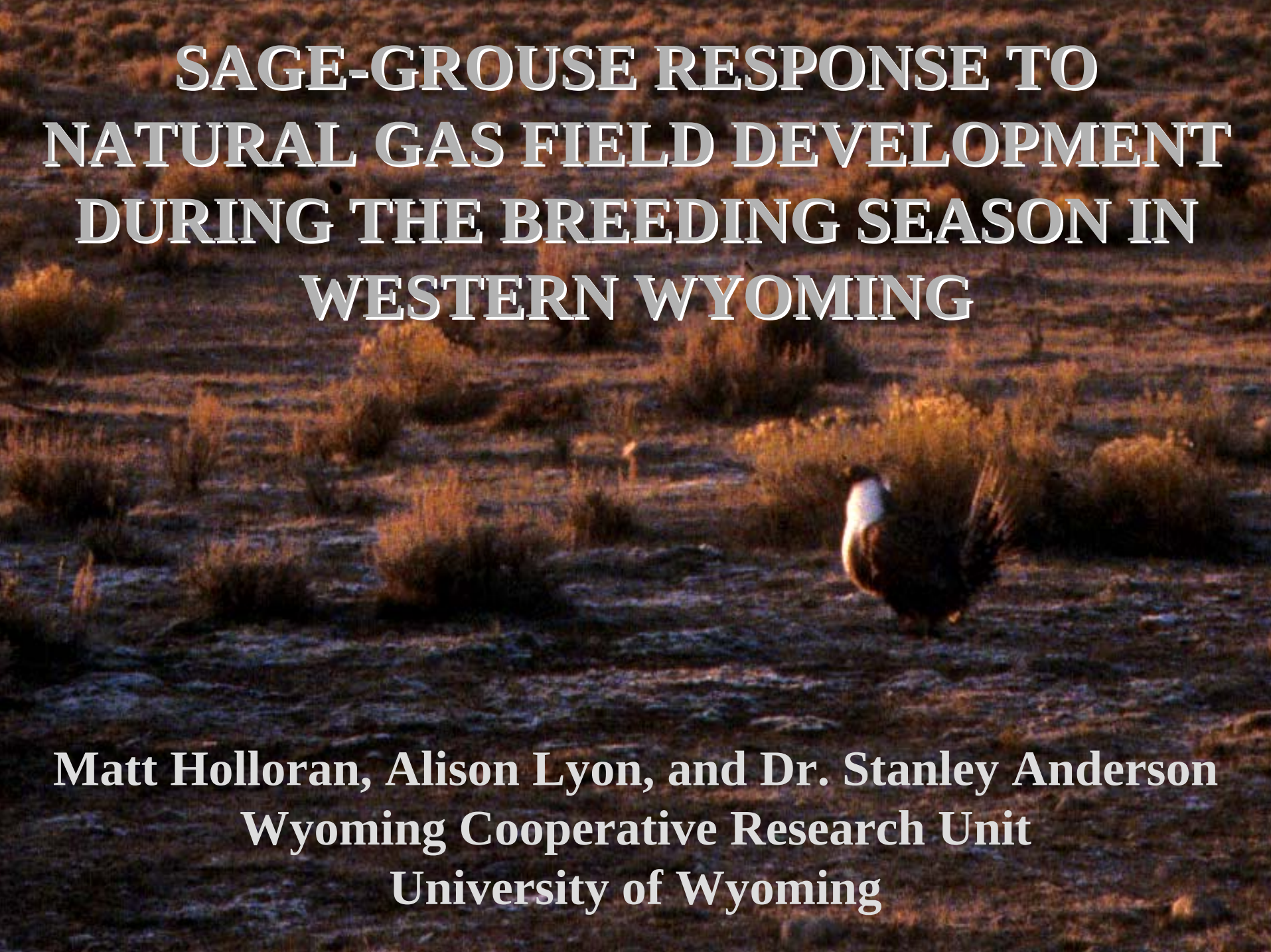
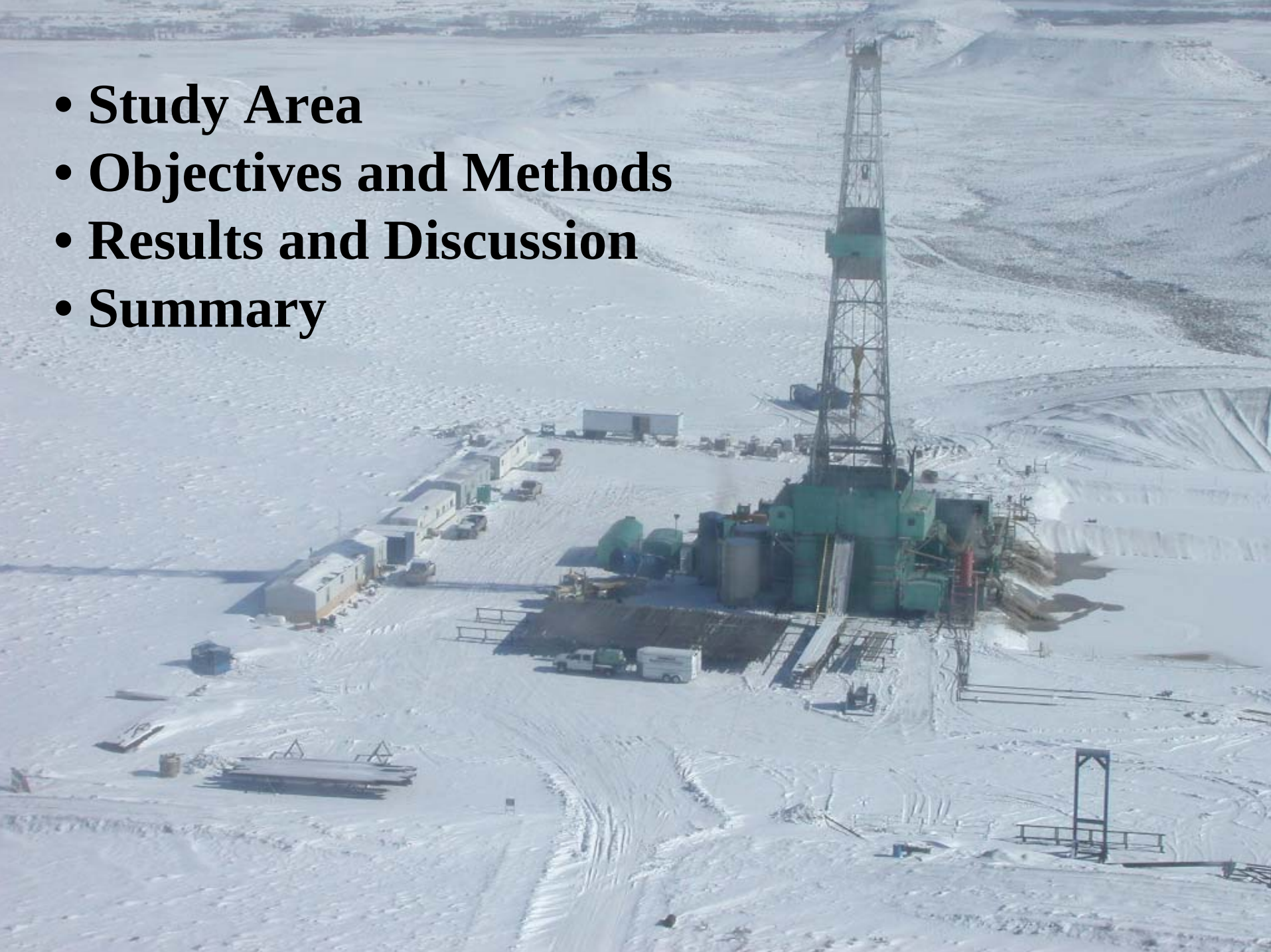
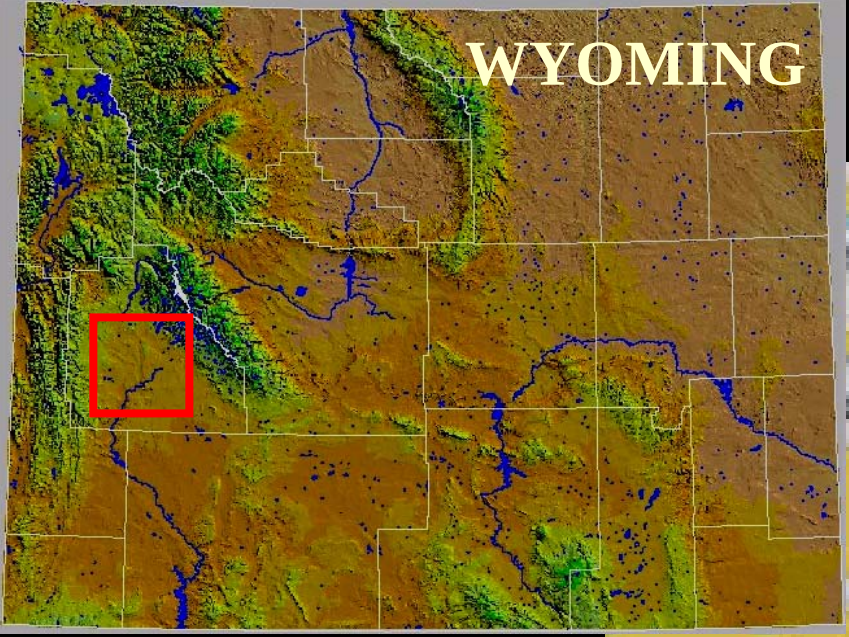
SAGE-GROUSE RESPONSE TO NATURAL GAS FIELD DEVELOPMENT DURING THE BREEDING SEASON IN WESTERN WYOMING



Matt Holloran, Alison Lyon, and Dr. Stanley Anderson
Wyoming Cooperative Research Unit
University of Wyoming



- **Study Area**
- **Objectives and Methods**
- **Results and Discussion**
- **Summary**



aniel

Pinedale

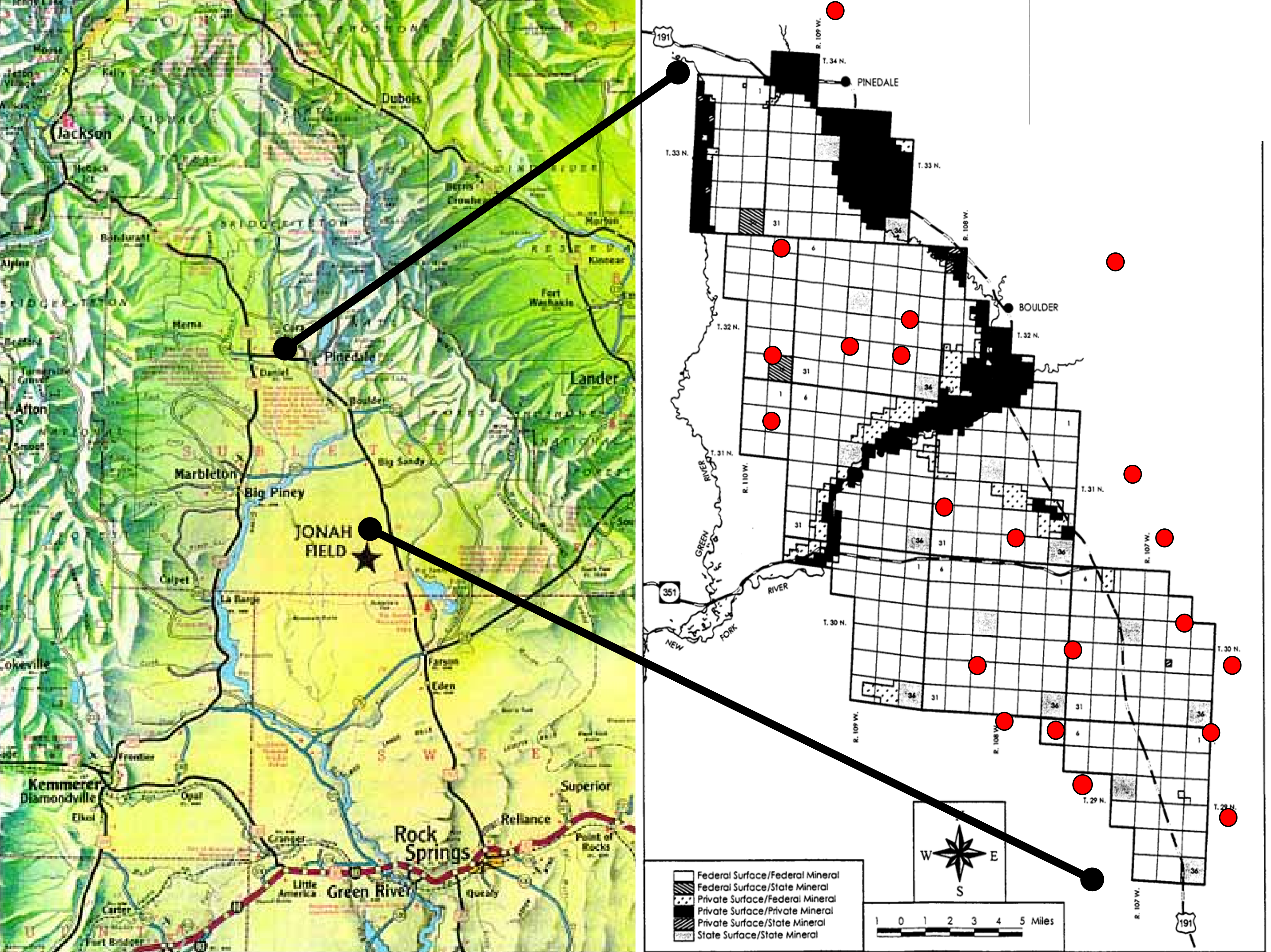
Boulder

Pinedale
Anticline

Marbleton

Big Piney

Jonah II



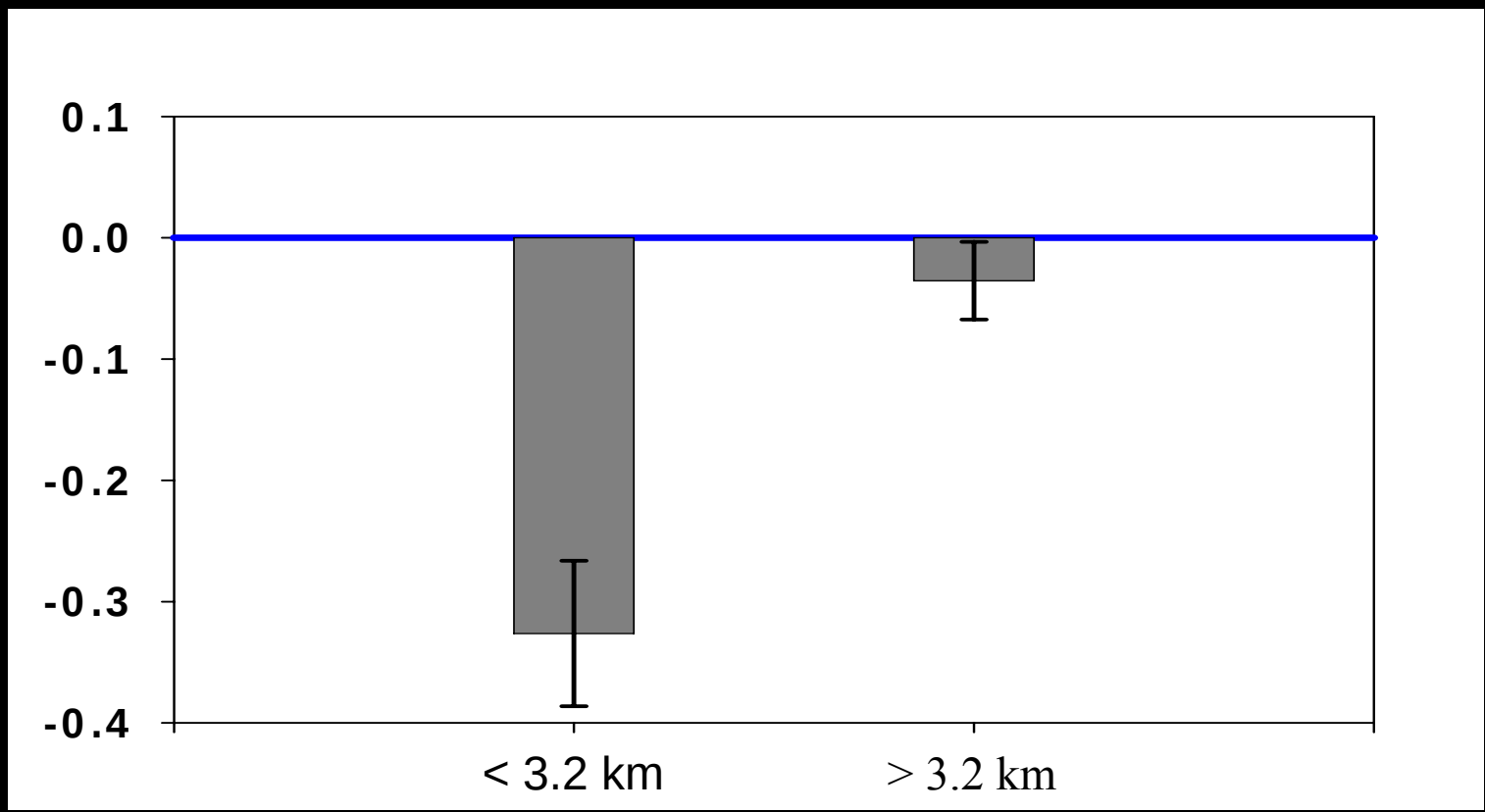
Jackson
Dubois
Pinedale
Lander
Fort Washakie
Kinnear
Marbleton
Big Piney
Big Sandy
Boulder
Daniel
Cora
Merna
Afton
Alpine
Bondurant
JONAH FIELD
La Barge
Calpet
Farson
Eden
Kemmerer
Diamondville
Frontier
Opal
Granger
Little America
Green River
Rock Springs
Reliance
Superior
Point of Rocks
Carter
Fort Bridger
PINEDALE
BOULDER
T. 34 N.
T. 33 N.
T. 32 N.
T. 31 N.
T. 30 N.
T. 29 N.
R. 110 W.
R. 109 W.
R. 108 W.
R. 107 W.
191
351
GREEN RIVER
NEW FORK RIVER
N
W
E
S
Federal Surface/Federal Mineral
Federal Surface/State Mineral
Private Surface/Federal Mineral
Private Surface/Private Mineral
Private Surface/State Mineral
State Surface/State Mineral
1 0 1 2 3 4 5 Miles

• Distance from sage-grouse lek where impacts of spring drilling activity to male breeding behavior are minimized?

• Presence of road near a lek alter male sage-grouse breeding behavior?

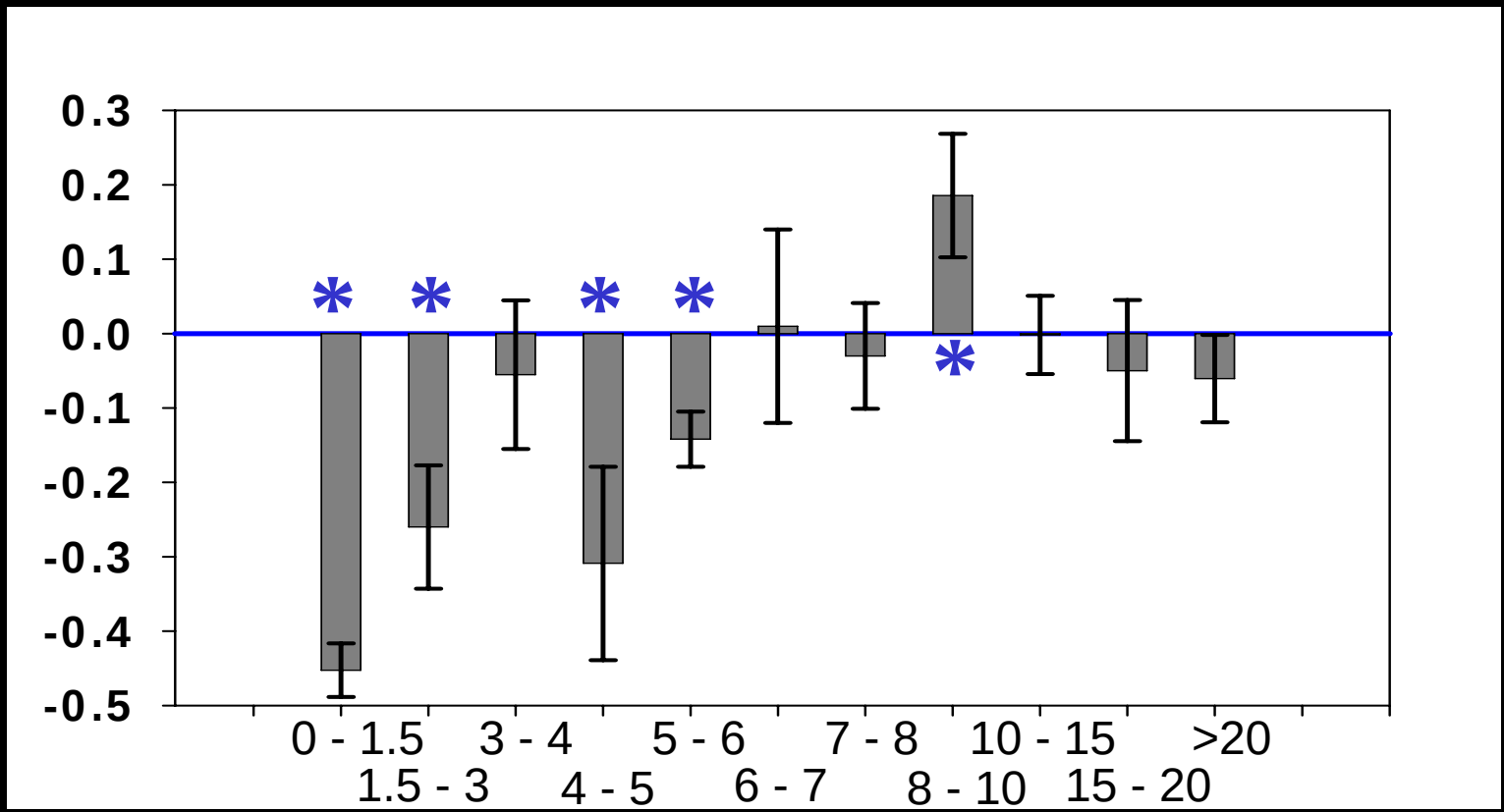
AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES Vs. LEK - to - DRILLING RIG DISTANCE

Change Differed at $p < \mathbf{0.05}$ (*T*-test)



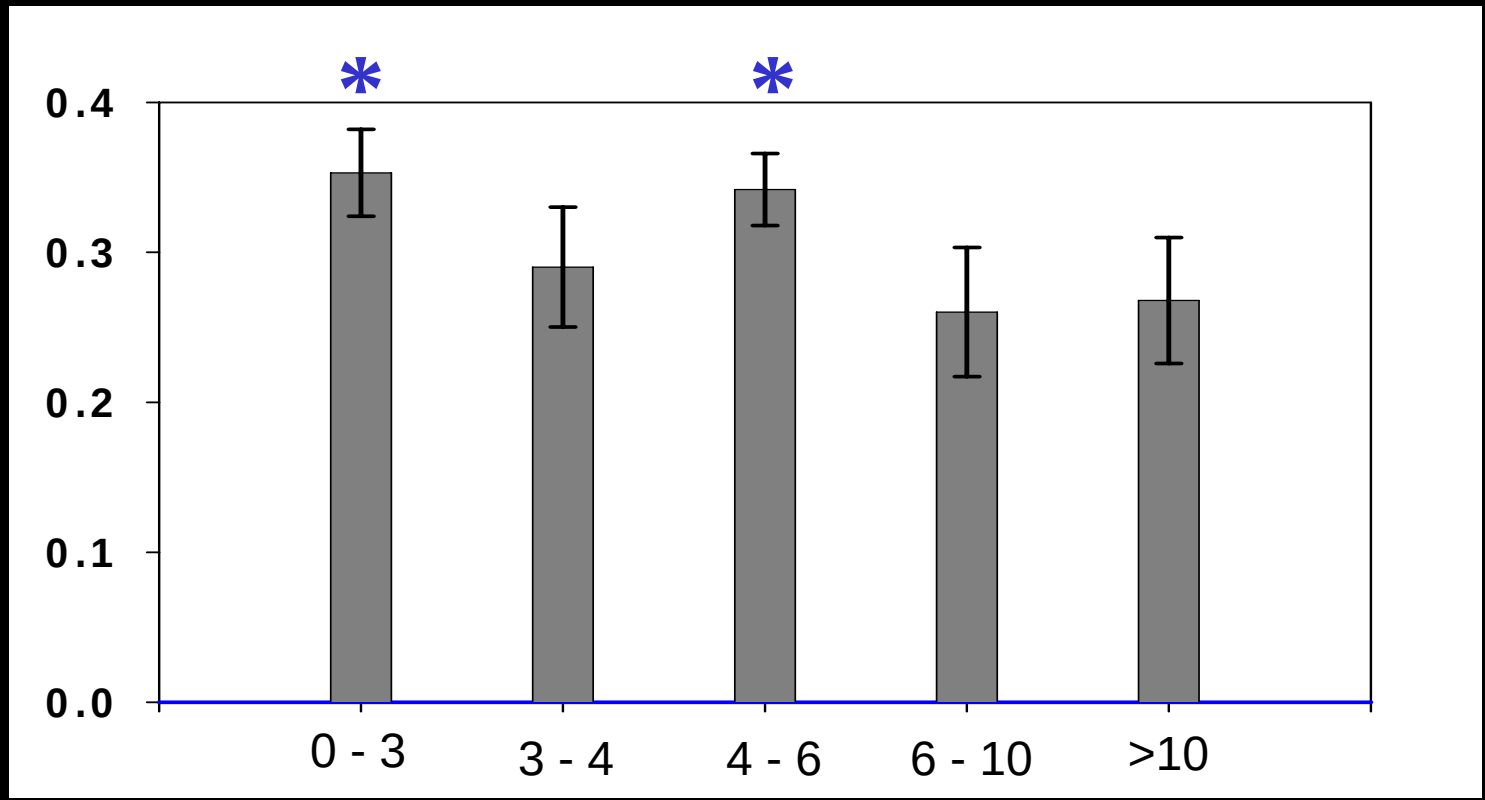
AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES Vs. LEK - to - DRILLING RIG DISTANCE (By Buffer)

* = Differed from Control at p < **0.10** (*T*-test)



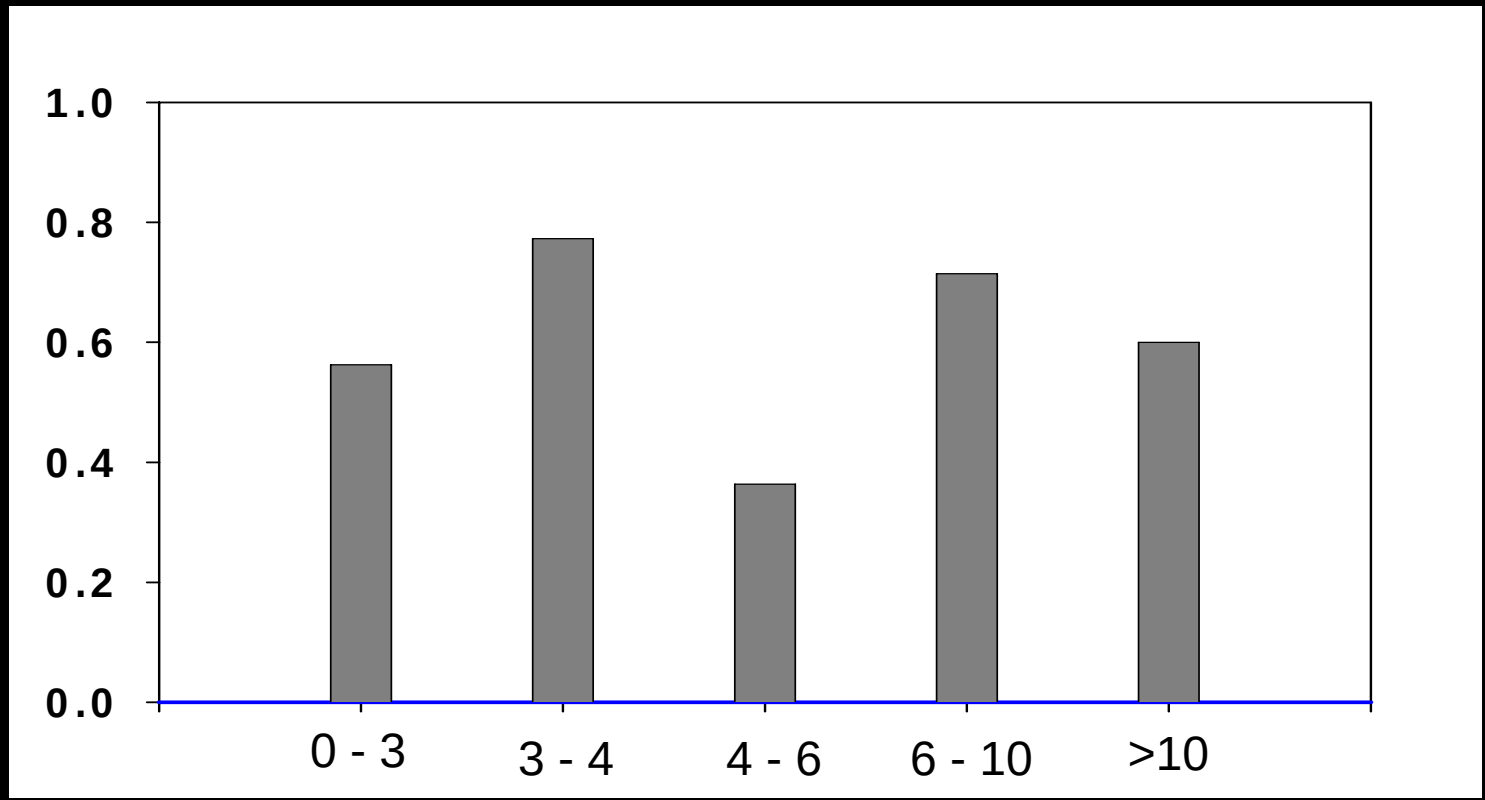
AVERAGE ANNUAL STANDARD DEVIATION in NUMBER of STRUTTING MALES
Vs.
LEK - to - DRILLING RIG DISTANCE (By Buffer)

* = Differed from Control at p < **0.15** (*T*-test)



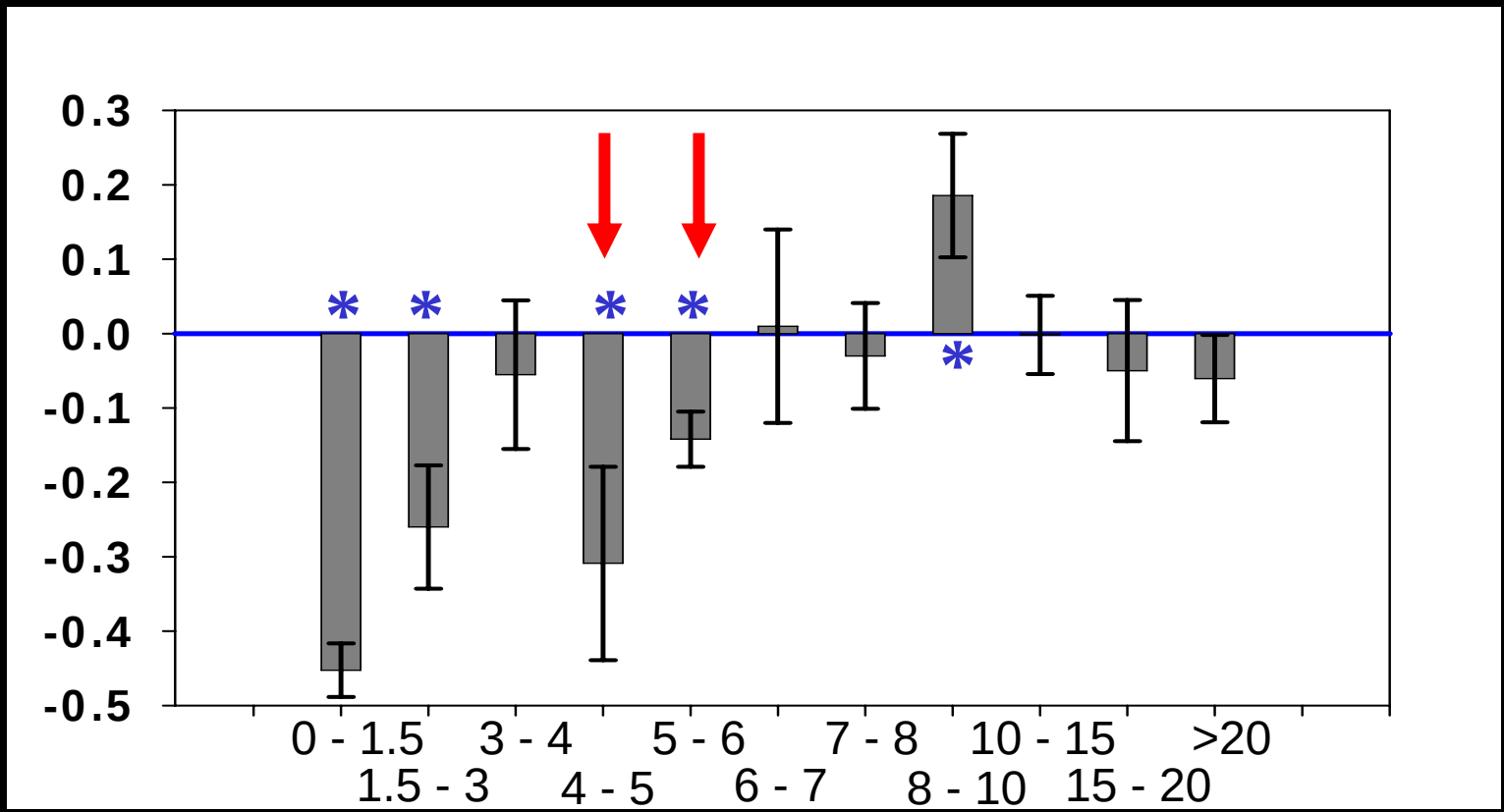
RADIO-MARKED MALE BREEDING SEASON SURVIVAL
Vs.
LEK - to - DRILLING RIG DISTANCE (By Buffer)

No Differences from Control (χ^2)



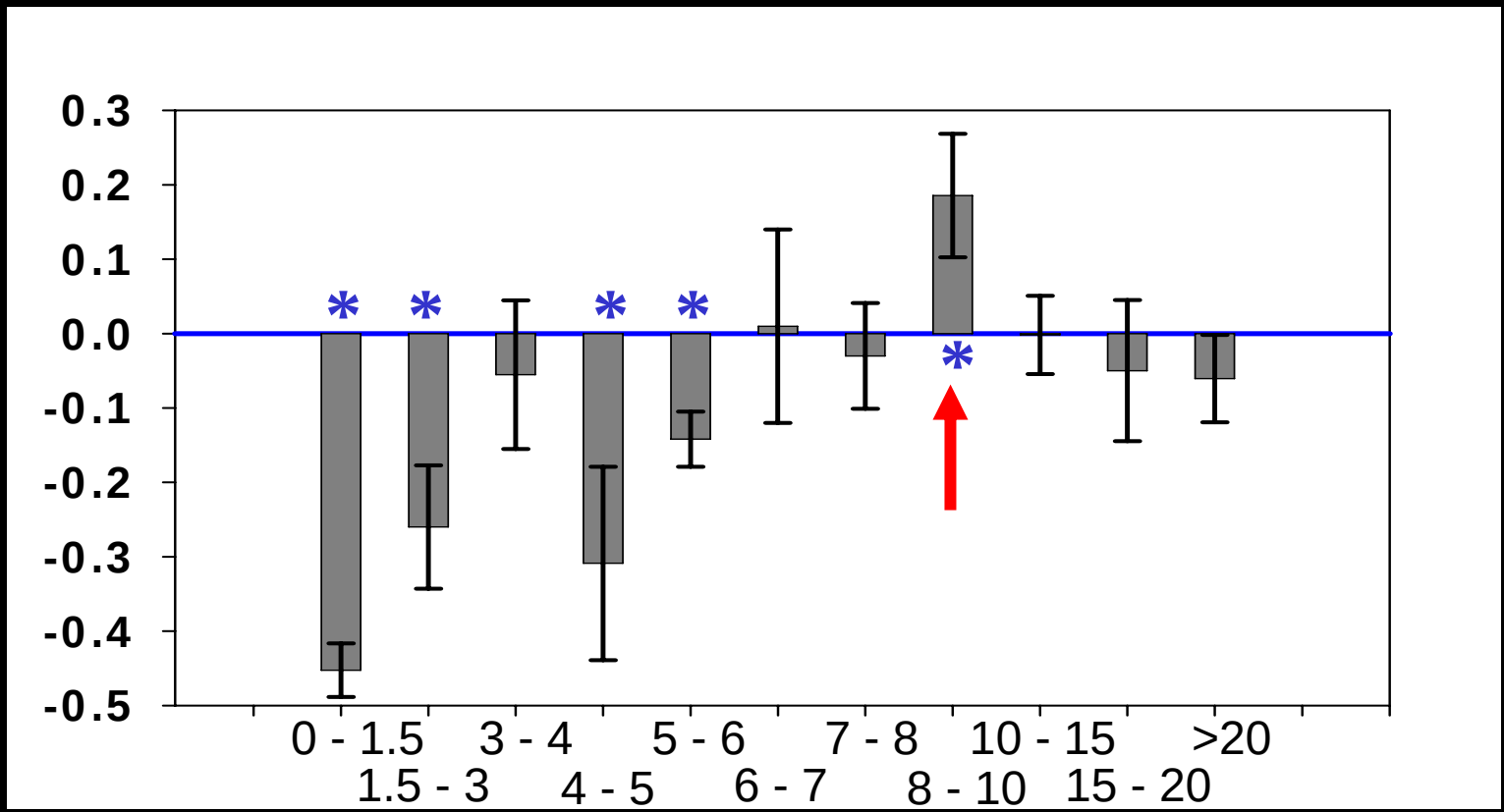
AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES Vs. LEK - to - DRILLING RIG DISTANCE (By Buffer)

* = Differed from Control at p < **0.10** (*T*-test)



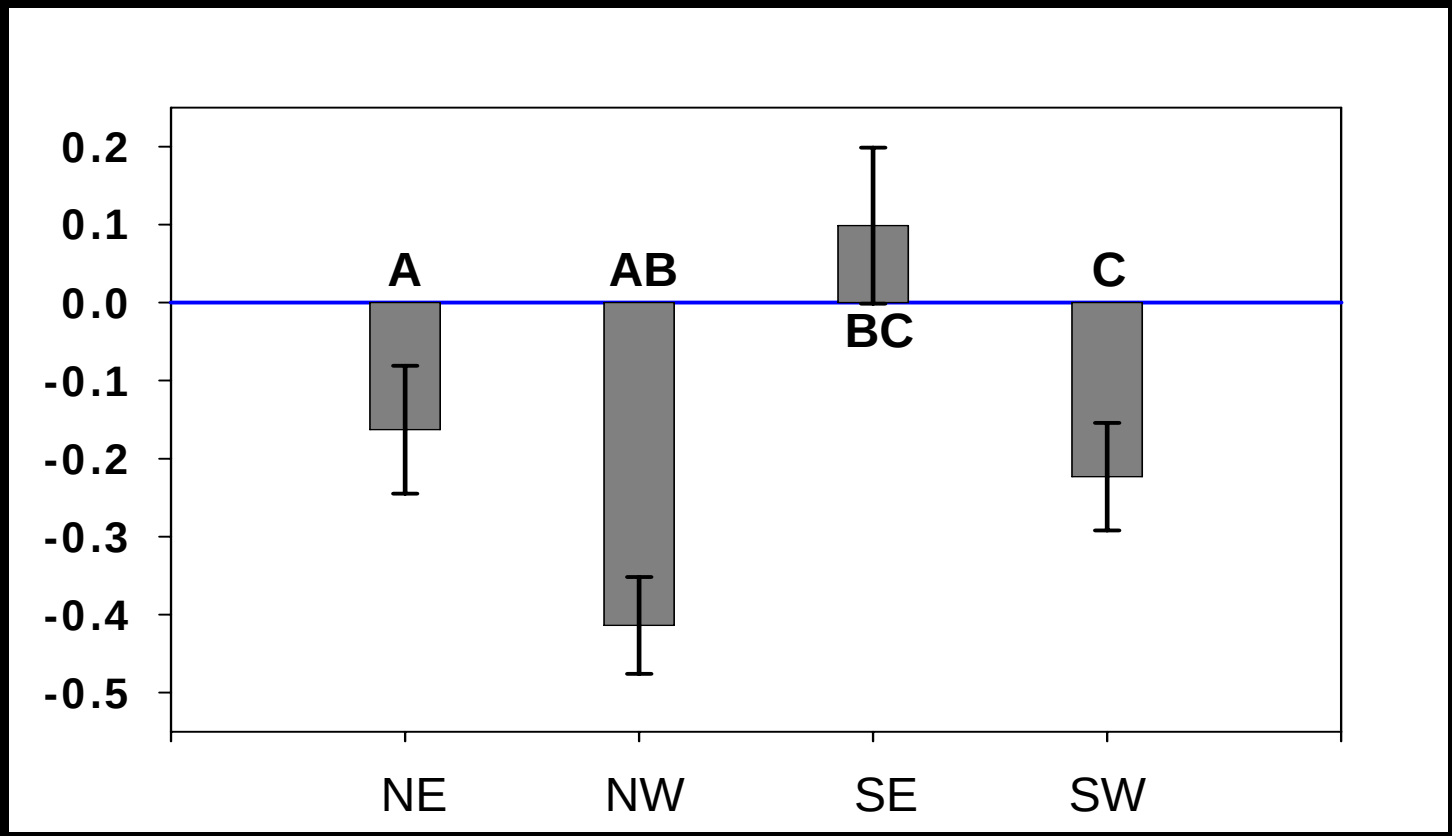
AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES Vs. LEK - to - DRILLING RIG DISTANCE (By Buffer)

* = Differed from Control at p < **0.10** (*T*-test)



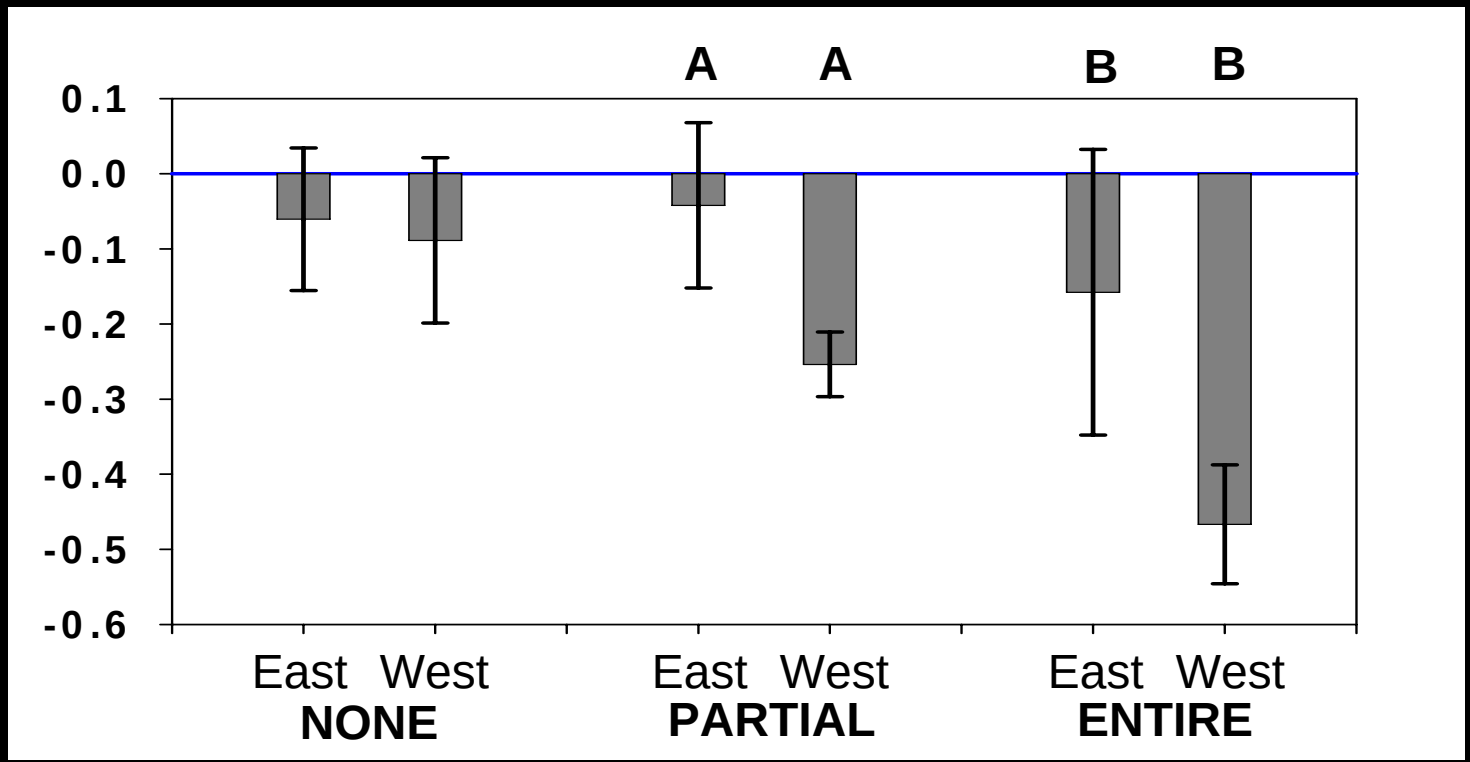
AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES Vs. DIRECTION to DRILLING RIG

Same Letters Differed at p < **0.05** (*T*-test)



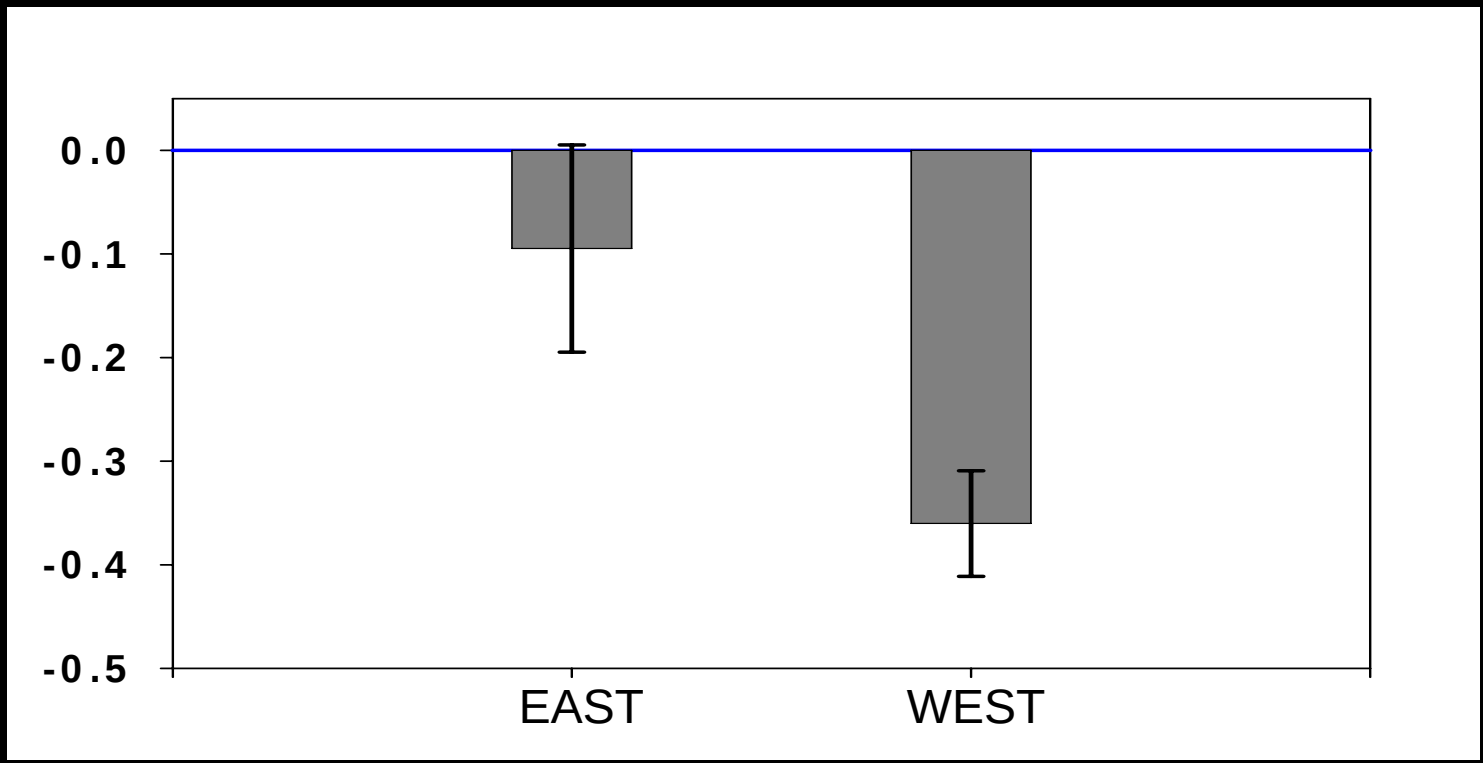
AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES Vs. DIRECTION and LINE - of - SIGHT

Same Letters Differed at p < **0.20** (*T*-test)



AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES Vs. DIRECTION to DRILLING RIG (PARTIAL and ENTIRE Line - of - Sight Combined)

Change Differed at $p < \mathbf{0.05}$ (*T*-test)

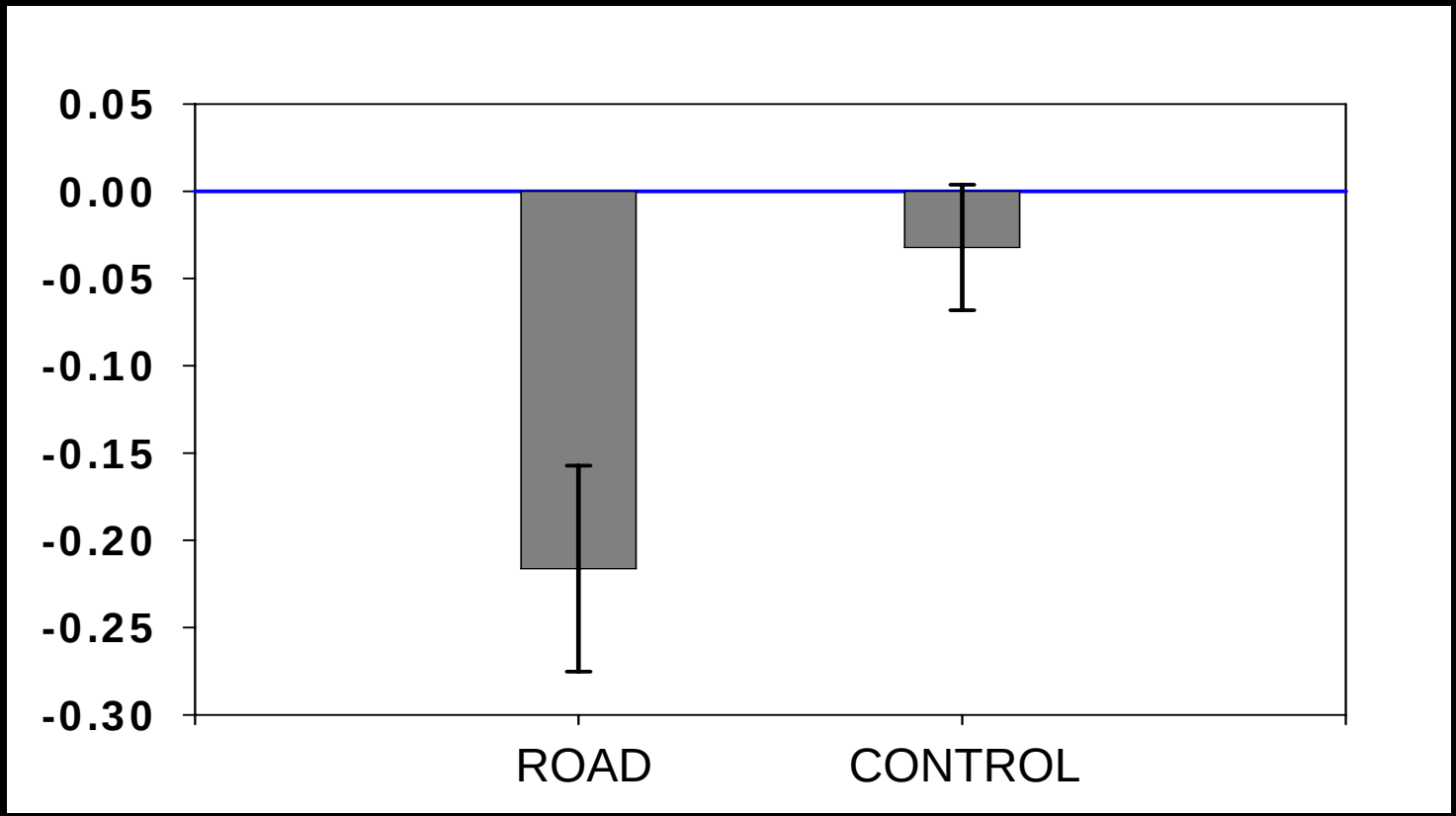


Direction to Closest Drilling Rig

AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES

ROAD (within 300m) Vs. CONTROL

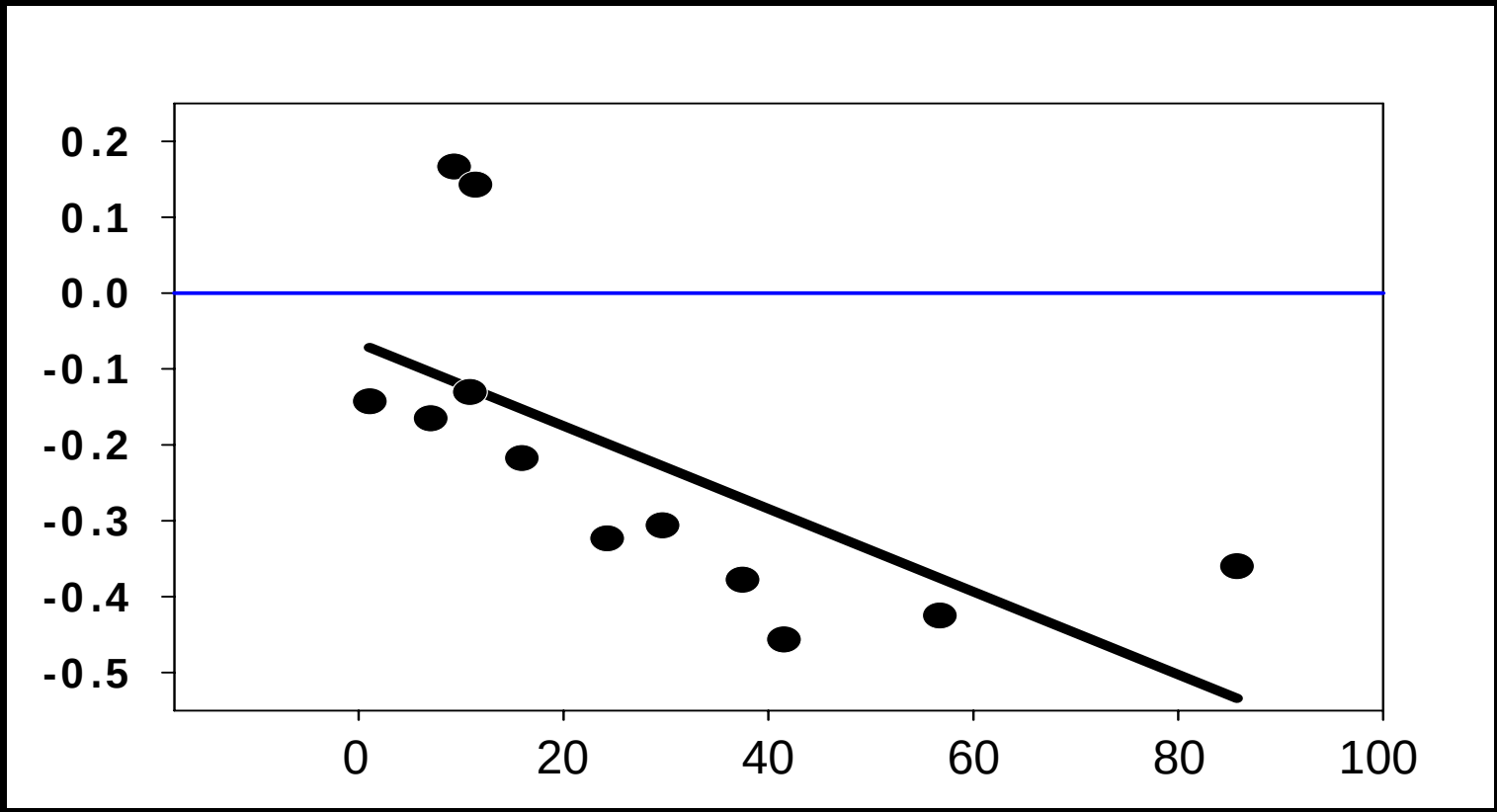
Change Differed at $p < \mathbf{0.05}$ (*T*-test)



Road vs. No Road / No Drilling

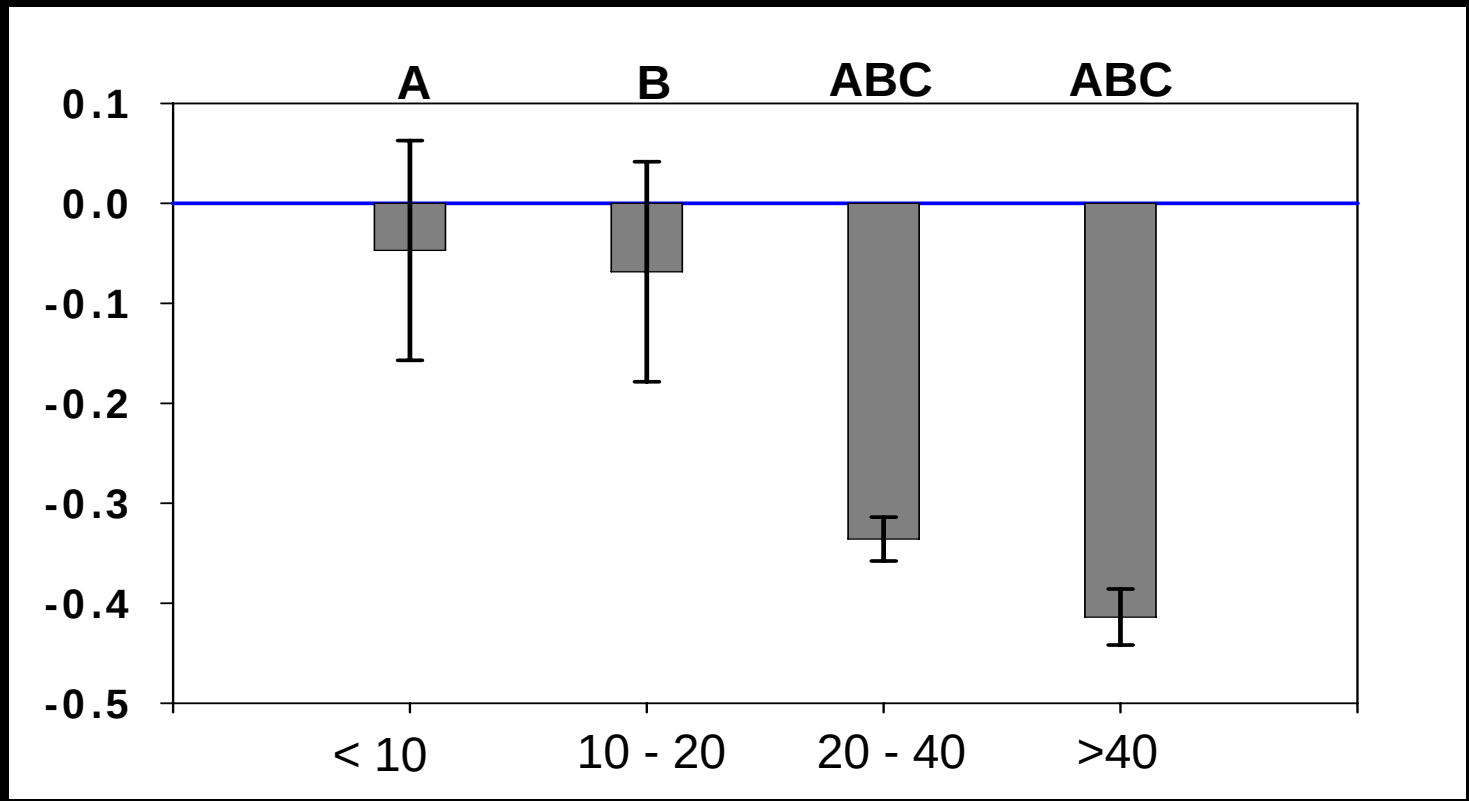
AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES Vs. TOTAL NUMBER of VEHICLES per DAY

Regression Line $R^2 = 43.4\%$



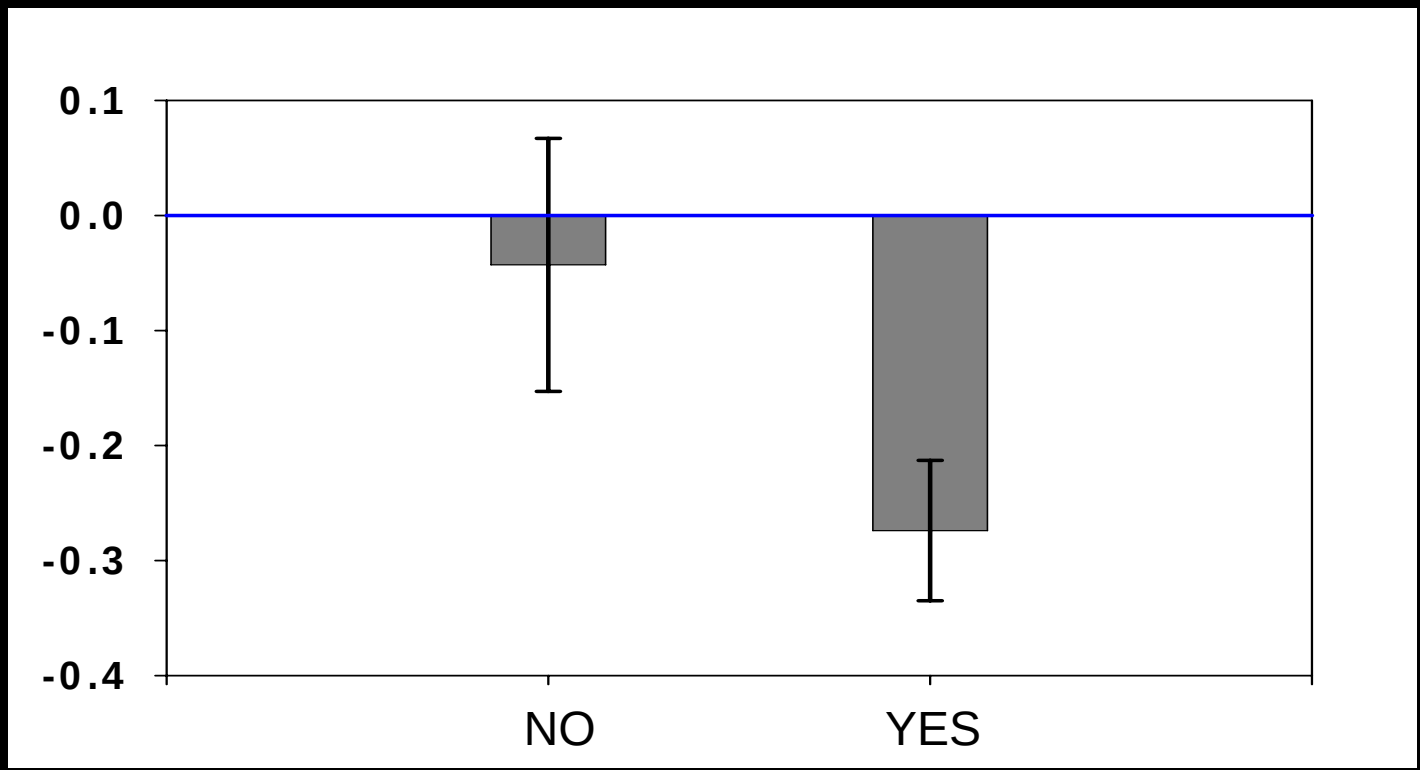
AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES Vs. TOTAL NUMBER of VEHICLES per DAY

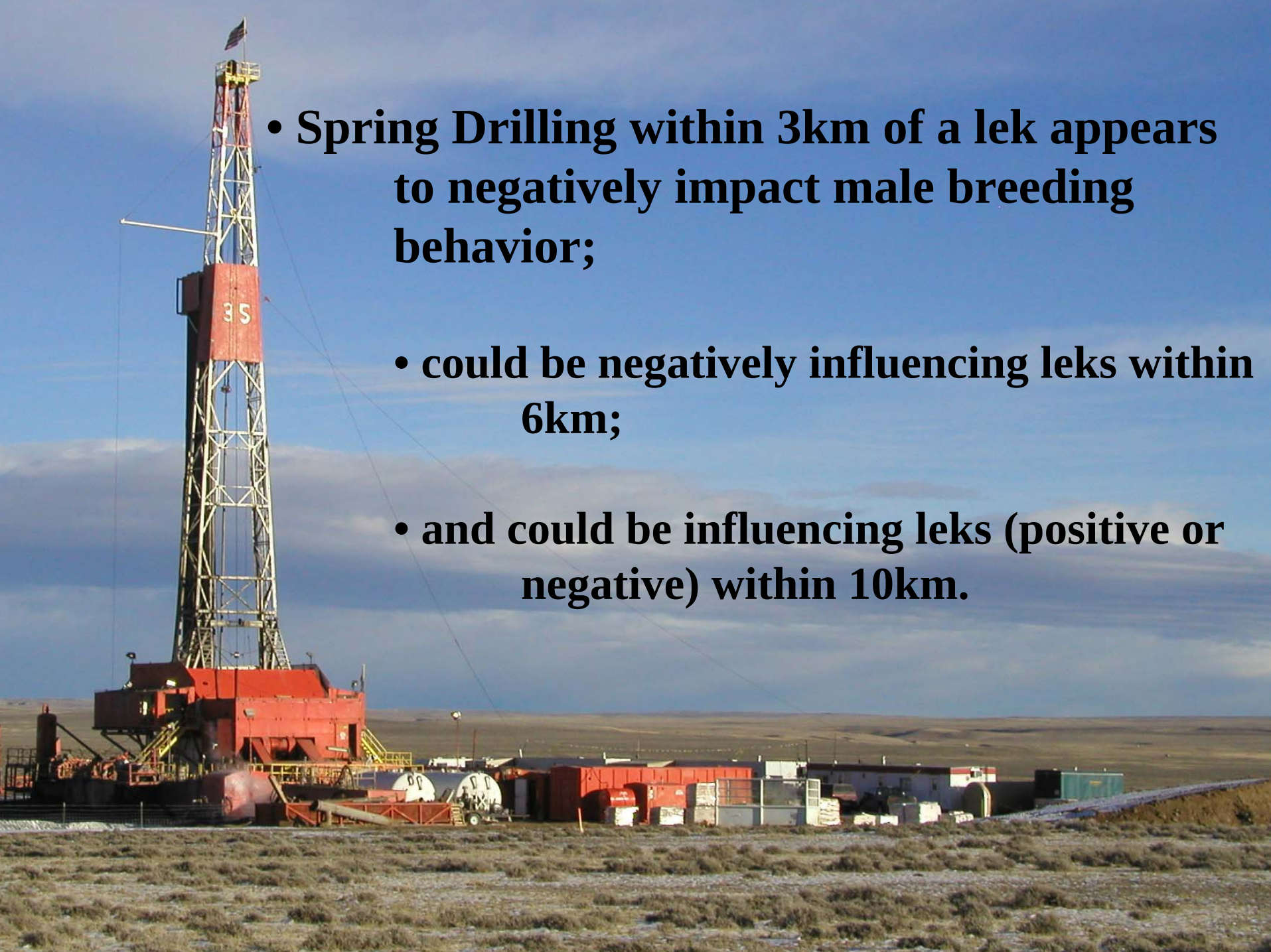
Same Letters Differed at p < **0.15** (*T*-test)



AVERAGE ANNUAL CHANGE in MAXIMUM NUMBER of STRUTTING MALES Vs. VEHICLES DURING STRUTTING PERIOD

Change Differed at p < **0.20** (*T*-test)

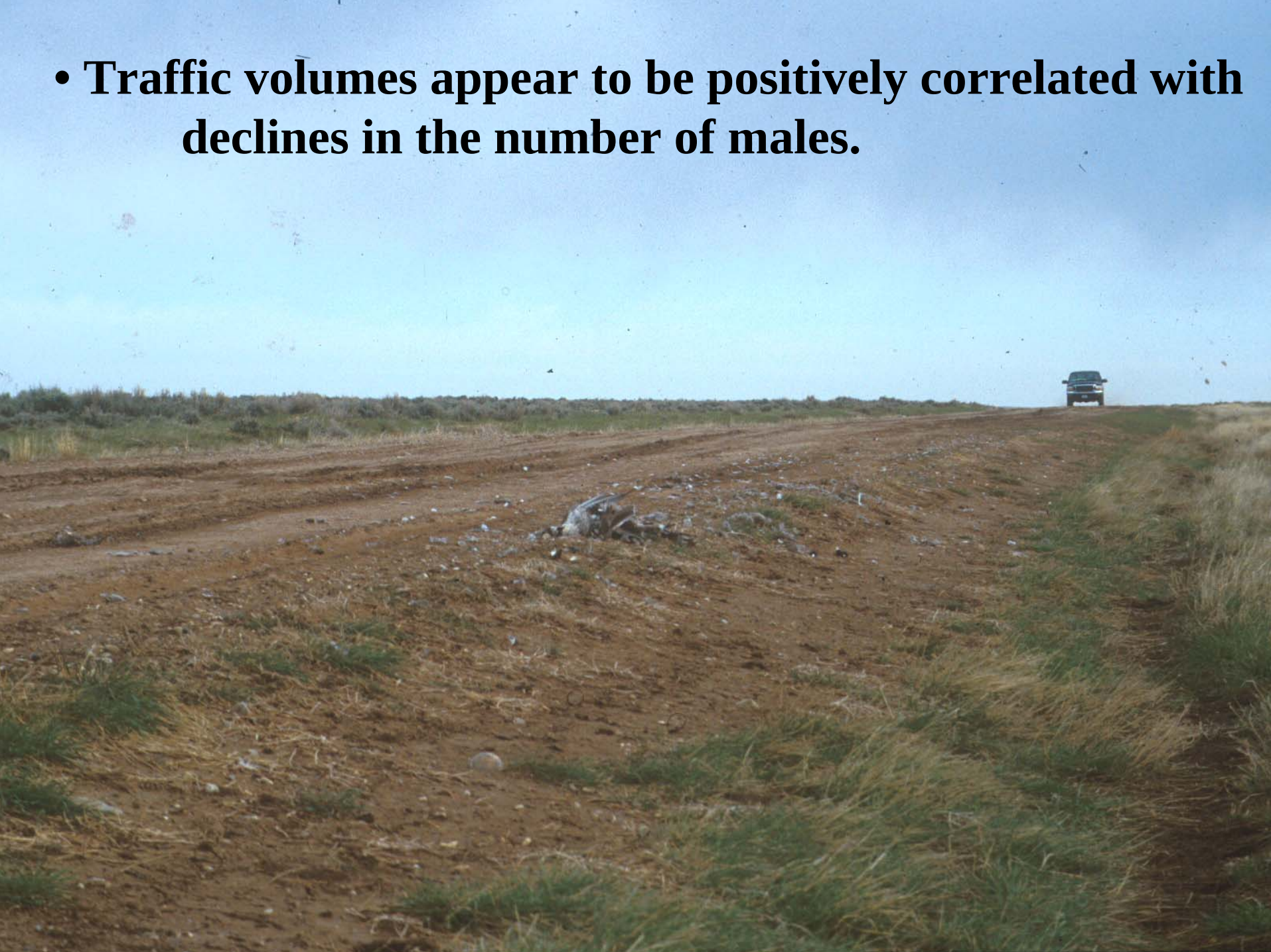




- **Spring Drilling within 3km of a lek appears to negatively impact male breeding behavior;**
  - **could be negatively influencing leks within 6km;**
  - **and could be influencing leks (positive or negative) within 10km.**

- **Drilling rigs located up-wind with at least partial line-of-sight could be negatively influencing males relative to rigs located down-wind.**

- **Traffic volumes appear to be positively correlated with declines in the number of males.**



FUNDING:

- Bureau of Land Management;
- Ultra Petroleum;
- Yellowstone - to - Yukon Initiative;
- EnCana Oil and Gas.

TECHNICAL SUPPORT:

Pinedale BLM Field Office; Wyoming Game & Fish Department; Wyoming Wildlife Consultants.

FIELD SUPPORT:

Dave Edmunds; Becky Holloran; Barry Holtby; Rusty Kaiser; Jarren Kuipers; Theresa Schneider; Steve Slater; Mark Stotts; Chad Taber; Kristen Thompson.

LITERATURE CITED:

Andersen, D. E., O. J. Rongstad, and W. R. Mytton. 1986. The behavioral response of a red-tailed hawk to military training activity. Raptor Research 20:65-68.

Andersen, D. E., O. J. Rongstad, and W. R. Mytton. 1990. Home-range changes in raptors exposed to increased human activity levels in southeastern Colorado. Wildlife Society Bulletin 18:134-142.

Braun, C. E. 1986. Changes in sage grouse lek counts with advent of surface coal mining. Proceedings: Issues and Technology in the Management of Impacted Western Wildlife, Thorne Ecological Institute 2:227-231.

Fitzner, R. E. 1985. Responses of birds of prey to large-scale energy development in southcentral Washington. Issues and Technology in the Management of Impacted Western Wildlife National Symposium Proceedings. February 4-6, Glenwood Springs, Colorado, USA.

Gibson, R. M. 1989. Field playback of male display attracts females in lek breeding sage grouse. Behavioral Ecology and Sociobiology 24:439-443.

Gibson, R. M. and J. W. Bradbury. 1985. Sexual selection in lekking sage grouse: phenotypic correlates of male mating success. Behavioral Ecology and Sociobiology 18:177-123.

Marzluff, J. M., S. T. Knick, M. S. Vekasy, L. S. Schueck, and T. J. Zarriello. 1997. Spatial use and habitat selection of golden eagles in southwestern Idaho. Auk 114:673-687.

Schoenburg, T. J. and C. E. Braun. 1982. Potential impacts of strip mining on sage grouse movements and habitat use. Colorado Division of Wildlife. Job Completion Report. Federal Aid Project W-37-R-35.