# Alaska Department of Fish and Game Wildlife Restoration Grant

**GRANT NUMBER:** W-33

**SEGMENT NUMBER:** 12

**PROJECT NUMBER:** 4.40

**PROJECT TITLE:** Grizzly bear use of the North Slope oil fields and surrounding region

PROJECT DURATION: 1 July 2008–30 June 2015

**REPORT DUE DATE:** 1 September 2014

**PARTNER:** National Fish and Wildlife Foundation

PRINCIPAL INVESTIGATOR: Richard T. Shideler, ADF&G

**COOPERATORS:** None

WORK LOCATION: Game Management Units 26A and 26B, oil field region

# I. SUMMARY OF WORK COMPLETED THIS SEGMENT ON JOBS IDENTIFIED IN ANNUAL WORK PLAN

OBJECTIVE 1: Develop a grizzly bear den habitat selection model that can be applied at the landscape level to remote sensing imagery to predict high, medium, and low probability denning habitat.

JOB/ACTIVITY 1A: Develop a grizzly bear den habitat selection model.

Problems with the scale of available Digital Elevation Models (DEM) continue to thwart our objective to develop a habitat selection model and map. We obtained a DTM derived from the National Elevation Dataset (NED) 1/3 arc-second imagery that had been upgraded by incorporating Interferometric Synthetic Aperture Radar (IfSAR) imagery of the North Slope. Horizontal resolution of this imagery was ca. 10 m; however, vertical resolution was  $\pm 7$  m. This limited its usefulness because this magnitude of elevation error on the Coastal Plain of the North Slope could make the difference between well-drained and wetland habitat (i.e., suitable versus unsuitable denning habitat). We compared slope and aspect measured at 120 dens encompassed by the coverage with slope and aspect derived from the DEM. Resolution scale errors were apparent. In some cases, aspect differed by 180° between the den and the map. Clearly, mapping at a finer scale will be necessary to accurately delineate suitable denning habitat. We are awaiting public release of Alaska Statewide Mapping Initiative DTM's for the study area which were acquired from orthoimagery at 2.5 m resolution, but they have yet to become available. We recently investigated another technique to collect digital orthoimagery at a meter to sub-meter scale. The technique was developed by Dr. Matthew Nolan of the University of Alaska Fairbanks and involves collection of digital imagery acquired by 2 digital cameras mounted in a small fixed-wing aircraft flown on a survey grid at relatively low altitude. We contracted with Dr. Nolan to acquire the imagery and process it for a Digital Elevation Model. He acquired the imagery on a selected section of the study area encompassing the lower Kachemach and Miluveach rivers where there are 9 dens on which we have collected data. There are no results to report because he is completing the conversion to the DEM. Funding for the contract was through federal aid.

We are also preparing a cooperative agreement with Repsol Exploration & Production, USA, for access to a DEM for the same small section as above. Their DEM was generated from LiDAR data acquired for areas in which Repsol has an interest and that overlap our study area. This will allow us to use the imagery to test another potential method to investigate the availability of denning habitat.

Although we have no DEM at a scale for us to generate a habitat availability map, we have analyzed data on den use. We focused on slope and aspect because our experience suggested that these influence location of snowdrifts which grizzly bears require for insulation over their dens. Although analysis for slope is fairly straightforward, analysis of aspect required use of circular statistics. We analyzed for differences in sex, females with offspring, age, den year, and feeding type (food conditioned vs. natural food). Mean aspect was 212° and 80% of den aspects were between 120° and 288°. There were no differences among any of the parameters. We analyzed slope for the same parameters. Mean slope varied from 22° to 25° for all sex and offspring classes, but there were no statistically significant differences. Eighty percent of dens fell on slopes between 13° and 36°. There does appear to be a trend toward flatter slopes over time. We will investigate potential reasons for this. We will also investigate the effects of feeding type on distance of dens from permanent oil field activities. We have noticed that only food-conditioned bears have denned within the active oil fields, suggesting that their habituation to human activity may allow them to exploit denning habitat that bears feeding on natural food only may avoid for denning. Consequently, den site selection for natural food bears may differ slightly from that of food-conditioned bears.

JOB/ACTIVITY 1B: Collect data on habitat characteristics of radiomarked bears, and field verify areas of high, medium and low probability denning habitat based on the predictive model generated in job 1a.

Due to reduced funding from the National Fish and Wildlife Foundation (NFWF) and poor weather we restricted our fall 2013 den location radiotracking flights to the immediate oil field area. We located 11 dens of radiomarked bears by interpretation of their radio signals. All or a portion of these dens will be inspected in FY15. Interestingly, 2 of those dens were located within 800 m of proposed industrial winter activities that could have potentially disturbed the denning bears and been in violation of permit stipulations on those projects. Therefore, we worked with industry to accommodate their schedule and work needs without subjecting the bears to undue disturbance. In FY14 we inspected 3 dens of radiomarked bears from den year 2012–2013 (FY13). These dens had been included as part of the den detection project (see job 1c) because they were within feasible distance to run the scent dog without contracting with over-snow vehicles. Data on habitat characteristics of these dens will be added to update the den habitat model in job 1a.

No progress was made on field verification of the den habitat selection model pending release of the higher resolution DEM (see job 1a).

*JOB/ACTIVITY 1C*: Evaluate the efficacy of den detection methods (e.g., hand-held and airborne Forward Looking infrared "FLIR" imagers, trained scent dogs).

Operational funding for this job was through the NFWF which ended summer 2013. In FY14 we inspected 3 dens originally detected by Karelian Bear Dogs in March 2013. All 3 dens were confirmed positives, and the alerts were within 7 m of the den entrance. Results from this job were included in the final report to NFWF.

# *JOB/ACTIVITY 1D*: Construct and instrument an artificial den to test the accuracy of FLIR under varying snow conditions.

Operational funding for this job had been through a grant from NFWF, and this funding was reduced for FY14. Therefore, we did not perform any work under this job. Results from this job were included in the final report to NFWF.

OBJECTIVE 2: <u>Investigate the response of bears feeding on naturally-available foods to</u> the removal of food-conditioned bears.

## JOB/ACTIVITY 2A: Capture bears and replace radio collars.

In summer 2013 we recaptured 11 radiomarked bears and replaced their VHF radio collars. We flew 3 radiotracking flights and relocated up to 35 bears on each flight. A previously identified and long-time food-conditioned female continued to periodically use anthropogenic food available in Deadhorse and at the North Slope Borough landfill. Her daughter, who had been feeding on exclusively natural foods in the Kuparuk-Alpine oilfield area for the previous 7 years, moved into the Prudhoe Bay area and fed in the landfill during summer 2013.

## JOB/ACTIVITY 2B: Analyze grizzly bear DNA specimens for individual relationships.

Operational funding for this job was from NFWF, and that funding ended in FY13. We did not continue to collect hair from barbed wire traps located on oil field power poles. Results from previous years were reported in the NFWF final report. In general, degradation of samples resulted in no new bears being identified. Wildlife Genetics International suggested that the DNA was denatured because ultraviolet light from continuous daylight on the North Slope in combination with the long delay between sample collections (e.g., 2–3 weeks) allowed UV to degrade the DNA. In addition, some of the samples were contaminated by creosote on the power poles.

Because we already had genetic data from the bears we recaptured in summer 2013, we did not collect any further samples from them. However, in our ongoing attempt to identify the fate of noncollared offspring of oil field bears, we continued to collect genetic samples from bears killed by hunters adjacent to the oil fields. These samples will be submitted for analysis in winter 2014–2015.

JOB/ACTIVITY 2C: Analyze grizzly bear tissue for stable isotopes.

We collected hair and blood samples from the bears we captured and from bears that were killed by hunters. Those samples were processed by the University of Alaska Fairbanks-Stable Isotope Facility. Although several of the previously identified food-conditioned bears continued to have isotope signatures consistent with an anthropogenic food diet, none of the hunter-killed bears or other radiocollared bears had an isotope signal derived from anthropogenic food.

OBJECTIVE 3: Prepare annual and final progress reports, interim and final technical reports, and give presentations at scientific forums.

JOB/ACTIVITY 3: Data analysis and reporting.

Data analysis was ongoing.

# II. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

None.

## **III. PUBLICATIONS**

#### A copy of the final report (pdf) to NFWF was submitted along with this annual report.

- BENTZEN, T. W., R. T. SHIDELER, AND T. M. O'HARA. 2014. Use of stable isotope analysis to identify food-conditioned grizzly bears on Alaska's North Slope. Ursus 25(1):14–23.
- A manuscript entitled "Effects of food-conditioning on grizzly bears in the North Slope oil fields, Alaska" was previously submitted to the journal *Ursus* and returned with suggested revisions. The original submittal included data through 2004 only. Therefore, the analysis and manuscript is being updated with additional data collected through 2012 and will be resubmitted in FY15 to *Ursus*.
- I coauthored a poster for the American Geophysical Union annual meeting: JONES, B. M., G. M. DURNER, J. STOKE, R. T. SHIDELER, C. J. PERHAM, AND G. LISTON. 2014. Remote identification of potential polar bear maternal denning habitat in northern Alaska using airborne LiDAR. American Geophysical Union Annual Meeting, 9–13 September 2013, San Francisco, California.

## IV. RECOMMENDATIONS FOR THIS PROJECT

Operational funding for this project had been provided by a grant from NFWF that expired at the end of December 2013. Funding for orthographic mapping and analysis was by federal aid. The following recommendations apply to future research and monitoring:

- 1. Maintain a sample of ca. 30 radiomarked bears within the oil field region and monitor demographic characteristics, oil field use, and den locations.
- 2. Conduct radiotracking surveys of dens within the oil-field region and provide locations to industry to meet their permitting requirements to avoid occupied dens. Upon completion of a den habitat suitability map, ground-truth locations to evaluate the precision of the map.
- 3. Once an accurate den habitat map becomes available, identify areas that may be affected by industry winter activities and apply a feasible detection method to identify active dens.
- 4. Continue to collect and analyze genetic data from newly captured bears, from hair collected at snares around the oil field, and from hunter harvest or department bear control projects.
- 5. Instrument the artificial den and survey with the handheld IR imager to evaluate the effects of weather (e.g., wind velocity, temperature differential between surface and den) and snow conditions (e.g., depth, density, presence/absence of ice layers) that may affect the IR signal. Investigate the possibility of converting this to a graduate level project at UAF.
- 6. Continue to conduct handheld IR imager surveys of dens within reasonable access of the oil field permanent or ice road system until there is sufficient data to evaluate feasibility of this method under a variety of weather (e.g., surface wind velocity) and snow (e.g., depth, density, presence/absence of ice layers) conditions using the artificial den(s) as subjects. Investigate the possibility of converting this project into a graduate level project at UAF.
- 7. Continue to evaluate the feasibility of using dogs to detect denning bears, especially focusing on the weather and snow conditions (e.g., snow depth, snow density, presence of ice layers) when dogs fail to locate the den or require an unacceptably long time (e.g., >0.5 hr) to detect the den.
- 8. Investigate the efficacy of employing new technologies such as FLIR-equipped Unmanned Aerial Vehicles ("drones") perhaps in concert with a UAF graduate project.
- 9. Expand the geographical scope to areas such as northeastern NPR-A where there has been reduced effort, and where industry is actively exploring and developing.

# **PREPARED BY:** Richard T. Shideler, ADF&G **DATE:** 22 August 2014