# IGBST Response to IBA Comments



Anchorage

15 June 2016

5:00-7:00 PM

USGS science for a changing world

Montana Fish, Wildlife & Parks

IDAHO FISH & GAME

Jake Davis

# IGBST Expectations

- Clarify and discuss issues of agreement and disagreement with IBA review
- Obtain feedback from committee
- Provide feedback to IBA on review process

# IGBST Response

**1. Science (Frank)**

- The status of GYE grizzly bears in 3 slides
- Specific topics
  - Food and density dependence
  - Chao2 estimator

**2. Policy (Chris)**

# The Forest, or the Trees?

*"….. Recovery should be seen as the provision of biological security [and] delisting should be understood as requiring the additional provision of regulatory security outside the ESA, such that the special regulatory protections of the ESA are no longer necessary."*

--H. Doremus, cited in Martha Williams, *Lessons from the Wolf Wars*, p. 149

# The Big Picture

**Demographics**

- Occupied range increased >3-fold from 1970s to current (>58,000 $km^2$)
- Chao2 estimate is very conservative and increased ~3-fold since listing
- Bias-corrected Chao2 and Mark-Resight estimates are similar, currently at approximately 100 females with cubs annually
- 4 population monitoring methods show slowing of population growth starting in early 2000s
- No statistical analysis supports population decline
- Proximate cause(s) known: lower juvenile survival and reproductive suppression
- Independent-male survival increased
- Bear density correlated with lower cub survival and reproduction
- Demographic changes began occurring prior to major changes in food resources

# The Big Picture

**Food resources**

- Food resources in the GYE have historically been dynamic
- No scientific data of fewer available calories on landscape
- No change in body mass; limited data on % body fat

**Movements and Home Ranges**

- Home-range size did not increase during period of whitebark pine decline
- Home-range size not associated with availability of whitebark pine
- Daily movement distance and activity radius did not change during 2000-2011
- Home range sizes of females declined from 1989-1999 to 2007-2012
- Female home-range size negatively associated with index of bear density (moderate evidence for male home ranges)
- Female home-range size small and less variable at higher bear densities, regardless of time period

# The Big Picture

**Mortality**

- Total estimated mortality for independent-aged females averaged 7.3% during the last 10 years using the negatively biased Chao2
- Total estimated mortality for independent-aged females using bias-corrected Chao2 or Mark-Resight would likely be under 5%, corresponding to known-fate survival estimate
- Ranges for known and probable mortalities estimated using 95% fix kernels expanding 9,275 $km^2$ per decade since; expansion motivated by male dispersal

**Genetics**

- 3- to 4-fold increase in effective population size since the early 1980s, matching trend in Chao2
- $N_e$ nearing 500 (estimator by parentage assignment)
- High $N_e/N_c$ ratio for Chao2 supports notion of underestimation
- No decline in genetic diversity or increase in inbreeding

# Topic 1:  Food and Density Dependence

- TO BE COMPLETED

# Topic 2: Population Estimation

- TO BE COMPLETED

# Considerations for Future Reviews

- Objectives of IBA reviews
- Challenges associated with review of complex materials and time constraints
- Context is crucial
- Requests for clarification

# Uncertainty and Type II Error

*"Thus, we see no escape from uncertainty. To claim that no decision about what has occurred should be adopted until uncertainty is removed or to claim that the only acceptable decision adopts some lower confidence limit as truth is to reject the role of science. If the possibility of population decline is treated as the fact of population decline (even where overwhelming evidence suggests otherwise), there is no need to spend money on research or monitoring because the management approach would be identical regardless of what data were produced. Because it is impossible to absolutely reject the hypothesis of decline, one would always manage as though a decline had occurred. To us this would seem poor policy."*

--Schwartz et al. 2006