Chao2 estimator and calibration in the peer review

Reviewer 1

"With respect to the use of Chao2 population estimate for the DMA, Keating et al. (2002) noted "Over all CV values, RMSEs for NChao2 were lower than for NC2 (Fig. 2), but Nchao2 became increasingly and negatively biased as CV increased (Fig. 1). Because individual animals clearly are not equally sightable, use of such an estimator would introduce a chronic, negative bias into estimates of population size and sustainable mortality." Therefore, the use of the Chao2 estimator would tend towards a conservative estimate of population size and a lower level of sustainable harvest. Because of this bias over all of the CV (coefficient of variation) values, the approach being proposed is precautionary and viewed as a "pro".
The only "con" associated with the use of the Chao2 estimator is that is negatively biased and thus, should the goal of management be to increase the harvest levels, use of other, less biased estimators may indicate a higher level of sustainable mortality.
I deem the use of the Chao2 estimator as appropriate and precautionary in approach. The statement that new estimators may be used, should an improved method become available, is a meaningful and scientifically sound approach. Continuation of the Chao2 estimator should a new estimator be used is deemed appropriate for long-term monitoring and trend detection." (page 5)

"The Demographic Recovery Criterion 1 focuses on he method applied to determine grizzly bear abundance, with the target of maintenance of at least 500 grizzly bears and at least 48 females in the DMA. The Criterion change is to allow flexibility in the specific method applied to obtain the population estimate. This objective is deemed both reasonable and meaningful for the conservation and management of grizzly bears in the GYE. The proposal to remove the single prescribed population estimator (i.e., Chao2) is deemed reasonable, science-based, and is viewed as a positive step in management. Reliance on a single population estimator may or may not be the best option and while the Chao2 method is both appropriate and conservation-based, allowing for improved methods to be applied is a logical step forward. Development of population estimation methods is an active field and it is deemed sensible and scientifically sound to allow for modification in estimation methods over time. There is, however, a need to calibrate any new estimation method with the previous approaches to ensure long-term comparability of data." (page 24)

Reviewer 2

"The change (described in the supplement under Demographic Recovery Criterion 1) to eliminate the criterion's dependence on the Chao2 estimator if improved, peer-reviewed methods become available agrees with using the best available science. The Chao2 estimator is somewhat dated and there are likely improved statistical methods available. However, if it is the opinion of the scientists and statisticians involved that the Chao2 estimator is performing well and there are independent measures of relative abundance to verify that it is, then there likely isn't a significant advantage of switching to a newer estimator. All models of biological systems perform poorly with poor input data and those that have been through the peer-review process should perform well if provided with good inputs. It is my opinion that the input data for the GYE is excellent for informing biological models.
Within the Proposed Plan or the Supplement there is no mention of independent measures to verify model trends. Including independent sampling for this purpose would strengthen interpretation of any model employed." (pages 6-7)