**Supplemental B. Simulation Modelling**

With SECR, the likelihood of detecting an individual at a given sampling location is estimated as a product of the sampling site location, relative to the estimated centre point of that individual’s home range. This home range centre point itself is estimated from that individual’s history of detections and non-detections at all other sites on the sampling grid (Efford and Fewster, 2013; Gardner et al., 2009). Additionally, the likelihood of detecting an individual at a given sampling site can be modeled by including habitat characteristics of the site, prior exposure of the individual to that site, and sex-specific movement and detection parameters (Efford and Fewster, 2013). This information allows for modelling the influence of habitat and sex-specific characteristics on capture probability and can greatly improve the predictive power of model results.

The spatial arrangement and physical spacing of a SECR grid can affect the spatial extent of the area surveyed as well as the recapture rates and detection of individuals at multiple sites within the study area (Boulanger pet al., 2018). To develop an optimized sampling design, we first examined the influence of sampling station spacing on model precision. We held in-depth discussions with the NGBT and reviewed relevant research to arrive at several conservative bear density estimates (0.72, 1.20, and 1.68 grizzly bears /1000 km2) for our simulations. Through further discussion with the NGBT, we examined the performance of different sampling grid designs that varied corral spacing from 5 to 10 km2 between each sampling station (Boulanger 2008). Model performance was then evaluated against the range of estimated grizzly bear densities and detection parameter estimates (g0 = 0.1, 0.2, σ = 7000; Howe et al., 2013; Efford, 2004).

The grizzly bear detection parameters estimated in our top performing model were markedly different from the estimates used for the development of this study. We based our simulation estimate of the detection parameters on previously published literature (Boulanger et al., 2016). Similarly, we used three different densities in our simulation exercise based on what we believed was a reasonable range of grizzly bear density in our area. Based on the results of our simulation, we chose a sampling scheme that would fit within our logistical constraints but still provide a density estimate with a CV < 0.2. However, our results indicate that the detection parameters are markedly different than those assumed for our simulation. Similarly, our estimated grizzly bear density is lower than the lowest simulated density. The reasons for such differences in parameters is not entirely clear, but is suggestive of grizzly bears moving through the BMA 1 landscape at a larger spatial scale than elsewhere in Alberta and because of their low densities in this area. Because of these differences, a much higher sampling effort would be required to achieve a density estimate with a CV < 0.2. We suggest future work in BMA 1 and in similar populations look to the parameters developed here to plan for future work.