

## USING DNA TO ESTIMATE COUGAR POPULATIONS IN WASHINGTON: A COLLABORATIVE APPROACH

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**Abstract:** To better understand population dynamics of cougars, wildlife managers need long-term data sets collected using standard methods. Short-term studies, while useful for management, are only “snapshots in time”, and provide little information about year-to-year variability and long-term status. Given that it is unlikely WDFW would successfully undertake a statewide census of cougars, it is imperative that an effective sampling regime be developed to estimate population size. The objectives of this project were to acquire a population estimate for cougars in northeast Washington, address management goals for effective cougar management, and to test the efficacy of using DNA techniques to estimate cougar population size. The 5,480-km<sup>2</sup> project area in northeast Washington was chosen because it represents a region that has been designated as a reduction zone (i.e. the public would like to see a reduced cougar population); being able to identify the decrease in the population without reducing it to collapse is imperative. Also, this region is close to another project area where cougars are being captured to estimate population demographics. Therefore, it provides a means of corroborating estimates and, if successful, a valuable link for estimating cougar abundance and demographics in NE Washington. Between 15 November and 31 December 2003 and 2004, approximately 15 hound handlers were deployed throughout the project area to tree cougars using hounds and obtain tissue samples using a biopsy dart fired from a CO<sub>2</sub>-powered rifle. Three biopsy dart types were tested during the first year of the project, a 1.5 and 2.0 cm biopsy tip that used barbed broaches to retain the tissue sample, and a 2.0 cm tip- that used a crimped barrel to retain the sample. Within the project area, each hound handler was assigned a specific work area with an identifiable border (i.e. roads or rivers) and required to work a minimum of 20 days. By doing so, we insured that the entire project area was sampled equally and each animal had the same opportunity of capture. There was no physical handling required and once the biopsy sample was retrieved, all research personnel immediately left with area while the cougar was still in the tree (in some instances, the animal jumped and ran off after being sampled). We referred to these initial samples as the “capture-period” samples, and the individuals from whom the samples were taken as “marked” individuals. The “recapture” period (i.e., the general hunting season) immediately followed this “capture” period to ensure a relatively high probability that these “marked” cougars were in the area and available for “recapture”. During the hunt season, WDFW personnel collected tissue samples from all known cougar mortalities via a mandatory reporting/sealing system. To confirm that WDFW obtained samples from all “marked” cougars that were killed during

the hunting season (i.e. to account for possible emigration), samples were collected from an area approximately 5-times the size of the initial project area (~25,000 km<sup>2</sup>). Upon completion of the hunting season, all cougar DNA samples from both "capture" and "recapture" sessions were sent to WDFW's DNA lab for analysis. The tissue samples were analyzed using microsatellite analysis. In this project, the fingerprint analysis consisted of positively identifying 36 alleles (2 alleles x 18 loci) for each tissue sample. Samples that did not produce at least 30 alleles were censored. A comparison was made to determine how many individuals made up each sample and if any individuals were in both samples. In 90 days of "capture" sampling over the two year period, the hound handlers retrieved 96 cougar samples. Of those 96 samples, 69 (72%) samples were uniquely identifiable and 54 individuals were identified. However, the success rate (i.e. efficiency) of identifying the necessary number of alleles increased from 60% success in 2003 to 89% in 2004. This was due to a superior design dart being identified during the first year and used exclusively in the second. Therefore, increased efficiency is likely to continue in subsequent years. During the "recapture" sessions, 182 samples were retrieved, of which 164 (90%) were uniquely identifiable. Thirty-two cougars were killed within the project area over the two-year period and 6 were "marked". While that supported the use of a closed-population estimator such as Lincoln-Petersen for a within-year estimate, the recapture rate of "marked" individuals was too low to generate a population estimate (i.e. <7 recaptures). Nonetheless, we can say for sure that, within 1 year (before the hunt), there was a minimum of 44 unique individuals occupying the project area equating to a density of .80 cougars/ 100 km<sup>2</sup>. No emigration was observed. As many as 28 cougars still remain "marked" on the landscape and will contribute to future within- and across-year population estimates. Continuation of this project can answer important questions including: What is the cougar population size in northeast and north-central Washington? Is this DNA monitoring technique a good technique for cougars? Is the precision of the method consistent with WDFW's management needs? And, if so, are management objectives being met? The longer the project is conducted, the smaller the confidence intervals will be around the population estimate, thus producing a robust estimate of population size and reduced bias.