

## Guidelines based on variable density by habitat quality and geography

### Description

WDFW's current cougar management framework applies a statewide average of cougar density to a discrete map of habitat suitability (i.e., suitable or unsuitable) to estimate population sizes within population management units (PMUs). While this approach is straightforward and scientifically defensible, it may not adequately capture local variability in habitat quality and cougar densities for some locations.

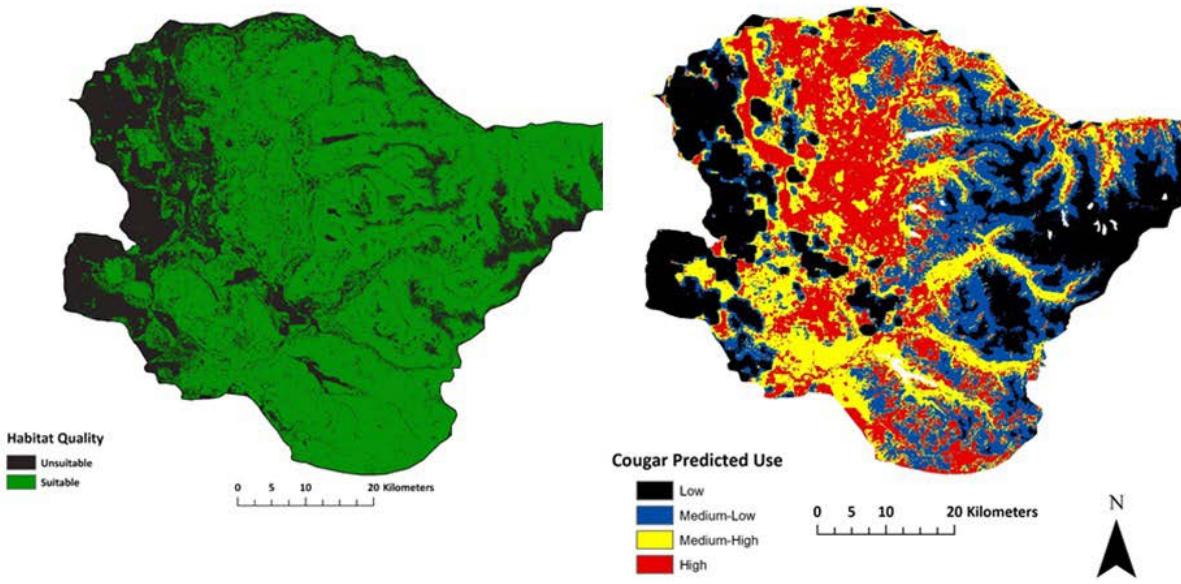
### Option

Apply the existing harvest framework to refined PMU population estimates generated using a revised map of cougar habitat that captures finer-scale variability in habitat quality and associated cougar densities. This option would still have the dual objectives of managing for stable populations and male territoriality.

Pros	Cons
Science-based	Uncertainty related to habitat quality metrics and connections to density
More accurate local population estimates	May aggregate harvest
More prescriptive	May result in over-harvest in places
May improve public support	More complicated, so may increase public confusion
Increased opportunity in places	Decreased opportunity in places

### Implementation

This is a viable option to consider, implementation would not occur this year given the time it takes to develop the necessary Resource Selection Function (RSF) model. To quantify the variable quality of cougar habitat throughout Washington, we will analyze GPS relocations from 382 cougars captured as part of seven long term research projects conducted between 2001 and 2019 in Washington. We will review the existing scientific literature on cougar habitat selection, spatial ecology, and predator-prey relationships to identify important biological factors and landscape features for inclusion in our preliminary RSF models. For example, the availability of ungulate prey, presence of cover, and a lack of human development are known to be important components of high-quality habitat throughout cougar range. The amount of area of each habitat class would be summed within each PMU and assigned a cougar density. The current harvest framework would still be applied throughout the state (i.e., season length and structure, 12-16% harvest limit), albeit with new population estimates for each PMU. Resource selection functions have the advantage of being objective, rigorous, and relatively flexible in their application when delineating habitat quality across a large spatial scale. Potential challenges in our approach will likely stem from the identification of suitable surrogates for prey availability and cover as direct measures of these covariates are unlikely to be available throughout much of Washington.



**Figure 1.** Comparison of the discrete map of habitat quality used in the current cougar management framework (left) and a more refined map of habitat suitability developed using a resource utilization function and GPS relocations from 27 cougars located along the western slope of the Cascades around North Bend, Washington (right).

### Other points

- There are a number of analytical tools available for creation of a new habitat map and these are well described within the scientific literature. To improve the final product, WDFW staff could also generate and compare multiple maps produced by different methods and evaluate their accuracy using existing GPS relocation and camera data.
- We would base density designations for habitat classes on the variability in density estimates provided by cougar research projects completed in Washington.
- How this change in the mapping of cougar habitat quality changes population estimates and the associated number of cougars available for harvest within individual PMUs is unknown.