Washington Mountain Lion Status Report

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Abstract: This status report will be an update of cougar research, management, and legislative activities since the last mountain lion workshop in 2008. Several cougar research projects have been completed involving personnel from WDFW, Washington State University, and University of Washington. Collectively, these projects investigated population size, survival, movement patterns, habitat use, changes in predation events, testing apparent competition and prey-switching hypotheses, and how cougars existed along the urban-wild land interface. We will also present a full description of 3 bills that have been introduced in the January 2011 legislative session and explain how they will affect cougar management in Washington. Engrossed Substitute House Bill 2438 (HB 2438), which in 2008 authorized a 3-year extension of a cougar pursuit and kill season with the aid of dogs (for a total of 7 years) in 6 Washington counties, expired in 2011. A new bill, HB 2011, attempts to extend this hunt season for 5 additional years. Another bill, Senate Bill 5385 (SB 5385) was introduced to increase hunting license fees, including that for cougar. Lastly, SB 5201 was introduced and would allow wildlife officers to fine residents that are negligently feeding, attempting to feed, or attracting predatory wildlife. Finally, WDFW and Insight Wildlife Management completed a public opinion survey regarding cougars in Washington. The objective of the survey was to better understand the public's perceptions of cougar management, identify information gaps, and define effective outreach methodologies for development of a cougar education and outreach plan. We will present results of that project and discuss our cougar education plans.

Effects of Residential Development on Cougar Spatial Ecology in Washington

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Abstract: Residential development creates significant challenges for managing and conserving large carnivores. Cougar (*Puma concolor*) use of residential areas and proximity to people is a growing management concern, but little is known of how residential levels and patterns effect cougar spatial ecology. We used utilization distributions (UD), county tax parcel data, and multiple comparison techniques to quantify and compare cougar (n = 101) use of residential areas across 4 study areas in Washington. We used Weibull functions and a lacunarity analysis to examine how different levels and patterns of residential development influence space use and reports of cougar-human interaction. Cougar UDs encompassed predominantly undeveloped parcels at both the hectare ($\overline{x}$ = 98.09%, SD = 3.12, n = 101) and km^2 ($\overline{x}$ = 81.59%, SD = 15.60, n = 101) scales as cougars decreased use as residential densities increased. Lower use of residential areas at the hectare scale demonstrated use of undeveloped, suitable habitat within the matrix of residential development. Use in eastern Washington study areas occurred in areas with residential densities ≤ 55.2 residences/km^2 whereas use in western Washington occurred in areas with ≤ 846.0 residences/km^2. Dense forest vegetation and clustered residential development allowed western Washington cougars to exploit landscapes with higher residential densities. Increasing amounts of forested habitat and human population size increased the number of cougar reports, but both factors explained < 50% of observed variability in annual report levels (Forest: R^2 = 30.5%, Population: R^2 = 44.3%). Diffuse, low density development (i.e., exurban) can increase cougar proximity to residences and may increase report levels. Wildlife managers looking to reduce use of residential areas and interactions should account for cougar spatial ecology and human distribution while exploring collaborations with development and landscape planners to cluster residential development at urban densities (> 10 residences/ha) in lower quality habitat.

Beyond Cougar Source-Sink Management: Distributing Hunt Effort to Preserve Social Stability

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Abstract: Wildlife agencies use a variety of techniques to regulate cougar (*Puma concolor*) harvest and achieve management objectives; these include general hunt seasons, limited entry hunts, harvest quotas, and bag limits. These techniques are often executed using a zone management (Logan and Sweanor 2001) and/or source-sink metapopulation approach (Laundré and Clark 2003). Zones incorporate large-scale geographic areas typically made up of multiple game management units (GMU's) and are designated as cougar population sources (low harvest) or sinks (high harvest). However, we believe it is important to maintain the natural, self-regulating mechanism of territoriality that cougars have evolved through eons of evolution and management should strive to mimic this natural dynamic when implementing hunts. The role of evolution is recognized in ungulate management and helps guide trophy management and quality hunt programs. However, a similar philosophy has not yet been considered for managing carnivores. Just as maintaining mature individuals is important for managing ungulates, maintaining resident adult cougars, which influences reproduction, rates of immigration and emigration, and density, mandates management attention. To avoid altering the natural regulating function of cougar social organization, we advocate a hunt system that preserves social stability. To accomplish this, our philosophy is to equitably distribute harvest across the jurisdiction using a limited entry draw hunt, reducing the hunt zone size to the individual GMU level, and limiting removals to 10% of the GMU's cougar population. This would avoid excessive removals in selected GMU's where human access is high and cats are most vulnerable. We also propose an increased license fee, comparable to that of other big game species. Benefits to this system may include a stable age structure, maintained or increased agency revenue, more efficient wildlife enforcement, less human conflict, and because older animals would be more plentiful, a quality hunt experience for the hunter.

Effects of Sport Hunting on Cougar Population, Community, and Landscape Ecology

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Abstract: Cougars (*puma concolor*) are managed on the traditional density dependent, compensatory mortality, game management model (same as deer and elk). In population ecology, hunting is believed to result in reduced numbers of cougars and increased female reproductive success, population growth, and sustained yield. In community and landscape ecology, hunting is believed to result in reduced predation on game animals, a decreased "footprint" of cougars, and reduced conflicts with humans. We conducted a series of field experiments from 1998 to 2011 (13 years, 16 papers) in 6 areas of WA to test the traditional game management model for cougars. Increased complaints, livestock depredations, and high predation on mule deer did not correspond with increasing numbers of cougars. Cougars were declining or stable where complaints and livestock depredations were high and were increasing where complaints and depredations were low. High hunting mortality of males resulted in compensatory immigration by males, decreased kitten survival (increased infanticide?), female decline, and male increase – resulting in no net change in total cougars and non-sustainable females. Low hunting mortality of males resulted in compensatory emigration by males, high kitten survival, female increase, and male stability – resulting in no net change and sustainable females. Heavy hunting reduced female population growth by 34%. Females with kittens were the main cause of mule deer declines in heavily hunted areas - because high hunting of males resulted in increased predation on mule deer by females. Females switched from numerous white-tailed deer at low elevations to sparse mule deer at high elevations to avoid potentially infanticidal immigrant males in heavily hunted areas. Only high harvest of females reversed high predation on mule deer. High hunting mortality resulted in a doubling of home range size and overlap (footprint size) for immigrant males. Large home ranges and movements outside a defined study boundary also resulted in a 2-3 X overestimate in population size. Younger animals used human-occupied areas more than older animals. Increased hunting of cougars did not reduce cougar complaints and livestock depredations. Our results suggest that the traditional game management model does not apply to solitary territorial predators such as cougars.