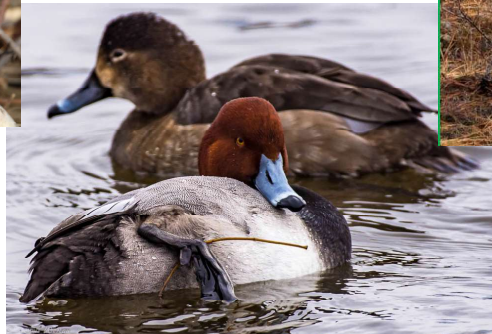
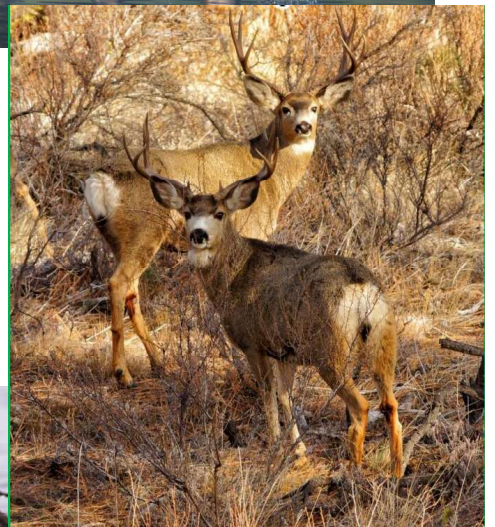
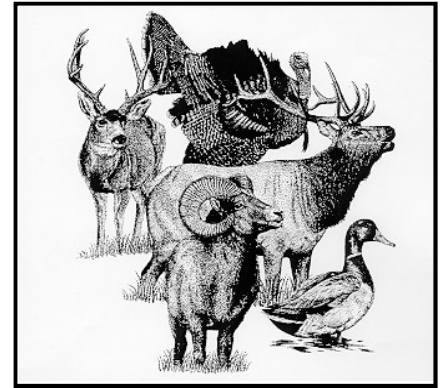


STATE OF WASHINGTON

2018 Game Status and Trend Report



Washington
Department of
**FISH and
WILDLIFE**

Cougar

Cougar Status and Trend Report

STATEWIDE

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Introduction

Cougars occupy forested habitats in Washington as well as some parts of the Columbia Basin where vegetation provides adequate cover (Figure 1). Cougars typically do not occur on the island archipelago of Puget Sound. For management purposes, the state is divided into forty-nine population management units (PMUs) (Figure 1). Agency cougar management objectives, strategies, regulations, and policy have been formulated using findings from scientific research in Washington. Long-term research and rigorous analytical methods provide the guiding principles needed for a systematic management strategy and offer WDFW empirical, objective rationale to defend management recommendations while providing recreational opportunities and viable cougar populations.

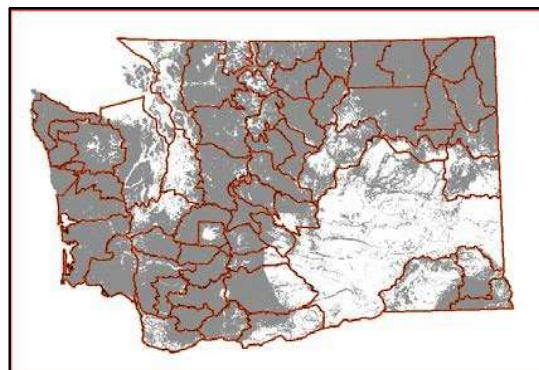


Figure 1. Cougar habitat (gray) and 49 management units in Washington, 2018.

Management Guidelines and Objectives

Washington's cougar management program is founded on cougar behavior and social organization designed to maintain an older cougar age structure, promote population stability, preserve territoriality, and provide a better quality hunt experience while maintaining ecosystem integrity (Beausoleil et al. 2013). To achieve these cougar management objectives as outlined in WDFW's Game Management Plan (WDFW 2015), the hunt structure is currently administered within 49 population management units (PMUs), each of which is approximately 1,000 km² in size. A harvest guideline of 12-16% of the population within each unit allows for an equitable distribution of harvest across the state. The 12-16% incorporates the margin of error surrounding a documented 14% growth rate (Wielgus et al. 2013) but this sliding scale also allows district biologists throughout Washington to adjust their regional harvest levels accordingly based on total mortality if necessary (i.e., non-hunt losses). Several studies in Washington and other western states have validated this growth rate estimate including Robinson et al. (2014) who documented a 12% growth rate in Montana, Logan (2015) demonstrated a slight population decline at a 15.5% harvest rate in Colorado which suggests a growth rate below that level, and Beausoleil et al. (2016) that showed an average harvest rate of 14% (range = 7-21%) over 10 years resulted in a slight population decline in northeast Washington.

Population Surveys

Over the past 16 years rigorous population surveys and analyses have been conducted through long-term cougar research throughout the state. In past status and trend reports, the Department provided adult only (>2 years old) population estimates but recently included all independent aged cougars (>18 months), currently the average density of cougars is 2.2 cougars/100km² in Washington. When multiplied by the available habitat the independent-aged statewide population is estimated at 2,300 cougars. Due to their social behavior and because territories of male cougars are strongly defended against other males while overlapping home ranges of several females, an average density of cougars can be used with a high degree of confidence. Therefore, territories of adult males are often arranged on the landscape like pieces of a puzzle, with relatively low overlap; females are similarly arranged but they are typically not territorial. Similar densities from long-term studies have been demonstrated in throughout western North America (Quigley and Hornocker 2010). Through this behavioral-based territoriality, cougar population size is limited by the amount of available habitat. With a greater understanding of this type of social organization, Washington managers can incorporate and consider the impacts of differing levels of cougar harvest on population growth as well as social organization.

Hunting Seasons and Recreational Harvest

Hunting with the aid of hounds has been banned by voter Initiative 655 for 22 years. Since then, cougar harvest has increased an average of 58%, a result of longer seasons which provide more opportunity. The cougar hunting season is currently 242 days, an increase from 212 days in the late 1990's and early 2000's, and from 60-70 days the 2 decades prior (Figure 2). Washington currently uses a split recreational harvest season structure (early and late season); which only allows for closure of PMUs that reach the harvest guideline beginning January 1. Over the past 10 years Washington's average annual cougar hunter harvest is 169 animals and when incorporating all mortality types averages 206 animals annually (Table 1). Under the current harvest guidelines which are applied to all 49 population management units statewide, WDFW is able to provide older-aged animals on the landscape, allowing harvest to be more equitable across the entire jurisdiction and the state. Additionally, when closures do occur, the current approach does not apply to a large-scale landscape resulting in less impact to hunter experience. During the 6 years using the current structure, an average of 29% of PMU's closed during the season (range = 16-46%) but harvest is expanding as intended. Over time several methods have been implemented to collect information from hunter-harvested cougars including collecting cougar teeth via mandatory sealing since 1985 and DNA since 2003. The Department also has maintained a cougar harvest reporting hotline since 2004.

Cougar Status and Trend Report 2018

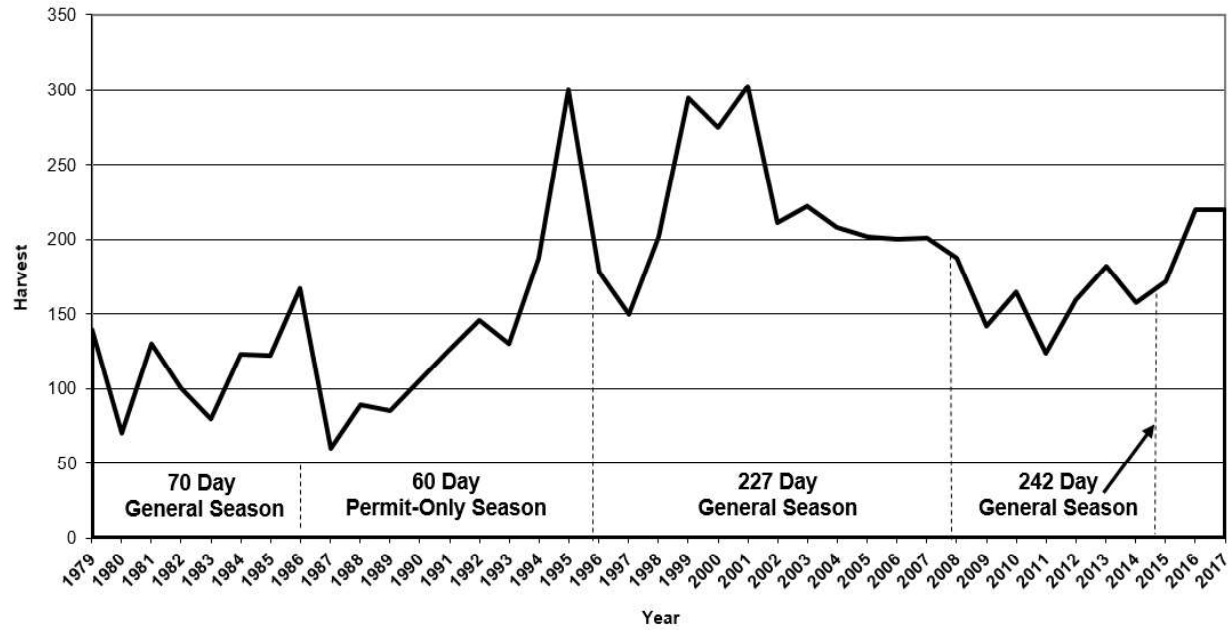


Figure 2. Cougar hunting seasons and numbers of cougar harvested in Washington 1979-2017, WDFW 2018.

Table 1. Cougar mortality^a in Washington by year, sex, and type, 2008-2018.

Year	Hunt Season Male	Hunt Season Female	Hunt Season Sex Unknown	Other ^b Male Mortality	Other ^b Female Mortality	Other ^b Unknown Sex Mortality	Total Mortality
2008-09	62	94	4	13	10	1	184
2009-10	69	67	2	14	17	0	169
2010-11	82	74	1	11	17	0	185
2011-12	62	54	7	20	9	3	155
2012-13	60	82	5	18	13	1	179
2013-14	78	100	4	28	17	2	229
2014-15	68	88	7	26	13	2	204
2015-16	82	87	3	24	15	2	213
2016-17	110	107	5	33	19	2	276
2017-18	95	124	3	22	22	1	267
Total	768	877	41	209	152	14	2061

^aDoes not include tribal cougar harvest

^bOther mortality includes unknown mortality type (44%), Depredation (35%), landowner kill (9%) roadkill (6%) and poaching (5%).

Survival and Mortality

Hunting is the main source of mortality for cougar populations across all study areas in Washington at an average of 48%. In areas of low hunt pressure, natural mortality resulting from intraspecific strife is the leading source of mortality, ranging from 12 to 44% depending on the region of the state. Male survival is typically lower than female, however female survival is the most important factor in determining population growth. Department research estimates annual female survival at an average of 67%, which is dependent on locale.

Habitat

Available cougar habitat was recently reassessed in 2018 using research data and the current habitat estimate encompasses approximately 104,500 km² throughout Washington; 91,000 km² of which WDFW manages hunting opportunity for. The National Parks and tribal lands do not fall under WDFW's management authority but many tribes conduct their own harvest management. Washington is the smallest of the western states and has the least amount of available cougar habitat. Idaho has approximately 99% more habitat, there is 84% more habitat in Montana, and 61% more habitat in Oregon. Because cougars are generally mediated by forested cover (Warren et al. 2016) and the majority of cougar habitat in Washington is in federal or State ownership, the core of cougar habitat is relatively secure but is susceptible to wildfire. Since 2007, approximately 10,000km² have burned in Washington with 50% of that occurring since 2015.

Human-Wildlife Interactions

Minimizing human-wildlife conflict is a management priority for WDFW (WDFW 2015). Because human populations continue to expand in Washington (currently 7.4 million), it is imperative to use a comprehensive outreach and information program to prevent negative human-wildlife interactions. During the past 10 years, complaints have averaged 195 statewide and decreased 26% from 224 to 166 annually. Overwhelmingly, the common causes of interactions identified by staff include the feeding of deer and turkey, which brings cougars closer to human development and husbandry practices of both livestock and domestic animals. Development patterns and increasing human occupation into the rural areas also contributes to conflict. Understanding how to reduce deer attractants and installing affordable electric fencing for goats, sheep, and fowl is the best approach to avoiding or minimizing potential interactions. Information and outreach materials are a mandatory component of staff response to potential conflict events. In 2018, an updated cougar brochure was developed (Figure 3).



Figure 3. Cougar information brochure developed in 2018 in cooperation with Western Wildlife Outreach.

Population Augmentation

No population augmentation takes place for cougars in Washington.

Research

Significant long-term research of cougar populations has occurred statewide in 8 study areas across

Washington. These research efforts resulted in numerous peer-reviewed, published scientific manuscripts. Research topics include abundance and density (Lambert et al. 2006, Beausoleil et al. 2013, Beausoleil et al. 2016), growth rate (Wielgus et al. 2014), using DNA to evaluate gender ID (Beausoleil and Warheit 2015) and genetic structure (Warren et al. 2016), effects of hunting (Robinson et al. 2008, Cooley et al. 2009a, Cooley et al. 2009b, Maletzke et al. 2014, Keehner et al. 2015a, Keehner et al. 2015b), prey use (Robinson et al. 2002, Cooley et al. 2008, White et al. 2010, Kertson et al. 2011a), habitat use (Kertson et al. 2011b) and response to human development (Kertson et al. 2013, Maletzke et al. 2017).

In 2016, WDFW and University of Washington began a predator-prey research project. The goal of the research is to assess how hunting and predation may affect Washington's ungulate population dynamics as well to document wolf-cougar interactions and assess survival and causes of mortality.

Management Concerns

Exceeding harvest beyond management objectives continues to be a concern. On average, 29% of the PMUs close within a given hunt season close (range = 16-45%) and of the 44 PMUs with harvest limits, 17% go beyond the upper end of the harvest guideline (Table 2). About half of the overages occur prior to January 1 (when harvest limits do not yet apply) and the other half after harvest guidelines take effect and hunters must call within 72 hours; this causes a lag time in closure. Percent female harvest may also be a concern as changes in adult female and kitten survival are the most influential parameters to population growth (Martorello and Beausoleil 2003). Over the past 10 years, females average 53% of the harvest but it is unknown if that percentage of the harvest rate is at a level where this would be a management concern. Finally, harvest that occurs outside of WDFW's management authority remain unknown and are not accounted for in harvest guidelines. These additional harvests are an additive source of take particularly in the northeast and Olympic peninsula regions of Washington. Accounting for that unknown additional harvest and evaluating its effect is difficult without accurate data records.

Management Conclusions

The current cougar management structure allows the Department to address concerns of various constituencies. For hunters, it provides older aged animals on the landscape thus a better quality hunt, it allows harvest to be equitable across the entire jurisdiction, and when closures do occur, it does not impact a large-scale landscape forcing hunters to travel long distances. For non-consumptive users, it recognizes their values by maintaining population stability, social structure, and ecosystem integrity. For managers, it's defensibly based in science, ensures credibility, it's simple for multiple user groups to understand, inexpensive to implement, and satisfies multi-stakeholder interests. The current structure of distributing harvest equitably across the landscape is being demonstrated as harvest clusters are declining and distribution of harvest is increasing. Two potential solutions to avoid exceeding harvest guidelines is to revert back to the 24-hour closure Washington and to the single season structure, both used prior 2013. Snow conditions are strongly correlated with cougar harvest and affect hunter success. Being able to respond to hunting conditions would improve the Department's ability to manage harvest and direct hunters to nearby open PMUs during optimal hunting conditions. The majority of agencies throughout the west utilize a 24-hour closure when harvest guidelines are met. Additionally, establishing an agreement to document tribal harvest of cougar would benefit statewide management in the future. Finally,

Cougar Status and Trend Report 2018

further developing a cougar education program focused on preventing conflicts needs more attention.

Cougar Status and Trend Report 2018

Table 2. Harvest objectives and actual harvest, by PMU and season 2012-13 to 2017-18. Shaded areas depict PMU closure and bordered areas indicate harvest objectives were exceeded, WDFW 2018.

Region	PMU	Harvest Objective	Actual Harvest						
			2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	
1	101	7-9	1	5	10	2	8	9	
	105	2	2	2	4	2	5	2	
	108, 111	5-6	6	6	7	8	11	12	
	113	4-6	3	5	6	3	4	6	
	117	6-8	9	12	12	10	11	12	
	121	5-6	7	5	8	4	17	9	
	124, 127, 130	7-9	8	5	8	4	11	11	
	145, 166, 175, 178	3-4	7	6	7	3	6	6	
	149, 154, 157, 162, 163	4-6	10	10	4	6	12	15	
	169, 172, 181, 186	3-4	4	4	1	2	7	3	
2	203	4-6	0	0	0	0	0	0	
	204	6-8	4	5	1	7	2	6	
	209, 215	4-5	4	2	4	3	3	5	
	218, 231	4-6	2	3	2	1	5	0	
	224	2-3	1	2	1	0	3	2	
	233, 239	3-4	2	0	1	1	6	1	
	242, 243	4-6	4	4	3	1	3	2	
	244, 246, 247	5-6	3	3	0	2	5	7	
	245, 250	5-6	2	0	4	1	6	3	
	249, 251	5-6	6	6	2	1	6	1	
3	328, 329, 335	6-8	10	9	7	8	11	8	
	336, 340, 342, 346	5-7	8	5	6	8	6	12	
	352, 356, 360, 364, 368	5-7	6	5	6	5	10	7	
	382, 388	3-4	4	10	1	3	3	3	
4	407	none	2	1	2	1	1	3	
	418, 426, 437	11-15	1	2	0	8	3	4	
	448, 450	9-13	0	0	0	0	0	3	
	454	none	0	2	3	0	0	1	
	460	5-7	2	1	0	2	0	2	
	466, 485, 490	2-3	0	2	0	1	0	0	
	5	501, 504, 506, 530	7-10	1	1	2	1	1	1
		503, 505, 520, 550	6-8	0	2	7	0	2	1
510, 513		3-4	0	1	2	3	1	2	
516		3-5	1	3	3	0	3	2	
522, 524, 554, 556		3-4	1	0	0	1	1	2	
560		5-6	1	4	1	3	1	3	
564, 568		3-4	2	4	0	4	1	4	
572		3-4	1	2	1	3	0	1	
574, 578	3-5	3	5	4	5	3	5		
6	601, 602, 603, 612	5-7	1	3	2	1	1	0	
	607, 615	4-5	0	1	0	1	2	2	
	618, 636, 638	4-5	2	4	4	0	1	4	
	621, 624, 627, 633	none	2	5	1	2	8	2	
	642, 648, 651	6-8	10	6	6	3	5	10	
	652, 666	none	2	1	1	0	1	0	
	653, 654	4-6	1	1	1	2	3	1	
	658, 660, 663, 672, 673, 681, 684, 699	9-12	1	1	1	0	3	7	
667	3-4	1	3	7	3	5	3		
1, 2, 3	133, 136, 139, 142, 248, 254, 260, 262, 266, 269, 272, 278, 284, 290, 330, 334, 371, 372, 373, 379, 381	none	11	13	10	14	22	17	

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