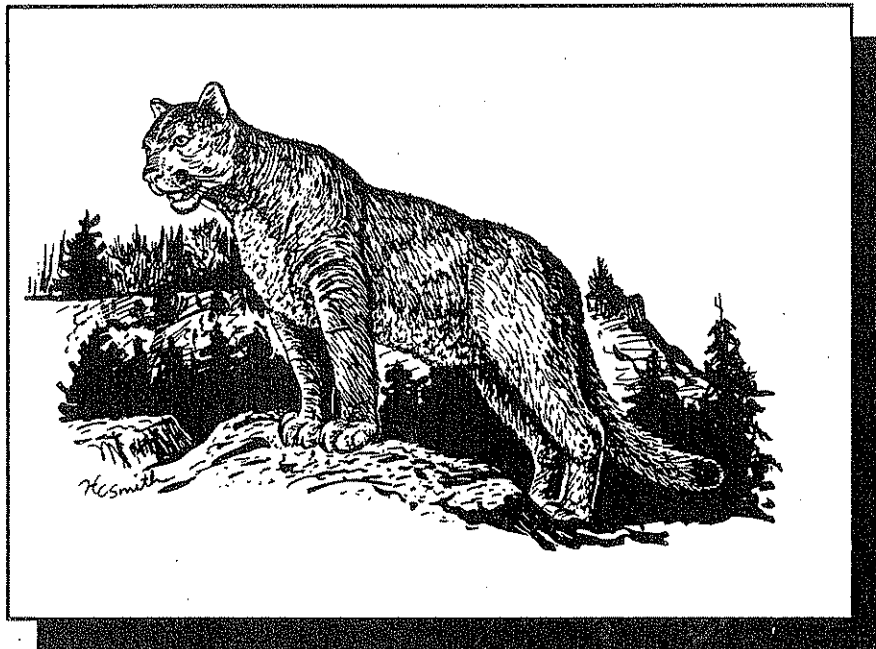


Oregon's Cougar Management Plan 1993-1998



Oregon Department of Fish and Wildlife



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PROGRAM GOALS

It is the goal of the Oregon Department of Fish and Wildlife (Department or ODFW) to:

1. Recognize the cougar as an important part of Oregon's wildlife fauna, valued by many Oregonians.
2. Maintain healthy cougar populations within the state into the future.
3. Conduct a management program that maintains healthy populations of cougar and recognizes the desires of the public and the statutory obligations of the Department.

INTRODUCTION

The largest member of the cat family in Oregon, the cougar is known by many names: panther, puma, catamount and, most commonly, mountain lion. Historically, the cougar (*Felis concolor*) had one of the most extensive distributions (including Oregon) of any North American wildlife species (Nowak 1991). The cougar is a secretive animal that is perceived as a symbol of wildness and the western back country.

Although many Oregonians may never see a cougar, they find satisfaction in the knowledge that cougar still remain in Oregon and that their existence is not threatened. These people entrust the Department with management responsibility for cougar and depend on the Department to provide for the animal's continued existence into the future. The Department recognizes the cougar as a valuable part of the native fauna of Oregon. An integral part of a complex biological system, the presence of cougar is an indicator of Oregon's ecological health.

Widely varying public attitudes toward the cougar are critical to the future existence of the species. Once hated by the early European settlers in Oregon, the cougar has since gained general acceptance. However, agricultural damage problems and public safety concerns maintain the controversy surrounding the species. Those who experience damage from cougar want assurance that problem animals will be selectively removed. Others fear cougar attacks on pets or family members and believe the animals should be kept well away from residential areas. If these damage and human safety concerns are not addressed, there is a risk that society's attitude toward the cougar might revert to that of the early 1900s. The Department must acknowledge public sentiments that range from total protection and absolutely no exploitation of cougar, to the desire for significant cougar population reductions.

Recent events in California depict the problems associated with cougar management. Public sentiment to protect the cougar resulted in a moratorium on sport hunting until more accurate population figures could be obtained. The last regulated sport hunting season for cougar in California was conducted in 1971. Subsequent studies conducted by the California Department of Fish and Game indicated cougar populations were adequate to support a limited sport hunting season. However, proposals in 1987 and 1988 to reinstate limited hunting were challenged in court by organizations opposed to cougar hunting. Californians later voted in favor of an initiative petition to curtail cougar hunting in California indefinitely. Despite these attempts to protect the California cougar population from human harvest, the annual take of cougar threatening livestock and human safety is now comparable to the sport harvest documented in 1970 and 1971 (Mansfield and Weaver 1989, Mansfield 1991).

Increased damage problems and cougar/human conflicts in California are, some believe, the result of increasing cougar numbers and reduced fear of humans by cougar. Others see public attitudes toward cougars in rural California slowly reverting to that of the early 1900s. California wildlife officials find their management options limited by the loss of sport hunting opportunities and decreased tolerance in some rural communities for the presence of cougar. Department wildlife biologists recognize a similar dichotomy of sentiment toward cougars among Oregon residents, which greatly complicates management of the species.

Until the late 1960s, the cougar was legally classified as a predator in Oregon and therefore unprotected. Seen as a threat to the livestock industry, cougar were often killed through bounty programs (Appendix A). The estimated statewide cougar population was as low as 200 animals in 1960. Some speculate cougar might have been extirpated from the state by 1970 had they not received game mammal status and subsequent protection by the Game Commission (W. Aney, pers. comm.).

Because cougar are very difficult to observe and census due to their secretive nature and characteristic low population density, many people believe they are few in number. Thus, they recommend increased efforts to protect cougar. Current population estimates based on population modeling and field research indicate at least 2,500 cougar inhabited Oregon in 1992. Because it is virtually impossible to accurately estimate a cougar population over a geographically diverse area as large as the state of Oregon, this estimate is a conservative number. Sighting reports and damage complaints indicate the cougar population continues to increase in number and to expand its range in Oregon.

A number of wildlife laws pertain to cougar management in Oregon and provide the Department direction on which to base current management goals. Oregon Revised Statute (ORS) 496.004 classifies the cougar as a game mammal and gives the Department responsibility for its management.

ORS 496.012, the Wildlife Policy, directs the Department to manage wildlife "...to provide the optimum recreational and aesthetic benefits for present and future generations of the citizens of this state..." The goals of this policy state: wildlife will be maintained at

optimum levels; utilization of wildlife will be orderly and equitable; and wildlife populations will be regulated in a manner that is compatible with the primary uses of the lands and waters of the state and provide optimum recreational benefits to the public.

ORS 498.012 pertains to wildlife damaging land, livestock, or agricultural or forest crops and allows a landowner or lawful occupant of the land to take any cougar that is causing damage without first obtaining a permit from the Department.

Hunting seasons for cougar and the removal of specific animals in conflict with human interests are two ways the Department meets its statutory obligation to provide recreational opportunities, address public safety, and maintain cougar populations at levels compatible with the primary land use and to provide for future generations.

Oregon's first cougar management plan was developed in 1987 for the purpose of guiding cougar management through 1992. The original plan identified several management concerns and developed management strategies to address those concerns. During the last five years, the Department has attempted to accomplish those management strategies within its personnel and fiscal resource limitations. This update discusses the accomplishments of the original Cougar Management Plan.

Cougar management issues and concerns of continuing importance will be carried into the next planning period. This plan revision and update also addresses newly identified concerns that came to light over the past five years or were brought to our attention through the public involvement process. Where applicable, management strategies are listed to address the new concerns. The policies and strategies contained in this report will guide cougar management through 1998.

SELECT LIFE HISTORY CHARACTERISTICS OF COUGAR

Reproduction and Productivity

Female cougar typically breed for the first time at 22 to 29 months of age (Eaton and Velander 1977, Rabb 1959, Ashman et al. 1983). Hornocker (1971) believed a female would not breed until she established a territory. Eaton and Velander (1977) stated it was "...probably safe to assume that wild puma in good health are sexually mature by 24 months of age, and if a female were territorially established she would normally give birth by the age of 36 months."

Cougar breed and give birth year-round, but studies in Nevada, Utah, and central Idaho reported that most births occurred during late spring and summer following an approximate 90-day gestation period (Robinette et al. 1961, Ashman et al. 1983, Seidensticker et al. 1973). Similar trends have been noted in Oregon. Most females give birth at approximately 24-month intervals, with some giving birth every 12-15 months.

Cougar females may have one to six young per litter, but average two to three kittens per litter. Oregon's cougar population averages 2.6 kittens per litter. The sex ratio of kittens at birth is normally equal. Good kitten survival, coupled with a relatively high reproductive potential, indicates cougar can quickly replace individuals lost from the population. Wildlife managers call this survival to adulthood "recruitment." If the mortality rate exceeds the recruitment rate, the population will usually decline. The recruitment trend of the cougar population is a significant factor in developing management strategies and establishing harvest seasons.

Robinette et al. (1977) reported an annual mortality of 32 percent of the population in Utah, while Ashman et al. (1983) noted a sustained annual mortality of at least 30 percent in Nevada. Ashman et al. (1983) believed that under "moderate to heavy exploitation (30%-50% removal)" cougar populations on their study areas in Nevada had the "recruitment capability of rapidly replacing annual losses." In Oregon, modeling suggests recruitment increases the statewide cougar population at a rate of 4-5 percent per year (after all causes of annual mortality have been deducted).

It is difficult to age cougar. No system of age classification has been widely adopted by wildlife managers. Ashman et al. (1983) presented criteria for a general classification of cougar age groups: kittens are 0-16 months old, sub-adults range from 17-23 months, and adults are 24 months or over. Several physical characteristics (tooth dimensions, degree of tooth wear and coloration) aid managers in placing cougar into one of the three age categories. Few cougar live past the age of 10-12 years in the wild (Young and Goldman 1946, Hansen 1992).

The Department's Wildlife Investigations Laboratory developed an aging technique which has improved our ability to determine cougar age (Trainer and Matson 1989) and is more reliable than any other in use. Since 1987, the Department has been analyzing the cementum of the root of the second premolar tooth. Tested on cougars of a known age, this technique is usually within one year of actual age (Trainer and Golly 1992). The tooth aging technique has provided biologists a method to sample the age structure of cougar populations, facilitate population modeling efforts, and monitor and analyze overall population health.

Movement

Hornocker (1970) reported that litters remained with their mother until the young were 12 to 20 months old. Robinette et al. (1961) recorded kittens with their mother until about 24 months of age. Oregon data suggest litters generally disperse at 15 months of age.

Once separated from their mothers, kittens or sub-adults eventually search for a new territory. These transient animals may establish a home range adjacent to their mothers or at a considerable distance (up to 100 miles) from where they were raised. Males generally use larger areas than females, and their territories may overlap those of one or more females.

Adult males on established territories generally do not tolerate any other males within their home range, which affects dispersal opportunities. Dispersal of kittens or sub-adults is an important factor in maintaining cougar populations by replacing cougar in vacated areas. Long-term livestock depredation damage situations may occur when the only areas available to dispersing sub-adult cougar are those with established agricultural operations.

Food Habits

Throughout the western United States, deer and elk are the staple food of cougar – Oregon is no exception. Cougar in northeastern Oregon consumed (in order of decreasing frequency): mule deer, Rocky Mountain elk, porcupine, snowshoe hare, and deer mice (Maser and Rohweder 1983). Natural winter foods for cougar in Oregon's Cascade Range were principally black-tailed deer and porcupine (Toweill and Maser 1985). Another Oregon study indicated deer, elk and porcupine were the most common winter food items (Toweill and Meslow 1977).

The number of prey consumed by an individual cougar varies with the cougar's sex, age, and reproductive status, as well as weather conditions (spoilage in warm temperatures) and scavenging by other species (birds, coyotes). In general, a cougar will kill a deer or elk every 10 to 14 days. If the kill is scavenged or spoils due to warm temperatures, cougar will kill more often than would occur during cold weather or in the absence of scavengers. Females with young will kill more often than a solitary cougar.

The health of the cougar population is integrally linked to the health of their primary prey species. When severe winter conditions or large-scale habitat loss severely reduce local deer and/or elk populations, the cougar population dependent on those deer or elk may further depress the population or prevent recovery of the herd (Neal et al. 1987). The Department recognizes predation is part of a naturally functioning ecosystem. If local prey populations are severely reduced (regardless of cause), the cougar population that depends on them also faces decline unless it shifts to another location or prey base. The Department will, therefore, attempt to manage for healthy populations of both predator and prey.

Habitat

Cougar are highly adaptable and widely distributed, occurring in a broad spectrum of habitats ranging from desert to alpine environments. They are very closely associated with deer and elk habitats due to their dependence upon these species for food.

Biologists believe the most productive cougar habitat in western Oregon is the Douglas fir-trailing blackberry type, with old growth forest a desirable component. The best eastern Oregon habitat is thought to be the open mixed-conifer type of the Blue Mountains, including the pine-bunchgrass type and the canyon country of northeastern Oregon. Both eastern and western Oregon cougar habitats are productive deer and elk areas.

Cougar appear to select for specific habitat components within the above mentioned general habitat types where prey is abundant. The Department is currently conducting the Catherine Creek Study in northeast Oregon to learn how cougars use specific habitat components. Preliminary results suggest over 90 percent of the locations used by cougar during the day are characterized by rock outcroppings and/or downed logs beneath a forested canopy. Field observations also suggest that horizontal cover is important to cougar for bedding sites and when hunting prey. Several den sites located in the study area were also associated with these habitat components. During the winter, cougar tend to avoid areas of deep snow, as do their prey species. Instead, they select forested areas with multi-storied canopy cover where snow depths are lower. Land use and management guidelines should consider these habitat components necessary to maintain optimum cougar habitat.

Major habitat alterations and human disturbance can strongly influence cougar behavior and habitat use. Van Dyke et al. (1986) measured the effects of logging and other human activities on cougar in northern Arizona. They noted dispersing cougar selected territories characterized by: (1) An absence of timber sale areas; (2) Lower than average road densities; and (3) Few or no permanent human disturbance sites. Resident animals did not appear to be much affected by logging as long as: (1) Sale areas were not overly large in proportion to their home area; and (2) Adjacent uncut areas were immediately available. A number of studies indicate deer and elk respond in similar manner to human activity. The results of this study, therefore, may depict the response of cougar to changes in the habitat use patterns of their prey base due to disturbance rather than reflect the cougar's choice of habitat.

Some Oregonians are concerned that forest management activities throughout the state have a negative impact on cougar populations. Habitat alteration activities that negatively affect deer and elk populations over the long term pose the most serious threat to cougar populations. Habitat components of importance to cougar and their prey must be retained within intensively managed habitats to assure maintenance of cougar populations. For example, road management programs designed to limit disturbance to deer and elk are appropriate in areas of high road densities.

Density

Cougar density is primarily influenced by a combination of prey availability and tolerance for the proximity of other cougars. Generally, prey availability is directly related to the quality of habitat for the prey species. In turn, prey availability directly influences cougar reproduction and mortality rates. Studies indicate cougar populations increase as available prey increases (Quigley et al. 1989). Because cougars are territorial animals, the population growth rate decreases as the density of cougars increases. As population density increases, a large number of young cougar disperse into unoccupied or less densely occupied habitat, and the mortality rate from fighting and cannibalism increases. Both reactions to increased cougar densities stabilize the population. The dependence of cougars on their prey and their territorial relationship to other members of the cougar

population explain why cougar numbers do not reach the levels observed in many other wildlife species.

This combination of relatively low density and the secretive nature of cougars make it very difficult for wildlife managers to measure their population density or size. The most reliable population estimates require labor-intensive mark-recapture studies in combination with radio telemetry.

The original Cougar Management Plan indicated wildlife biologists and others were concerned that cougar population characteristics were not well known in Oregon. To address this issue, the plan recommended a cougar study in northeast Oregon designed to collect this data. The Department initiated the Catherine Creek wildlife management unit study (Union county) in 1988 with the objective to determine cougar population density within the unit. Secondary objectives included documenting cougar population characteristics (productivity, survival, dispersal) as well as the effects of hunting on the population (Table 1).

A variety of techniques have been used to estimate cougar densities in other states, which range from a low of approximately one cougar per 100 square miles to a high of 24 cougar per 100 square miles (Johnson and Strickland 1992). The average density estimate for the western states was 7.5 cougar per 100 square miles (Johnson and Strickland 1992). Preliminary findings of the Catherine Creek Cougar Study in northeast Oregon indicate a cougar density of 7.8 per 100 square miles – comparable to densities documented in other western states.

The Department began a study in 1992 near Roseburg (Douglas county) patterned after the Catherine Creek effort. This study will examine the potential differences in cougar population characteristics between eastern and western Oregon. The results of both studies will be used to make future cougar management decisions.

Because intensive statewide studies of cougar are beyond the fiscal and personnel resources of the agency, the Department developed a cougar population model in 1988 with which to estimate population trends. This model is used primarily to monitor cougar population changes over time. The cougar model is based on the premise that a base population of adults must be present (given parameters such as productivity and age-specific mortality) to produce a recruitment level that will allow the harvest of a given number of animals. The starting population for the model was set at 200 cougars based on the work of W. Aney. The model was in part built on information obtained from Oregon-harvested cougar (sex ratio, age, reproductive parameters). Where information from Oregon was lacking, data from other cougar studies were used to develop the model.

The original Cougar Management Plan indicated information collected from cougar harvested in previous years had not been adequately analyzed and it contained a strategy to correct this situation. Department analysis of cougar population information from Oregon addresses this concern as well as meeting modeling needs. Information specific to Oregon increased as the Catherine Creek study progressed, demonstrating data compiled

from other sources for use in the model are comparable to data collected in the northeast Oregon study (Table 1).

Table 1. Population parameters used in the Oregon Cougar Model compared to Catherine Creek Study data.^a

Population Parameter	Model	Catherine Creek Data
Natural Mortality Rate of:		
1,2,10 yr. olds	25%	14%
3-8 year olds ^b	10%	0%
9 year olds ^b	20%	0%
11 year olds ^b	60%	0%
12 year olds ^b	100%	0%
Sex Ratio at Birth	50M:50F	31M:61F ^c
Litter Size	2.6 ^d	2.3 ^e
Proportion Pregnant Each Year	57% ^f	56% ^g
Age at First Reproduction	24 Months	25 Months
Accidental Mortality Rate	2.5%	4.8%
Poaching Loss Rate	4.1%	2.4%

^a All data relating to the Catherine Creek study are preliminary; data analyzed on a calendar year basis.

^b No natural mortality of cougar in these age classes has been noted to date.

^c Based on a sample of 41 collared cougar, 23 of which are still alive; 13 litters totaling 30 kittens (sex determined on 26). Sex ratio of all captured cougar (41 total) is 39M:61F.

^d Based on placental scar counts, Oregon data.

^e Based on litters observed in the field.

^f Based on reproductive tract analysis.

^g Based on field data.

Based on the Department's cougar model, the statewide cougar population is increasing at a rate of 4-5 percent per year (after subtracting all natural and hunting losses). The 1992 statewide population estimate was 2,500 cougars. Because of the higher proportion of females born into the population and the lower natural mortality rates of all age classes, the statewide population estimate would be slightly larger if the model was based solely on Catherine Creek data. The Department will continue to use the current version of the model until data collected from the southwest Oregon study are comparable to that gathered in the Catherine Creek study.

HISTORY OF COUGAR MANAGEMENT IN OREGON

Early History

Cougar were characterized as abundant or common throughout most of the forested parts of the state in the 1800s and early 1900s (Bailey 1936, Figure 1). Settlement of the state and burgeoning timber and agricultural industries created conflicts between human interests and the cougar population. To address this problem, bounties were placed on cougar and other "predators" as early as 1843. The bounty system exacerbated the negative impacts of human alteration and development of habitat for cougar and their prey species. Between 1900 and 1930, an annual bounty of 200 or more cougars was not uncommon. By the 1930s, cougar numbers had declined markedly from historic levels and continued to decrease through the late 1960s. The Legislature repealed the bounty system in 1961. That final bounty year, only 13 cougar were bountied; all from western Oregon (Table 2).

Table 2. Recorded bountied cougar take in Oregon, 1912-1963 (Harcombe 1976).

County	Total No. Bountied	Last Year/No. Bountied
Baker	9	1960/2
Benton	30	1960/1
Clackamas	403	1959/2
Clatsop	81	1960/1
Columbia	114	1949/1
Coos	502	1961/2
Crook	16	1948/1
Curry	1,044	1961/1
Deschutes	9	1948/1
Douglas	1,869	1961/2
Gilliam	0	None since 1912
Grant	54	1958/1
Harney	29	1940/1
Hood River	18	1956/1
Jackson	384	1960/1
Jefferson	30	1959/1
Josephine	349	1961/1
Klamath	9	1956/1
Lake	9	1956/1
Lane	1,286	1961/3
Lincoln	115	1960/1
Linn	296	1960/1
Malheur	4	1959/1
Marion	81	1959/1
Morrow	4	1952/1
Multnomah	67	1961/2

County	Total No. Bountied	Last Year/No. Bountied
Polk	86	1961/2
Sherman	0	None since 1912
Tillamook	139	1959/1
Umatilla	9	1960/1
Union	50	1960/1
Wallowa	84	1960/1
Wasco	34	1959/1
Washington	23	1940/1
Wheeler	6	1956/1
Yamhill	44	1956/1

From 1918 to 1973, a minimum of 6,831 cougar were harvested in Oregon (Nowak 1976). The greatest number were taken from Douglas, Lane, Curry and Coos counties. In 1973 the Department estimated the statewide cougar population in 1961 had been 200 animals and predicted cougar would be extirpated from the state by the early 1970s without protection (W. Aney, pers. comm.).

Several events and actions benefited the cougar population: (1) The bounty system was repealed in 1961; (2) The cougar was classified as a game animal in 1967; (3) the Department initiated a statewide hunting season closure in 1968; and (4) cougar hunting has been tightly regulated since 1970. The Department delineated 44,740 square miles of cougar habitat in Oregon in a 1980 statewide wildlife planning update. An estimated 1,800 cougars occupied that habitat at that time. Increased cougar observations, road kill incidents, and damage complaints over the last 10 years indicate the statewide cougar population has increased substantially since 1980.

Cougar are now distributed statewide, with the exception of portions of the Willamette Valley, Columbia Basin and other interior valleys where resident deer and elk populations are small. The Department estimates the 1993 statewide cougar population is 2,500 animals occupying approximately 80,000 square miles in varying densities (Figure 2).

Harvest Management

History

The cougar was classified as a game mammal in 1967 out of concern for maintenance of the population. This gave the Oregon State Game Commission (now Oregon Department of Fish and Wildlife) management responsibility for the species. The Game Commission responded by curtailing open hunting seasons for cougar in 1968 and 1969. However, in response to livestock damage complaints in northeastern Oregon, the Department offered 25 cougar tags in 1970 for controlled seasons in the Snake River, Imnaha, and a portion of the Minam wildlife management units.

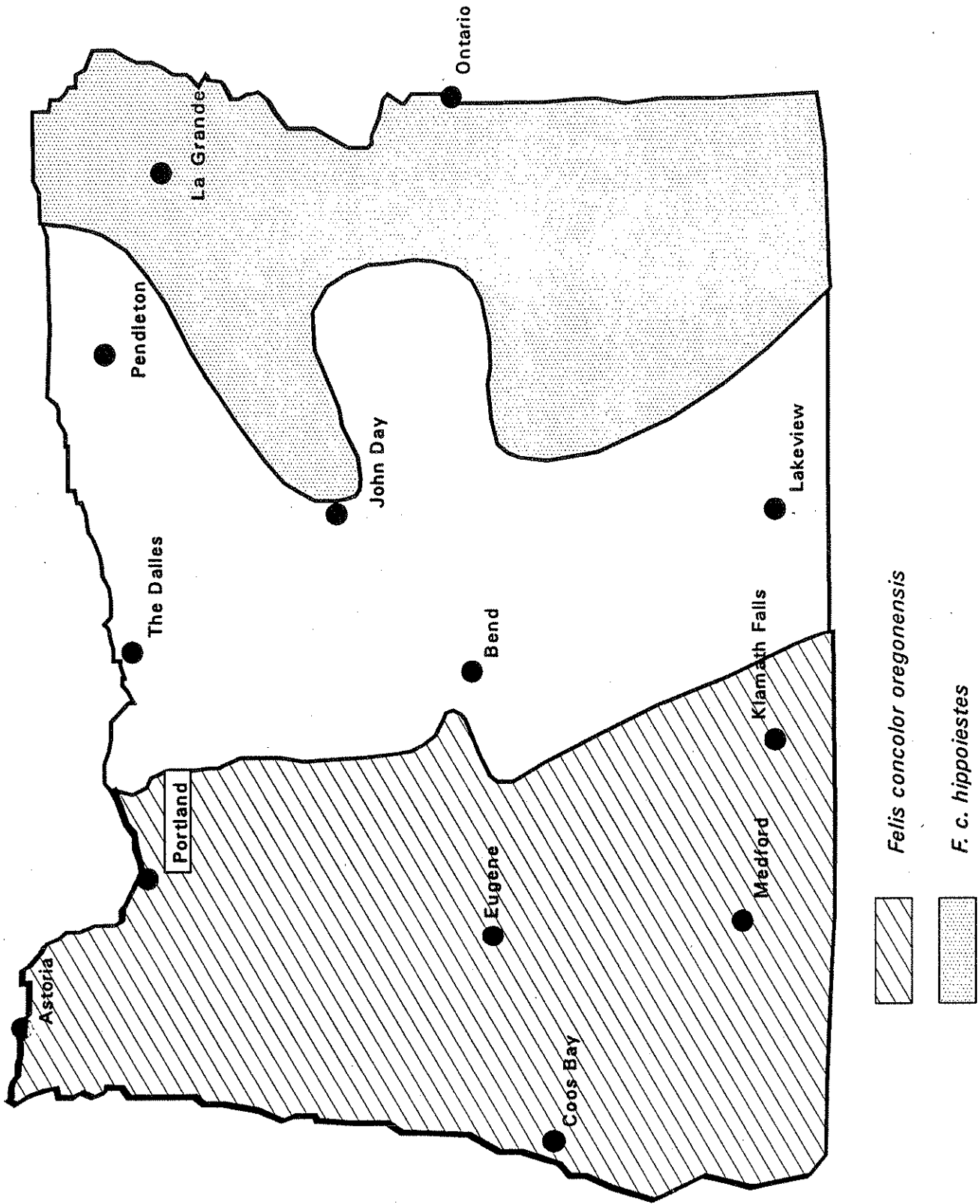


Figure 1. Historic range of cougars in Oregon (Bailey 1936).

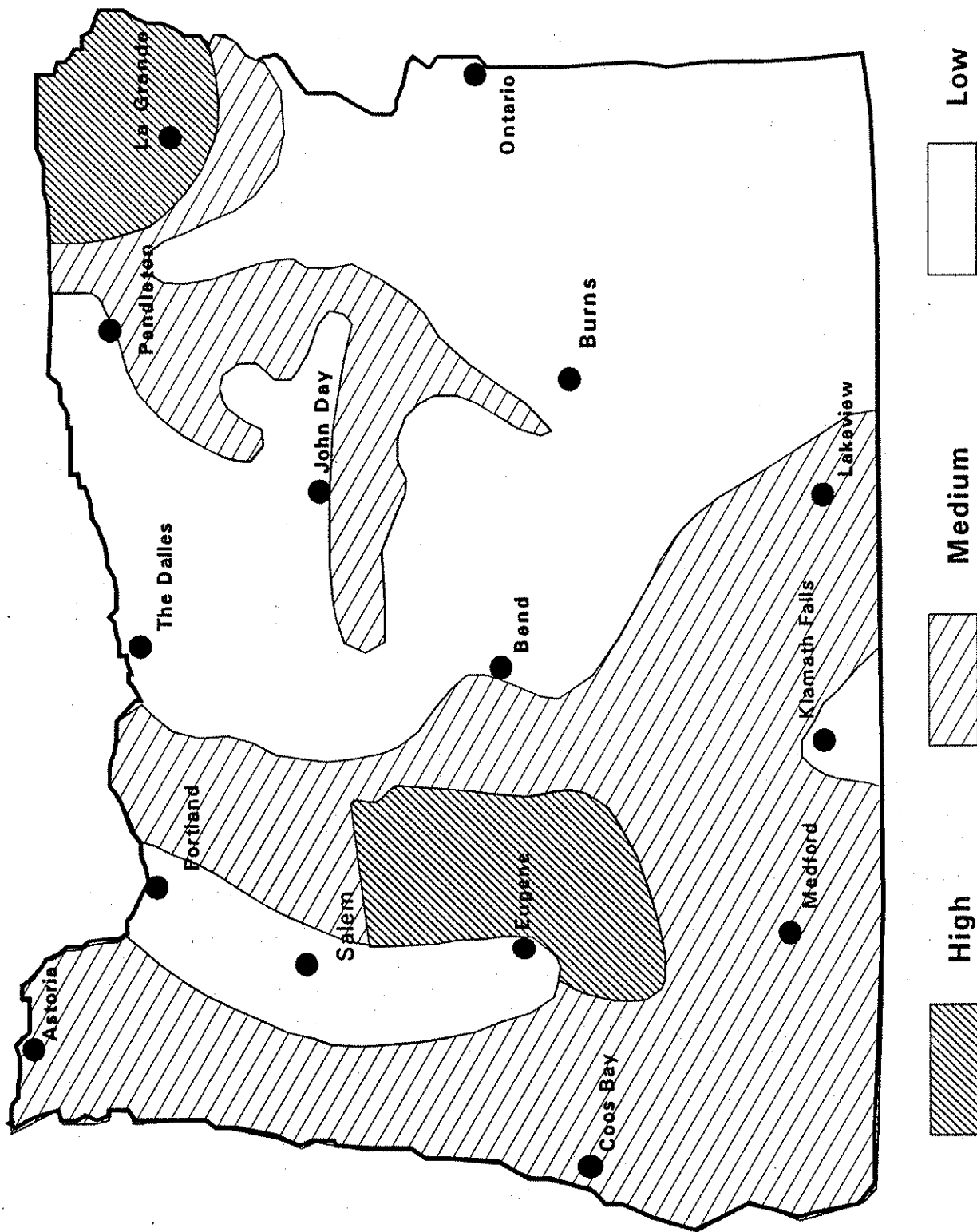


Figure 2. Generalized distribution and density levels of cougar in Oregon, 1992.

Controlled hunt seasons (where hunter numbers and hunting areas are tightly managed) have been authorized for cougar every year since 1970. The Department authorizes hunting seasons on cougar to: (1) Provide recreational opportunity; (2) Address livestock damage concerns by removing problem animals; and (3) Reinforce a fear of humans and maintain wildness in the behavior of cougars in proximity to humans.

Controlled tag numbers have gradually increased over the years to the 1992 level of 517 total tags authorized in 19 hunts ranging from one to 2.5 months in length (Table 3, Figure 3). In 1992, controlled cougar hunting was authorized for approximately 48 percent of the state (Figure 4). Hunter participation averaged 74 percent over the last six years, with hunter success statewide averaging slightly above 40 percent during the same time period (Table 3). Historically, one cougar has been harvested for every three to five tags issued; hunter harvest over the last five years has averaged slightly over 150 cougar per year (Table 3). These hunter participation and hunting success figures help Department biologists establish season lengths and tag numbers for sport hunting seasons as one tool to maintain cougar numbers at levels compatible with available habitat and human tolerance.

Demand for cougar tags in the early 1980s was high. Applicants in the computerized random tag issuance process had only a 10-20 percent chance of drawing a tag for their first choice hunt selection (Table 4). Substantial increases in the tag numbers offered from 1983 to 1986, combined with the stabilized demand by 1,700 to 1,800 first-choice applicants, resulted in much better odds of receiving a cougar tag. When 1987 controlled cougar tag applicants were required to purchase an application card (which included the cost of the tag plus application fee) to enter the drawing, the Department experienced a decline in the number of applicants (Table 4). A further decline was noted in 1988 when the resident cougar tag fee increasing from \$20 to \$50. To more equitably distribute hunting opportunities among controlled hunt applicants, the Department imposed waiting periods for hunters successful in drawing tags. With the decline in applications for cougar tags, the three-year waiting period for cougar hunters was no longer needed and it was discontinued in 1988. Interest in cougar hunting has increased slightly over the last three years (Table 4).

Table 4. Cougar hunting demand, 1980-1992.

Year	Tags Authorized	Applicants ^a	% Chance of Draw	Applicants per Tag ^a
1992	517	921	56	1.8
1991	482	797	60	1.6
1990	471	664	71	1.4
1989	451	612	74	1.4
1988	442	706	63	1.6
1987	457	835	55	1.8
1986	462	1,685	27	3.6
1985	362	1,759	21	4.9

Year	Tags Authorized	Applicants ^a	% Chance of Draw	Applicants per Tag ^a
1984	263	1,788	15	6.8
1983	188	1,732	11	9.2
1982	168	1,674	10	10.0
1981	161	1,487	11	9.2
1980	160	1,063	15	6.6

^a First choice applicants; an applicant can currently (1993) apply for up to five different hunt choices on an controlled hunt application.

Tag Number Determination

Cougar tag numbers for individual hunts are approved by the Oregon Fish and Wildlife Commission. When recommending sport seasons for cougar (tag numbers, hunt areas and season lengths), Department biologists consider past harvest rates, the sex and age composition of that harvest, the number of damage complaints received over time, the number of cougar taken to control damage, estimated natural mortality, and the number of sighting reports received over time. Decreasing trends in a majority of these categories warrant a decrease in the number of tags issued or the closure of specific controlled cougar hunts. Increasing trends indicate more generous seasons may be authorized without jeopardizing the cougar population.

Biologists in northeast Oregon are now using cougar density and productivity information from the Catherine Creek study when recommending tag numbers. Preliminary results of the study suggest that an average of one sub-adult cougar is recruited into the population each year for every adult female cougar in the population. Biologists estimate the number of adult females in the population from the average home range size for females and the degree of home range overlap for those females. Wildlife managers combine these two factors to estimate the annual recruitment (or potential surplus) to the population of each hunt area. Biologists use this predicted recruitment figure as well as past harvest data, hunter success, other causes of mortality, and the number of damage complaints received to recommend cougar seasons and tag numbers. The Department will evaluate and update this process as new information becomes available.

The original Cougar Management Plan directed the Department to investigate the feasibility of implementing a harvest quota system to limit the number of cougar taken by hunt area. The quota system sets a maximum harvest level for cougars within a specific hunt area. Once that level is reached (through recreational and damage control harvest) the hunting season is closed for the year. The Department learned that the states currently using the quota system for cougar authorize hunt areas that are much larger and general seasons that are much longer than those in Oregon, and they do not necessarily limit the number of cougar hunters who can participate in the season.

Table 3. Cougar harvest in Oregon, 1970-1992.

YEAR	EASTERN OREGON			WESTERN OREGON			GRAND TOTAL			
	TAGS		HARVEST	TAGS		HARVEST	TAGS		HARVEST	
	AUTHORIZED	HUNTERS		AUTHORIZED	HUNTERS		AUTHORIZED	HUNTERS		
1970	25	16	10				25	16	10	63
1971			15			3	100	68	18	26
1972	75	46	22				75	46	22	48
1973	83	55	16				83	55	16	29
1974	75	34	16				75	34	16	47
1975	35	52	15				95	52	15	29
1976	115	52	14	10	8	2	125	60	16	27
1977	115	54	25	25	19	2	140	73	27	37
1978	105	64	24	25	16	10	130	80	34	43
1979	115	54	19	25	17	4	140	71	23	32
1980	120	56	17	40	33	15	160	89	32	36
1981	98	52	25	43	31	8	141	83	33	40
1982	117	69	43	46	29	14	163	98	57	58
1983	132	51	41	56	34	13	188	85	54	64
1984*	167	-	42	96	-	37	263	-	79	-
1985*	207	-	36	155	-	26	362	-	62	-
1986	232	161	61	230	146	56	462	307	117	38
1987	227	157	76	230	180	90	457	337	166	49
1988	237	163	63	205	162	69	442	325	132	41
1989	226	153	65	225	203	79	451	356	144	40
1990	241	178	78	230	185	77	471	363	155	43
1991	252	173	86	230	192	69	482	365	155	42
1992	267	189	93	250	202	94	517	391	187	48

* NO HUNTER SURVEY TAKEN

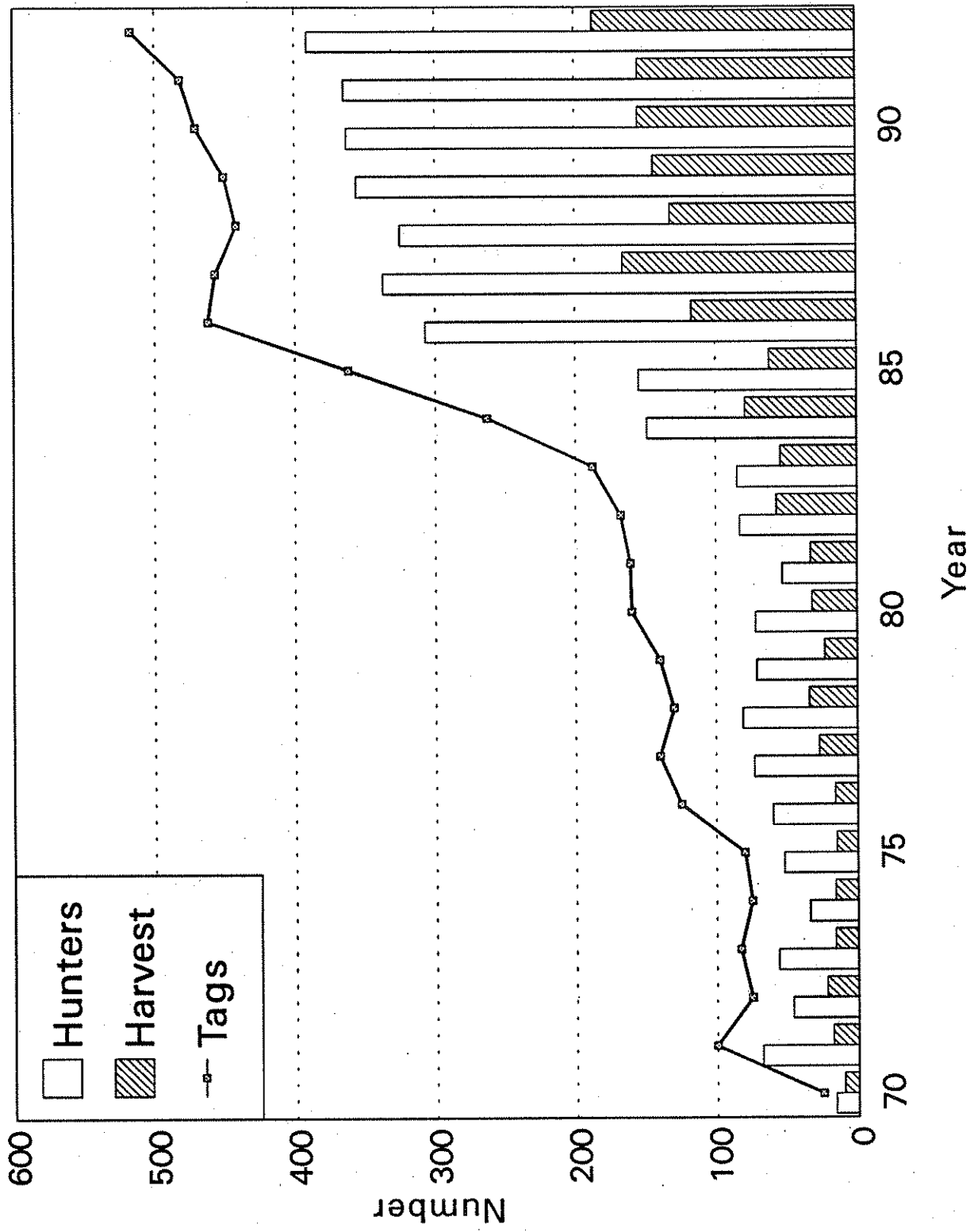


Figure 3. History of cougar hunting seasons in Oregon, 1970-1992

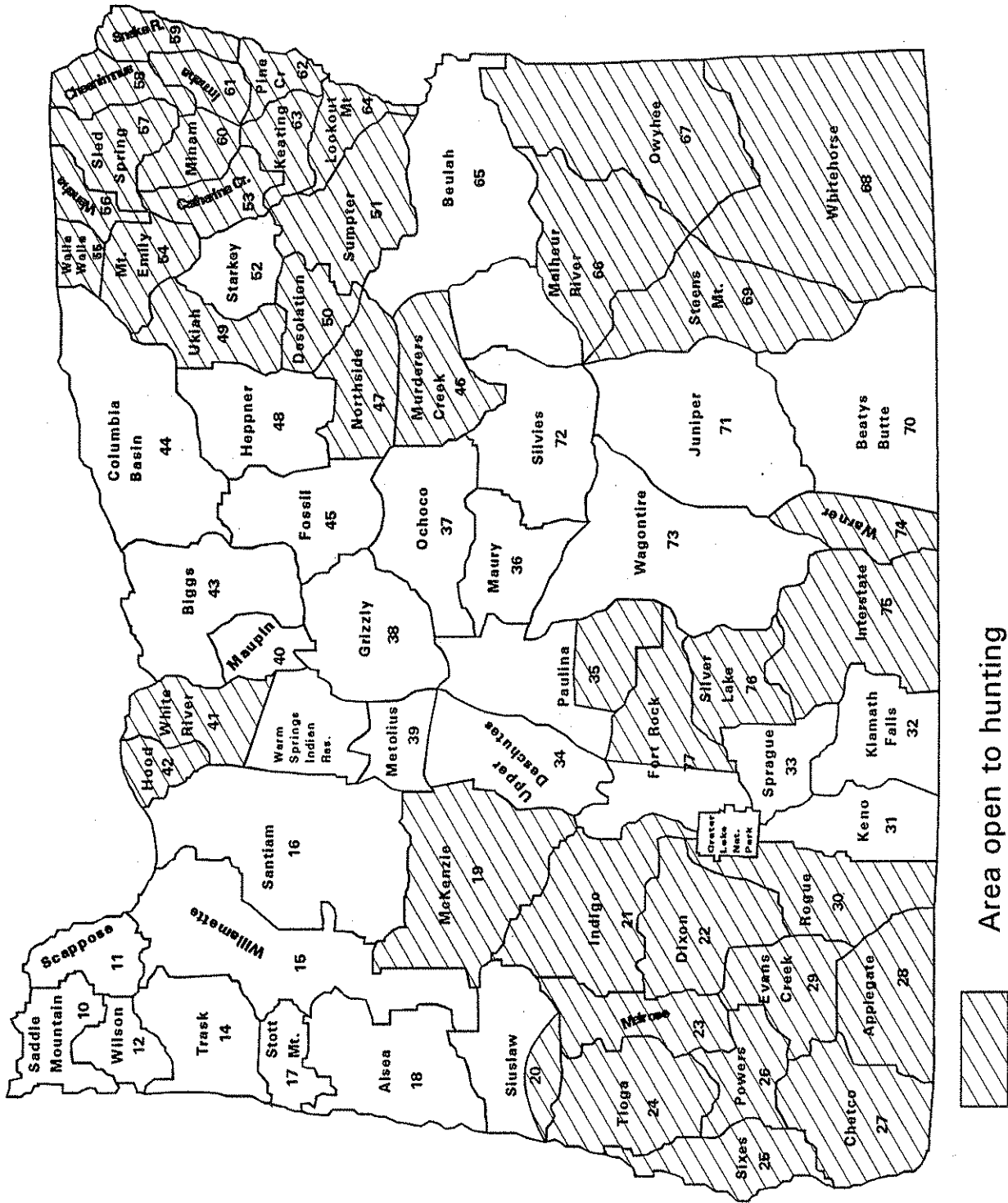


Figure 4. Areas open to cougar hunting during the 1992 Oregon hunting season.

The Department believes the present controlled hunt system is most appropriate for Oregon and meets goals to maintain healthy cougar populations yet provide recreation. Cougar seasons in Oregon are set annually based on the best information available regarding population health and harvest history. Controlled hunting seasons enable the Department to limit the number and location of hunters, which reduces hunter crowding and improves the quality of the hunting experience. This system also allows the Department to change harvest rates from year to year in response to changing conditions, as well as target areas with excessive damage problems. Although a quota system may provide a longer season for recreational hunters, it would also increase administrative demands. While the quota system may be feasible in some instances, the Department proposes to continue the existing controlled hunt system.

Harvest Analysis

The Department evaluates the sex and age structure of all cougar mortalities to monitor the overall health of the cougar population. Successful cougar hunters are required to check in at a Department office to verify the sex of the cougar taken. The Department similarly monitors all other known cougar mortalities. This information is particularly important to cougar management activities because it is impossible to conduct an annual census of cougars.

Normally, more males than females are taken in the harvest (Table 5). This occurs for four primary reasons: (1) Adult males have larger home ranges than adult females and young males tend to disperse farther than young females, therefore, there is a greater chance that males will be located and taken by hunters; (2) Cougar hunters prefer males to females because males tend to be larger in size; (3) Cougar hunters recognize that females are the reproductive base of a population and therefore they tend to target the males; and (4) Spotted kittens and females with spotted kittens are protected during hunting seasons.

The age distribution of harvested cougars is another indicator of population health and the impact of hunting on a population. The presence of young cougars in the age data indicates that reproduction is occurring and that harvest rates are conservative enough to allow females to reach reproductive age. High percentages of young in the harvest with few older age-class animals taken may indicate excessive exploitation of the population. Similarly, the presence of older cougar in the take indicates that harvest rates are conservative enough to allow a sector of the population to reach older age classes.

Table 5. Sex ratio of hunter-killed cougar in Oregon, 1970-1992.^a

Year	Male	Female	Unknown	Total	% Male
1970	4	6	0	10	40
1971	8	10	0	18	44
1972	10	12	0	22	45
1973	7	9	0	16	44
1974	11	5	0	16	69
1975	4	11	0	15	27
1976	10	6	0	16	63
1977	16	11	0	27	59
1978	16	18	0	34	47
1979	9	14	0	23	39
1980	10	14	8	32	31
1981	17	13	3	33	52
1982 ^b	-	-	57	-	-
1983 ^b	-	-	-	54	-
1984	39	38	2	79	49
1985	29	32	1	62	47
1986	52	65	0	117	44
1987	101	65	0	166	61
1988	78	54	0	132	59
1989	94	51	0	145	65
1990	98	57	0	155	63
1991	94	61	0	155	61
1992	111	76	0	187	59
Total/Ave.	818	628	14	1571	51

^a For 1970 - 1983 harvest information is the result of hunter survey; No hunter survey conducted in 1984 and 1985; Data for 1986-1992 based on harvest validated by mandatory hunter check-in. Spotted kittens and females with spotted kittens protected starting in 1974.

^b Statistical breakdown of data unavailable for these years.

Oregon cougar hunters tend to take larger cougars (which are usually older), and select for males. If this targeted harvest was coming from a small or declining cougar population, the sex ratio of the harvest would shift over time from primarily male to female. In addition, over time fewer cougar in the harvest would come from the older age classes. Neither trend is evident in Oregon's data (Tables 5, 6). In fact, data indicate that males are actually comprising an increasing amount of the harvest in Oregon (Table 5). This increasing proportion of males in the harvest, coupled with the representative age distribution of the harvest (Table 6), indicate Oregon's cougar population is healthy and growing. These data also support the population projections based on the Department's cougar model.

Age data from Oregon's cougar harvest indicates both young and old animals are represented in the population (Table 6). As is typical of a growing population, the greatest representation is found in the younger age classes. The 1- and 2-year-old age classes are more vulnerable to hunting and more likely to be taken on damage complaints (Trainer and Golly 1992) because they are in the act of dispersal; therefore, biologists expect them to be well represented in the harvest. Cougars less than 1 year of age are, for the most part, protected from hunting in Oregon which explains why they do not appear in large proportions in the harvest data. The consistent and gradually increasing presence of older animals in the harvest indicates the recreational and damage control harvest of cougar in Oregon is not excessive, since young cougars are present in the wild and surviving to older age classes. In general, cougars taken on damage are younger than those of the harvest.

Table 6. Age distribution of Oregon cougars 1987-1992.^a

Year	N	Percent by Age Class										
		0	1	2	3	4	5	6	7	8	9	10+
1987	163	4	14	30	16	13	9	7	3	1	1	2
1988	148	6	22	31	18	10	5	2	1	2	2	1
1989	170	6	14	31	19	8	5	5	4	4	1	3
1990	185	7	10	20	17	14	11	8	2	4	0	7
1991	190	6	6	18	14	12	16	12	4	5	4	3
1992	223	4	6	14	14	14	13	8	7	5	5	10

^a Includes hunter harvest, damage and other losses.

Hunter Success/Methods

Oregon authorizes cougar seasons for the late-fall and winter (when the ground is usually covered with snow) to help hunters positively identify cougar tracks. This reduces the likelihood that females with young will be hunted, or non-target wildlife species will be tracked. As a result, hunter success varies markedly from year to year depending on weather conditions during the hunting period.

Ninety percent of Oregon cougar hunters use dogs because it is the most successful method of hunting cougar. The sport is not without its detractors, who are concerned about the impact of dogs on wildlife during a critical time of the year.

The disturbance factor of tracking dogs on non-target species is very difficult to quantify. Dogs on the trail of their quarry will displace other species of animals encountered along that trail. However, such disturbance is generally temporary, since trained dogs do not typically pursue non-target species. Similar disturbance and displacement is also

associated with other activities such as timber harvest, photography, hiking, recreational vehicle use, or hunting without dogs.

Dogs that trail non-target species can cause more than minor displacement of the pursued animal. However, an equivalent displacement is caused by wild predators such as coyotes, cougars, or bears in the act of predation. This phenomenon exists year round and is not confined to a few weeks of the year. The predator-prey behavior pattern is the same for native predators as it is for tracking dogs. Prudent hound handlers do not tolerate their dogs tracking any species other than that targeted, and dogs that cannot be stopped from trailing non-target species usually are not retained by the owner.

Because good tracking dogs are very expensive, some handlers use telemetry collars on their animals to help keep track of the dogs once released. Telemetry allows a hunter to retrieve a lost dog more quickly and, therefore, reduce the potential impact of lost dogs on non-target animals. In addition, telemetry collars aid the owner in stopping pursuit if a dog does trail non-target animals.

Some people claim the use of telemetry collars increases harvest rates and, therefore, has a detrimental impact on the population. However, cougar hunting in Oregon is limited through controlled tag seasons, and harvest data do not indicate over-harvest is occurring. There is also the fear that telemetry collars on dogs increases the incidents of night hunting for cougar. Hunting big game mammals at night is illegal in Oregon. The unscrupulous poacher may use telemetry equipment in an illegal manner, just as any other equipment or device may be misused. The Game Division of the Oregon State Police enforces this and other fish and wildlife laws as staffing and budgetary constraints permit.

A major concern regarding cougar hunting is the possibility that a female with dependent kittens may be killed, thus orphaning the kittens. Current regulations protect spotted kittens and females with spotted kittens during the hunting season. It is extremely difficult to determine the extent to which orphaning may occur; which explains why orphaning of cougar kittens as a result of hunting is seldom documented in Oregon. Of those instances that have been documented, the cause for the adult female's loss was not determined. However, hunting during periods of snow cover reduces the chance that a female with dependent kittens will be tracked and taken during the hunting season.

Orphaning has not been documented among the Catherine Creek study animals – a hunted population where females with young have been radio-tracked during hunting seasons for the last four years. Although the orphaning of kittens does not appear to occur at levels that threaten cougar populations, it may happen on occasion.

Cougar/Livestock Conflicts

ORS 498.012 allows landowners or their agents (without first obtaining a permit from the Department) to take any cougar that is causing damage to property they own or lawfully occupy. Landowners or their agents may not pursue cougar off the property where

damage is occurring, and the statute requires immediate notification of "...a person authorized to enforce the wildlife laws...." when any cougar is taken.

Animal Damage Control (ADC) personnel with the Animal and Plant Health Inspection Service (APHIS) of the U. S. Department of Agriculture conduct most cougar damage control work in Oregon, and have acted as an agent of the Department since 1984. Damage control efforts are closely associated with the area undergoing damage, and designed to take only the offending animal. In the past, most damage control efforts occurred in northeast and southwest Oregon. Most recently, complaints have increased from other parts of the state – another indicator of a growing statewide cougar population.

Because Southwest Oregon has more damage than any other part of the state (Table 7), Douglas County conducts its own predator control program for county residents. In most cases, county control agents coordinate with Department personnel before taking any control action. Much of the cougar damage in Douglas county is related to the numerous livestock operations in the county and the close proximity of cougar habitat to these ranching operations. The only special damage hunt in the state authorized for cougar is in the interior valleys surrounding Roseburg

Table 7. Cougar damage complaints by region, 1986-1992.

Administrative Region	Calendar Year						
	1986	1987	1988	1989	1990	1991	1992
Columbia	1	0	0	3	2	11	6
Northwest	9	10	10	10	13	36	48
Southwest	15	36	17	29	44	84	64
Central	8	5	5	9	14	9	19
Northeast	3	8	4	12	13	20	12
Southeast	0	0	1	0	0	5	2
TOTAL	36	59	37	63	86	165	151

Cougar damage complaints continue to increase in Oregon. Biologists generally believe this is indicative of an increasing cougar population that may be exacerbated by the increasing human population encroaching on cougar habitat. The Department will give special attention to areas where cougar/human conflicts occur, with the overall objective to minimize such conflicts.

Landowners take a few cougar each year under the damage statute (ORS 498.012) without a permit (Table 8). Department personnel receive most cougar damage

complaints filed in the state and investigate them before taking any control action. A majority of these complaints involve cougar depredation to livestock, but an increasing number of complaints involve human safety.

In many cases, the Department resolves livestock depredation problems by providing the complainant advice on how to handle the situation himself or herself. The Department prefers to handle these types of complaints with recommended actions to solve or avoid the situation to preclude destroying the offending cougar. Where possible, the Department advises a change in livestock husbandry techniques to solve the problem. To standardize the process of damage control statewide, the Department developed a policy for handling cougar (and bear) damage complaints (Appendix B). This policy will be updated as new information and control alternatives become available.

Table 8. Known cougar loss outside hunting seasons, 1980-1992.

Year	ADC	Douglas County Predator Control	Private & Accidental^a	Total
1980	0	9	8	17
1981	0	8	12	20
1982	0	6	6	12
1983	1	3	6	10
1984	10	4	8	22
1985	7	6	14	27
1986	5	4	13	22
1987	22	8	13	43
1988	12	6	18	36
1989	10	5	23	38
1990	16	10	23	49
1991	15	4	21	41
1992	19	3	16	38

^a Includes verified illegal kills, road kills, and depredating animals killed by private landowners.

Cougar/Human Conflicts

Some Oregon residents have an increasing concern about being attacked by a cougar. There has been only one documented cougar attack on a human in Oregon. However, several other states and provinces recently documented instances where cougars inflicted severe wounds and caused several human deaths – an occurrence that appears to be on the increase in these areas (Beier 1991). Reported cougar sightings are increasing in Oregon as the cougar population increases and expands back into its original range as well as areas

inhabited by humans. This expansion is bringing cougar into closer daily contact with people and increasing the potential for conflict.

In addition to fears about encounters with wild cougars, some Oregon residents are concerned about human safety associated with cougars held in captivity. The Department shares these concerns. It is against the law to capture a cougar from the wild in Oregon and hold it in captivity. Individuals may, however, hold a cougar legally acquired out of state or purchased from a licensed propagator. The Oregon Fish and Wildlife Commission declared the cougar "dangerous" (OAR 635-44-035); thus, anyone holding a cougar must build a pen that meets Department specifications. However, not all cougar owners keep their animals within the pen at all times. When these "domesticated" cougars escape for short periods in residential areas, citizens are alarmed about the safety of their family and pets, which has stimulated some city governments to pass ordinances prohibiting the possession of the animals within the city limits. Escaped domestic cougars may potentially threaten human safety, and cause disease and genetic degradation affecting the health of Oregon's native cougar population.

Illegal Harvest

The 1987 Cougar Management Plan directed the Department and the Oregon State Police (OSP) to determine the extent of the illegal harvest. Current regulations require any person taking a cougar to bring the animal to a Department office within 48 hours of the kill. The Department collects biological information and attaches an ownership seal to the hide. This seal must remain with the hide until the hide is processed. This requirement distinguishes a legally harvested cougar (marked with a seal) from one that is not (unmarked) for easier identification by enforcement officers. The Department also collects information pertaining to the hunt when hunters check in their animals, which provides the OSP data related to the season should they receive reports of illegal hunting activity.

The current extent of illegal cougar kill remains unknown. Poaching is difficult to quantify, but it is recognized as a significant problem in some areas. However, the Department has not yet found poaching to have a widespread negative biological impact on Oregon's cougar population. Increased cougar numbers in many areas of the state, combined with the high monetary value of the species, sometimes lead to increases in illegal cougar hunting activities.

Findings from the Catherine Creek study do not indicate poaching is extensive in portions of northeast Oregon. Only one of the 41 radio-collared cougar (2.4 percent) has been taken illegally over a four-year period.

MANAGEMENT CONCERNS AND STRATEGIES

The following concerns associated with the present cougar management program illustrate the problems and needs. The strategies listed are the means by which the Department will address these needs and/or solve existing problems. The Department will implement these management actions as fiscal and staffing limitations permit.

1. THE DEPARTMENT HAS A CONTINUED NEED FOR INFORMATION ON WHICH TO BASE COUGAR MANAGEMENT.

Strategies:

- a. The Department will continue to authorize controlled cougar hunting seasons conducted in a manner that meets the agency's statutory mandates to maintain the species and provide consumptive and non-consumptive recreational opportunities. As it has done since 1970, the Department will use information from the hunter harvest, damage control, and illegal and accidental kill to monitor the health of the statewide cougar population.
 - b. The Department will continue to study cougar population characteristics as well as the impact of hunting on cougar populations. Research findings and new information will be used to update and/or amend management programs.
 - c. The Department will continue to apply population modeling to track the overall cougar population status. The cougar model will be updated as new information becomes available. Specific attention will be given to the information derived from special Oregon studies of the cougar population, reproduction, and age distribution.
 - d. The Department will continue the mandatory check of all hunter-harvested cougar and evaluate the information collected on population characteristics for use in setting harvest seasons.
 - e. The hunting season bag limit will remain "one cougar except spotted kittens and females with spotted kittens are protected."
 - f. The Department will continue development of a tooth aging (cementum annuli) technique.
- 2. ILLEGAL HUNTING ACTIVITY HAS BEEN IDENTIFIED AND APPEARS TO BE RELATED TO THE INCREASE IN COUGAR POPULATIONS AS WELL AS THEIR AESTHETIC AND COMMERCIAL DESIRABILITY. ILLEGAL HUNTING HAS NOT BEEN FOUND TO THREATEN OVERALL COUGAR POPULATIONS.**

Strategies:

- a. The Department will continue to work with the Game Division of the OSP to monitor the level of illegal cougar hunting activity.
 - b. The Department and OSP will implement appropriate enforcement actions and make the necessary changes in regulations to reduce illegal cougar hunting.
 - c. The Department will continue the mandatory check-in of all hunter-harvested cougar.
 - d. The Department and OSP will continue to inspect taxidermist facilities and records to discourage and document the processing of cougar hides lacking Department seals.
- 3. POPULATION MODELING, HARVEST STATISTICS, DAMAGE COMPLAINTS, AND COUGAR SIGHTINGS INDICATE OREGON'S COUGAR POPULATION IS INCREASING. THIS, IN TURN, INCREASES THE POTENTIAL FOR FUTURE HUMAN-COUGAR CONFLICTS AND CREATES FEAR AMONG SOME CITIZENS.**

Strategies:

- a. The Department will provide information to the public about cougar distribution, management needs, behavior, etc., through various media and other available opportunities.
 - b. Where possible, the Department will attempt to solve human-cougar conflicts by non-lethal methods.
 - c. The Department will consider additional hunting seasons or increased hunter numbers in those areas where human-cougar conflicts develop.
 - d. The Department will manage for lower cougar population densities in areas of higher human occupancy.
- 4. THE ANNUAL COUGAR HARVEST IS ERRATIC BECAUSE THE AMOUNT AND TIMING OF SNOWFALL STRONGLY AFFECTS HUNTER SUCCESS. THIS, IN TURN, AFFECTS THE DEPARTMENT'S ABILITY TO MANAGE THE COUGAR POPULATION THROUGH HUNTING SEASONS.**

Strategies:

- a. Because annual fluctuations in the weather greatly influence the recreational cougar harvest, the Department will manage the species based on population *trends*. That is, the Department will *not* make regulation changes based on a single year's data collection, except in an emergency situation.
- b. The Department will continue to regulate cougar hunting through controlled permit seasons.

- c. The quota system will remain an option for regulating cougar harvest.
- 5. **ALTHOUGH THE MOST SUCCESSFUL METHOD OF HUNTING COUGAR IS WITH THE USE OF TRAINED HOUNDS, MANY CITIZENS ARE CONCERNED ABOUT THE IMPACT DOGS MAY HAVE ON NON-TARGET SPECIES.**

Strategies:

- a. The Department will continue to allow the use of dogs to hunt cougar.
- b. The Department will minimize the potential impacts of dogs on non-target species through regulation and education.
- 6. **CURRENT STATUTES ALLOW PRIVATE AND PUBLIC LANDOWNERS TO TAKE DAMAGE-CAUSING COUGAR WITHOUT A DEPARTMENT PERMIT.**

Strategies:

- a. The Department will not seek changes to existing damage control statutes.
- b. Department personnel will continue to work with landowners to encourage them to report potential damage before it occurs, with the goal of solving complaints by other than lethal means.
- c. The Department will continue to emphasize that damage must occur before landowners or Department agents may remove an offending animal.
- d. The Department will continue to encourage improved livestock husbandry practices as a means of reducing cougar damage on domestic livestock.
- e. The Department will continue to work closely with personnel of APHIS and USDA, as well as private landowners to solve cougar depredation problems. The Department will continue coordination with ADC or Douglas County Predator Control through a memorandum of understanding. Because control agents can respond rapidly to complaints, and their expertise and techniques greatly improve damage control efficiency – the Department will ask control agents to solve cougar damage complaints. In most cases, once a control effort has been initiated by a control agent, no additional personnel will be used on that complaint.
- f. The Department will explore the application of sport hunting to control cougar damage, especially in counties that do not participate in the APHIS program.
- g. All cougar taken to control damage will be reported to the Department as required by ORS 498.012, or the Department will initiate appropriate enforcement action

7. **BECAUSE COUGAR ARE GENERALLY VERY DEPENDENT ON DEER OR ELK AS THEIR PRIMARY FOOD SOURCE, THE BEST COUGAR HABITAT IS THAT WHICH SUPPORTS HEALTHY DEER OR ELK HERDS. HOWEVER, ADEQUATE DEER AND ELK HABITAT IS DECLINING IN SOME AREAS. IN ADDITION, SOME COMPONENTS OF COUGAR HABITAT APPEAR TO BE CRITICAL TO THEIR WELFARE.**

Strategies:

- a. The Department will continue to work with landowners and public land managers to maintain satisfactory deer, elk and cougar habitat.
 - b. Where possible, the Department will evaluate the effects of human activities and human disturbance on cougar.
 - c. In areas where the Department determines human access is detrimental to the welfare of cougar or their prey base, it will take actions to correct the problem (such as coordinating with landowners to establish road closures).
8. **OREGON CITIZENS AND VISITORS TO THE STATE INDICATE AN INCREASING DESIRE TO OBSERVE WILDLIFE, INCLUDING COUGAR.**

Strategies:

- a. Opportunities for casual viewing of cougar are virtually nonexistent; however, the Department will make available information about where cougar can be found.
 - b. Cougar viewing and photography opportunities can be provided by treeing cougar with trained hounds. The Department will explain the regulations and opportunities pertaining to these activities to the public.
9. **COUGAR POPULATIONS MAY REDUCE LOCAL PREY POPULATIONS (DEER OR ELK) TO VERY LOW LEVELS.**

Strategies:

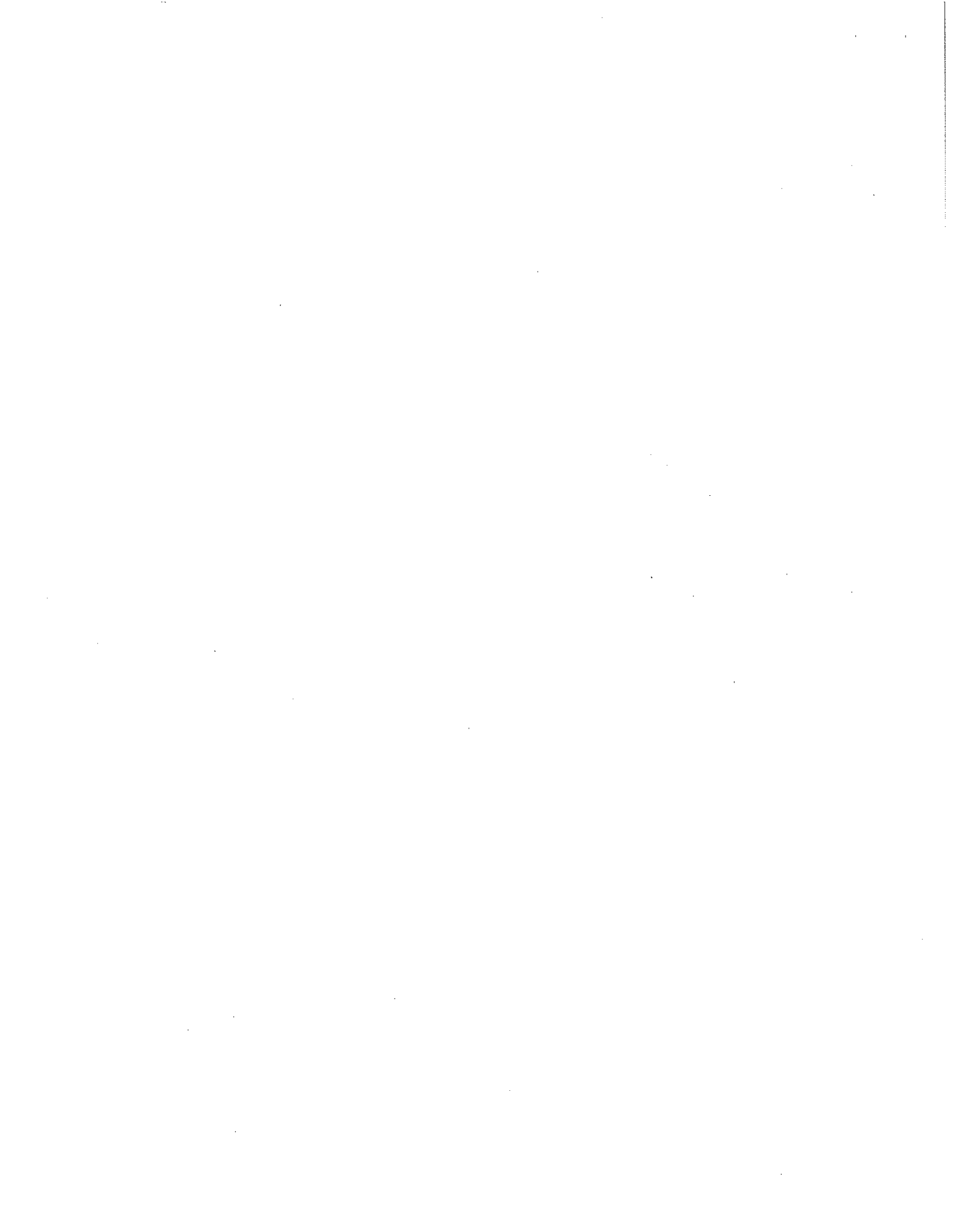
- a. The relationship between predator and prey populations means healthy cougar populations depend on healthy prey populations.
- b. The Department will manage for healthy populations of *all* big game species.

LITERATURE CITED/SUGGESTED READING

- Ashman, D. 1976. Mountain lion investigations. Job. Final Rpt. Pitt. Rob. Proj. W-48-7, Study S&I, Job 5 and Study R-V, Job 1. Nev. Game and Fish Dept., Reno. 19pp.
- Ashman, D., G. C. Christensen, M. L. Hess, G. K. Tsukamoto, and M. S. Wickersham. 1983. The mountain lion in Nevada. Nevada Dept. of Wildl., Reno. 91pp.
- Bailey, V. 1936. The mammals and life zones of Oregon. N. Amer. Fauna No. 5, U.S. Gov. Print. Off., Washington, D. C. 416pp.
- Beier, P. 1991. Cougar attacks on humans in the United States and Canada. Wild. Soc. Bull. 19:403-412.
- Eaton, R. L., and K. A. Velander. 1977. Reproduction in the puma: biology, behavior, and ontogeny. World's Cats 3:45-70.
- Johnson, G. D., and M. D. Strickland. 1992. Mountain lion compendium and an evaluation of mountain lion management in Wyoming. Wstrn. Ecosys. Tech., Inc. Cheyenne, Wyo. 41pp.
- Hansen, K. 1992. Cougar, the American lion. Northland Pub. Co., Flagstaff, Ariz. 129pp.
- Harcombe, D. W. 1976. Oregon cougar study. Oregon Dept. Fish and Wildl., Portland. 62pp.
- Hemker, T. P., F. G. Lindzey, and B. B. Ackerman. 1984. Population characteristics and movement patterns of cougars in southern Utah. J. Wildl. Manage. 48:1275-1284.
- Hornocker, M. G. 1970. An analysis of mountain lion predation upon mule deer and elk in the Idaho Primitive Area. Wildl. Mono. No. 21, The Wildl. Soc. 39pp.
- Hornocker, M. G. 1971. Suggestions for the management of mountain lions as trophy species in the Intermountain region. Ann. Proc. Western Assoc. State Game and Fish Comm. 51:399-402.
- Koford, C. B. 1978. The welfare of the puma in California. Carnivore 1:92-96.
- Mansfield, T. M. 1991 Mountain lion damage to property in California. Pages 75-78 in C. E. Braun, ed. Mountain lion-human interaction symposium and workshop. Denver, Colo. 114pp.

- Mansfield, T. M., and R. A. Weaver. 1989. The status of mountain lions in California. Pages 15-18 in R. M. Smith, ed. Proc. Third Mt. Lion Wrkshp. Prescott, Ariz. 88pp.
- Maser, C., and R. S. Rohweder. 1983. Winter food habits of cougars from northeastern Oregon. Great Basin Natur. 43(3):425-428.
- Murphy, K. M., 1983. Relationships between a mountain lion population and hunting pressure in western Montana. Mont. Dept. Fish, Wildl. Parks. Pitt. Rob. Proj. Rpt. W-120-R-13 & 14. 48pp.
- Neal, D. L., G. N. Steger, and R. C. Bertram. 1987. Mountain lions: preliminary findings on home-range use and density in the central Sierra Nevada. U. S. Dept. of Agric., PSW For. and Range Exp. Sta. Res. Note PSW-392. 6pp.
- Nowak, R. M. 1976, The cougar in the United States and Canada. U.S. Dep. Inter., Fish and Wildl. Serv., Washington, D.C. and New York Zool. Soc., New York. 190pp.
- Nowak, R. M. 1991. Walker's mammals of the world. Fifth Ed. John Hopkins Univ. Press. Baltimore and London. 1629pp.
- Power, G. 1976. Comments. Pages 50, 55, 89-90 in G. C. Christensen and R. J. Fisher, co-chairman. Trans. Mtn. Lion Wkshp. U.S. Fish and Wildl. Serv., Portland, OR., and Nev. Fish and Game Dept., Reno. 213pp.
- Quigley, H. B., G. M. Koehler, and M. G. Hornocker. 1989. Dynamics of a mountain lion population in central Idaho over a 20-year period (Abstract Only). Page 54 in R. M. Smith ed., Proc. of the Third Mtn. Lion Wrkshp., Prescott, Ariz. 88pp.
- Rabb, G. B. 1959. Reproductive and vocal behavior in captive pumas. J. Mammal. 40:616-617.
- Robinette, W. L., J. S. Gashwiler, and O. W. Morris. 1961. Notes on cougar productivity and life history. J. Mammal. 42:204-217.
- Robinette, W. L., N. V. Hancock, and D. A. Jones. 1977. The Oak Creek mule deer herd in Utah. Utah Div. Wildl. Res. Publ. 77-15. 148pp.
- Seidensticker, J. D., IV., M. G. Hornocker, W. V. Wiles, and J. P. Messick. 1973. Mountain lion social organization in the Idaho primitive area. Wildl. Mono. No. 35., The Wildl. Soc. 60pp.
- Shaw, H. G. 1989. Soul among lions. Johnson Books, Boulder, Colo. 140pp.
- Toweill, D. E., and C. Maser. 1985. Food of cougars in the Cascade Range of Oregon. Great Basin Natur. 45(1):77-80.

- Toweill, D. E., and E. C. Meslow. 1977. Food habits of cougars in Oregon. *J. Wildl. Manage.* 41(3):576-578.
- Trainer, C. E., and N. E. Golly. 1992. Cougar age and reproduction. Pitt. Rob. Fed. Aid. Proj. W-87-R, Prog. Rpt., Subproject 281, Job 3. Oregon Dept. of Fish and Wildl., Corvallis. 14pp.
- Trainer, C. E., and G. Matson. 1989. Age determination in cougar from cementum annuli counts of tooth sections (Abstract Only). in R. H. Smith, ed. Proc. Third Mtn. Lion Wrkshp. Prescott, Ariz. 88pp.
- Van Dyke, F. G., R. H. Brocke, H. G. Shaw, B. B. Ackerman, T. P. Hemker, and F. G. Lindzey. 1986. Reactions of mountain lions to logging and human activity. *J. Wildl. Manage.* 50(1):95-102.
- Young, S. P., and E. A. Goldman. 1946. The puma, mysterious American cat. Dover Pubs., Inc. New York. 358pp.



APPENDIX A

History of Cougar Management in Oregon

1843-1912: First bounty offered by territorial government in 1843. Bounty in 1911 was \$10.

1913-1961: Cooperative government hunter program began in 1915. Between 1915 and 1961, federal hunters killed 442 cougar. Bounty increased from \$10 to \$25 in 1925. The depression forced a reduction to \$20 in 1933. Bounty increased to \$50 in 1939 and was paid until 1961.

1962-1967: Government hunters took 31 cougar on damage complaints. Sport hunting became more popular as road construction increased and more efficient snow travel equipment was developed. The 1967 Oregon Legislature granted the Oregon State Game Commission authority to declare cougar a game mammal in areas where damage was not expected. Bounties were no longer in effect (ORS 610.205).

1968-1969: Sport hunting for cougar was closed. A total of 26 cougar were taken on damage complaints.

1970: The Department authorized controlled season for 25 tags from December 1-31 in parts of Wallowa County. Ten animals were harvested with 80 percent classified as immature. The price of a cougar tag was \$5.

1971-1974: The Department continued to offer controlled hunts with all or varying portions of the state open to hunting. In 1974, the bag limit was changed from one cougar to "one cougar except kittens and females with spotted kittens are protected."

1975: The cougar tag fee was increased to \$10.

1975-1987: Controlled hunts continued. Varying parts of the state were open.

1987: Cougar Management Plan developed and adopted. The Oregon Legislature approved legislation that increased the price of a cougar tag to \$50 (effective 1/1/88).

1987-1992: Controlled hunts continued. Number of hunts and tags increased in response to an expanding cougar population and increasing cougar damage complaints.

1989: The Department initiated the Catherine Creek Cougar Study.

1992: The Department initiated the Southwest Oregon Cougar Study.

1993: The Department and Fish and Wildlife Commission revised the Cougar Management Plan to guide management through 1998.

APPENDIX B

Oregon Department of Fish and Wildlife

Guidelines for Handling Bear and Cougar Damage Complaints

(Effective June 1, 1992)

Recommended Action

Although frequently similar in nature, no two bear or cougar damage complaints are the same. Therefore, there is no simple solution to handling these complaints. The following guidelines give the biologist on the scene a series of options, in order of priority, that he or she may implement appropriate to the situation.

1. **Advice:** In many cases a nuisance complaint can be solved simply by providing the complainant with advice (remove the attractant, secure an entryway, etc.)
2. **Trap/Relocate:** If Option 1 fails, a nuisance animal may be captured, marked, and moved one time. If the animal returns to the original damage site and/or becomes involved in a similar situation a second time, it will be destroyed.
3. **Destroy:** Destroy any animal that is damaging livestock or causing concern for human safety (Options 1 & 2 do not apply).

Decision Criteria for Destroying An Animal: Human Safety

The ultimate decision on how an animal will be removed in a damage situation rests with the district biologist or his/her representative. Information used to make this decision includes but is not limited to:

1. Testimony by the complainant or complainants' neighbors about the situation at the time;
2. The district biologist's (or agent's) observations; and
3. The district biologist's determination of the potential for the problem to become more severe.

This information will be evaluated against the following criteria. If one or more of the following criteria are satisfied, the decision to destroy the animal due to concerns over human safety is justified.

Behavior Pattern Criteria:

1. Exhibits little or no fear of people.
2. Displays aggressive behavior when in contact with people:
 Bear - false charges, growling, teeth popping
 Cougar - crouching, advancing on person, snarling
3. Repetitive daylight activity around people.
4. Hazing is ineffective (includes yelling or other loud noises).
5. Killing or attempting to kill domestic companion animals (dogs, cats).
6. Attempting to break into residences or buildings, thus indicating no fear of people (pertains primarily to bear).
7. Animal is in poor physical condition due to injury or malnutrition which causes the district biologist to believe the animal would not survive if relocated or would return to the same behavior.