Idaho
Mountain Lion Management Plan
2024-2029

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EXECUTIVE SUMMARY

Mountain lions (*Puma concolor*) are a wide-ranging, territorial species that occur at low population densities. From the early to mid-1900s mountain lions had a restricted distribution in Idaho due to widespread bounties and unregulated harvest. Mountain lions now inhabit all suitable landscapes across the state and are classified and regulated as a big game species. As a result, Idaho offers generous and diverse mountain lion hunting opportunities.

Idaho Department of Fish and Game's (IDFG) mission is to preserve, protect, perpetuate, and manage all wildlife in Idaho, and provide for the citizens of Idaho, and as by law permitted to others, continued supplies of such wildlife for hunting, fishing, and trapping. Species management plans are developed to provide regional and statewide direction to advance this mission.

In the 2002–2010 Mountain Lion Management Plan (IDFG 2002), priorities focused on managing for well-distributed lion populations to provide recreational opportunity, while maintaining flexibility to address ungulate predation and depredation concerns. Eighteen mountain lion Data Analysis Units (DAUs) were created to summarize harvest data at biologically and locally relevant scales. While the DAU framework supported this objective, the ability to evaluate population changes through harvest trends was limited due to low harvest in some DAUs.

This Idaho Mountain Lion Management Plan 2024–2029 (Plan) provides guidance to IDFG staff to improve mountain lion monitoring and management at a landscape-scale and focus localized management actions at the local scale where predation, livestock depredation, or human-lion conflicts occur.

This plan will function as the action plan for Idaho mountain lion management through 2029 by guiding IDFG in annual work plan development and program prioritization and provide direction for development of regulatory recommendations.

The plan identifies four main priorities to address during the 2024–2029 planning period:

- Hunter opportunity and harvest
- Population monitoring and management
- Human-lion conflicts and livestock depredations
- Predation management

The mountain lion management planning team identified these priorities to improve mountain lion management, address conflicts, and maintain hunter opportunity. As the human population in Idaho continues to grow and expand, these priorities will become more complex. It will be increasingly important to minimize lion conflicts with humans and livestock, while also maintaining public acceptance for mountain lions and mountain lion hunting.

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INTRODUCTION

Mountain lion management is complex and involves a wide range of public attitudes towards predators. Additionally, population monitoring is difficult for this solitary species that exists at low density. Mountain lions, like other large carnivores, are valued by some people but seen as a source of difficulty by others, depending on different values, attitudes, livelihoods, and everyday activities. Management must therefore consider the social, cultural, biological, and ecological values Idaho citizens have for mountain lions, while simultaneously maintaining flexibility to address shifting issues and concerns. Mountain lions are an iconic big game animal and mountain lion hunting is a deeply rooted part of Idaho's hunting

heritage. Hunting plays an important role in promoting public advocacy and tolerance for mountain lions.

In Idaho, mountain lions are classified as a big game animal; therefore, a hunting license and tag are required to hunt mountain lions. Idaho mountain lion hunters are fortunate to have a diversity of hunting opportunities to choose from. IDFG sells approximately 30,000 mountain lion hunting tags and 4,000 hound-hunting permits annually. Around 650 mountain lions are harvested annually, and successful hunters spend approximately 2,300 days pursuing those lions.

Purpose of the Management Plan

The Idaho Fish and Game Commission (Commission) and IDFG have a legal responsibility to preserve, protect, perpetuate, and manage all of Idaho's wildlife to provide continuous supplies for hunting, fishing, and trapping (Idaho Code 36-103). Idaho Code 67-1903 requires state agencies to develop strategic plans that express how they will meet core mission requirements. Plans must identify outcome-based goals and performance measures.

The development of the 2024–2029 Mountain Lion Management Plan (hereafter Plan) was initiated in June 2020. A diverse group of biologists, researchers, enforcement officers, and communications staff from across the state supported Plan development. Several statewide big game species and predation management plans have been developed since the previous mountain lion planning effort and these documents helped to guide the management direction of this Plan.

The Plan will provide guidance to IDFG to implement programs that support mountain lion conservation and management. The Plan identifies issues that affect mountain lions and their management and will function as the action plan to guide overall direction for mountain lion management during the next 6 years (2024–2029). The Plan incorporates Commission policy and provides management direction to IDFG. Multi-year species management plans provide guidance and overall direction to staff and help identify both statewide and regional population and management objectives, intended to guide the biennial season setting process (additional clarification in Appendix A). Major components of this Plan include:

- Management Background
- Harvest Management
- Population Dynamics and Monitoring
- Health and Disease
- Predator – Prey Relationships
- Human – Mountain Lion Conflict
- Mountain Lion – Livestock Depredations

Results from Previous Planning Period

The primary management goals of the previous 2002–2010 Mountain Lion Management Plan (IDFG 2002) were to manage for well-distributed mountain lion populations to provide

recreational hunting opportunity and stabilize harvest, while being responsive to wildlife-human conflicts and prey population objectives (Table 1). Eighteen mountain lion Data Analysis Units (DAUs) were created with the goal of summarizing harvest data at biologically and locally relevant scales.

Table 1: Accomplishments during 2002–2022 for Management Goals identified in the 2002–2010 Mountain Lion Management Plan.

Management Goal	Results
Maintain mountain lion populations in Idaho at levels sufficient to assure their future recreational, ecological, intrinsic, scientific, and educational values, and limit conflicts with human enterprise and values.	- Monitored harvest through mandatory checks: • Mountain lion harvest increased an average of 2.2% annually (Harvest Seasons 2002–2022). • Maintained at least 45% female and 55% male harvest (averaged 44.7 % female and 55.3% male harvest during 2002–2022 seasons). - Offered second lion tag in north and central Idaho Game Management Units (GMUs) with underperforming ungulate populations. - Developed more uniform opening and closing dates to align with other big game harvest seasons. - Continued to implement female harvest quotas in 35 southern Idaho GMUs (2002–2020). • Implemented male and female harvest quotas in southeast Idaho (Harvest Season 2019–2021). - Removed all harvest quotas statewide after 2021 season.
Maintain a diversity of harvest opportunities for mountain lions.	- Continued to allow hound hunting: • Hound hunter permits increased 2.8% annually (2008–2022). • Implemented quota on non-resident hound hunting permits to regulate hunting pressure. - Allowed use of electronic calls. - Expanded dog training seasons.
Be responsive to human conflicts, livestock depredations, and prey population objectives.	- Implemented a Wildlife Human Attack Response Team (WHART) in each region to respond to wildlife attacks. - Updated IDFG Wildlife Public Safety Policy (W-3.0). - Continued to respond to mountain lions in urban areas. - Continued to work with U.S. Department of Agriculture - Wildlife Services through a Memorandum of Understanding to address local mountain lion livestock depredations. - Developed predation management plans for 5 elk zones. - Monitored survival rates and causes of mortality for collared ungulates to determine mortality from mountain lions.
Research and develop better mountain lion population monitoring tools.	- Evaluated efficacy of winter aerial track surveys. - Captured and collared 44 mountain lions to monitor demographic rates and develop and evaluate camera-based population modeling techniques. - Conducted DNA mark-recapture surveys via biopsy darting. - Evaluated the use of carpeted scent post as a method to collect DNA. - Implemented large-scale research project in north Idaho in 2020 to better understand predator/prey and predator/predator dynamics in mixed-conifer forests.

MANAGEMENT BACKGROUND

SPECIES STATUS

The legal status and public perception of mountain lions in Idaho have changed over time. Settlement of the West in the late 1800s and early 1900s brought thousands of horses, cattle, and sheep to ranges formerly occupied by bison, bighorn sheep, pronghorn, elk, and deer. Mountain lions and other predators such as wolves, coyotes, black bears, and grizzly bears were perceived as significant threats to livestock and human interests and were systematically targeted (Anderson et al. 2009). During the early to mid-part of the 20th century, mountain lion hunting became increasingly popular, harvest was unregulated, and bounties were paid on mountain lions. As a result, mountain lion distribution and numbers declined in many areas accessible to hunters.

Research on mountain lion predation, population dynamics, and social organization in the Big Creek drainage of the central Idaho Primitive Area (now known as the Frank Church River of No Return Wilderness) from 1964–1973 added significantly to our knowledge and may have reformed some public perceptions and attitudes regarding the role of predators on the landscape (Seidsticker et al. 1973). Concern over the status of mountain lion populations resulted in legislation reclassifying the mountain lion as a big game species in 1972. Reclassification allowed IDFG to regulate and manage mountain lion harvest for the first time. Mandatory check of harvested mountain lions has been required since 1973, and a mountain lion tag has been required since 1975.

DISTRIBUTION

In recent decades, a combination of factors that synergistically benefitted the species led to mountain lions naturally recolonizing the West (Shaw et al. 2007). These factors include unregulated take shifting toward state agency regulated hunting seasons, an increase in perceived value as a game species, increases in prey populations, habitat changes, and a general increase in human tolerance for large carnivores (Anderson et al. 2009, Cougar Management Guidelines Working Group 2005). The current broad geographic distribution of mountain lions in North America demonstrates the species' ability to persist almost anywhere there is adequate cover and prey (Anderson 1983, Pierce and Bleich 2003). The reestablishment of this large carnivore across Idaho and the western U.S. over the past 60–70 years is a testament to state wildlife management and the resiliency and adaptability of the species.

Idaho mountain lion habitat is extensive and diverse. Mountain lions currently occupy most available habitat within the state and even frequent some suburban areas. More robust mountain lion populations are found in habitats typically associated with vegetative/topological cover across mountainous and desert terrain, canyons, and rocky slopes (Hornocker 1970, Koehler and Hornocker 1991, Holmes and Laundré 2006). Optimal mountain lion habitats are those that support healthy populations of prey species, and mountain lion distribution corresponds with the primary prey species of the area, including mule deer, white-tailed deer, elk, pronghorn, and bighorn sheep (Anderson 1983, Koehler and Hornocker 1991, Pierce and Bleich 2003). Accordingly, land use or habitat

management practices that impact distribution of ungulate prey will impact mountain lions. Because mountain lions occupy such a wide range of habitats, conflicts with humans and livestock can occur.

Long-distance lion movements provide for genetic connectivity among populations. Research in Wyoming and Colorado suggested the Rocky Mountains are comprised of mountain lion metapopulations with most gene flow occurring through long-range dispersal events by males (Logan and Sweanor 2001, Anderson et al. 2004). Studies in Idaho and Montana (Loxterman 2011, Onorato et al. 2011) showed a complex, hierarchical genetic structure in mountain lions that was influenced by geographic distance and local barriers to gene flow (e.g., Snake River Plain). Balkenhol et al. (2014) indicated that while gene flow was not uniform across Idaho, movement and gene flow appeared frequent enough to prevent formation of spatially separated and genetically distinct cougar populations.

HARVEST MANAGEMENT

BACKGROUND

With changing perceptions and the reclassification of mountain lions in the early 1970s, state-regulated hunting seasons were established (September 1–January 15 or 31 in most areas) The first seasons in Idaho included a bag limit of one, no harvest of female with young, and mandatory harvest reporting. Under this strategy, mountain lion populations grew and expanded into unoccupied habitats, resulting in expanded seasons in some areas. Mountain lion harvest rapidly increased from an average of 80 during the first years of regulated hunting (1973–1976), to approximately 275 annually by the late 1980s (Fig. 1).

Ungulate monitoring in the 1990s through 2000 indicated some big game herds were negatively impacted by predation (IDFG 2014). This research prompted the IDFG Commission to direct staff to increase mountain lion hunting opportunity, particularly in areas where predation was negatively impacting elk and deer populations. However, to reduce the potential for overharvest in areas with easy hunter access and in smaller populations, female quotas were initiated in many southern Idaho units. Population density and distribution continued to increase, as did harvest. The highest single season harvest occurred during the 1997–1998 season, when 798 mountain lions were harvested statewide (Fig. 1).

Following this peak, harvest declined and then stabilized through the mid-2000s before increasing again through the mid-2010s. Annual harvest has stabilized between 630–690 mountain lions during the last 7 years. The previous plan's harvest objective was to maintain a mountain lion population capable of sustaining a harvest of at least 331 lions annually (the 1990–1992 average); that objective has been attained annually since 1991. Since 2002, 3-year average harvest goals were exceeded in most (14 of 18; 78%) DAUs, harvest goals were exceeded for a portion of that timeframe in 2 DAUs, and harvest goals were never reached in 2 DAUs. In 2021, the use of electronic calls was adopted statewide (except in units with grizzly bears to avoid potential conflicts) and all male and female lion quotas were removed across the state.

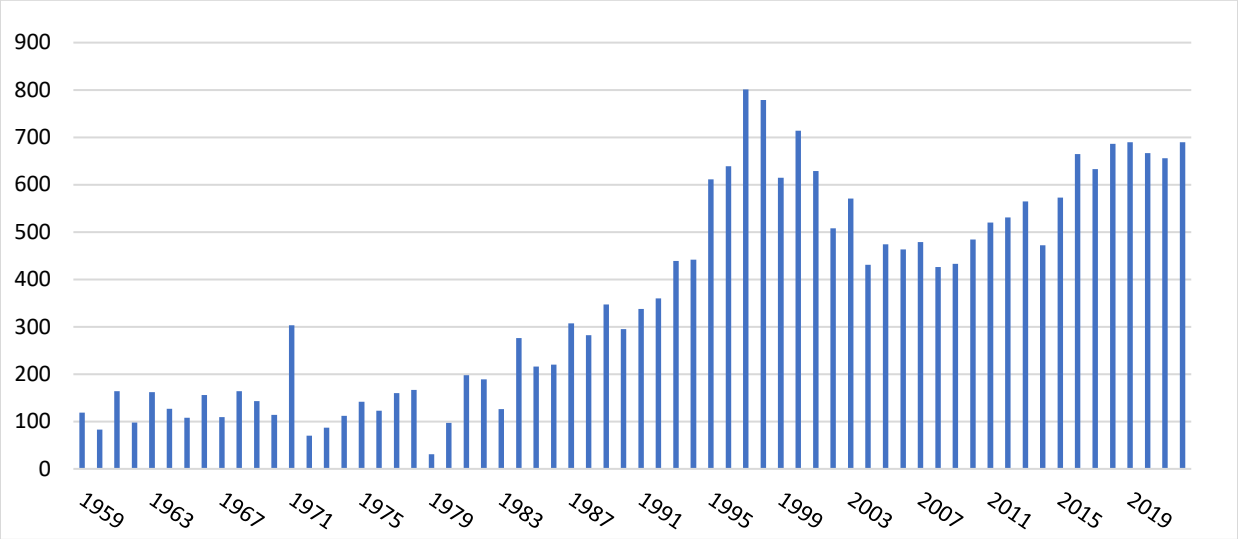


Figure 1: Documented mountain lion harvest from mandatory harvest check for the 1958–2022 harvest seasons (harvest season = July 1 – June 30).

HARVEST SEASONS AND CHARACTERISTICS

Idaho Department of Fish and Game currently manages mountain lions through general hunting seasons and tags are offered over the counter. Nonresidents may use their deer and elk tags to harvest a mountain lion during any open general season corresponding to the elk or deer tag when the mountain lion season is also open. Over-the-counter hound hunter permits are offered for residents who hold a valid hunting license, while nonresidents are limited to 70 hound hunter permits (who are not Idaho licensed outfitters), with exceptions for the Lolo, Selway, and Middle Fork Elk Zones to help address the impact of predation on elk populations.

Most mountain lion hunting seasons run August 30 – March 31, with 22 game management units closing later. In some backcountry GMUs, as well as GMUs with underperforming ungulate populations, hunters are permitted to take two mountain lions. By Idaho Administrative Rule, neither spotted young nor any females accompanied by young can be taken (13.01.08.300.01d). Most mountain lions are harvested in winter when snowfall

provides optimal conditions for hunting with hounds (Lindzey 1987). Heavy snowfall in early winter may lead to an increased number of lions being harvested.

All hunter-harvested and salvaged mountain lions are required to be checked in at an IDFG regional office, IDFG staff, or approved IDFG vendors to document age and sex. In harvest season 2022, 47% (n = 328) of harvested mountain lions were checked by IDFG personnel, and 53% (n = 363) were checked at approved IDFG vendors. Other important information on hunter effort and location of harvest or salvage is also collected. A premolar tooth is extracted from all documented mountain lion mortalities (e.g., harvest, roadkill, depredation kill, and natural mortality) to determine age (Trainer and Matson 1988). Idaho hunters are not required to salvage meat of a harvested mountain lion.

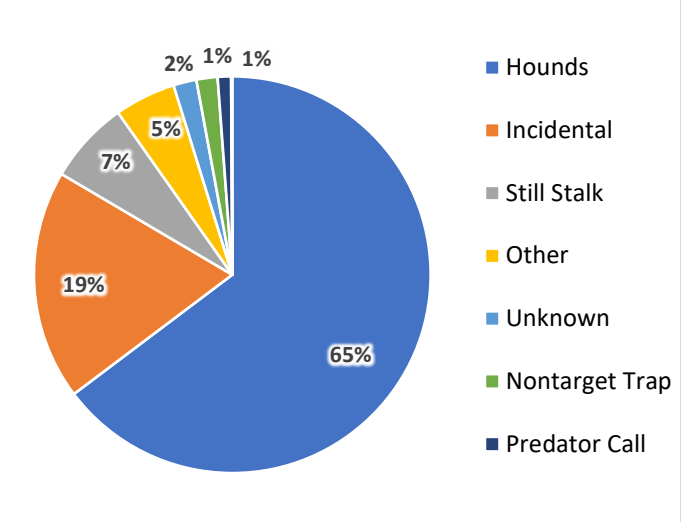


Figure 2: Proportion of total mountain lions harvest by method of take as recorded at mandatory check-in during 2013–2022 harvest seasons.

Hunting with pursuit dogs is the most popular harvest method, comprising 65% of the total harvest, followed by 19% incidental take (Fig. 2). Mountain lions are also seldom taken through predator calls and still-stalking.

The number of avid mountain lion hunters, particularly hound hunters, in Idaho is relatively small compared to other big game species like deer or elk. Locating mountain lion tracks and training and maintaining hunting dogs is both expensive and time-consuming. Some houndsmen harvest no or few lions themselves, but instead prefer to chase mountain lions to train and work their dogs or take other mountain lion hunters. The use of dogs to tree mountain lions provides hunters the ability to be more selective for adult males. Incidental harvest tends to be comprised of a greater proportion of females due to random encounter rates (Beausoleil and Warheit 2015).

While hunting is the primary source of documented mountain lion mortality, IDFG also collects data from mountain lions that die from other sources of mortality, including: illegal harvest, depredation kills, road kills, incidental trapping, and natural mortalities. Over the past 10 harvest seasons, these forms of human-caused mortality ranged from 6–10% of the total documented mortality. This information is not included in Fig. 2.

IDFG monitors age and sex of harvested mountain lions each year and calculates 3-year running averages of these data streams to inform management (Fig. 3). Variable weather patterns, particularly during winter, can result in significant variation in mountain lion harvest, reproduction, and survival rates between individual years. Therefore, it is necessary to look across multiple years to identify overall trends (i.e., declining, increasing, or stable) in the sex and age structure of harvested mountain lions. The data in this figure indicates a modest decline in the statewide population: increasing annual harvest, but declining; high female harvest; and relatively low adult male/female harvest with fewer older males/female and a corresponding higher proportion of younger lions in the harvest. During harvest seasons 2019–2021, females comprised 43% of the total harvest, adult females (≥3 years old) averaged 16% of the total harvest, and adult males (≥3 years old) averaged 25% of the total harvest.

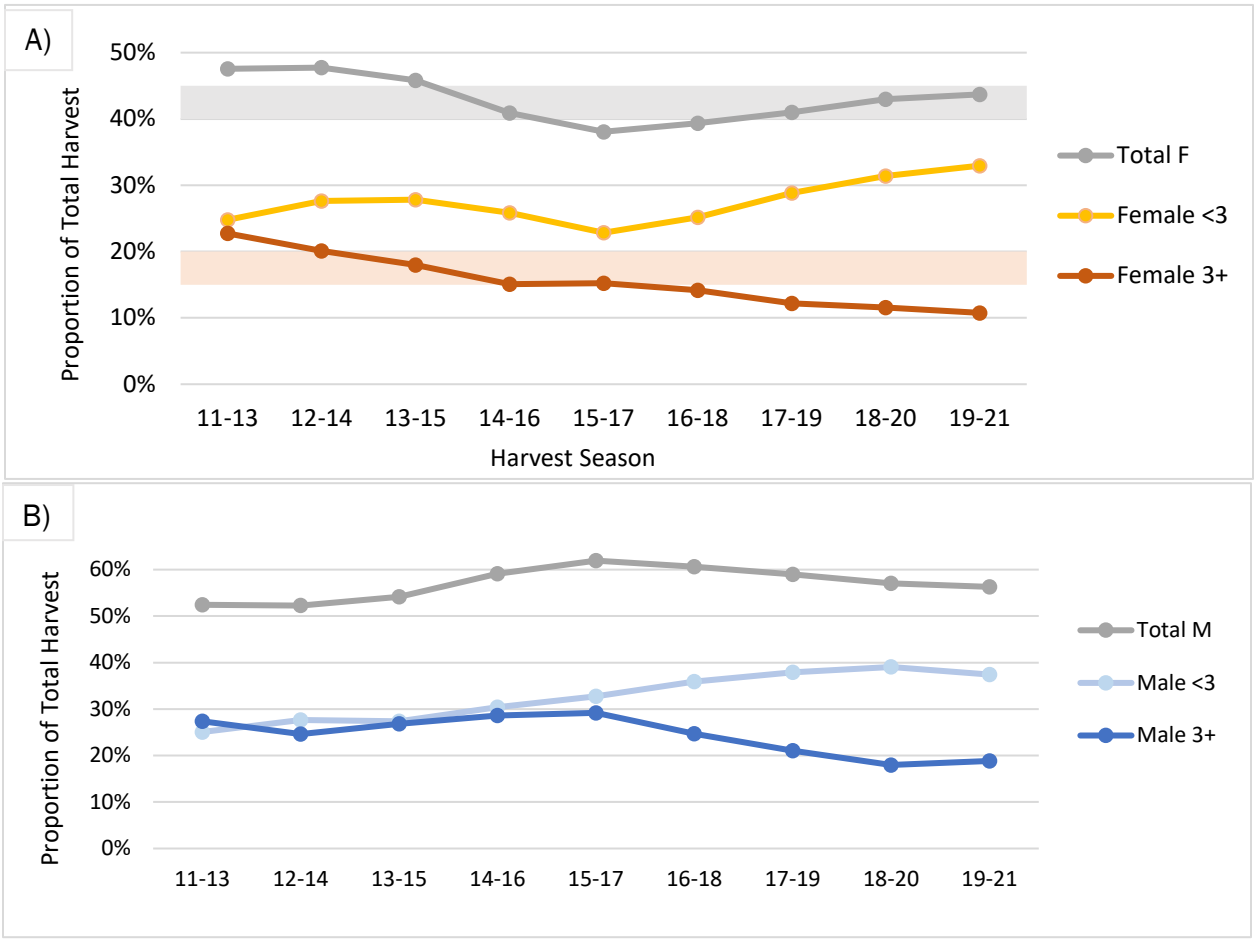


Figure 3: Proportions of total harvest for A) female and B) male mountain lions harvested in Idaho, calculated as 3-year running averages, during the 2011–2021 harvest seasons. The shaded areas in chart A represent the proportional ranges of total females (gray) and females 3+ years of age (orange) in the harvest that would be indicative of a stable lion population; see Table 4.

As adjacent states have limited mountain lion hunting opportunities, Idaho has experienced a growing demand for non-resident lion tags and hound-hunting permits. This is of concern to some Idaho hunters. Balancing the nonresident demand for mountain lion hunting with the desires of resident hunters and outfitters will continue to be a challenge for the duration of this plan.

The total number of mountain lion tags purchased by hunters increased 61% from 2010 to 2022, with 22,037 mountain lion tags sold in 2010 and 35,672 tags sold in 2022 (Fig. 4; i.e., individually purchased tags and tags included in a Sportsman's Package). Resident hound hunter permit sales increased 51% between 2010 and 2022, from 2,886 to 4,366. Tag sales for other big game species have remained relatively stable or slightly increased over the same time (Fig. 5). In addition to the revenue generated for the state from license and tag fees, mountain lion hunters contribute to local economies through outfitter fees, travel within the state (four-wheel drive, snowmobile, and small aircraft), lodging, taxidermist fees, and other miscellaneous expenses.

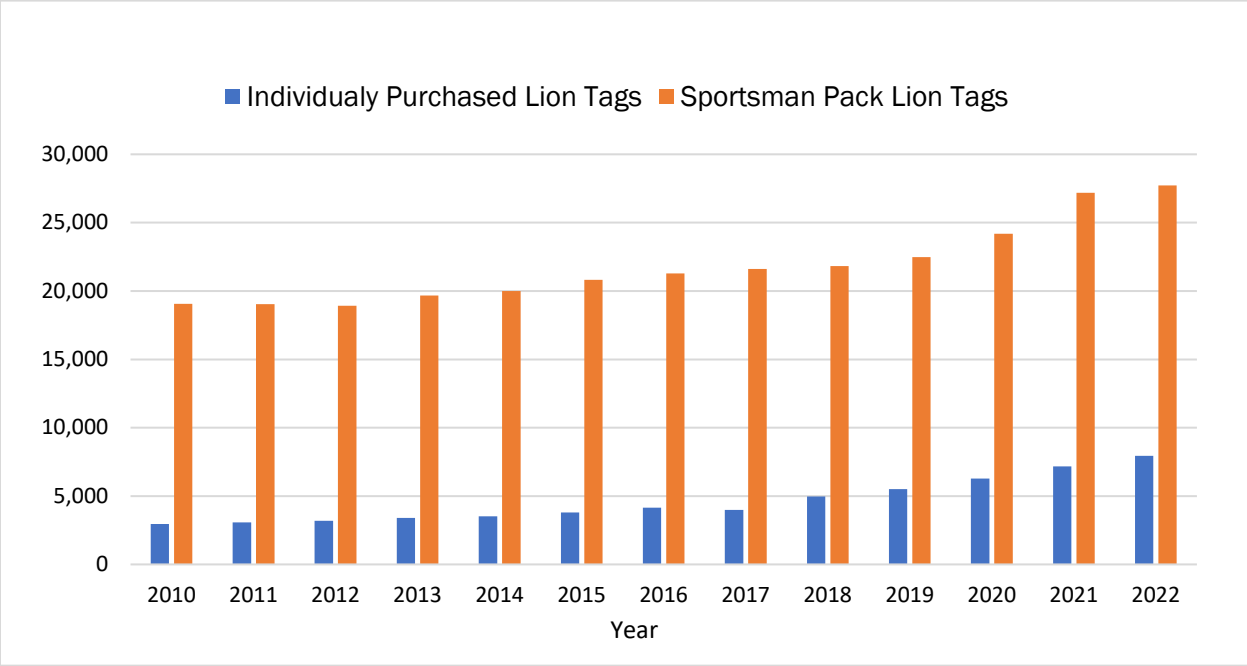


Figure 4: Individual and sportsman package mountain lion tags purchased 2010–2022.

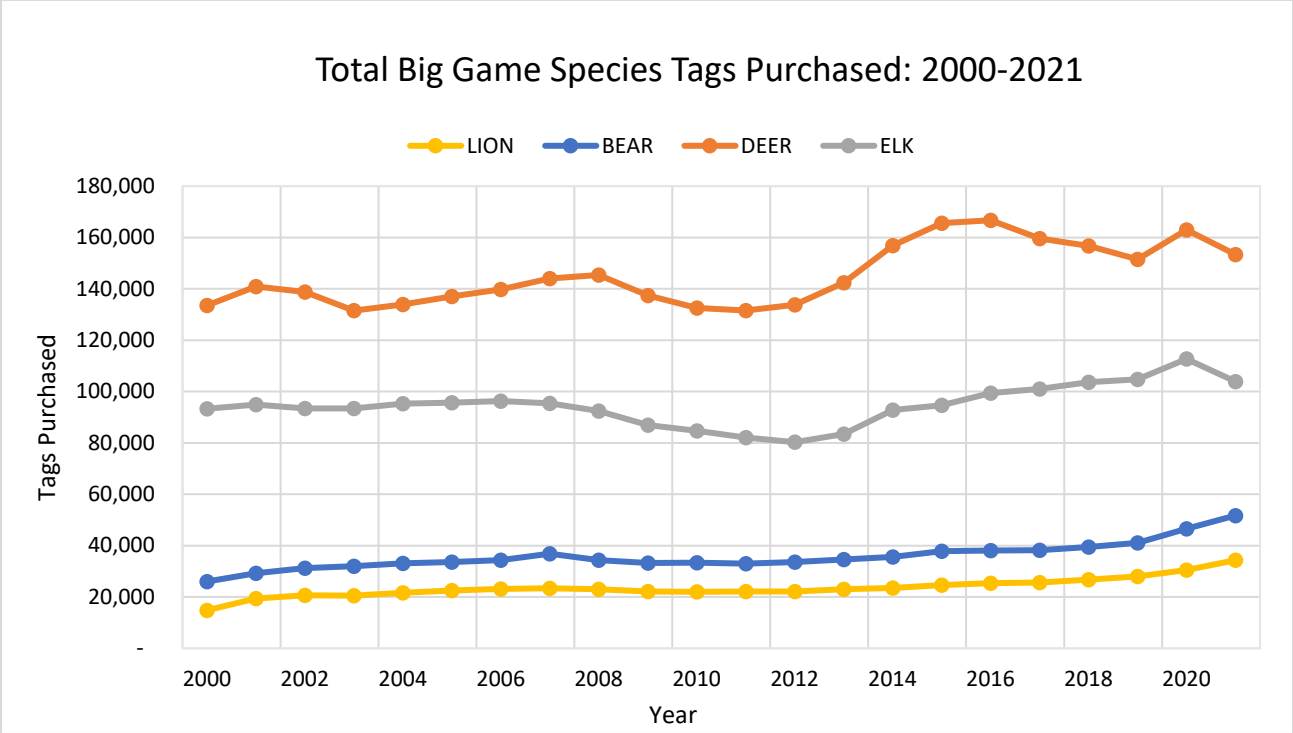


Figure 5: Deer, elk, black bear, and mountain lion tags purchased 2000–2021. Includes tags from sportsman's package and those purchased individually.

IDFG does not conduct annual harvest surveys (i.e., telephone survey of those that purchased a tag) for mountain lions. A harvest report is required for hunters who harvest a mountain lion, but because not all tag holders are surveyed, it is not known what proportion of tag holders actively hunted lions during the season. Mountain lion tag holders may be surveyed in the future to better understand participation rates.

Harvest Strategies

Management agencies throughout the west, including Idaho, use regulated harvest as a tool to achieve management goals and objectives for mountain lions. A variety of strategies are used to regulate harvest, including season timing and length, method of take, number of permits, and quotas or bag limits (Beausoleil et al. 2013, Robinson et al. 2014). These methods allow for a gradation of liberal to conservative harvest of mountain lions to align with management objectives.

Hunting is an important factor influencing size, growth rate, and composition of Idaho's mountain lion population. Hunting can skew age and sex ratios of a population towards younger individuals due to juvenile dispersal and immigration (Robinson et al. 2008, Robinson et al. 2014). Dispersal from adjacent areas can also counteract efforts to reduce populations in localized areas (Lambert et al. 2006, Robinson et al. 2008, Cooley et al. 2009a, Beausoleil et al. 2013). Alternatively, large hunting zones can challenge managers when hunter access and harvest is concentrated in fewer areas of the zone (Ross et al. 1997). In Idaho, some areas likely maintain a relatively high density of mountain lions

because of sufficient prey resources combined with limited hunter access and/or inefficiency of hunting with hounds, while others likely maintain a high lion population through immigration from adjacent areas.

Mountain lion density, the number of hound and incidental hunters, the opportunity provided for those hunters, road access, and snow conditions are the main factors driving lion harvest (Lindzey 1987, Ross and Jalkotzy 1992, Stoner et al. 2013). Annual fluctuations are usually the result of differences in snow conditions between years. Long-term trends, however, typically reflect changes in lion or hunter populations or hunter success. Despite more liberal seasons and bag limits, the 3-year harvest trend in some localized areas has declined, possibly reflecting a reduction in lion numbers. Therefore, it is essential to monitor lion harvest and hunter trends to identify possible changes in lion populations.

Mountain lion harvest was shown to be an additive source of mortality in several studies where populations declined when hunted and increased when harvest levels were reduced (Lindzey et al. 1992, Ross and Jalkotzy 1992, Lambert et al. 2006, Robinson et al. 2014, Logan and Runge 2021). The harvest of breeding females tends to determine whether harvest is a compensatory or additive form of mortality for mountain lion populations (Anderson and Lindzey 2005, Stoner et al. 2006, Cooley et al. 2009a). Robinson et al. 2014 demonstrated that mountain lion population growth rates in Montana were most sensitive to changes in female adult survival, followed by juvenile and kitten survival and adult pregnancy rates. In the same study, male survival had little effect on population growth and small, incremental changes in quotas did not result in significant differences in survival.

Anderson and Lindzey (2005) found that when adult (≥3 years old) females comprised 25% or more of the total harvest, the lion population declined. Research on non-hunted populations documented intrinsic population growth rates from 14–17%. However, when a source population existed nearby, even the effects of high harvest (>14% of population) were offset by increased immigration into the area, primarily by young males (Beausoleil et al. 2013).

A Colorado study demonstrated a significant reduction in abundance when annual harvest reached 22% of the population and >20% of that harvest was comprised of adult females (Logan and Runge 2021). Harvest data from Wyoming indicated mountain lion populations maintained themselves when 10–15% of the harvest was comprised adult females. Most states limit female hunting mortality to <50% of the total harvest (Anderson and Lindzey 2005, Beck 2005). Researchers in southern Idaho and northern Utah suggested that a harvest that included 15–20% adult females would not likely reduce a mountain lion population (Laundré et al. 2007).

Population density and sex and age composition are affected by harvest rates. Mountain lion populations in remote areas typically have low exploitation rates, low population turnover, a greater proportion of resident lions, and an older age structure. Areas that are more accessible to hunters tend to have higher exploitation rates and population turnover, a greater proportion of transient lions, and a younger age structure. Heavily exploited mountain lion populations comprised primarily of young (≤4 years) individuals may reach higher densities than populations with a large percentage of mountain lions in the ≥5 years

of age, due to disruption of the mountain lion social organization (Anderson and Lindzey 2005).

A harvest quota system is intended to provide a high amount of hunter opportunity while still limiting the total number of animals taken by hunters. A harvest quota system is the most common mountain lion harvest management strategy used by state agencies. Female and age quotas can effectively accomplish age and sex composition management goals. However, quotas can lead to competition and reduced selectivity because it encourages hunters to harvest early, before quotas are met and the season closed. It is not uncommon for a quota to be exceeded due to delayed hunter reporting during the check-in period. Mountain lion harvest quotas were previously used in Idaho to limit take in areas with small lion populations or where females were thought to be susceptible to overharvest. In 2021, all harvest quotas in Idaho were removed because they were rarely met, and to address human-safety, predation, and depredation related conflicts. Through mandatory harvest checks, staff have continued to monitor harvest trends and will make recommendations to alter harvest when warranted to meet management goals.

HEALTH AND DISEASE

IDFG's documented information on mountain lion health parameters and disease exposure is limited. Recent assessments have focused on live-captured animals, but additional research would be needed to better understand population health status and diseases that could have population level impacts. Past investigations in Idaho have been limited by sample size, and in many cases documentation of diseases, parasites, or toxin exposure was from examination of single mortality events.

Mountain lions are susceptible to most of the pathogens found in domestic felines (Foley et al. 2013), including: feline calicivirus, herpesvirus, coronavirus, leukemia virus, panleukopenia, and heartworm. Since 1991, IDFG's Wildlife Health Lab has used serology testing of mountain lion blood samples to evaluate the exposure of Idaho's lion population to each of these diseases. To date, there is no evidence that mountain lions in Idaho have suffered any population-level impacts from these diseases. Mountain lions have occasionally been diagnosed with rabies virus outside of Idaho and rabies should be considered as a possible diagnosis in neurologic cases, especially in rabies-endemic areas. The significance of these infections or exposure on a population scale is largely unknown, but Idaho has no documented cases of rabies in mountain lions.

Bacterial diseases occur in lions but are generally acquired directly or indirectly from their prey. Mountain lions serve as susceptible hosts to the plague bacterium (*Yersinia pestis*; Tabor and Thomas 1986, Paul-Murphy et al. 1994). The primary mode of transmission is via a flea bite and the disease causes high morbidity (i.e., sickness from the disease) and mortality in affected animals. The disease tends to be more prevalent in mountain lions when deer populations are low and lions consume more rodent prey (Smith 1994). To date, there have been no documented cases of plague in mountain lions in Idaho.

Parasites are common in wildlife and are often easier to detect than disease since they often remain on a carcass after death. Several nematodes, helminths, cestodes and protozoa have been detected in Idaho mountain lions, although none are typically the ultimate cause of mortality. Trichinella is a parasite sometimes found in mountain lions. It can be transferred to humans and pets through uncooked meat. Idaho hunters are not required to keep meat from harvested mountain lions (Idaho code 13.01.08.420c). Center for Disease Control (2017) recommends mountain lion meat that is consumed be cooked above 160°F internal temperature to assure it is safe for human consumption.

POPULATION DYNAMICS AND MONITORING

POPULATION DYNAMICS

Mountain lion populations consist of resident adult males and females, transient males and females, and kittens of resident females. Fairly distinct home ranges are maintained by resident lions but not by transient lions. Home range size varies by sex and age, reproductive status, season, and distribution and density of prey species. Males are territorial and temporal overlap is rare (Logan and Sweanor 2000, Grigione et al. 2002, Pierce and Bleich 2003); however, each resident male home range may include three to five resident females (Lindzey 1987, Logan and Sweanor 2001).

Female mountain lions become sexually mature and breed as early as 20 months of age, but first breeding may be delayed until age 5 depending upon whether the female has an established home range. Kittens are produced every second or third year thereafter and remain with their mothers for 17–22 months. Litter sizes vary from 1–6, but typically average 2–3 kittens (Lindzey 1987, Logan and Sweanor 2000). Mountain lions may breed at any time of year in Idaho, although peak births occur during spring/summer (Hornocker 1970, Seidensticker et al. 1973, Logan and Sweanor 2001). When a litter is lost, the female will enter estrus and conceive a new litter once body condition is restored (Hornocker 1970, Logan and Sweanor 2000). Consequently, an adult female may have kittens or yearlings dependent upon her for food and survival at any time of the year.

Subadult mountain lions are more transient, and therefore more susceptible to human-caused mortality. Survival rates vary and depend on population size, resource availability, competition, and level of human presence (Lindzey 1987, Lindzey 1988). In two studies of hunted mountain lions, kitten survival averaged 65% (Robinson et al. 2014, Logan 2020). Adult females with kittens are subject to more stress and risk of injury than males because they must hunt and kill large prey animals at more frequent intervals to successfully rear their young. If an adult female is killed, chances of her dependent offspring surviving are greatly reduced (Logan and Sweanor 2001, CWGMG 2005, Robinson et al. 2014). Past mountain lion population modeling efforts suggest adult female survival is the most important factor driving population growth rates (Robinson et al. 2014).

With the reintroduction and expansion of gray wolves in the Northern Rocky Mountains, research has evaluated competition and behavioral and distributional shifts between

mountain lions and wolves (Kortello et al. 2007, Bartnick et al. 2013). In areas of higher wolf densities, mountain lions exhibited distributional shifts in habitat use and, in some cases, potential decreases in abundance (Elbroch et al. 2015, Elbroch et al. 2020). In one study where wolves and lions overlapped, wolves were responsible for 15% of adult lion deaths and wolf and bear predation accounted for 35% of kitten mortality (Ruth et al. 2011). Mountain lions are also directly affected by wolves through usurpation of kills (i.e., wolves claiming and consuming mountain lion kills) and reduction of home range size (Boyd and Neale 1992, Kortello et al. 2007, Ruth et al. 2011). Mountain lion kill rates increased 48% in Colorado and California in the presence of black bears due to usurpation of kills, with bears detected at 48–77% of mountain lion kills (Elbroch et al. 2015). Wolves usurped 12% and scavenged 28% of mountain lion kills during a 4-year period in Banff National Park (Kortello et al. 2007). This is a complex topic and additional research in Idaho could benefit mountain lion management.

Population Monitoring

Monitoring populations is central to effective wildlife management and allows wildlife managers to detect changes in populations over time as management, habitat, or environmental factors change. Overall population size, population age and sex structure, age-related productivity of females, and age- and sex-specific mortality sources and rates are beneficial sources of information for population management. Unfortunately, these data are difficult to obtain for mountain lions because of their low densities, elusiveness, and solitary behavior. As a result, managers have primarily relied on harvest metrics, knowledge of prey population trends, number and distribution of depredation/conflict occurrences, and information gained from small scale research efforts to inform management decisions.

Changes in age and sex structure in mountain lion harvest is often used as an index to population change. However, there are limitations to how well these harvest metrics represent actual population changes. Changes in age and sex structure observed in mountain lion harvest could be strongly influenced by factors other than population trend (e.g., hunter selectivity, immigration, emigration, habitat, reproduction, and recruitment). Despite limitations, these metrics can be informative in evaluating population trajectories because they are relatively cost effective and efficient to collect (Anderson and Lindzey 2005, Logan and Runge 2021).

Past research efforts to assess population size primarily relied on costly, labor-intensive mark-recapture efforts over small geographic scales. Although informative, these studies and associated estimates of mountain lion populations are not easily extrapolated to larger landscapes with varied environmental, physical, and biological attributes (e.g., wilderness, prey abundant urban areas; Choate et al. 2006). Recent advancements in wildlife monitoring techniques show promise for species like mountain lions. Habitat-based population modeling (resource selection function or RSF) and statistical population reconstruction (SPR) show the most promise for population monitoring primarily using existing resources.

Resource selection function models (RSF; Manly et al. 2002) are broadly used to understand how species utilize specific habitat types. Montana, North Dakota, Oregon, and Wyoming have used RSF modeling to help inform harvest management decisions for

mountain lions (Wyoming Game and Fish Department 2006, Robinson et al. 2015, Oregon Department of Fish and Wildlife 2017, R. Johnson et al. 2019, Montana Fish Wildlife and Parks 2019). Developing RSF's for mountain lions in Idaho and incorporating additional modeling efforts could provide managers with a better understanding of population distribution. This information would strengthen Idaho managers' ability to prescribe harvest strategies that meet desired objectives. Data from previously GPS collared mountain lions would be used to develop an Idaho mountain lion RSF. IDFG is currently conducting trail camera-based wildlife surveys where photos of animals are obtained at various times of the year in various habitat types. These efforts may also contribute additional mountain lion location information for modeling. IDFG also collects abundance data on primary prey (e.g., deer and elk) in many areas of the state, which could be used as predictors of mountain lion habitat.

Statistical population reconstruction (SPR) is a method to estimate the demographics of harvested wildlife over large geographic areas using age-at-harvest data (i.e., number of animals harvested in each year and age class; Gove et al. 2002, Allen et al. 2018, Clawson et al. 2013). These models require some auxiliary data on the population, such as survival rates (i.e., non-harvest mortality), harvest rates, hunter effort, recruitment, and/or abundance. For mountain lions, SPR analysis units would need to be appropriately scaled to support model assumptions and encompass an adequate sample size of harvested lions (Clawson and Skalski 2016, Hatter 2019, Howard et al. 2020). SPR provides a flexible framework, where the user can update abundance estimates every year with the most recent age-at-harvest data, allowing managers to monitor populations and quickly assess the impact of different management actions. To date, SPR has been used to estimate mountain lion abundance in British Columbia (Hatter 2019), northeast Oregon (Clawson 2010), North Dakota (R. Johnson et al. 2019), and Arizona (Howard et al. 2020).

In addition to SPR models, camera-based methods to estimate density and abundance for several species of wildlife, including mountain lions, are continually being refined through IDFG's ongoing collaborations (Moeller et al. 2018, Loonam et al. 2021). These methods show promise for estimating mountain lion abundance in Idaho (Loonam et al. 2021). IDFG will also continue to investigate other evolving population estimation methods, like integrated population models, to evaluate their potential usefulness in Idaho mountain lion estimation.

PREDATOR – PREY RELATIONSHIPS

The interactions between predators and prey are often complex and can be dependent on many external factors, like weather and habitat quality. Predation can be compensatory—in which, the animal killed would likely have died from another factor anyway if it hadn't been preyed upon (e.g., injury, malnutrition, disease)—or additive—in which, the animal would have otherwise survived to contribute to population growth if it had not been killed. Predator and prey population management can also be controversial, as many stakeholders hold differing opinions on desired outcomes for prey and predator populations.

Mountain lions are opportunistic predators and are adaptable to regional differences in prey availability, which is evident in the range of species they consume across the wide diversity of habitats they occupy (Logan and Sweanor 2001, Fecske et al. 2011). In the predominantly forested western states and provinces, mountain lions primarily prey on deer and elk (e.g., Ballard et al. 2001, Husseman et al. 2003, Atwood et al. 2007, Kortello 2007, Cooley et al. 2008, Murphy and Ruth 2009). While some studies have shown a selection for mule deer in multiple-prey systems (e.g., Atwood et al. 2007, Cooley et al. 2008), mule deer are not consistently selected for, which is due in large part to mountain lions readily switching prey species in response to changes in availability or vulnerability (Murphy and Ruth 2009). Ultimately, prey selection may be best explained as a function of the interaction between prey vulnerability (e.g., size, body condition, age, habitat use, snow depth) and mountain lion attributes (e.g., sex, experience, age, size, reproductive status, individual preferences, and past success; Murphy and Ruth 2009). Thus, mountain lion predation patterns fluctuate across their range, given their prey selection and interactions.

Studies using GPS tracking to document kill sites found that mountain lions kill approximately one large ungulate per week (Anderson and Lindzey 2003, Cooley et al. 2008, Knopff et al. 2009, Wilckins et al. 2016) and that kill rates vary little by season (Cooley et al. 2008). Mean estimated lion kill rates on large ungulates in Wyoming from September through May were 7.3 days per kill for sub-adult females (1–2.5 yr.), 7.0 days per kill for adult females without young, 5.4 days per kill for adult females with young, 9.5 days per kill for a sub-adult male, and 7.8 days per kill for adult males (Anderson and Lindzey 2003). Females in the study preferentially selected mule deer and males selected elk.

PREDATION ON MULE DEER

Mountain lions are a major predator of mule deer of all age classes throughout their range (e.g., Lawrence et al. 2004, Pierce et al. 2004, Bishop et al. 2005, Cooley et al. 2008, Bishop et al. 2009, Hurley et al. 2011, and Peterson et al. 2018). Predation was the major cause of mule deer death, excluding harvest, in three study sites in southwest Idaho from 1993 - 1997. The study found that while coyote predation was largely compensatory, mountain lion predation was independent of deer body condition and more dependent on deer habitat use (Bishop et al. 2005). However, a supplemental nutrition study in Colorado found that improved body condition in wintering deer reduced predation rates from both coyotes and mountain lions, suggesting that in habitat-limited populations' mountain lion mortality can be compensatory (Bishop et al. 2009).

From 1997–2003, IDFG studied the effect of removing coyotes and mountain lions on mule deer survival and population growth rate in southeastern Idaho (Hurley et al. 2011). We monitored 250 neonates, 284 6-month-old fawns, and 521 adult does to document causes of mortality and used helicopter surveys to monitor population trend and December fawn to doe ratios. The best model describing six-month-old fawn mortality correlated with the variables: summer precipitation, winter precipitation, fawn mass, and mountain lion removal. Over-winter mortality of adult does decreased with removal of mountain lions. ~~Precipitation variables were important to all age classes of deer. Coyote reduction at this landscape scale did not improve mule deer fawn ratios or abundance, suggesting that~~

~~coyote mortality was partially compensatory~~. Although mountain lion removal increased mule-deer survival and fawn ratios, researchers were unable to demonstrate significant changes in population trend; however, population monitoring was only conducted one-year post-treatment.

We used cumulative incidence function survival analysis to estimate cause-specific mortality rates for all mule deer IDFG monitored across the state from 1984–2022. That monitoring included 389 adult bucks, 3,205 adult does, 2,686 wintering fawns (6-12 months of age), and 250 newborn fawns (0-6 months of age) sampled from the major mule deer populations in the state. After excluding hunting mortality and unknown causes of death, mountain lion predation was the most important source of mortality for adult bucks (2% of marked bucks killed by lions) and adult does (4% of marked does killed by lions). Mountain lion predation was the third most important cause of mortality for wintering fawns (8% killed by lions) and newborn fawns (9% killed by lions), behind coyote predation (13% and 12% respectively) and malnutrition (13% and 11% respectively).

PREDATION ON ELK

Mountain lion predation occurs on all age classes of elk (e.g., Zager et al. 2007a, b; White et al. 2010; Griffin et al. 2011, Lehman et al. 2018), but does not appear to be a significant driver of elk population trajectory in most instances (Brodie et al. 2013, Lehman et al. 2018). When mountain lion and wolf predation are combined, there can be additive effects on cow elk mortality; though the total impacts to elk survival across large geographic areas typically remain low (reduced survival by <2%; Brodie et al. 2013).

In some elk populations, lion predation rates on calves can be high enough to limit population growth (Lehman et al. 2018), but rates vary across ecosystems depending on relative carnivore densities and other factors (Eacker et al. 2016, B. Johnson et al. 2019). Husseman et al. (2003) determined that mountain lions preyed disproportionately on elk calves and old individuals in Idaho. Whether lion predation is additive or compensatory for elk calves is unclear (White et al. 2010); however, it likely is at least partially compensatory, especially in areas where elk populations are somewhat habitat limited (Griffin et al. 2011, B. Johnson et al. 2019).

From 1997--2004, IDFG researchers evaluated elk neonate calf survival in two study areas of north-central Idaho (Lochsa and South Fork Clearwater). The primary causes of mortality for both study sites were predation by black bears and mountain lions. Researchers experimentally modified bear and lion harvest and found that calf survival was influenced by biological factors, landscape surrounding calf locations, and predator harvest levels. Black bear harvest, birth mass, sex, age at capture, and shrub cover around calves were the most important factors explaining mortality risk across sites. The study also indicated that increased mountain lion harvest lowered calf mortality risk; but lion harvest was less important to calf survival than age at capture and black bear harvest (White et al. 2010).

Idaho researchers also monitored elk mortality through radio telemetry from 2004 to 2016 to determine causes of mortality, and then related mortality risk to wolf pack size, winter conditions, and individual characteristics. Researchers analyzed data from 1,244 adult

female elk and 806 6-month-old calves from 29 populations throughout Idaho. Annual mortality rates (excluding harvest) for adult females and calves were 9% and 40%, respectively. The study found that 4% of collared adult females and 10% of collared calves died from mountain lion predation; 4% of adult females and 7% of calves died from wolf predation; and 1% of adult females and 2% of calves died from malnutrition. Wolves preferentially selected smaller calves and older adult females, but mountain lions showed little preference for calf size or adult female age class. Although the study was prompted by wolf management questions, mountain lions killed more elk than wolves in the study and differences in selection of individual elk indicates that mountain lions may have had a larger effect on elk population dynamics than wolves (Horne et al. 2019).

Predation on Bighorn Sheep

Mountain lion predation on bighorn sheep can be variable, even within the same sheep population (Ross et al. 1997, Sawyer and Lindzey 2002, McKinney et al. 2006b, Gammons et al. 2021), and mortality rates for ewes can be equal or greater than those of rams (Krausman et al. 1989, Hayes et al. 2000, Kamler et al. 2002, Festa-Bianchet et al. 2006). In some cases, high levels of predation are capable of depressing bighorn sheep populations (Kamler et al. 2002, McKinney et al. 2006b, Foster and Whittaker 2010, Brewer et al. 2013, Johnson et al. 2013, Gammons et al. 2021) and can cause the extirpation of small, isolated populations (Rominger 2018, Rominger and Weisenberger 2000). Mountain lion predation has also been the primary cause of mortality in some larger bighorn sheep populations (e.g., >100 individuals) that declined (Wehausen 1996, Hayes et al. 2000, Foster and Whittaker 2010).

High annual variation in lamb survival has been reported in multiple studies due to predation (Rubin et al. 2000, McKinney et al. 2006a, Cain et al. 2019). Smaller predators such as coyotes, bobcats, and golden eagles are likely more effective predators on neonates. However, for desert bighorn sheep, mountain lions have been documented as the primary predator of lambs (Parsons 2007, Smith et al. 2014, Karsch et al. 2016, Cain et al. 2019).

In Idaho, Cassirer and Sinclair (2007) assessed mortality factors for Rocky Mountain bighorn sheep in Hells Canyon during 1997–2003. Pneumonia was the most common cause of adult mortality (43% of all mortalities) and the primary factor limiting population growth. Mountain lion predation was the second most frequent source of adult mortality (27% of all mortalities) but did not significantly reduce the rate of population growth. From 2011–2014, IDFG studied cause-specific mortality in the Jacks Creek and Owyhee Front PMUs with 7 radio-collared rams and 32 ewes. Overall annual ewe survival varied from 90% to 96%, with mountain lion predation the most significant source of adult female mortality (4 ewes). IDFG initiated cause-specific mortality research from 2016–2020 in the Owyhee Front and Owyhee River PMUs following a pneumonia outbreak in neighboring populations in Oregon. Seven of 31 ewes were killed by mountain lions, the leading source of adult female mortality for that project.

Mountain lion predation may be exacerbated by other factors that ultimately lead to low bighorn sheep densities and population declines (Anderson 2008), including prolonged drought (Logan and Sweanor 2001, Bender and Weisenberger 2005), changes in habitat (Holl et al. 2004), disease (Logan and Sweanor 2001), and changes in primary prey species abundance (Schaefer et al. 2000, Logan and Sweanor 2001, Kamler et al. 2002, Holl et al. 2004, Rominger et al. 2004, Festa-Bianchet et al. 2006, Brewer et al. 2013, Johnson et al. 2013, Rominger 2018). When bighorn sheep are already struggling with factors such as disease, inadequate habitat, or changes in availability of other prey species, mountain lion predation may have compounded impact on populations.

Predation Management

Management of predators to increase prey populations is a complex issue, in part because different segments of society value predator and prey species differently. Although intuition might suggest the abundance of predators would be the primary factor affecting predation rates on prey species, research has shown that the success of predator control operations in affecting prey abundance is complex and dependent on many factors (e.g., Hurley et al. 2011). Predator management can be an important tool for IDFG to employ in the management of prey populations when and where appropriate.

In 2000 the IDFG Commission adopted the "Policy for Avian and Mammalian Predation" to guide IDFG's implementation of predator management activities (https://idfg.idaho.gov/conservation/predators/policy-avian-mammalian). The policy directs IDFG to develop a site-specific predation management plan where evidence indicates predation is a significant factor preventing prey populations from meeting IDFG management objectives. A predation management plan is intended to address predator and prey population objectives, contributing factors, proposed management actions, monitoring, and public outreach and education. Management actions may include increasing predator harvest opportunities (e.g., more tags, longer seasons), and/or contracting to remove predators in specific areas.

Idaho Department of Fish and Game focuses predator management plans in specific areas for targeted time periods to ensure the long-term survival and productivity of prey populations. Predation management plans are rereviewed and evaluated annually.

Human – Mountain Lion Conflict

A combination of factors contributes to human-lion conflicts, including human presence and density, prey abundance and location, interspersion of prey habitat within residential development, and dynamics of the greater mountain lion population (Washington Department of Fish and Wildlife 2015). In some urban areas in Idaho, human-lion conflicts have increased because of human population growth and expansion into mountain lion habitats. In other areas, increased conflicts result from increased suburban deer and elk populations drawing lions into unsuitable human-dominated habitats, or young lions using these developed areas to find easy prey like feral cats and dogs.

Human-mountain lion conflicts range from interactions to attacks on pets, livestock, or more rarely on people (Appendix B). Idaho has had two reported non-fatal mountain lion attacks on humans in the last 70 years (1999 and 2016). Not surprisingly, most reports of human-mountain lion interactions occur in and around the wildland-urban interface. Increased sightings are attributed to an increase in the human population and more people in and around mountain lion habitat, enhanced technology (such as doorway cameras), healthy ungulate populations throughout much of Idaho, and localized alternative prey (e.g., dogs and cats) or urban wildlife that attract mountain lions.

IDFG manages for healthy and sustainable populations of wildlife. Often, the appropriate population level does not mean the maximum number of animals possible. Public safety will always take priority over mountain lion occupancy. Due to the adaptable nature of mountain lions, some individuals appear to thrive in and around human population centers. Managing urban lion populations through harvest is typically not a viable option, as the most effective method of lion hunting (i.e., hounds) and discharge of firearms are often disruptive or precluded in these areas. Therefore, managers must often utilize alternative methods. Depending on the situation, managers may determine non-lethal tactics such as hazing or relocation are appropriate. In other cases, lethal removal may be the most appropriate action. In some instances, the situation resolves itself when the lion moves on without direct action by IDFG. Managers consider the behavior, sex, age, and condition of the mountain lion, its location (urban or rural), and its proximity to more vulnerable humans (e.g., schools or playgrounds) when making these decisions.

It is important that management actions in response to human-mountain lion conflicts be accompanied by education and outreach. This is becoming increasingly important in areas of the state with an influx of new residents that have had minimal interaction with large mammals like mountain lions, bears, elk, and moose. Developing consistent messaging about precautions people can take while living and/or recreating in mountain lion occupied areas will improve customer service, assist staff in helping to maximize public safety, and improve support for mountain lions on the landscape. Methods of public outreach and education might include: promoting best management practices through the IDFG website; providing a weblink for cities to include on their webpage; distributing paper materials to residents, schools, Homeowners Associations, rental companies, and local media outlets; and providing access to virtual or in-person trainings.

MOUNTAIN LION – LIVESTOCK DEPREDATIONS

In 1990 the Idaho legislature added livestock losses associated with mountain lion predation to the Idaho statutes guiding depredation prevention, responses, and compensation (36-1107 and 36-1109). These statutes describe the efforts the state will take to prevent and compensate losses associated with predation of livestock.

Depredation is “damage to or destruction of livestock (mainly sheep, cattle, and goats) that are raised with the intention of profit.” Depredations are reported to the U.S. Department of

Agriculture Animal Plant and Health Inspection Services-Wildlife Services (APHIS-WS), which is responsible for the investigation and removal of the offending mountain lion. Depredations are variable in scope and nature; however, in general, Idaho livestock producers report minimal conflicts with mountain lions. Some incidents of mountain lion depredations may go unconfirmed due to a lack of detection of livestock carcasses. IDFG has paid less than $111,000 total since 2000 in mountain lion depredation claims. During that same period, a total of 183 lions were removed for depredation management. On average, 8 mountain lions are removed annually across the state.

Livestock production continues to be a primary economic driver in Idaho, with cattle and domestic sheep production forming the bulk of the industry. In recent years, hobby farming has increased in certain parts of the state, resulting in llamas, alpacas, and goats occasionally being killed by mountain lions. Typically, these instances occur in more urban areas, prompting the removal of the lion due to public safety concerns as much as the depredation itself.

Managing mountain lion-livestock conflicts effectively requires a variety of management strategies across the state. Removal of individual lions responsible for conflicts, rather than overall population reduction, is often the most effective method for minimizing losses while also maintaining public acceptance and hunter opportunity. Managers may also need to consider the effects that harvest can have on human-lion conflicts. For example, Maletzke et al. (2014) determined that high harvest can lead to territorial instability for male mountain lions. That instability can result in a greater number of immigrant sub-adult males overlapping in the same area and increasing encounter rates with people, pets, and livestock. Conserving a proportion of older individual males (especially around urban areas) could maintain spatial stability, which in turn may minimize unintended consequences harvest (Packer et al. 2009).

STATEWIDE MANAGEMENT DIRECTION

Mountain lions are currently managed to provide continued opportunity for hunting and non-hunting resource users while also minimizing the effects of mountain lion predation on ungulates and livestock. The increasing popularity of the mountain lion as a big game animal, the mountain lion's appeal to non-hunting users as an apex predator, and the facts that mountain lions are a predator of ungulate species valued by the hunting and non-hunting public and can be a predator of valuable livestock, can create conflicting management interests among different stakeholder groups. It is important for wildlife managers to effectively communicate with these different stakeholders while demonstrating and emphasizing science-based management strategies to monitor and manage game species.

This 2024–2029 Mountain Lion Plan recognizes different stakeholder views and is adapted from the 2015 IDFG Strategic Plan that provides the framework for developing species management objectives and associated management direction (Table 2).

Table 2. IDFG Strategic Plan objectives and corresponding mountain lion management direction.

Strategic Plan Objectives	Mountain Lion Management Direction
Maintain or improve game populations to meet the demand for hunting, fishing, and trapping.	Implement management activities that are designed to maintain viable lion populations. Manage predation to ensure long-term sustainability of ungulate populations. Continue to improve knowledge of possible impacts that mountain lions or other predators have on ungulate species. Continue to refine and implement the mountain lion monitoring program. Implement management activities that address mountain lion depredations. Implement management activities that address human-mountain lion conflicts (e.g., educational outreach).
Provide a diversity of mountain lion hunting opportunities.	Provide annual mountain lion hunting opportunity. Assess participation and demand for mountain lion hunting opportunities. Provide diverse hunting opportunities to meet the desires of a wide variety of user groups.
Eliminate the impacts of fish and wildlife diseases on fish and wildlife populations, livestock, and humans.	Improve disease surveillance for diseases of concern for mountain lion populations.
Improve Citizen Involvement in the Decision-Making Process.	Provide opportunities for interested and affected stakeholders to participate in the decision-making process. Utilize opinion surveys to sample a cross section of hunters.
Increase public knowledge and understanding of Idaho's fish and wildlife.	Provide biological information on Idaho's fish and wildlife to convey the status of populations and the basis for management decisions. Provide timely and accurate information on harvest opportunities or changes, management actions, and important news related to mountain lion hunting opportunities and mountain lion awareness.

STATEWIDE POPULATION MONITORING AND MANAGEMENT

2024–2029 MANAGEMENT DIRECTION

This mountain lion management plan incorporates predation management direction and recognizes the large geographic and temporal scales at which mountain lion populations operate. This Plan carries forward the 2002–2010 plan goals of maintaining mountain lion populations within their current statewide distribution and acknowledges the importance of providing diverse hunting opportunities, improving population monitoring tools, and maintaining responsiveness to human conflicts, livestock depredations, and prey populations.

IDFG species management plans often group individual GMUs into larger areas for data analysis and to identify broad goals for a population, but not necessarily to restrict management options and objectives to a single prescription for the entire area. Pertinent information for each Data Analysis Unit (DAU) includes population status, objectives, and management strategies. Grouping management units to form DAUs may or may not reflect actual population boundaries depending on the species under consideration.

The 2002–2010 Mountain Lion Management Plan grouped Idaho's 99 GMUs into 18 DAUs based on season structure, habitat type, habitat security, accessibility, mountain lion vulnerability, lion population density, and prey species availability. The utility of mountain lion DAUs was evaluated during the development of the current plan and IDFG staff determined that the grouping of GMUs into multiple small scale DAUs was not beneficial for effective management. This adjustment was made based on these considerations:

1) Many DAUs in the previous plan were too small to adequately interpret harvest and population trends, age structure, and distribution.

2) Population objectives for individual DAUs in the previous plan revolved around high, moderate, and low harvest regimes, which were set 30 years ago as the minimum level of harvest based on the 1990–1992 harvest average. Since then, harvest levels and management goals have changed.

3) Many states manage mountain lions using large scale management areas to reflect the species ecology. Mountain lions occur at low density, have large home ranges, and commonly make extensive movements over the landscape (Robinson et al. 2008, Stoner et al. 2008, Thompson and Jenks 2010). Mountain lions are often successfully managed at a large scale that reflects mountain lion spatial requirements, while preserving smaller management units to distribute hunting pressure, address local population concerns, and reduce human conflicts, livestock depredations and predation on ungulate species (Logan and Sweanor 2001, Jenks 2011, CMWG 2019).

4) New population modeling techniques (e.g., SPR) for monitoring require large-scale monitoring areas to obtain adequate sample sizes of biological samples (e.g., DNA and age at harvest data). Smaller scale areas, like GMUs or the small DAUs created

in the previous mountain lion plan, have limited data within each area and are not appropriate for these types of techniques.

IDFG will monitor and manage mountain lion populations at a regional and statewide level following the guidance outlined in Table 3.

Table 3. State and regional mountain lion management direction and strategies.

Management Direction	Strategies
Implement management activities that are designed to maintain viable mountain lion populations.	Continue to utilize a framework of general hunts; season dates and lengths may vary across the state depending on local management objectives and social considerations. Monitor and evaluate statewide and regional mountain lion mortality data collected through mandatory check of all documented mountain lion mortalities. Continue to evaluate regional harvest trends, sex ratios and age-at-harvest data at scales relevant to the estimation methods employed and prey species management as determined by wildlife managers (e.g., region, Elk Zone, bighorn sheep PMU, mule deer DAU; see Table 4). Continue to protect young and adult females accompanied by young. If mountain lion population data indicate populations are not self-sustaining, evaluate and reduce hunting opportunity where warranted, including adjusting season dates and harvest limits.
Manage predation to ensure continued supplies of wildlife for hunting (See Table 4 and Appendix C).	When predation is determined to be a limiting factor preventing a prey population from reaching objectives: • Implement additional predator harvest opportunity during the season setting process. • Where a Predation Management Plan exists, implement identified actions. • If a plan does not exist, develop a predation management plan under the authority of IDFG Predation Management Policy.
Improve baseline knowledge of possible impacts that mountain lions (and other predators) have on ungulate big game species.	Use ongoing ungulate monitoring techniques to evaluate population performance where lion predation may be an issue, including: • Herd composition surveys • Aerial abundance surveys • Camera-based surveys Investigate cause-specific mortality of radio-collared ungulates where populations are under-performing to assess potential effects of predation. Support research projects to better understand predator-prey dynamics.
Implement management activities that address and reduce livestock depredations.	Utilize methods listed in the plan to address and alleviate depredation/nuisance issues (Appendix B): • Utilize kill permits in areas where hazing and other methods are not effective.

	• Explore non-lethal methods to alleviate depredation/nuisance issues. Continue to cooperate with livestock interests, the Idaho State Animal Damage Control Board, and APHIS-WS to minimize and document livestock depredations. Develop and maintain a list of houndsmen in the community willing to volunteer to assist APHIS-WS and livestock producers.
Implement management activities that address and reduce mountain lion-human conflict.	Utilize the existing wildlife conflict reporting guidelines; W-3.0 IDFG Policy and WC-1 report form. Refine and improve the WC-1 report form and reporting system. Notify and address the public regarding mountain lion-human conflicts or human safety concerns. Identify region-specific procedures that tier off the W-3.0.
Continue to refine and implement the mountain lion monitoring program.	Explore additional/alternative methods of mountain lion population monitoring, including: • Camera surveys • Non-invasive genetic sampling • Statistical population reconstruction models Examine more relevant Data Analysis Units using additional monitoring data. Develop harvest survey methods that include evaluating hunter effort.
Assess participation and demand in mountain lion hunting opportunities; adjust management to achieve objectives.	Conduct hunter effort/opinion surveys to better gage mountain lion hunter participation, effort, and preferences across the state. Explore strategies to broaden our understanding of hunters views on predators and their experience mountain lion hunting. Continue public input and scoping processes during season setting and management planning. Continue to work with interested stake holders across the state when managing lion populations.
Provide diverse hunting opportunities to meet the desires of a wide variety of user groups.	Continue to allow a variety of methods of take: hound hunting, incidental, spot/stalk, and predator calls. Continue to overlap mountain lion seasons with deer and elk seasons. Utilize hunters as the primary means to harvest mountain lions to meet wildlife management objectives.
Improve disease surveillance for diseases of concern for mountain lion populations.	Improve IDFG mountain lion health screening guidelines and establish health screening and disease sampling protocol.

	Compile studies that address disease transmissions for better public understanding and place on the wildlife disease page on the IDFG website.
Provide biological information on Idaho's fish and wildlife to convey the status of populations and the basis for management decisions.	Continue to provide annual statewide mountain lion reports. Continue to provide wildlife research project reports. Develop a strategy to convey mountain lion management information more effectively to the Idaho public.
Provide timely and accurate information on recreational opportunities, management actions and important news related to mountain lion hunting opportunities and mountain lion awareness.	Develop education and outreach materials that focus on improving public understanding of mountain lions, the factors that impact mountain lion populations, and methods to minimize and mitigate conflicts. Look for examples from other agencies and entities to communicate information more effectively on living in areas with mountain lions. Update and maintain the mountain lion web page on the IDFG website. Engage with the trapping community regarding assistance with release of incidentally-trapped mountain lions. Engage with sportsman's groups to assist with public outreach, including information on sex and age identification techniques.

REGIONAL DATA ANALYSIS

One goal of this plan is to continue to monitor and report on mountain lion populations at a regional and statewide scale while concurrently analyzing data with new monitoring methods to develop more management relevant DAUs. Managers will continue using existing methods (e.g., harvest trends and mortality data) to monitor lion populations while concurrently exploring options to incorporate these data streams into the more sophisticated modeling techniques described previously (e.g., SPR). Additionally, opportunistic or ancillary data that can be readily collected and that will improve monitoring efforts will be evaluated. This change will allow managers to monitor mountain lion populations at various scales, particularly in relation to prey species status, conflict hotspots, harvest trends (e.g., percent females and adult males) or other management metrics, while still incorporating public input.

Mountain Lion Population Monitoring, Management, and Reporting Guidance

Wildlife managers will continue to monitor local mountain lion populations and consider ungulate population health at a regional scale. Managers will also consider the public's desire for local scale mountain lion management. Movements between game management units will be considered for localized management aimed at distributing hunting pressure or reducing predation on livestock and/or ungulate populations when developing local harvest seasons. For annual reporting, wildlife managers report by region on several measures used to monitor populations. These include:

- Harvest and mortality trends (3-year running average; Table 4, Appendix C-Table 7)
    - The number of total and adult female mountain lions removed.
    - Trends in sex and age composition of harvest over time. This information is evaluated in conjunction with other population indices to guide decisions about the status of the lion population and the appropriate local management prescriptions. Harvest goals will be based on trends in past harvest data, mountain lion population dynamics, harvest vulnerability, and the desired level and composition of harvest (e.g., % females ≥3 yrs. old).

  - Trends in catch/effort by hunters. Increases or decreases in the number of days hunting may reflect changes in lion population numbers.
- Trends in the number of human-lion interactions documented through the Wildlife Conflict Application
- Trends in the number of livestock depredations documented through reports from USDA APHIS-Wildlife Services
- Lion-related impacts to ungulate populations that are below management objectives
- Changes in harvest seasons and rules
- Updates and information from wildlife research projects

Table 4*:* Considerations for managers when evaluating mountain lion harvest for a defined area (e.g., region, elk zone, deer DAU) based on mountain lion population status, ungulate prey population status, and conflict.

Mountain lion management considerations based on lion population status.

Lion Population Status	Lion Harvest Indices[1,2,3]	Lion Population Goal	Considerations
Declining	>25% adult females in harvest (3-year avg.) >50% total females in harvest (3-year avg.) Increasing proportion of subadults in the harvest Progression in mean age of harvested adult females declines to <5 years old Average age of harvested lions is decreasing Hunter days/effort increasing	If ungulate populations are meeting objectives, consider maintaining or reducing harvest opportunity.	An increase in adult female harvest may indicate a decreasing lion population. Continue to evaluate adult female harvest. If adult female harvest is greater than 25% for 3 years, consider season or harvest restrictions to reduce female harvest.
Stable	10-20% adult females in the harvest (3-year avg.) ~40-45% total females in harvest (3-year avg.) Consider maintaining intermediate aged adult females (mean ≅ 4-6 years old) in the harvest	Maintain lion population	Evaluate whether ungulate populations are meeting objectives. Maintain general seasons.

	Stable proportion of all age and sex classes in the harvest Stable average age of harvested lions		
Increasing	Consistent or decreasing proportion of females in the harvest Decreasing proportion of subadults in harvest Increasing or stable average age of harvested lions Hunter days/effort decreasing Increasing older-age adult females in the population (>5 years old). This will be difficult to identify without additional sampling due to low sample size from harvest but would be expected for lightly hunted populations.	Consider reducing lion population, especially if ungulate populations are not meeting objectives.	Evaluate whether ungulate populations are meeting objectives. A high proportion of subadult males in the harvest can indicate that high harvest levels are leading to increased immigration, which may increase the total population. High proportion of older individuals (≥ 5 yrs.) in the harvest = low to moderate harvest levels.

1- Age classes: <3 =subadult, ≥3 = adult
2- Anderson and Lindzey 2005, Laundré et al. 2007, Logan and Runge 2021
3- Appendix C: Table 6, Elbroch et al. 2022

Mountain lion management considerations based on <u>ungulate population status.</u>

Ungulate Population Status	Indicators	Ungulate Population Goal	Considerations
Ungulate populations above objectives	Aerial Abundance Surveys Age:Sex Composition Surveys Depredation Issues Cause-Specific Mortality	Align ungulate populations with objectives	Continue to evaluate ungulate monitoring criteria for the species and the population management units. Consider reducing ungulates expanding to urban areas that may attract lions. Continue to allow general mountain lion harvest opportunity. Continue to monitor % of total females and adult females in the mountain lion harvest.

Ungulate populations at objectives	Camera-Abundance Survey Hunter and Public Observations Hunter Harvest Data	Maintain ungulate populations at current level	Continue to evaluate ungulate monitoring criteria. Continue to allow general mountain lion harvest opportunity. Continue to monitor % of total females and adult females in the mountain lion harvest.
Ungulate populations underperforming or below objectives		Increase ungulate population	Determine drivers of prey population decline: Investigate cause-specific mortality Target lion populations when evidence indicates lion predation is a limiting factor. Refer to current Predation Management Plan specific to that ungulate population or monitoring area. Develop a predation management plan where warranted. Increase adult female lion harvest over 25% Consider additional lion management strategies: second tags, increase nonresident hound hunting permit quota, expand season length Monitor ungulate response to lion reduction to determine the need to continue or discontinue management direction.

Mountain lion management considerations based on <u>conflict.</u>

Conflict Type	Indicators	Metrics	Considerations
Human	Wildlife Conflict Reporting	The 3-year average of non-hunting mortalities due to human safety/pet conflicts exceeds the 10-year average	Follow W-3.0 Wildlife Conflict Policy. Consider agency removal of lions in areas around human habitation. Consider reducing prey in urban areas that may attract mountain lions. Expand local harvest opportunity.

Livestock	Wildlife Services Reports and claims submitted to IDFG	The 3-year average of non-hunting mortalities due to livestock conflicts exceeds the 10-year average	Expand local harvest opportunity through the season setting process or with local depredation hunts. Consider kill permits for individual producers.

STATEWIDE

Mountain lions are distributed across Idaho and occupy a wide range of habitats. Mountain lions can be found wherever large ungulates are present. Topography, prey availability, prey vulnerability, and road accessibility during the harvest season are the primary factors that influence mountain lion populations.

Table 5. Statewide mountain lion management metrics.

State Characteristics	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Harvest	565	472	573	665	633	687	690	669	645	690
Number of Mortalities	607	508	611	708	697	741	769	740	698	765
% Females in Harvest	46.1%	44.7%	40.5%	40.4%	41.0%	45.2%	41.2%	43.8%	44.5%	45.1%
% Adult Females (≥3yo)	23.5%	17.3%	19.0%	21.2%	14.5%	14.4%	16.3%	13.6%	16.5%	unk
Hunter Days/Effort	1816	1282	1986	2013	2100	2343	2289	2314	1978	2224
Harvest Density: Lions per 100 mi²	0.68	0.56	0.69	0.80	0.76	0.82	0.83	0.80	0.78	0.83
Conflicts: Depredation Investigations (losses)*	6(12)	11(36)	12(158)	15(127)	16(62)	15(42)	40(143)	23(116)	29(152)	32(81)
Conflicts: Human-Safety**	52	56	53	55	65	37	33	29	26	56
Conflict Lions Removed	7	10	7	17	17	16	24	24	10	35

*USDA-WS: confirmed and probable mountain lion-caused livestock investigations and losses
** Conflict types include encounters, incidents, and attacks

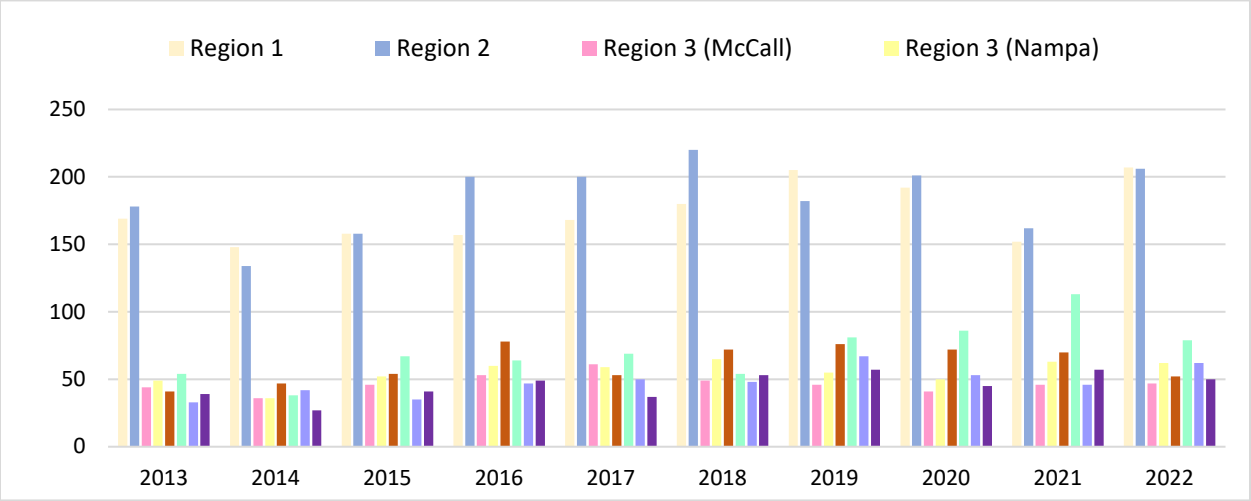
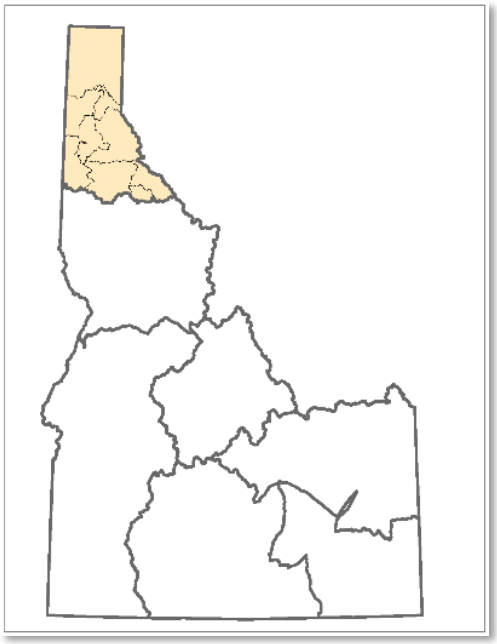


Figure 6: Total mountain lion mortality by Region 2013–2022 harvest seasons.

PANHANDLE: REGION 1

GMUs: 1, 2, 3, 4, 4A, 5, 6, 7, 9



Mountain lion populations in the Panhandle Region are healthy and support relatively high harvest due to extensive forests and diverse prey species, such as white-tailed deer, elk, and moose. Regional priorities include maintaining hunter opportunity as well as decreasing livestock and human-safety related conflicts. Hunting seasons in the Panhandle are relatively liberal with long seasons and the opportunity to use a second tag in specific GMUs in the eastern and southern portion of the region. Second tag GMUs are targeted to reduce lion populations in units where elk populations are underperforming. Regional staff will continue to examine elk and deer survival and sources of mortality to better understand how lions impact these species.

Table 6. Panhandle Region mountain lion management metrics.

Regional Characteristics	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Harvest	157	135	152	148	154	169	187	179	143	190
Total Mortalities	169	148	158	157	168	180	205	192	156	207
% Females in harvest	51.6%	49.6%	40.4%	36.5%	39.2%	42.0%	42.2%	48.3%	42.6%	45.8%
% Adult Females (≥3yo)	23.6%	12.2%	17.0%	15.8%	12.7%	14.0%	10.3%	10.7%	11.6%	Unk
Hunter Days/Effort	525	408	623	436	581	566	846	804	430	722
Harvest Density: Lions per 100 mi²	2.02	1.74	1.95	1.90	1.98	2.17	2.40	2.29	1.84	2.42
Conflicts: Depredations Investigations (losses)*	3(5)	6(23)	3(10)	2(4)	8(12)	5(13)	9(23)	3(3)	3(6)	6(14)
Conflicts: Human-Safety**	8	5	9	7	8	3	6	5	5	14
Conflict Lions Removed	0	6	3	4	7	5	4	3	2	7

*USDA-WS: confirmed and probable mountain lion-caused livestock investigations
**Conflict types include encounters, incidents, and attacks

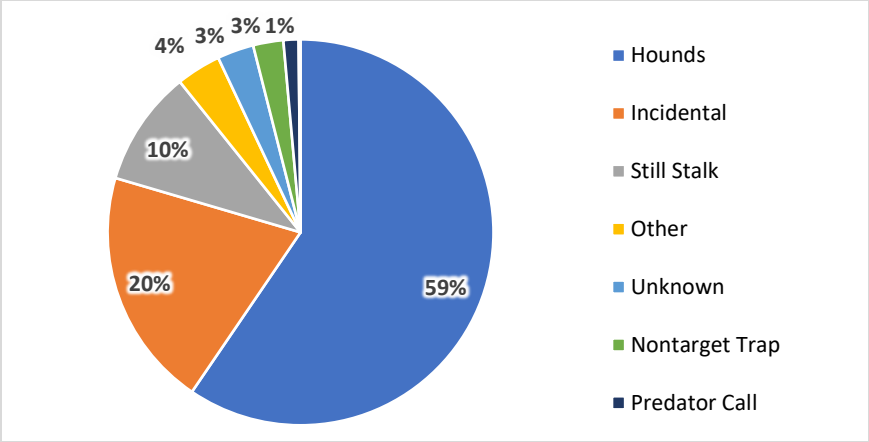


Figure 7: Panhandle Region proportion of total mountain lions harvest by method of take during 2013–2022 harvest seasons.

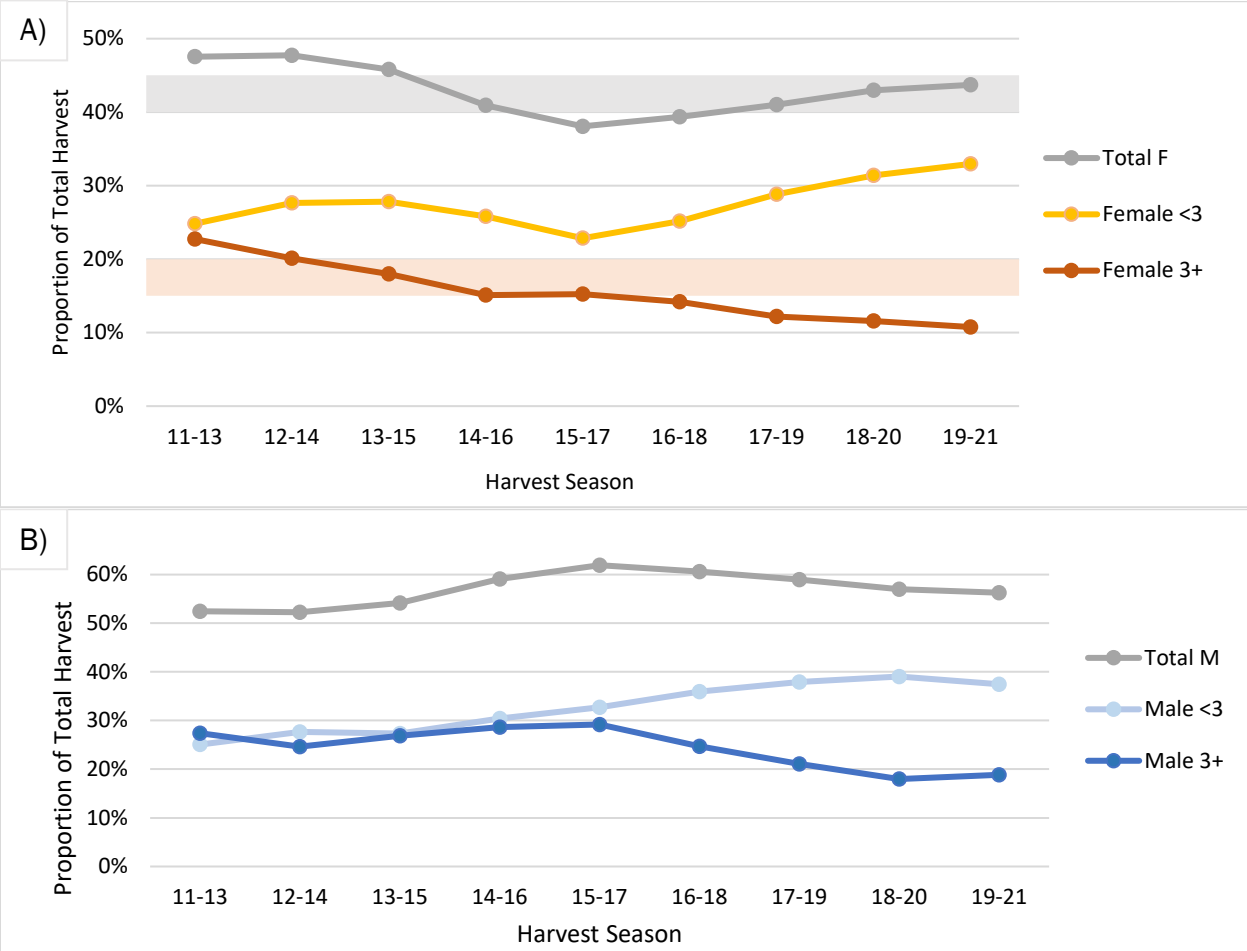


Figure 8: Proportions of total harvest for A) female and B) male mountain lions harvested in the Panhandle Region, calculated as 3-year running averages, during the 2011–2021 harvest seasons. The shaded areas in chart A represent the proportional ranges of total females (gray) and females 3+ years of age (orange) in the harvest that would be indicative of a stable lion population; see Table 4.

CLEARWATER: REGION 2

GMUs 8, 8A, 10, 10A, 11, 11A, 12, 13, 14, 15, 16, 16A, 17, 18, 19, 20

Habitats in the Clearwater Region are diverse and include dense coniferous forests with relatively high precipitation in mountainous terrain, canyon breaks, and privately owned farmlands in upland prairies. This diversity of habitats supports a healthy and abundant prey population of white-tailed deer and elk, along with some mule deer. Regional priorities include providing opportunities to hunt lions and reduce nuisance and depredation issues. Current harvest seasons on the east side of the region are long and second tags are allowed to expand harvest opportunity in remote, difficult to access areas where elk populations are underperforming. Regional staff will continue to work with private timber companies to improve access to private timber lands to pursue mountain lions. Wilderness areas and large roadless areas limit access for mountain lion hunting in this region.

Table 7. Clearwater Region mountain lion management metrics.

Regional Characteristics	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Harvest	168	131	153	189	193	215	179	190	155	187
Total Mortalities	178	134	158	200	200	220	182	201	162	206
% Females in Harvest	53.0%	45.0%	48.4%	45.7%	49.0%	51.6%	45.5%	48.4%	46.5%	47.6%
% Adult Females (≥3yo)	26.9%	20.0%	22.5%	22.9%	15.7%	17.7%	15.8%	13.9%	26.7%	unk
Hunter Days/Effort	531	354	460	494	511	658	512	673	466	532
Harvest Density: Lions per 100 mi²	1.40	1.09	1.27	1.57	1.61	1.78	1.49	1.58	1.29	1.56
Conflicts: Depredation Investigations (losses)*	1(5)	3(6)	3(7)	4(10)	4(9)	4(9)	1(3)	4(16)	6(21)	5(24)
Conflicts: Human-Safety**	6	23	10	13	16	9	0	1	6	15
Conflict Lions Removed	5	1	1	7	3	2	1	5	3	14

*USDA-WS: confirmed and probable mountain lion-caused livestock investigations and losses
**Conflict types include encounters, incidents, and attacks

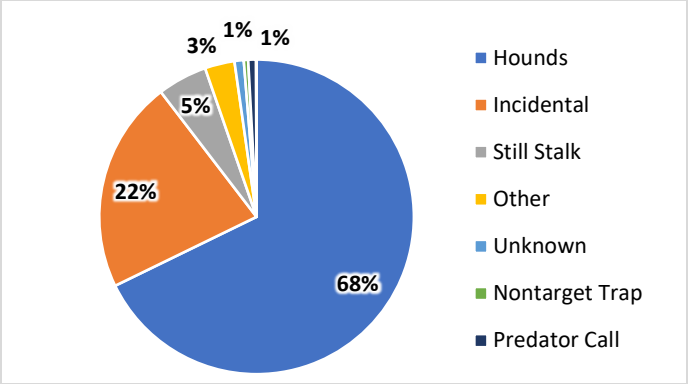


Figure 9: Clearwater Region proportion of total mountain lions harvest by method of take as recorded at mandatory check-in during 2013–2022 harvest seasons.

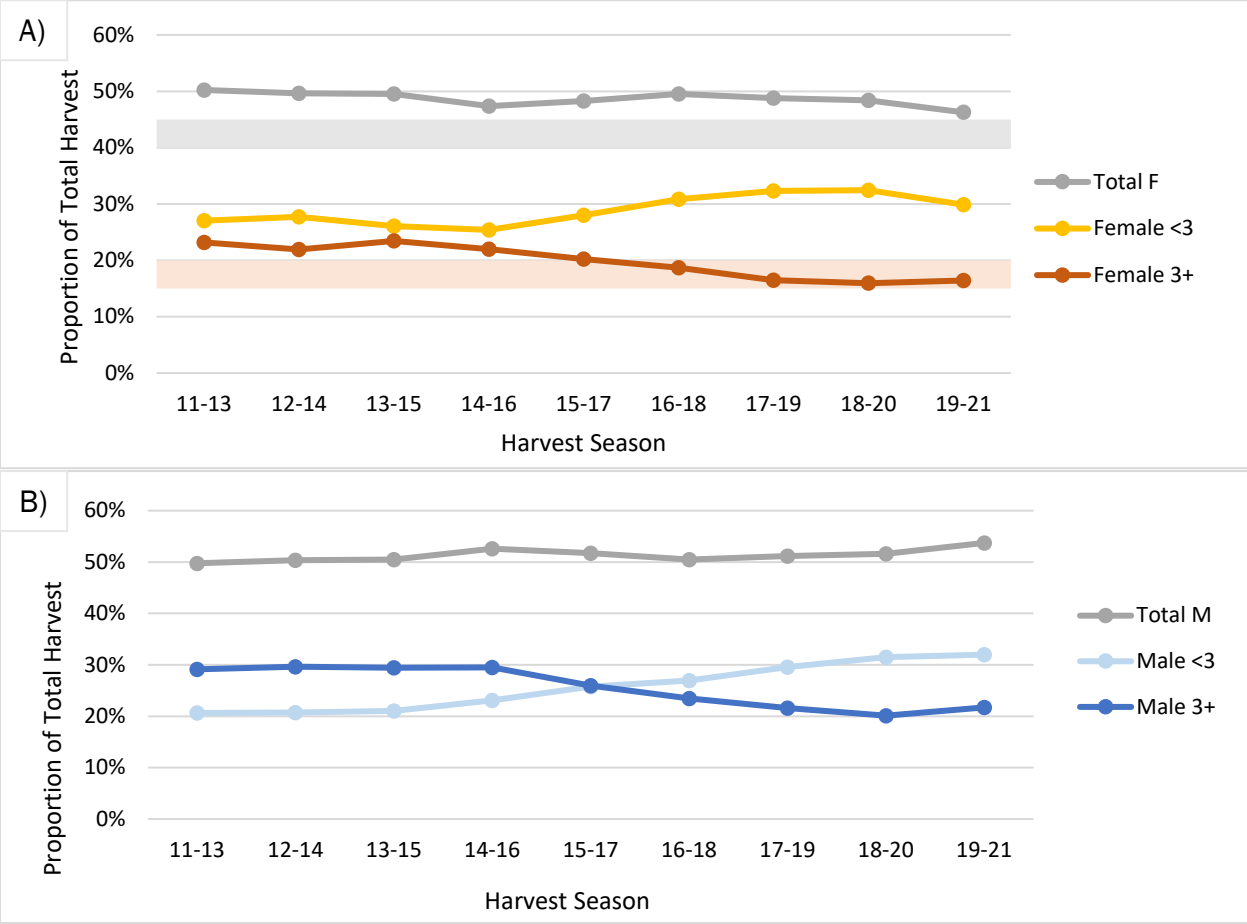
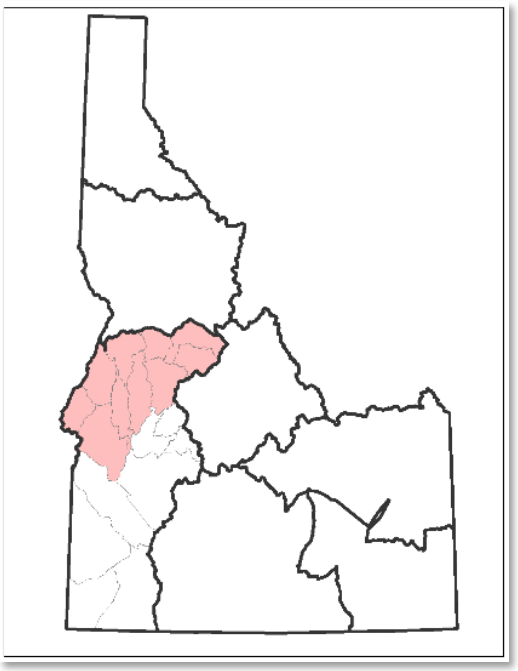


Figure 10: Proportions of total harvest for A) female and B) male mountain lions harvested in the Clearwater Region, calculated as 3-year running averages, during the 2011–2021 harvest seasons. The shaded areas in chart A represent the proportional ranges of total females (gray) and females 3+ years of age (orange) in the harvest that would be indicative of a stable lion population; see Table 4.

SOUTHWEST: REGION 3-MCCALL

GMUs 19A, 20A, 22, 23, 24, 25, 26, 31, 32, and 32A



Within the McCall portion of the Southwest Region, open, scattered shrub communities at lower elevations and mixed-conifer forests at mid to upper elevations characterize the habitat on the west side of the region, while the east side consists of wilderness areas and large roadless areas that limit access for mountain lion hunting. Moderate to high road densities exist in most of the west side, with lower road densities on the eastern side of the DAU. Regional priorities include maintaining general hunting opportunities and continuing to reduce depredation, nuisance, and complaints human-safety conflicts. The McCall sub-Region includes some of the most heavily hunted units with some of the most remote units in the state. The current structure of long seasons and 2-lion bag limits in wilderness GMUs 20A and 26 were implemented in response to hunter concerns about declining ungulate recruitment. Limited access, rugged topography, prey population dynamics, and competition with wolves likely have the greatest effects on lion populations in this area.

Table 8. Southwest Region-McCall mountain lion management metrics.

Regional Characteristics	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Harvest	39	32	44	52	56	46	42	38	45	45
Total Mortalities	44	36	46	53	61	49	46	41	46	47
% Females in Harvest	46.2%	53.1%	47.7%	35.3%	33.9%	41.3%	38.1%	50.0%	42.2%	42.2%
% Adult Females (≥3yo)	21.6%	29.0%	24.4%	21.3%	12.0%	17.5%	11.1%	14.3%	13.1%	unk
Hunter Days/Effort	75	86	137	175	201	201	129	113	130	131
Harvest Density: Lions per 100 mi²	0.50	0.41	0.56	0.66	0.72	0.59	0.54	0.49	0.58	0.58
Conflicts: Depredation Investigations (losses)*	0	1(3)	0	0	1(1)	1(6)	11(41)	2(27)	4(48)	5(8)
Conflicts: Human-Safety**	4	5	5	14	13	4	5	7	8	5
Conflict Lions Removed	0	1	1	0	1	1	4	2	0	1

*USDA-WS: confirmed and probable mountain lion-caused livestock investigations and losses
**Conflict types include encounters, incidents, and attacks

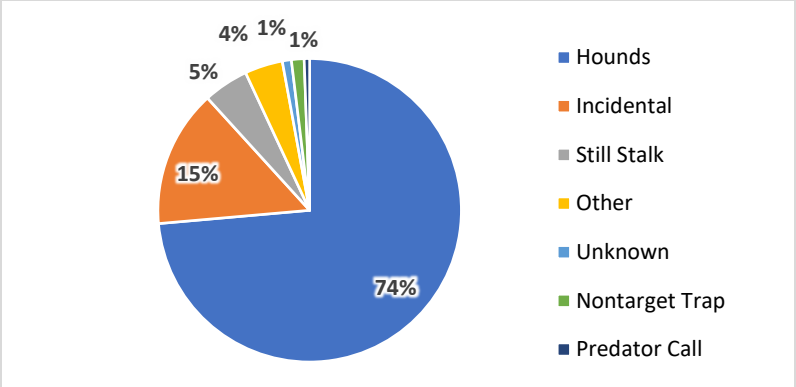


Figure 11: Southwest Region- McCall proportion of total mountain lions harvest by method of take as recorded at mandatory check-in during 2013–2022 harvest seasons.

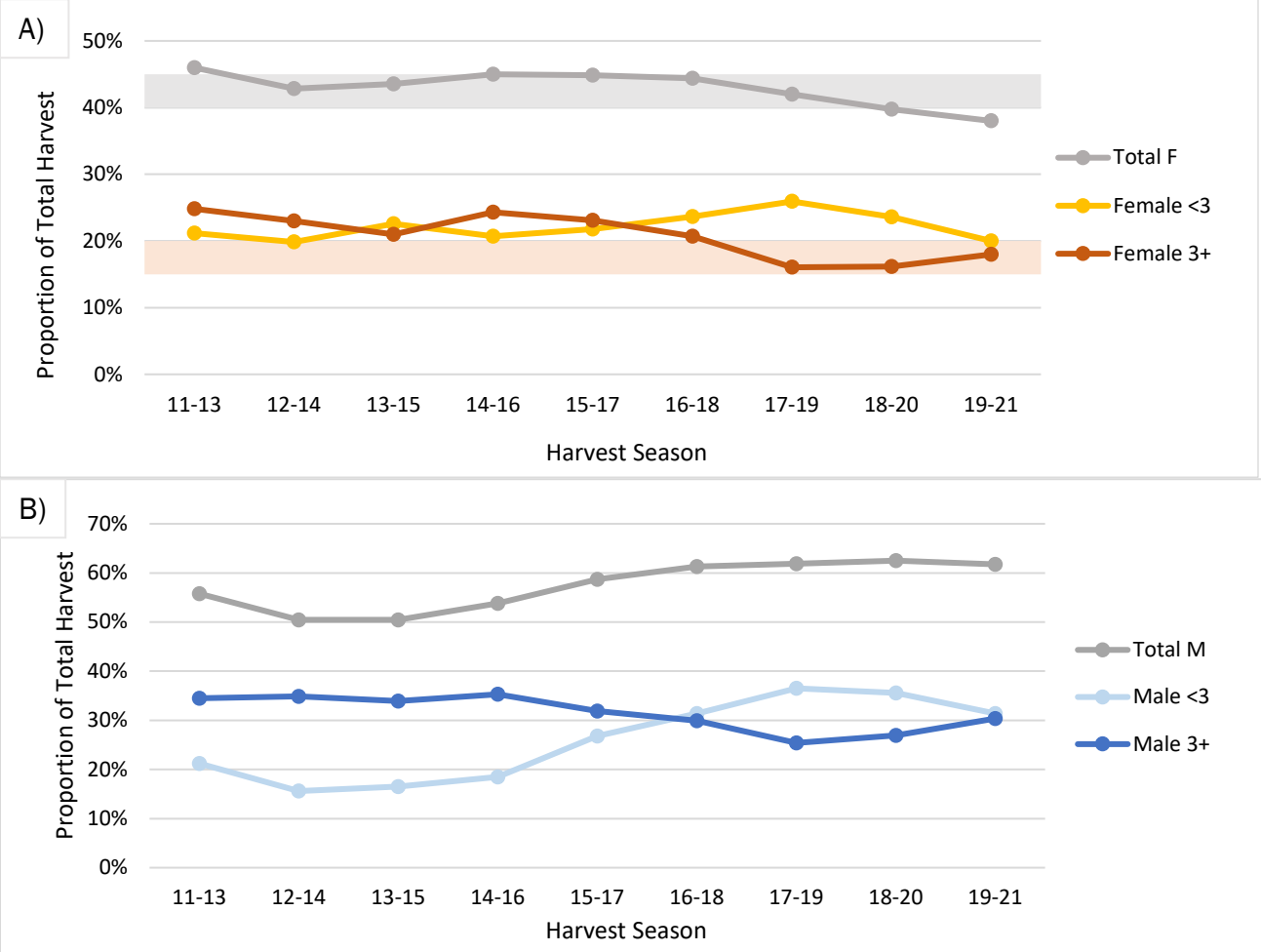
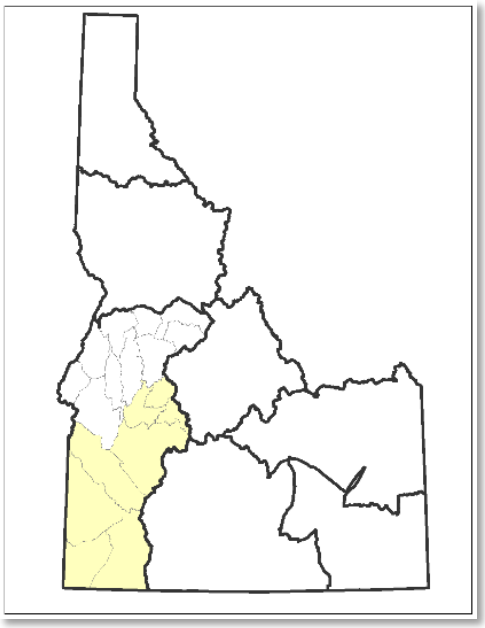


Figure 12: Proportions of total harvest for A) female and B) male mountain lions harvested in the Southwest Region-McCall, calculated as 3-year running averages, during the 2011–2021 harvest seasons. The shaded areas in chart A represent the proportional ranges of total females (gray) and females 3+ years of age (orange) in the harvest that would be indicative of a stable lion population; see Table 4.

SOUTHWEST: REGION 3-NAMPA

GMUs 33, 34, 35, 38, 39, 40, 41, 42



The Snake River and Treasure Valley bisect the Southwest-Nampa Region—Idaho's largest metropolitan area—and surrounded by private agricultural lands in the valley bottoms. Habitat to the north is characterized by open public land, scattered shrub communities at lower elevations and mixed-conifer forests at mid to upper-elevations. In the south, the habitat is largely open sagebrush desert with interspersed canyonlands ranging to dry forested mountains. The remoteness of the area and general scarcity of trees and presence of cliffs, caves, and other rocky features in parts of these GMUs make mountain lions difficult to hunt with hounds. Mule deer are the primary ungulate prey species for mountain lions in most of the region; however, lions also prey on elk, pronghorn, and bighorn sheep. Regional priorities include maintaining a diversity of harvest opportunities, being responsive to human-safety and livestock conflicts, and addressing predation impacts on ungulate populations.

Table 9. Southwest Region-Nampa mountain lion management metrics.

Regional Characteristics	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Harvest	47	35	48	58	53	59	53	48	61	56
Total Mortalities	49	36	52	60	59	65	55	50	63	62
% Females in Harvest	44.7%	48.6%	39.6%	44.8%	45.3%	42.4%	39.6%	38.8%	42.6%	46.4%
% Adult Females (≥3yo)	23.3%	20.6%	19.1%	30.5%	18.0%	13.3%	17.3%	18.4%	18.3%	unk
Hunter Days/Effort	130	84	114	197	116	214	191	87	229	225
Harvest Density: Lions per 100 mi²	0.39	0.29	0.40	0.49	0.44	0.49	0.44	0.41	0.51	0.47
Conflicts: Depredations Investigations (losses)*	0	0	0	0	0	0	1(2)	2(14)	5(6)	4(7)
Conflicts: Human-Safety**	22	14	16	16	16	5	3	6	2	18
Conflict Lions Removed	0	0	0	0	0	0	0	0	0	2

*USDA-WS: confirmed and probable mountain lion-caused livestock investigations
** Conflict types include encounters, incidents, and attacks

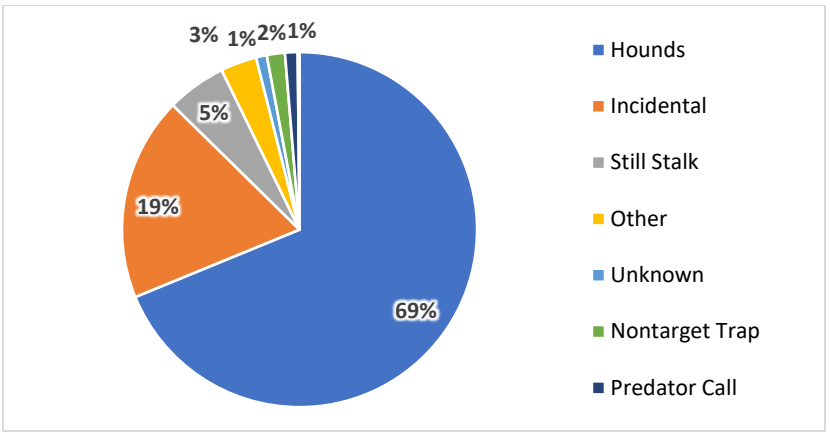


Figure 13: Southwest Region Nampa proportion of total mountain lions harvest by method of take as recorded at mandatory check-in during 2013–2022 harvest seasons.

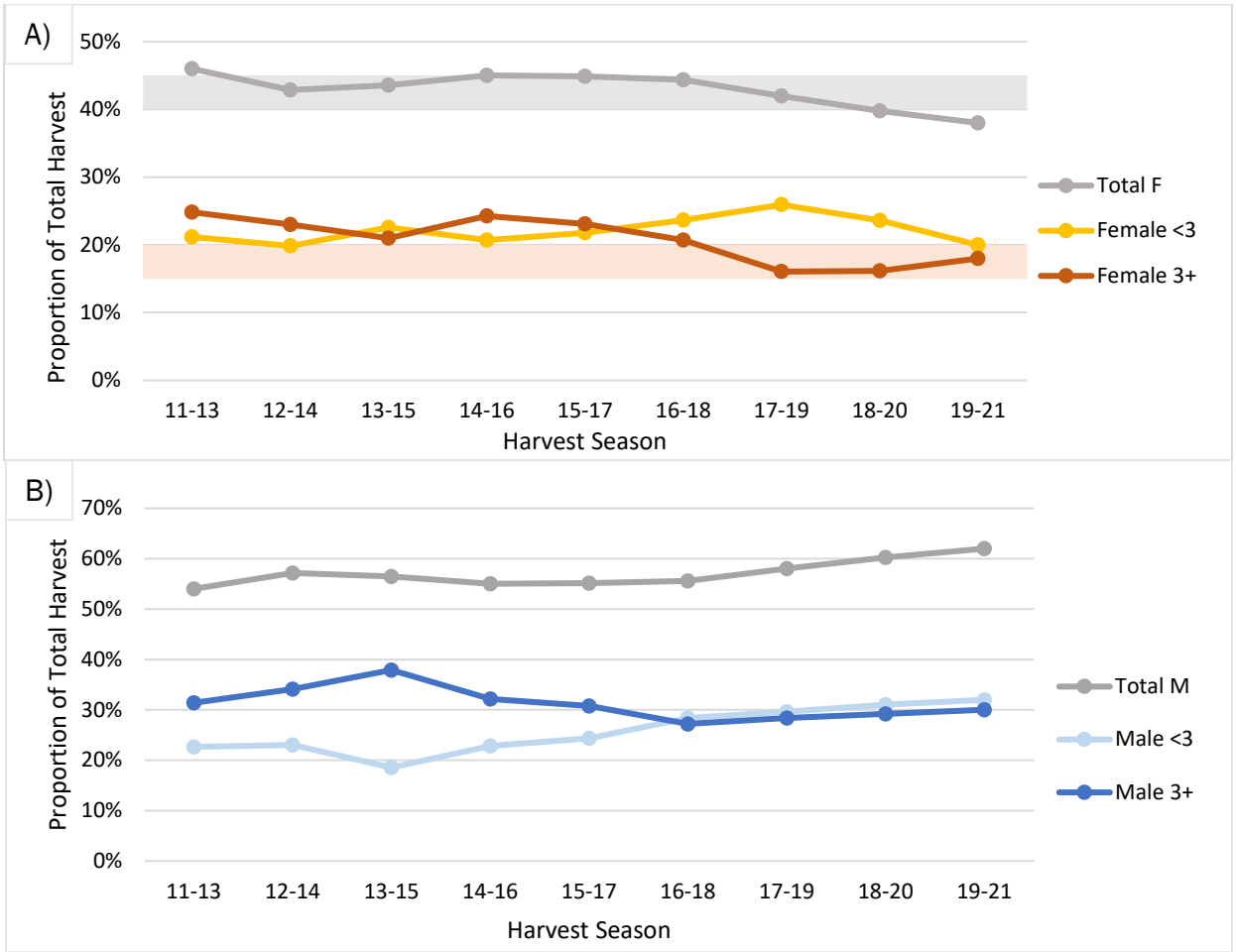
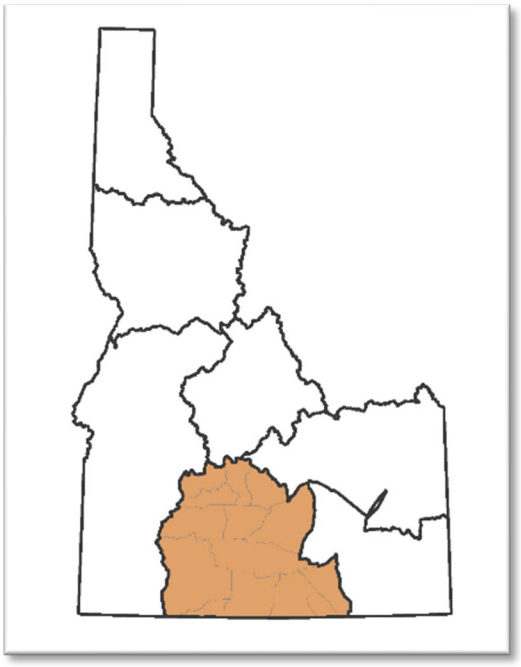


Figure 14: Proportions of total harvest for A) female and B) male mountain lions harvested in the Southwest Region-Nampa, calculated as 3-year running averages, during the 2011–2021 harvest seasons. The shaded areas in chart A represent the proportional ranges of total females (gray) and females 3+ years of age (orange) in the harvest that would be indicative of a stable lion population; see Table 4.

MAGIC VALLEY: REGION 4

GMUs 43, 44, 45, 46, 47, 48, 49, 52, 52A, 53, 54, 55, 56, 57



The Magic Valley Region stretches across the Snake River Plain up into the Sawtooth Mountains and down to the Nevada and Utah borders. Mule deer are the primary ungulate prey for mountain lions in most of the region; however, lions also prey on elk, pronghorn, and bighorn sheep. In general, GMUs in the north have low lion harvest compared to other units across the region. Regional mountain lion management priorities include maintaining a diversity of harvest opportunities, being responsive to human conflicts, and developing better lion population monitoring tools. The Region has also been working on improving community outreach and education about personal safety when living, visiting, and recreating in areas with mountain lions. Reevaluating mountain lion trends in response to the reintroduction (bighorn sheep) and proliferation (elk) of alternative prey species could provide valuable information for future management.

Table 10. Magic Valley Region mountain lion management metrics.

Regional Characteristics	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Harvest	39	43	53	74	44	57	62	66	60	45
Total Mortalities	41	47	54	78	53	72	76	72	70	52
% Females in Harvest	38.5%	39.5%	24.5%	45.2%	31.8%	50.9%	45.9%	47.0%	53.3%	48.9%
% Adult Females (≥3yo)	18.9%	18.6%	8.2%	28.8%	19.0%	13.2%	21.8%	23.3%	24%	unk
Hunter Days/Effort	128	84	171	222	176	234	132	198	187	160
Harvest Density: Lions per 100 mi^2	0.26	0.28	0.35	0.49	0.29	0.38	0.41	0.44	0.40	0.30
Conflicts: Depredations Investigations (losses)*	1(1)	1(4)	1(120)	1(1)	2(22)	4(13)	14(51)	6(33)	7(8)	10(22)
Conflicts: Human-Safety**	4	3	0	0	0	8	15	0	2	3
Conflict Lions Removed	0	1	0	1	5	6	4	1	2	3

*USDA-WS: confirmed and probable mountain lion-caused livestock investigations and losses
** Conflict types include encounters, incidents, and attacks

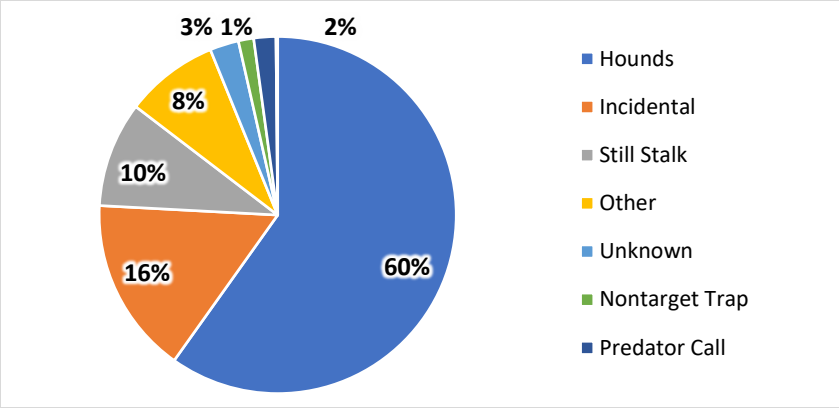


Figure 15: Magic Valley Region proportion of total mountain lions harvest by method of take as recorded at mandatory check-in during 2013–2022 harvest seasons.

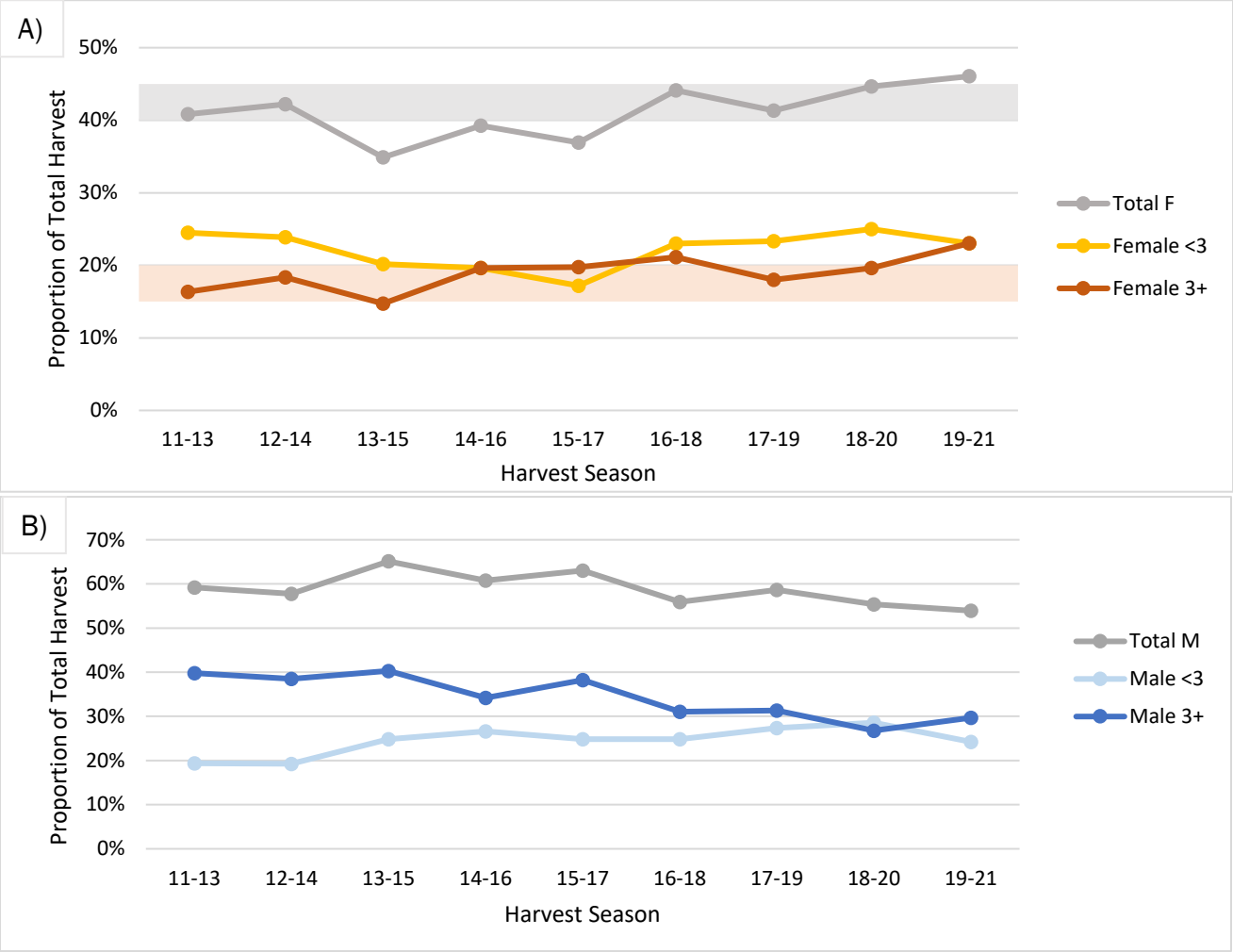
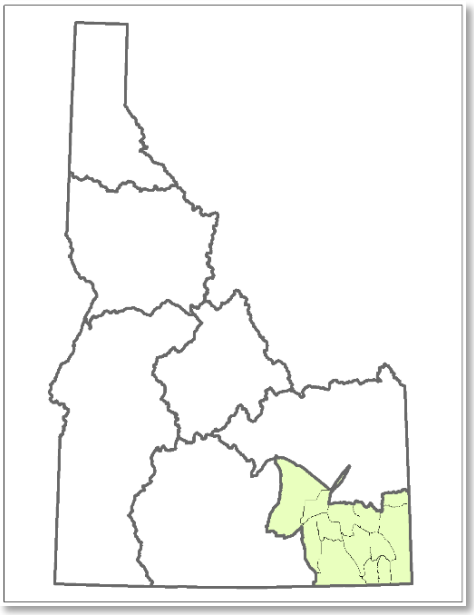


Figure 16: Proportions of total harvest for A) female and B) male mountain lions harvested in the Magic Valley Region, calculated as 3-year running averages, during the 2011–2021 harvest seasons. The shaded areas in chart A represent the proportional ranges of total females (gray) and females 3+ years of age (orange) in the harvest that would be indicative of a stable lion population; see Table 4.

Southeast: Region 5

GMUs 66A, 68, 68A, 70, 71, 72, 73, 73A, 74, 75, 76, 77, 78



The Southeast Region is comprised of mix of sagebrush and antelope bitterbrush communities, mahogany and juniper woodlands, high-elevation aspen and mixed-conifer forests and cultivated agriculture lands. Populations of the main mountain lion prey species in the region mule deer, fluctuate widely and are currently at low-moderate levels due to a recent sever winter. The region has a large agriculture industry and livestock depredations will continue to influence mountain lion populations and management. Southeast Region priorities include maintaining hunter opportunity and decreasing livestock and human-safety related conflicts. From 2019–2021 harvest management strategies included both male and female quotas. Regional staff will continue to examine elk and deer survival and sources of mortality to better understand how lions impact these species. Monitoring predation by lions, as well as other predators, on ungulate populations will continue to be an important factor for regional staff to consider.

Table 11. Southeast Region mountain lion management metrics.

Regional Characteristics	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Harvest	47	33	54	60	59	48	60	65	105	71
Total Mortalities	54	38	67	64	69	54	81	86	113	79
% Females in Harvest	36.2%	30.3%	42.6%	36.7%	32.2%	47.9%	55.0%	52.3%	45.7%	38.8%
% Adult Females (≥3yo)	20.5%	14.8%	20.8%	13.5%	16.7%	9.3%	28.6%	13.3%	21.1%	unk
Hunter Days/Effort	157	93	243	168	188	135	119	162	267	152
Harvest Density: Lions per 100 mi^2	0.53	0.37	0.61	0.67	0.66	0.54	0.67	0.73	1.18	0.80
Conflicts: Depredations Investigations (losses)*	0	0	1(1)	3(100)	1(18)	1(1)	3(22)	5(22)	4(62)	2(6)
Conflicts: Human-Safety**	7	6	13	3	10	4	10	48	42	unk
Conflict Lions Removed	1	1	2	1	1	1	7	9	1	4

*USDA-WS: confirmed and probable mountain lion-caused livestock investigations and losses

** Conflict types include encounters, incidents, and attacks. Region 5 started documenting all lion observations and calls for service in 2019.

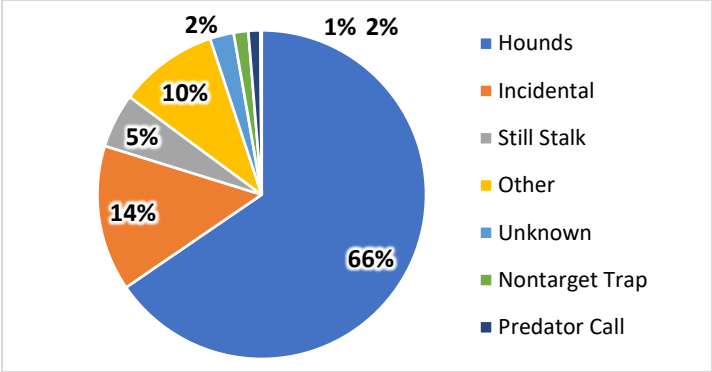


Figure 17: Southeast Region proportion of total mountain lions harvest by method of take as recorded at mandatory check-in during 2013–2022 harvest seasons.

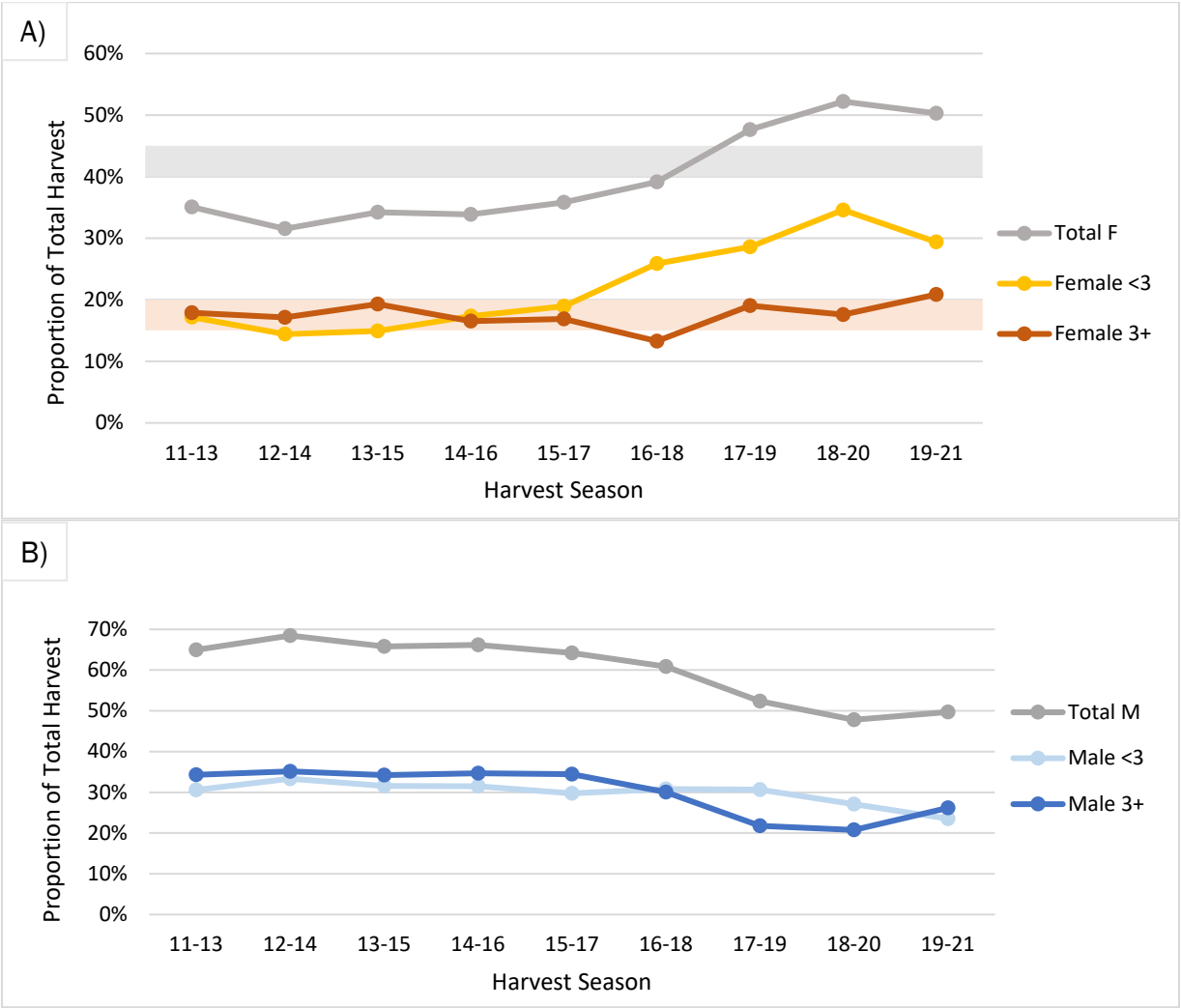
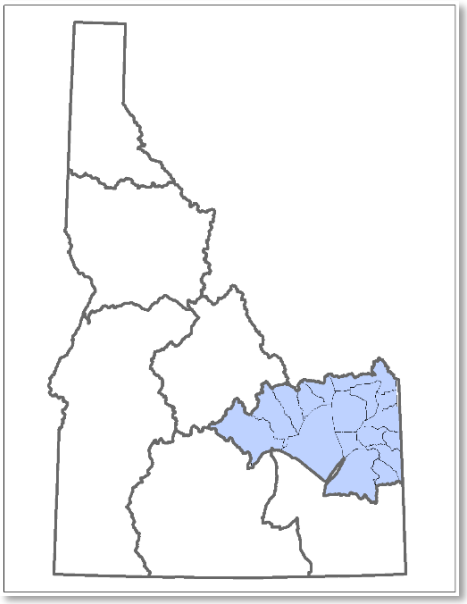


Figure 18: Proportions of total harvest for A) female and B) male mountain lions harvested in the Southeast Region, calculated as 3-year running averages, during the 2011–2021 harvest seasons. The shaded areas in chart A represent the proportional ranges of total females (gray) and females 3+ years of age (orange) in the harvest that would be indicative of a stable lion population; see Table 4.

UPPER SNAKE: REGION 6

GMUs 50, 51, 58, 59, 59A, 60, 60A, 61, 62, 62A, 63, 63A, 64, 65, 66, 67, 69



The Upper Snake Region contains diverse landscapes which include high desert shrub-steppe communities, sub-alpine habitats, high-elevation sagebrush, mountain peaks, and dense mixed-conifer forests. Units along the Snake River Plain have marginal lion habitat, lack year-round prey sources, and lie on the margins of areas with established lion populations. Populations of the main mountain lion prey species, mule deer, fluctuate widely and are currently at low-moderate levels due to a recent sever winter. Hunter access, winter conditions, and vulnerability of lions to harvest also vary throughout the region. Regional mountain lion management priorities include maintaining hunting opportunities and minimizing depredation and human-safety conflicts. The region has a large agriculture industry and livestock depredation management will continue to influence mountain lion management.

Table 12. Uppersnake Region mountain lion management metrics.

Regional Characteristics	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Harvest	31	38	31	42	42	47	59	47	41	54
Total Mortalities	33	42	35	47	50	48	67	53	46	62
% Females in Harvest	38.7%	50.0%	38.7%	29.3%	33.3%	29.8%	33.9%	31.9%	43.9%	40.7%
% Adult Females (≥3yo)	25.0%	21.2%	17.9%	22.2%	6.5%	12.2%	16.4%	5.1%	16.2%	unk
Hunter Days/Effort	129	97	128	210	222	184	163	163	135	148
Harvest Density: Lions per 100 mi^2	0.27	0.33	0.27	0.36	0.36	0.41	0.51	0.41	0.36	0.47
Conflicts: Depredations Investigations (losses)*	0	0	2(19)	1(8)	0	0	1(1)	0	0	0
Conflicts: Human-Safety**	0	0	0	1	0	3	1	0	0	0
Conflict Lions Removed	1	0	0	1	0	0	2	0	0	2

*USDA-WS: confirmed and probable mountain lion-caused livestock investigations and losses
** Conflict types include encounters, incidents, and attacks

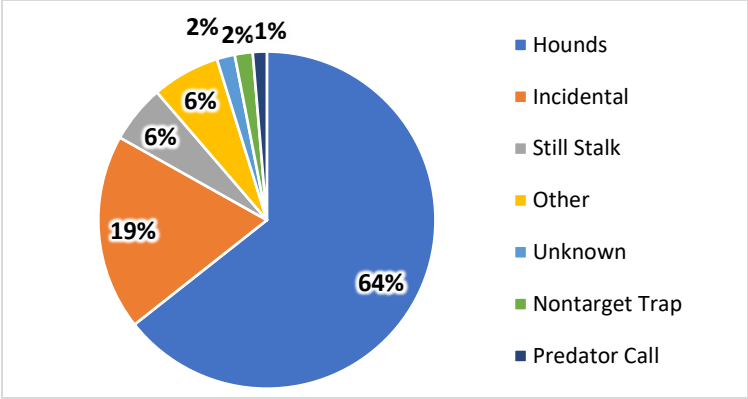


Figure 19: Uppersnake Region proportion of total mountain lions harvest by method of take as recorded at mandatory check-in during 2013–2022 harvest seasons.

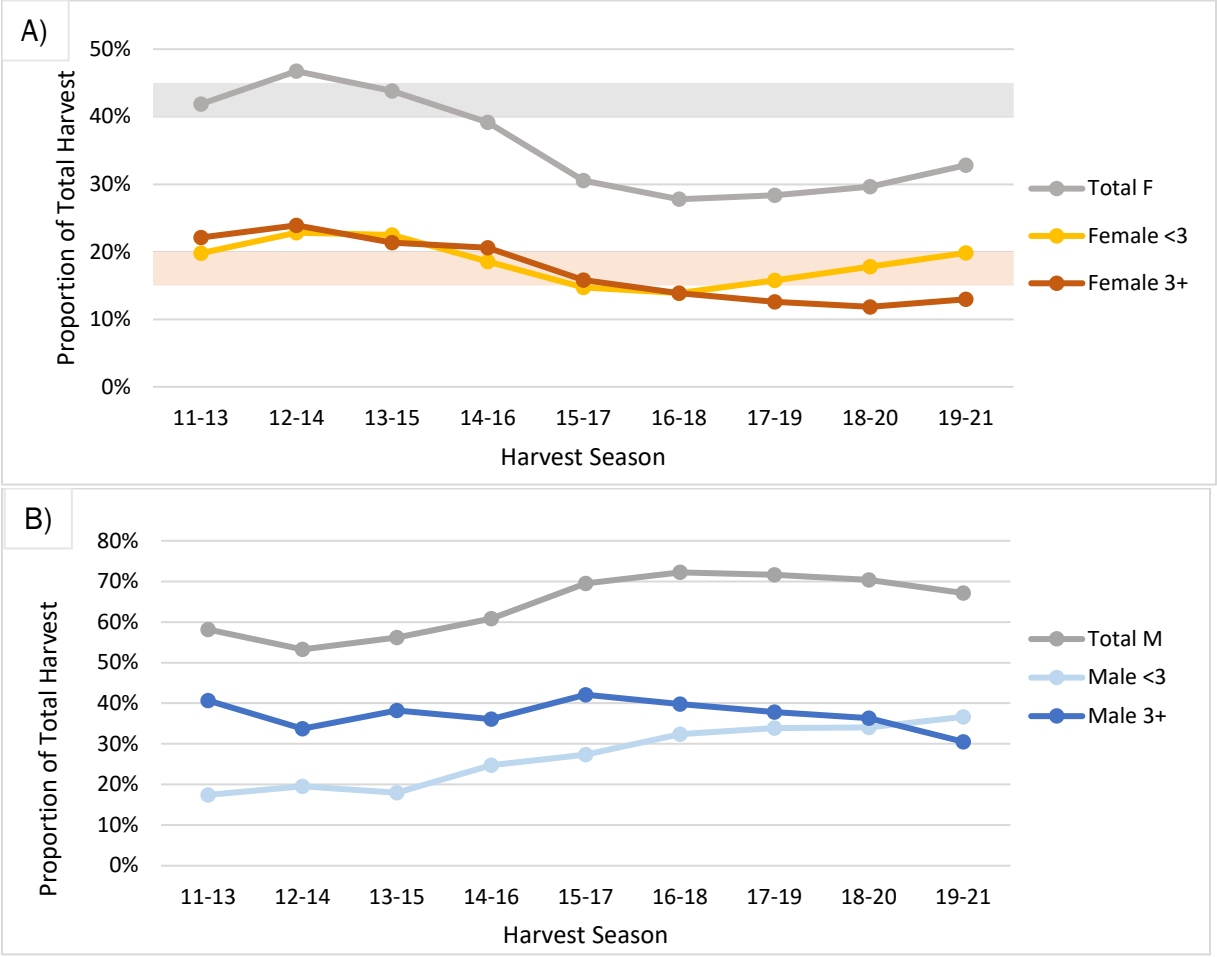


Figure 20: Proportions of total harvest for A) female and B) male mountain lions harvested in the Uppersnake Region, calculated as 3-year running averages, during the 2011–2021 harvest seasons. The shaded areas in chart A represent the proportional ranges of total females (gray) and females 3+ years of age (orange) in the harvest that would be indicative of a stable lion population; see Table 4.

SALMON: REGION 7

GMUs 21, 21A, 27, 28, 29, 30, 30A, 36, 36A, 36B, 37, 37A

Habitats in the Salmon Region include sagebrush grasslands, river breaks, mixed conifer forests, and sub-alpine habitats. Human population centers are few, small, and scattered. Much of this region contains remote and rugged public land, with most private land occurring as agricultural and residential properties along valley bottoms. Both deer and elk are abundant ungulate prey for mountain lions, with bighorn sheep and mountain goats locally available. Salmon Region mountain lion populations are likely partly sustained by immigration from adjacent, less-hunted wilderness populations. Some bighorn sheep populations may be locally affected by mountain lion predation and mountain lions also likely play a limiting role on deer in certain areas of the region. Prey populations and competition with wolves will likely have the greatest effect on lion populations in this area. Regional mountain lion management priorities include maintaining general hunting opportunity and addressing predation on underperforming ungulate populations.

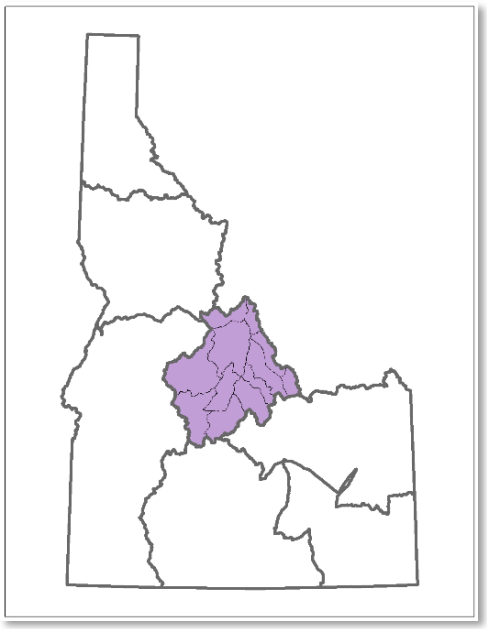


Table 13. Salmon Region mountain lion management metrics.

Regional Characteristics	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Harvest	37	25	38	42	32	46	48	35	46	44
Total Mortalities	39	27	41	49	37	53	57	45	57	50
% Females in Harvest	29.7%	24.0%	28.9%	23.8%	43.8%	41.3%	33.3%	34.3%	34.8%	47.7%
% Adult Females (≥3yo)	15.2%	4.0%	18.8%	19.0%	12.1%	8.5%	23.1%	10.5%	12.8%	Unk
Hunter Days/Effort	141	76	110	111	105	151	197	114	134	154
Harvest Density: Lions per 100 mi²	0.45	0.30	0.46	0.51	0.39	0.56	0.58	0.43	0.55	0.52
Conflicts: Depredations Investigations (losses)*	1(1)	0	1(1)	4(3)	0	0	0	1(1)	1(1)	0
Conflicts: Human-Safety**	1	0	0	1	2	1	1	8	1	1
Conflict Lions Removed	0	0	0	3	0	1	2	4	2	2

*USDA-WS: confirmed and probable mountain lion-caused livestock investigations and losses
** Conflict types include encounters, incidents, and attacks

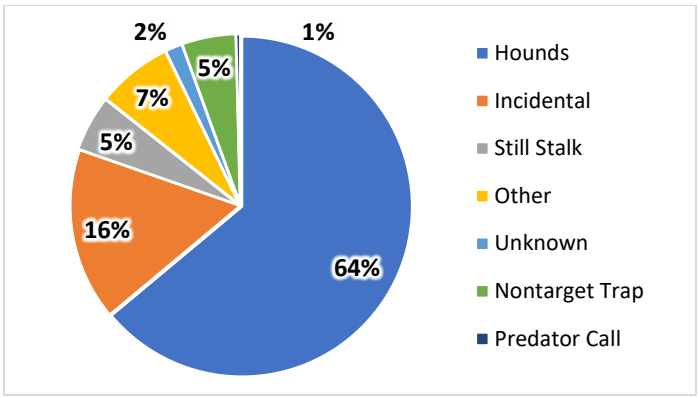


Figure 21: Salmon Region proportion of total mountain lions harvest by method of take as recorded at mandatory check-in during 2013–2022 harvest seasons.

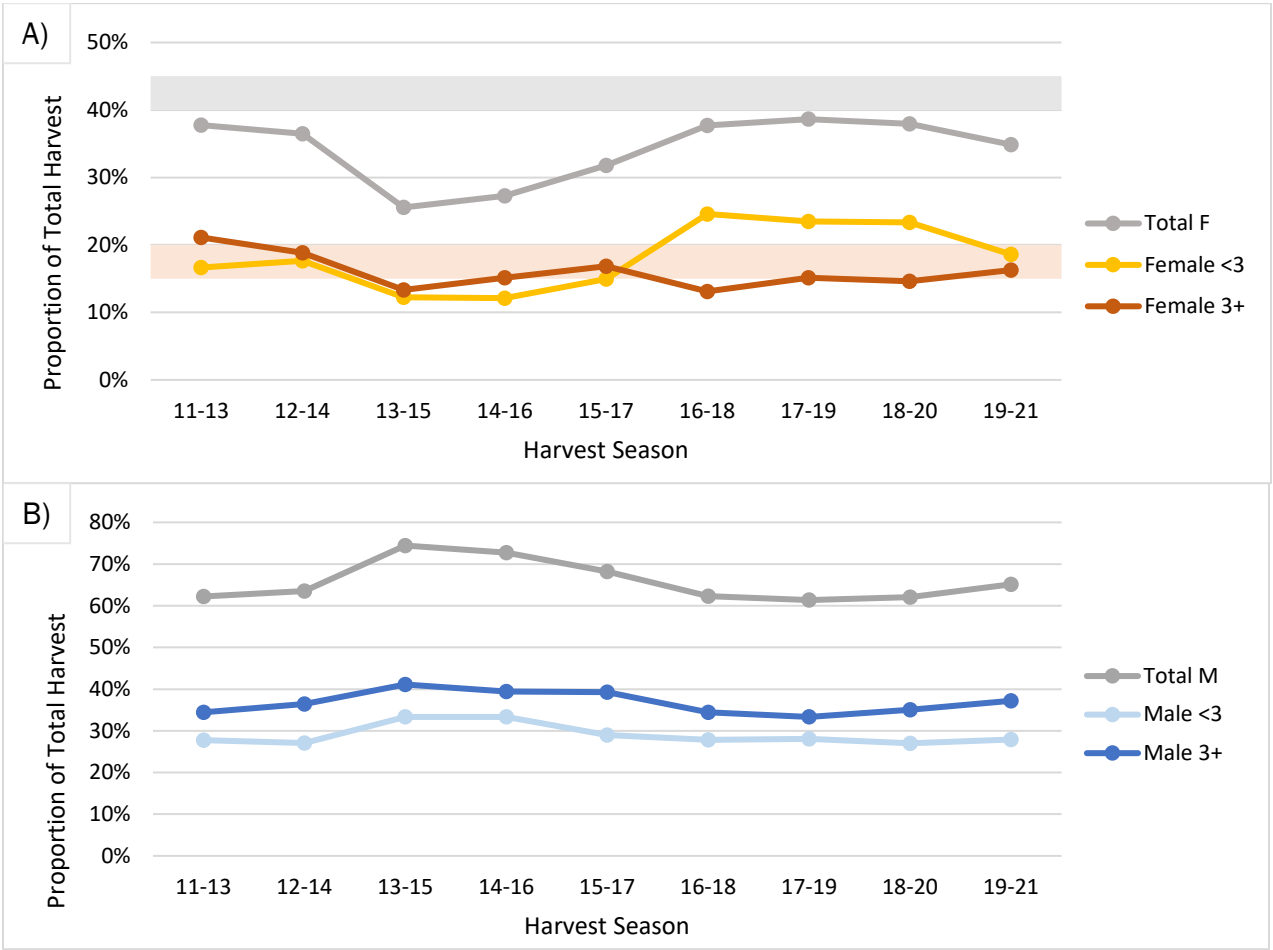


Figure 22: Proportions of total harvest for A) female and B) male mountain lions harvested in the Salmon Region, calculated as 3-year running averages, during the 2011–2021 harvest seasons. The shaded areas in chart A represent the proportional ranges of total females (gray) and females 3+ years of age (orange) in the harvest that would be indicative of a stable lion population; see Table 4.

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APPENDIX A: PUBLIC INPUT SUMMARY

Solicitation of Public Comment:
The draft Idaho Mountain Lion Management Plan 2024-2029 was posted for public information/scoping on the Department's website Aug 2, 2023 – Aug 23, 2023 (21 day-open comment period). The Department received 231 submissions through webform, plus 2 submissions via email and phone call, from the public and sportsmen's groups.

Summary of Public Input:
Of the webform submissions, 10 duplicate submissions and one blank submission with an irrelevant comment were removed. A total of 222 unique individuals selected a level of support for the plan, which includes 204 (92%) residents and 18 (8%) nonresidents (Table 5). Seven people did not select a support preference for the plan but did comment on mountain lion management and were included in the summary of comments.

Overall, the plan was supported by both residents and nonresidents. Across all submissions, 94 (42%) supported the plan, 65 (29%) supported it with concerns, and 59 (25%) did not support it. Among residents, 86 (44%) supported the plan, 59 (30%) supported it with concerns, and 54 (27%) did not support it. Among nonresidents, 8 (50%) supported the plan, 6 (37%) supported it with concerns, and 2 (13%) did not support it.

Table 14: Summarized levels of support for the draft mountain lion management plan based on public input submitted through the webform and other routes (n= 222).

Level	Support	Support w/Concern	Do Not Support	Blank
Overall	94 (44%)	65 (30%)	56 (26%)	7
Resident	86 (43%)	59 (30%)	54 (27%)	5
Nonresident	8 (50%)	6 (37%)	2 (13%)	2

Summary of Comments:
Some commenters did not choose a support level for the plan but included a comment related to mountain lion management and/or the draft plan. Also, several commenters selected the level of support but did not directly address the draft plan in their comments.

Staff reviewed and summarized 164 (73%) additional comments submitted by the public. Sixty-seven percent of Idaho residents (n = 149) provided additional comments. Of the nonresidents, 83% (n = 15) provided additional comments. Most of the comments received were from Idaho residents. The following analysis of comments pertains only to comments received from Idaho residents.

Organizations and groups that submitted comments or reached out for discussions advocating for their constituents: Idaho Trappers Association, Idaho Wild Sheep Foundation, Idaho Wildlife Federation, and Safari Club International

Support & Support With Concerns: The most frequent topics residents mentioned in support of the draft management included support for mountain lion management relative to conflicts with predation, depredation, and human-safety (32 comments; Figure 6). Respondents indicated Idaho's lion population is too high (14 comments) and/or supported increasing harvest opportunity (10 comments), including expanding seasons and limits (14 comments) and/or allowing trapping or incidental trap take (16 comments). Those who supported the plan, supported IDFG's management overall (17 comments).

Do Not Support: Many respondents who did not support the plan asserted the plan needs to reestablish the quota system (16 comments) and/or reduce opportunity because too many lions are being taken (12 comments). However, others who did not support the plan stated there are too many lions (6 comments) and/or supported increased hunting opportunity (10 comments).

Both commentors supporting and not supporting the plan shared concerned that mountain lion populations may need additional regulation, suggesting the use of quotas (27 comments) and/or implementing additional protections for females and females with dependent young (17 comments). In addition, both types supported managing conflicts related to predation, depredation, and human-safety (43 comments); restricting nonresidents (12 comments); and/or managing the increase in human presence (hunters/hound hunters) on the landscape (14 comments).

Many comments were specific to changes in hunting seasons and rules statewide or to a specific hunting area (i.e., quotas 27, changes to seasons 22, restricting non-residents 11, increase 20 or decrease 19 opportunity, female/female with young restrictions 17); which are typically approached during the season setting process. Many commenters stated they were from the Southeast Region (20) and/or a hound hunter (16).

After considering all public comments, the draft plan was modified and prepared for consideration by the Commission.

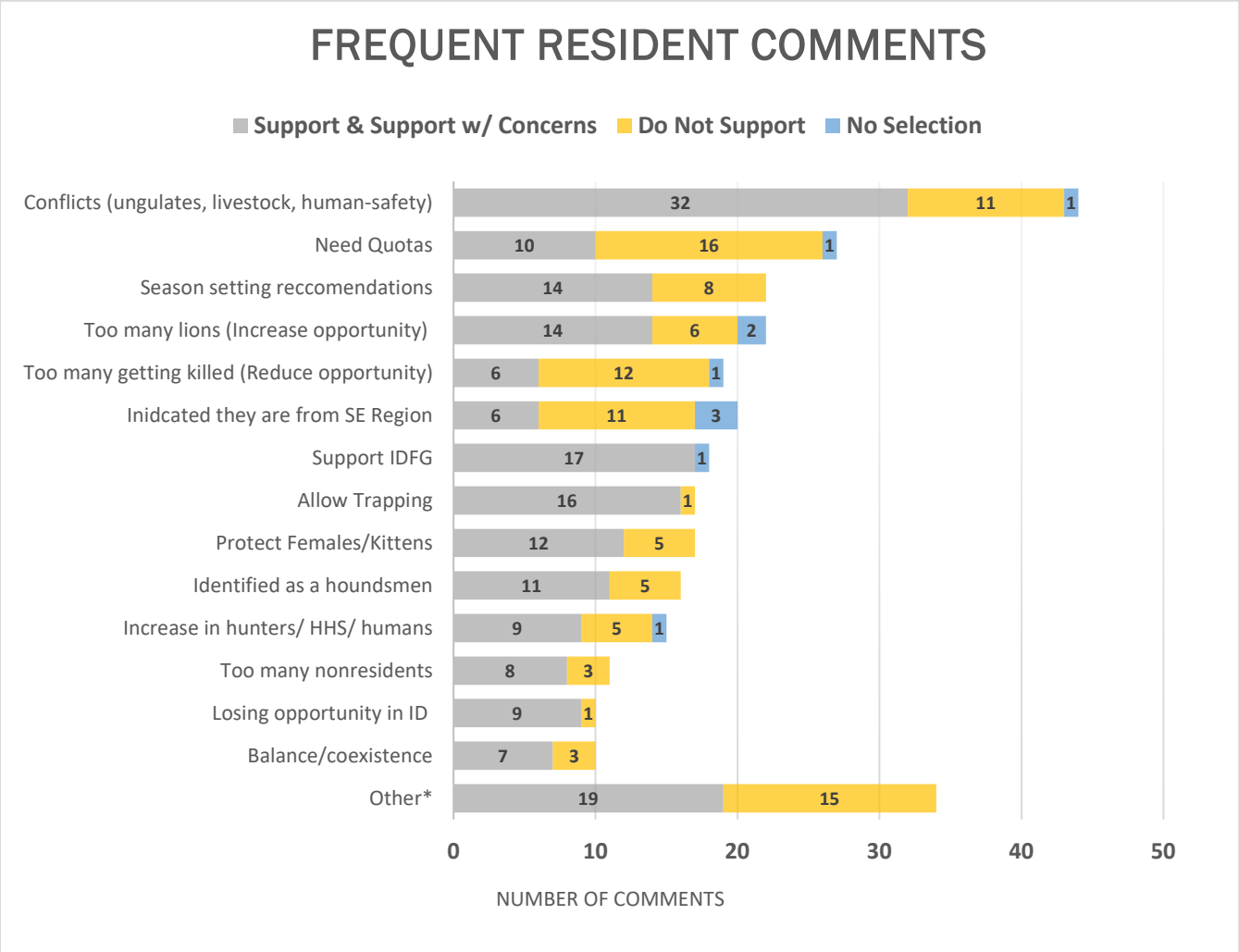

Figure 23: Summary of topics of discussion from users who provided a comment (n = 323). *Other: includes minimal topics (i.e., access issues, wolves, classify as a predator, better science, no quotas).

SETTING HARVEST SEASONS AND RULES VS SPECIES MANAGEMENT PLANS

Species Management Planning: Species management plans are statewide, multi-year documents providing guidance and overall direction to IDFG staff to help identify both statewide and regional population and management objectives. Staff assess wildlife population needs and hunter/angler desires and set management direction and goals. IDFG conducts surveys of hunter/angler opinions and conducts public and agency scoping. The planning process includes Commission direction and involvement. The Commission reviews draft proposals and options and approves or rejects recommended plans.

Harvest Season Setting: Occurs on a two-year cycle and includes setting season timing and length, species, sex, size, and number of animals allowed per permit/license/tag. Season regulations do not require legislative approval. The mountain lion season setting process consists of primarily three components: 1) IDFG staff recommendations, 2) IDFG

Commission action; and 3) Post-IDFG Commission action. Below is a simplistic model depicting the process for the development of IDFG mountain lion harvest seasons and rules.

– **Staff recommendations:** A variety of information and data are collected, reviewed, and used in the development of mountain lion hunting season recommendations by IDFG staff.
  - Biological Data: population surveys, reports, population modeling
  - Social Data: public input, hunter information, landowners
  - Harvest Data: harvest effort, trends, composition

– **Commission Action:** The seven commissioners, each representing a different region of the state, are responsible for administering the Idaho Fish and Game policy. The Commission has the discretion to open/close hunting seasons for mountain lions and set harvest limits. The Commission has adopted administrative rules and seasonal brochures.

– **Post Commission Action**: Idaho Administrative Procedure Act specifies rules for the following: application for licenses; license forms and fees; possession, processing, and transportation of game; hunting requirements and prohibited methods; and, and license allocations. These rules must be adopted following IDAPA, including approval by the Idaho Legislature whose guidance is that formal negotiated rulemaking should be followed whenever feasible.

APPENDIX B: IDAHO WILDLIFE PUBLIC SAFETY POLICY W-3.0

IDFG categorizes wildlife-human conflicts based on human injury and the behavior of the wildlife involved (see attached chart). IDFG will provide guidelines to its personnel for addressing situations involving human injuries or fatalities caused by wildlife attacks on livestock and domestic animals, and nuisance behavior (refer to procedures WLD – 8.0 & 9.0).

For incidents involving serious bodily injury or death of a person, the Wildlife-Human Attack Response Team (WHART) will be activated and respond consistent with WHART Guidelines and Procedures (Table 6). The WHART's responsibilities include acting to protect the safety of the public and incident responders; attempting to identify, locate, and control the animal(s) involved in the incident; conducting, documenting, and reporting investigative findings.

Table 15: IDFG guidance table for responding to wildlife-human attacks and interactions.

	On-scene Response	Post-Incident Review	Authorization of Control Action	Other	WC-1 Form
Category [Red] Wildlife has caused serious physical human injury or death (Animal has been killed or remains at large)	✓ WHART GUIDELINES	✓ WHART GUIDELINES	Killing of animal without additional authorization if imminent threat to human safety; USFWS authorization needed for non-imminent threats by ESA-listed animals, IDFG DO/RS authorization for other non- imminent threats	Law enforcement investigation if claim protected animal killed in defense of human life/property (Refer to USFWS if listed species)	✓
Category [Orange] Wildlife has caused minor/no human injury AND involved animal has been killed/captured		✓ WHART GUIDELINES	Handling of captured animal per USFWS authorization for ESA-listed animals or per IDFG authorization for non-listed animals.	Law enforcement investigation if claim protected animal killed in defense of human life/ property (Refer to USFWS if listed species)	✓
Category [Yellow] Wildlife is at large and: • Demonstrates aggressive behavior toward humans or otherwise poses significant risk to human safety • Has killed Livestock and/or domestic animals • Poses public nuisance			USFWS authorization needed for ESA-listed animals and IDFG Director/RS authorization needed for other species, unless response to imminent threat to human safety, or unless response to threat to property as authorized under Idaho law Orphaned, Injured and Problem Wildlife Guidelines	Report attack or molesting of domestic animals to USDA-WS	✓

Category [Green] Report of wildlife activity NOT involving aggressive or problem behavior				Forward report to regional staff; if multiple sightings, assess for Category [Yellow]

Guidelines for Responding to Orphaned, Injured and Problem Wildlife

These guidelines have been developed to provide consistent direction and support to Idaho Department of Fish and Game employees when dealing with Orphaned, Injured, or Problem Wildlife. They are also intended to explain the rationale for decisions made by IDFG personnel. Potential threats to public safety, which can be caused by habituation to humans, disease, genetics, or other factors, must be considered when making difficult decisions about what to do with Orphaned, Injured, or Problem Wildlife.

Background

The mission of the Idaho Department of Fish and Game (36-103) includes: all wildlife shall be preserved, protected, perpetuated, and managed for citizens to provide for continued supplies for hunting, fishing and trapping. This mission requires the Department to focus resources on managing populations rather than on individual animals.

It can be difficult for people to watch an animal experience protracted illness, injury, starvation, or death, especially when young animals are involved. There are also times when individual animals have undesirable interactions with humans prompting the Department to respond as a matter of public service or public safety. In both cases, members of the public may become emotionally invested, resulting in direct involvement or active following of the case of an individual animal. As a profession that also cares for wild animals, we share in the public's compassion. During those times when Department staff responds as a matter of public service or public safety to an individual animal, we will remain cognizant of public sentiment as we focus on our primary responsibility.

Decision Framework

Idaho Code 36-106(e) (5) provides broad discretion for the agency to evaluate the circumstances of each situation and make decisions regarding the take of wildlife "in the interest of fish and game resources of the state."

The Director has delegated authority regarding disposition of orphaned, sick, or injured animals to Regional Supervisors, Bureau Chiefs and their designees. Legal requirements also need to be considered (*e.g.,* Endangered Species Act, Migratory Bird Treaty Act, state restrictions on certain species to avoid disease transmission (*e.g.,* Idaho Code 25-236 restricting possession of skunk, raccoon, and fox; ISDA brucellosis rules), and damage control and compensation programs under Idaho Code 36-1107 to 36-1110)).

As a matter of standard operating procedure, the Department will respond to Injured, Orphaned, or Problem wildlife based on level of concern for public safety or private property damage. When incidences occur with little risk to human safety or private property damage, Department efforts will focus on providing technical assistance designed to change behavior

of the animal, without need for intrusive intervention and removal of the animals. Wildlife creating a concern for public safety or private property damage, and under the jurisdiction of the Department, should receive active intervention.

Big Game Animals

IDFG will generally not consider big game animals for rehabilitation. Edible game meat from otherwise healthy game animals may be salvaged when practical.

Relocation/release of black bear, mountain lion or gray wolf should only occur if there is a demonstrated management or conservation need. IDFG may consider transferring big game animals out of the wild when an AZA-accredited zoo or appropriate captive wildlife facility is willing and financially able to take the animal, and such transfer is practical. The receiving facility should have a conservation and management mission consistent with the Department. Response to situations involving grizzly bear will be consistent with applicable management documents.

Public Outreach

The decision maker should consult with their Regional Supervisor, Regional Communications Manager, or Bureau of Communications personnel to determine what, if any public outreach is appropriate to explain why a decision is/was made.

APPENDIX C: HARVEST METRICS TREND TABLE

Table 16: Mountain lion harvest metric and expected trends table from Elbroch et al. 2022 reflecting changing mountain lion populations from a summarized literature review from across the western United States (Barnhurst 1986, Anderson and Lindzey 2005, and Wolfe et al. 2016.

Metric	Population decreasing	Population stable	Population increasing
%Subadult males[a]	Decreasing proportion of the harvest	Stable proportion of the harvest	Consistent or increasing proportion of the harvest
%Adult males	Decreasing proportion of the harvest	Stable proportion of the harvest	Consistent or increasing proportion of the harvest
%Subadult females	Increasing proportion of the harvest	Stable proportion of the harvest	Consistent or decreasing proportion of the harvest
%Adult females[b]	Increasing proportion of the harvest	Stable proportion of the harvest	Consistent or decreasing proportion of the harvest
Mean age of all cats killed	Decreasing average age	Stable average age	Increasing or stable average age
% subadults (of both sexes) versus adults	Increasing proportion of the harvest	Stable proportion of the harvest	Consistent or decreasing proportion of the harvest

[a]A low subadult male harvest may indicate a depressed mountain lion population rather than a trend (Anderson & Lindzey, 2005).
[b]Female harvest is expected to rise after impacts of harvest are already apparent in other age and sex classes (Anderson & Lindzey, 2005), but their relative abundance in the population has also been shown to decrease under increased harvest pressure as well, exhibiting contrary patterns to what is reported above in this table (Cooley et al., 2009).