Management Plan for the

Conservation of Fisher, Wolverine and Canada Lynx

2023-2028

Prepared by **IDAHO DEPARTMENT OF FISH AND GAME**
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Executive Summary

DEPARTMENT DIRECTION FOR THE MANAGEMENT AND CONSERVATION OF FISHER, WOLVERINE, AND CANADA LYNX

- Manage fisher, wolverine, and Canada lynx for conservation purposes, retaining/returning state management of these species.
- Continue to provide technical assistance for land management planning activities, including forest management, recreation, and other uses, to support habitat suitability. Most suitable habitat for these species in Idaho occurs on National Forest lands managed by the U.S. Forest Service (USFS).
- Support use of best-available science through continued collaborative, interagency efforts to monitor occupancy and distribution and to assess climate factors.
- Develop and implement strategies to promote genetic health and connectivity for these species, recognizing their inherent low density or limited distribution in Idaho.
- Support public information and education programs regarding these species.

FISHER

Fisher-specific priorities:

- Continue to support fisher habitat in higher-occupancy areas in the Bitterroot-Clearwater and Cabinet Mountains of Idaho (with adjacent habitat in Montana).
- Continue to collaborate with Montana Department of Fish, Wildlife and Parks (FWP) to monitor occupancy and track status of fisher distribution.
- Analyze the large fisher genetic data set collected by Idaho Department of Fish and Game (IDFG), USFS, FWP, and Coeur d'Alene Tribe.
- Develop and implement strategies to promote fisher genetic health and connectivity in Idaho and adjacent Montana.
- Identify factors that may affect fisher connectivity among higher-occupancy habitat areas in Bitterroot-Clearwater and Cabinet Mountains.
- Continue to provide technical assistance for forest management planning activities in relation to fisher habitat needs (suitable fisher habitat primarily occurs in portions of Panhandle and Nez Perce-Clearwater National Forests in Idaho).

WOLVERINE

Wolverine-specific priorities:

- Continue to monitor status and distribution of wolverine through collaboration with Western Association of Fish and Wildlife Agencies (WAFWA) forest carnivore sub-committee.
- Continue to contribute to investigation of wolverine landscape and population genetics in the western U.S. and adjacent Canada through the Trans-Boundary Wolverine Genetic Project.
- Identify and incorporate connectivity considerations for wolverine (e.g., Carroll et al. 2018) in wildlife connectivity planning efforts and associated technical assistance for land managers (suitable wolverine habitat primarily occurs on National Forest lands in Idaho).
- If feasible from available data, improve ability to characterize and predict wolverine natal denning habitat to inform USFS land management and planning efforts.
- Provide technical assistance for land managers and recreation planners related to intensity and distribution of winter recreation, and considerations for wolverine habitat or connectivity.

CANADA LYNX

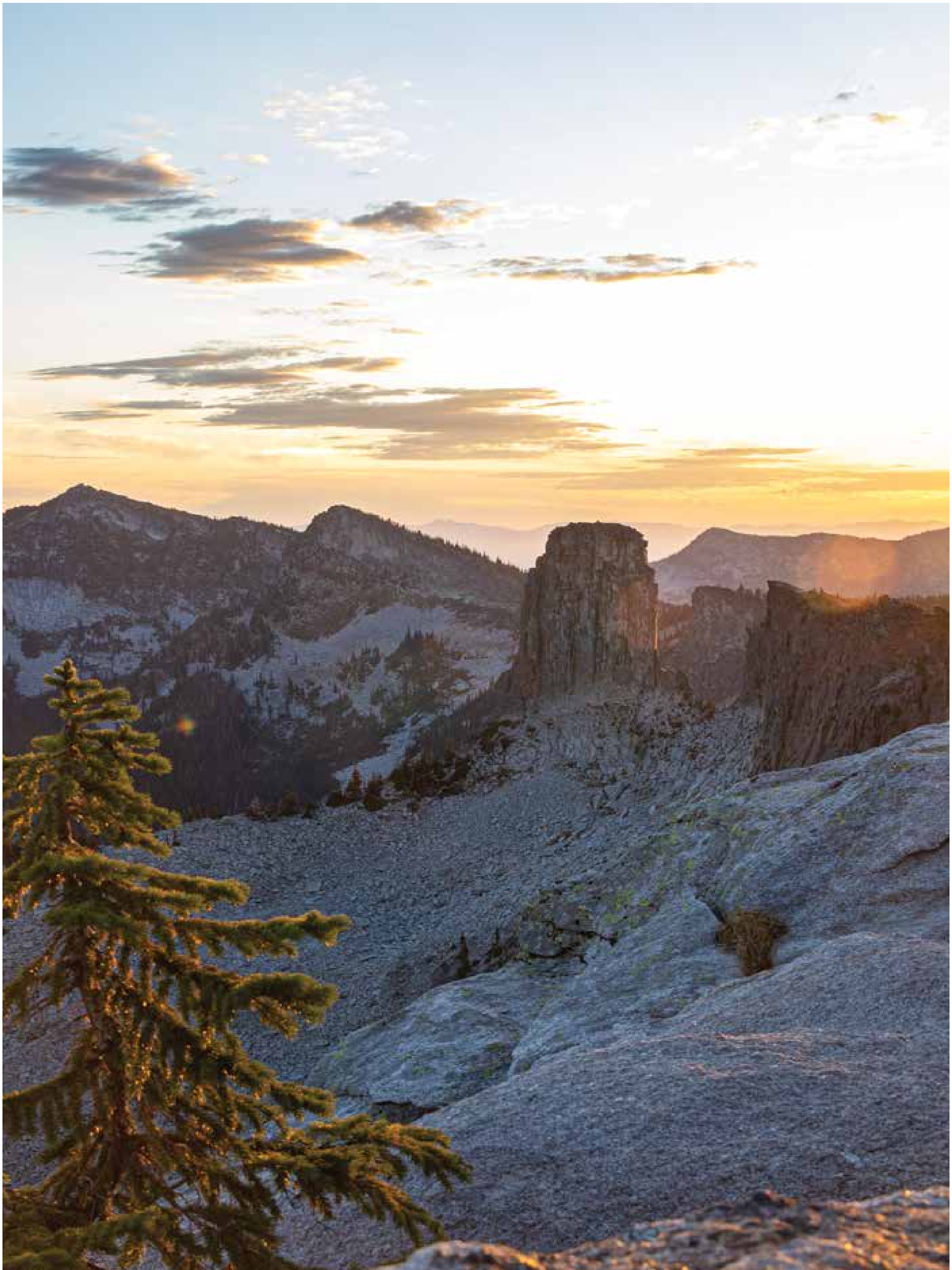
Canada lynx-specific priorities:

- Continue to collaborate with agencies in other states to develop and implement a scientifically robust monitoring approach to determine lynx status and support post-delisting monitoring.
- Review habitat suitability and potential critical habitat designations while lynx remain under Endangered Species Act (ESA) protection in the contiguous U.S.
- Continue to provide technical assistance for forest management planning activities in relation to lynx occurrence in Idaho (limited designated critical habitat for Canada lynx in Idaho occurs in the Purcell Mountains within Panhandle National Forest).

INFORMATION AND EDUCATION

Information and education priorities for these 3 species:

- Continue to minimize human-caused mortality, such as non-target captures, during IDFG-regulated trapping activities by educating trappers through outreach, including biennial upland game, turkey, and furbearer seasons and rules booklets, and through in-person outreach at various trapping organization events.
- Generate support and partnerships for conservation of these species by promoting education, awareness, and stewardship of their habitat.



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This plan addresses 3 species of medium-sized carnivores: fisher (*Pekania pennanti*), wolverine (*Gulo gulo*), and Canada lynx (*Lynx canadensis*). These species have historically been valued as fur resources, and as charismatic animals, sightings of which in the wild are cherished.

Idaho Department of Fish and Game's (IDFG) mission with respect to species conservation is to preserve, protect, perpetuate, and manage Idaho wildlife. Fisher, wolverine, and lynx have limited or low-density distribution in Idaho and occur at the southern extent or periphery of their current ranges in the Rocky Mountains.

Fisher and wolverine populations rebounded considerably in suitable habitat since near extirpation in Idaho in the 1950s and represent successful conservation efforts. Idaho's potential role in lynx conservation is narrower, given limited availability of suitable habitat in our state.

Science-based state management of these species continues to be important to Idaho, both from a perspective of individual species conservation and as a matter of state sovereignty over wildlife.

For decades, these 3 species have been the subject of multiple petitions and lawsuits under the federal Endangered Species Act (ESA), often seeking to force federal restrictions on activities such as forest management, winter recreation, and trapping. Based on best-available science, status of these species in the U.S. and Canada, and existing regulatory and conservation measures, the State of Idaho maintains ESA protections are not warranted for populations occurring in Idaho.

Idaho should continue contributing to best-available science and promote effective, collaborative conservation of these species. The Idaho State Wildlife Action Plan (SWAP, IDFG 2023) includes these carnivores as Species of Greatest Conservation Need (SGCN). Because of their low density or limited distribution in Idaho, our management and conservation efforts for these species differ from those addressed in IDFG's furbearer management plan, which identifies harvest management strategies for furbearers that are more abundant and widely distributed in Idaho.

This plan provides updated information on ecology, status, and conservation challenges and opportunities for these 3 species and identifies our management priorities.

Fisher

Ecology and Status

General Physical Description

The fisher is a member of the weasel family which is infrequently encountered in forests of Idaho. At a distance, a fisher's coat may appear black, though the fur is actually dark brown, commonly with frosted white tips on hairs across the shoulders and white markings on the chest and groin. Females average 4.5 pounds, and males 10 pounds, although 15-pound individuals have been reported in Idaho.

Distribution and Population Status

Fishers have been documented from the Sawtooth Mountains to the Selkirk Mountains near the Idaho-Canada border (Figure 1). However, most of the population occurs in the Bitterroot-Clearwater and Cabinet Mountains, extending into limited portions of western Montana. These fishers are geographically separated from fisher occurring in the forest belt that runs across Canada, extending north to southeastern Alaska and southward into the U.S. (northeastern and upper midwestern states). They are also separate from fisher found in the Cascade Mountains of Washington and Oregon, and the Sierra Nevada Mountains of California.

In 2016, the U.S. Fish and Wildlife Service (USFWS) determined fishers in Idaho and Montana would qualify as a distinct population segment (DPS, Northern Rocky Mountains), but concluded this DPS did not meet criteria for ESA listing due to modeled gains in habitat under predicted climate change scenarios, and because potential stressors to fisher are expected to remain relatively stable in the future (USFWS 2017b). Since then, the Southern Sierra Nevada DPS of fisher was listed under ESA.

The historical distribution of fishers in Idaho is not well documented. Until the early 1800s, fisher distribution likely coincided with mid- to low-elevation late-seral mesic forests (see Habitat Use section). From the mid-1800s into the early 1900s, fisher distribution was likely reduced by non-selective predator control, over harvest, and habitat destruction (including extensive wildfires in northern Idaho between 1910 and 1934). The fisher was considered extirpated from Idaho by the 1950s.

During the 1960s, fishers from British Columbia were released in north-central Idaho to restore the population to provide additional trapping opportunity (Williams 1962, 1963). Subsequent releases of fishers occurred at various locations in Montana, including the Cabinet Mountains, a range that extends from northwest Montana into the Idaho Panhandle.

In 2018, IDFG partnered with FWP to estimate fisher occupancy in the 2 states. That study (Krohner et al. 2022) made 3 important conclusions relevant to fisher distribution and population status in Idaho. First, most of the area likely occupied by fishers in the northern Rocky Mountains of the U.S. occurs within Idaho (Figure 2). Second, fishers currently occur in 2 core areas: the Cabinet Mountains of the Idaho Panhandle National Forest, and the Bitterroot and Clearwater Mountains of the Nez Perce-Clearwater National Forest. Third, occupancy is higher in the Bitterroot and Clearwater Mountains, whereas adjacent areas of predicted suitable habitat are occupied at lower rates or unoccupied (Figure 2).

Abundance and Space Use

Fisher occupy large landscapes and naturally occur at low densities. In Idaho, adult male fisher maintained home ranges averaging 38 mi^2 (range 23–69 mi^2) and females maintained home ranges averaging 17 mi^2 (range 9–36 mi^2, Sauder and Rachlow 2014). These home ranges are generally intra-sexually specific; however, some sub-adult individuals may be tolerated within a territorial adult's home range (likely because they may be offspring). No estimates of fisher population exist for Idaho.

Habitat Use

Distribution of fisher is broadly limited by 3 factors: abundance and structure of snow, availability of suitable forest structure (including resting and denning sites), and prey abundance (see Food Habits section). Unlike lynx and wolverine, fishers are not well-adapted to deep, unconsolidated snow. For their size and weight, fishers have small feet, making them prone to sinking into snow rather than walking on top. Therefore, fishers experience increased energy expenditure for movement in areas characterized by deep, unconsolidated snow pack. Elsewhere in the range of fishers, snow depth is a useful metric for predicting fisher distribution (Krohn et al. 2005). In Idaho and Montana, fishers are broadly associated with low- to mid-elevation, mesic mixed-forest types where snows consolidate, making travel easier. In north-central Idaho, regular occurrences of fishers taper off above 5,000 feet, though some observations occur at much higher elevations.

Within mid-elevation, mesic mixed-forest types of north-central Idaho, fishers established home ranges in landscapes with larger, more connected and contiguous patches of mature forest, and smaller amounts of open areas (Sauder and Rachlow 2014). Within established home ranges, fisher core-use areas were characterized by moderate amounts of forest with tall canopy cover and forest edge (Sauder and Rachlow 2015). Heterogeneous forest patterns likely allow preferred habitats for both hunting and resting to occur in close proximity. Between foraging bouts, fishers regularly use resting sites in cavities of trees, or on platforms formed by witches' brooms, broken-top trees, or tree forks. Specific data on resting site selection by fishers in Idaho are scarce, but consistent themes were identified across other populations (Aubry et al. 2013). Resting sites are typified by dense overhead cover, steeper slopes, cooler micro-climate, and greater prevalence of large trees and snags than are generally available in the surrounding landscape. Zielinski et al. (2004) found fisher resting sites were often in larger-than-average trees within stands of trees larger than the landscape average. Further, resting sites were principally located in cavities in live conifer trees and snags averaging approximately 46 inches in diameter (Zielinski et al. 2004). Jones (1991) reported average diameter of resting-site trees used by fishers in Idaho was approximately 22 inches (range 11–59 in) and 68% of resting sites were on witches' brooms.

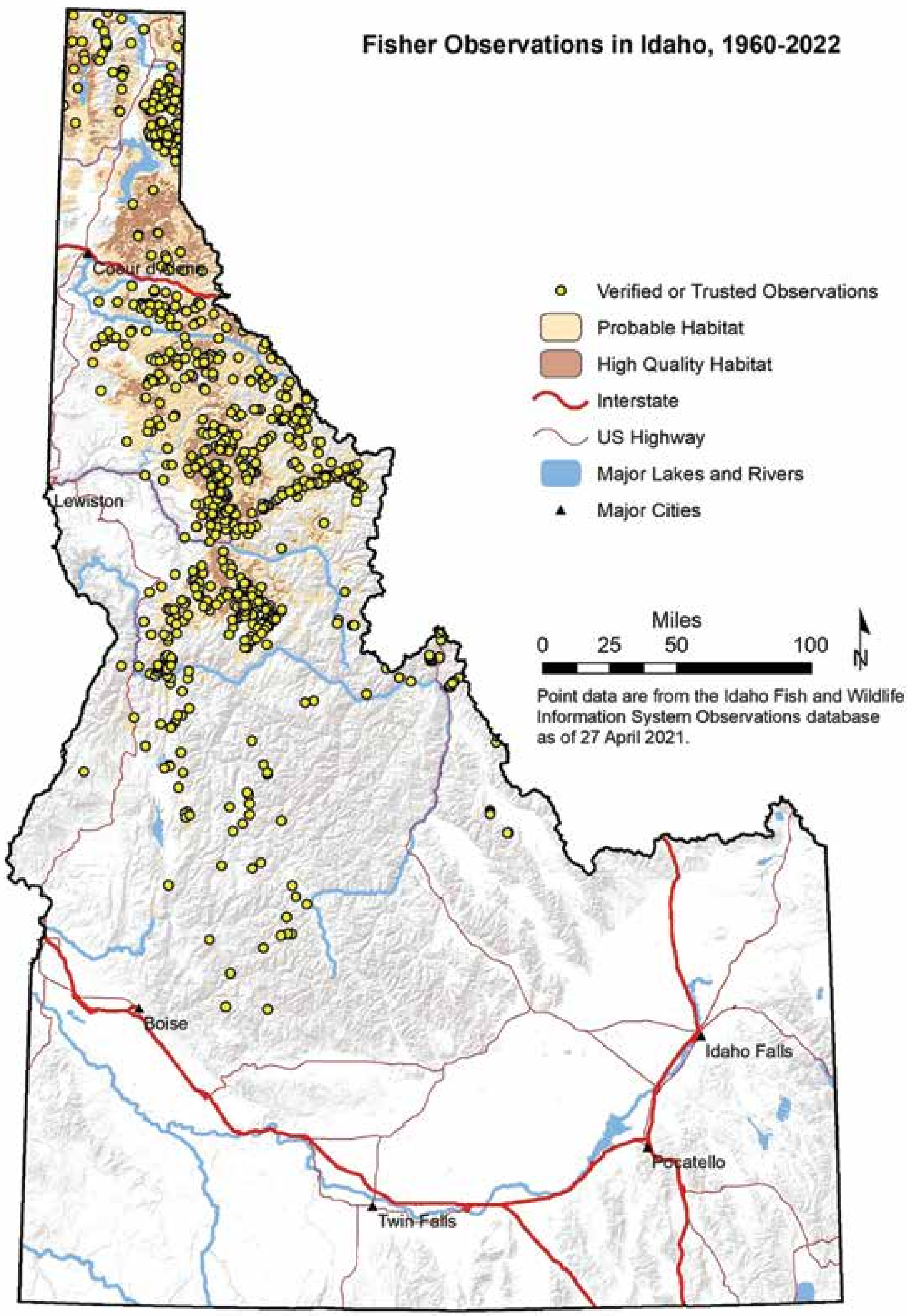

Figure 1.

Predicted fisher habitat categorized as probable and high quality (Sauder 2014) and verified fisher observations since 1960, Idaho, USA.

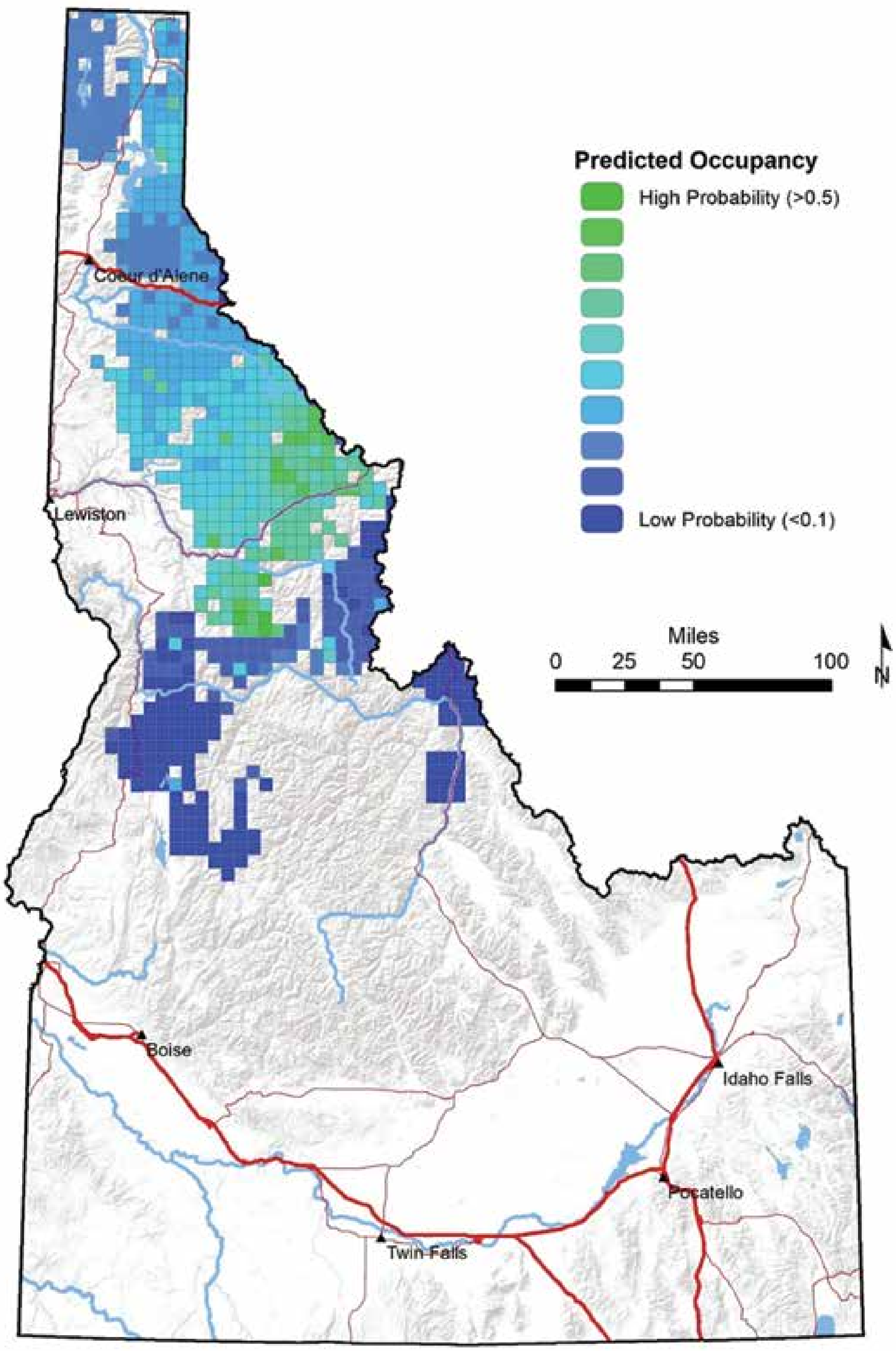

Figure 2.

Modeled spatial occupancy for fishers, Montana and Idaho, winter 2018–2019 (Krohner et al. 2022). Green colors indicate higher predicted occupancy rates; dark blue colors indicate lower predicted occupancy rates.

Reproduction

Females give birth in March or early April and almost immediately breed again. Because fertilized eggs do not implant for almost 10 months, female fisher are technically pregnant for 11 months. This characteristic, called delayed implantation, results in females not giving birth to their first litter until >2 years of age. Females usually give birth to 2–3 kits (range = 1–4). No studies of denning have been conducted in Idaho, but research conducted elsewhere indicated natal dens were almost always in large trees with cavities. Raley et al. (2012) suggested cavities used by reproductive females for natal and pre-weaning dens were created by heartwood decay through heart-rot fungi. Females regularly choose cavities with the smallest opening that allows entry. Use of these small entries is believed to protect kits from predators, including male fishers, which are significantly larger than females and will kill kits. Soon after birth, female fisher will often move their kits through a sequence of maternal dens, which are also primarily in cavities of large trees. This behavior emphasizes reliance of fisher on presence of abundant large trees that are prone to forming cavities. Tree species that attain a large diameter and often develop heartwood decay in Idaho include western red cedar (Thuja plicata), grand fir (Abies grandis), and western hemlock (Tsuga heterophylla).

Food Habits

Fishers are generalist carnivores. Snowshoe hares (*Lepus americanus*), voles (*Microtus spp.*), and squirrels (*Sciuridae*) likely compose the bulk of fisher diets in Idaho. Birds, reptiles, and vegetative matter (e.g., berries) are also likely supplementary, opportunistic food sources. Fishers are natural predators of North American porcupines (*Erethizon dorsatum*); with an innate knowledge of how to kill and eat them while (mostly) avoiding quills. Although fishers sometimes prey on porcupines in Idaho, porcupines are not considered a principal food source in this state due to low densities and patchy distribution.

Mortality

Sources of mortality include starvation (particularly of juveniles), predation by other carnivores, disease, infanticide, and non-target harvest. Predation on fishers remains un-studied in Idaho, but mountain lions (*Puma concolor*), bobcats (*Lynx rufus*), coyotes (*Canis latrans*), Canada lynx, and wolverines occasionally prey on fishers in other parts of their range. The arboreal capabilities of fisher generally make populations resistant to pressures from predators. No harvest of fishers is permitted in Idaho and non-target trapping mortality is generally infrequent.

Genetics

Although fisher were presumed extirpated from Idaho by the 1950s, recent analyses demonstrated otherwise. Using a museum specimen collected in northcentral Idaho in 1896, Schwartz (2007) discovered a native genetic signature (i.e., genetic haplotype) in the Northern Rockies not found elsewhere in the range of fishers. This unique haplotype was observed in a portion of samples from Idaho fisher collected in the early 2000s (Schwartz 2007). Existence of this unique haplotype indicates some fishers persisted in Idaho-Montana despite population pressures of the early 1900s and were not extirpated. Existence of the unique haplotype also indicates long-term, limited or absent gene flow between fishers in Idaho and Montana and those in adjacent areas, including the Cascades and southern Canada.

Considering these findings, past fisher reintroduction efforts (one in Idaho and multiple in Montana) are more appropriately viewed as population augmentations. Thus, trans-locations resulted in a population of fishers in Idaho displaying a blend of native and non-native haplotypes (i.e., British Columbia and Midwest; USFWS 2017a). From near extirpation in the 1950s to the current known distribution (Figure 1), fisher populations have expanded significantly. However, the native haplotype has not been observed in fisher in the West Cabinet Mountains, indicating low or absent gene flow with fisher in the Bitterroot and Clearwater Mountains since imported fisher releases in the 1960s (Lucid et al. 2019).

Legal and Conservation Status

Fisher is classified as a furbearer in Idaho, with no open season or allowed harvest since 1940. Further, fisher is considered a SGCN under Idaho's SWAP (IDFG 2023). Multiple National Forests in Idaho include fisher on their various sensitive or at-risk species lists. In the 2 areas of high fisher occupancy in Idaho, the Nez Perce-Clearwater and Idaho Panhandle National Forests list fisher as a Sensitive Species.

In the past 25 years, there have been 3 petitions for ESA listing of fisher in the Northern Rocky Mountains of the U.S. (1994, 2009, 2013). Petitions have argued for listing based on population size, isolation, habitat loss, and incidental (non-target) trapping. The most recent determination by the USFWS concluded fisher in the Northern Rocky Mountains were a DPS under the ESA, but the DPS's status and threats did not warrant listing (USFWS 2017b).

Conservation Challenges and Opportunities

Because no harvest is allowed, primary drivers for fisher population management include actions that affect habitat suitability, genetic health, and population connectivity.

Population Monitoring

Given the fisher's naturally low densities, association with late-seral forests, and unique genetic characteristics, implementing a robust monitoring strategy to inform management actions is key to conserving fisher. The 2018–2019 partnership between IDFG and FWP to assess fisher occupancy in Idaho and Montana established a sampling framework and monitoring methods to track fisher populations over time (Krohner et al. 2022).

Objective: Improve population monitoring.	
Strategies	**Actions**
Regularly evaluate trend and pattern of fisher occupancy in suitable habitat in Idaho and Montana.	In coordination with FWP, implement the fisher occupancy sampling framework developed by Krohner et al. (2022) at ~5-year intervals.

Forest Management and Habitat Modification

Fisher use such large landscapes that any one patch of forest or single forest management project is unlikely to affect fishers at a population level. However, forest management over time and on a larger geographic scale may have positive or negative population-level effects. Although fishers are not old-growth forest obligates, across western North America they are consistently associated with complex vertical and horizontal structure typical of late-seral forests (e.g., large trees, snags, dense canopy cover; Raley et al. 2012). In Idaho, fishers disproportionally used stands characterized by larger diameter trees (>15 in dbh) and avoided areas with ponderosa pine (*Pinus ponderosa*) and lodgepole pine (*P. contorta*) at both stand and landscape scales (Schwartz et al. 2013). Median fisher home range in Idaho was composed of 56% mature forest and 5% open area (Sauder and Rachlow 2014).

Forest lands managed for multiple uses, such as National Forest lands north of the Salmon River, provide most suitable habitat for fisher in Idaho. These lands average 5.7% open area (Sauder and Rachlow 2014). Management yielding suitable habitat for fisher could be a competing priority with management efforts yielding less suitable fisher habitat (e.g., early-seral forest habitat favorable for elk, stand management for timber merchantability).

Sauder and Rachlow (2014) reported industrial forest landscapes, which averaged 17% open area, were 72% less likely to be occupied by fisher when compared to multiple-use forests. Trends in management of private lands for timber merchantability, based on computerized timber processing, are unlikely to create forest conditions that meet habitat preferences of fisher. Forests intensively managed for timber production do not reach the size class or provide the structural complexity suitable for fisher foraging, denning, and resting sites. Commercial forests tend to exhibit simplified vertical and horizontal structure, with shorter harvest rotations, even-aged and single-species stand management, and harvest of smaller-diameter trees (e.g., Simmons et al. 2014).

Objective: Support fisher habitat suitability at the landscape level.

Strategies	Actions
Incorporate fisher habitat suitability in forest management planning considerations.	Provide technical assistance to USFS, Idaho Department of Lands, and private timber companies for incorporating fisher habitat suitability into project design and forest management planning, prioritizing effort in documented or predicted higher-occupancy habitat.
	Identify factors (e.g., forest structure or prey densities) that may affect fisher occupancy in areas of higher-occupancy habitat. (e.g., habitat evaluation in Coeur d’Alene, St. Joe, Cabinet Mountains).

Genetics and Connectivity

Although trans-location efforts of fisher into Idaho and Montana succeeded in increasing the fisher population, genetic health and associated long-term viability remain unclear. The 2018–2019 Idaho-Montana assessment indicated substantially higher fisher occupancy rates in the Cabinet Mountains (Idaho Panhandle) and Clearwater and Bitterroot Mountains (north-central Idaho; Figure 2) than in adjacent areas. Limited available genetic information indicates gene flow between fisher in the Cabinets and Bitterroot-Clearwater is limited or absent. Fisher in the Cabinet Mountains appear to carry genes only from previous fisher trans-locations (from Canada and the Midwest), whereas fisher in the Clearwater-Bitterroot include native genes in addition to genes of translocated animals.

Limited work to identify fisher population genetics has occurred in Idaho and Montana, where previous translocations augmented a small number of native fishers (which were separated from other populations) before genetic implications were better recognized. Further, little information exists to identify what management actions, if any, are needed to promote genetic health and connectivity in a small population to guard against inbreeding and deleterious genetic characteristics.

Objective: Promote genetic health and connectivity among higher occupancy areas.	
Strategies	**Actions**
Improve understanding of fisher genetic health in Idaho and Montana.	Partner with FWP and USFS to conduct a genetic analysis of fishers in Idaho and Montana.
Promote connectivity among higher occupancy habitat areas.	Identify factors (e.g., forest structure or prey densities) that may affect fisher occupancy among or adjacent to higher-occupancy habitat. (e.g., habitat evaluation in Coeur d'Alene and St. Joe National Forests).
	Identify opportunities for connectivity among higher-occupancy areas. These may include habitat improvement efforts, voluntary conservation easements, and inclusion of fisher in wildlife connectivity considerations in transportation planning.
Promote genetic health with management actions if appropriate.	If applicable, investigate feasibility of increasing distribution and genetic diversity of fisher within suitable habitat.

Human-Caused Mortality

***Rodenticides*—**Exposure to anticoagulant rodenticide (ACR) and related poisoning was identified as a threat to fishers in the Sierra Nevada and Coast Range Mountains of California and Oregon, where ACR use was associated with illegal marijuana grow operations (Gabriel et al. 2012, 2015). Gabriel et al. (2015) found 85% of fishers tested positive for ACR exposure and 9% of known-fate mortalities of fishers were attributed to ACRs. Illegal rodenticide use was identified as a threat to fishers in the USFWS determination to list the South Sierra Nevada DPS as threatened in 2020.

In 2017, IDFG submitted liver samples from 29 incidentally harvested fishers to test for ACR exposure. Nine individuals (31%) were exposed to ACRs, 4 of which contained trace amounts, and 5 which exhibited quantifiable levels (31–610 ppb). Uncertainty exists as to what concentration of ACRs result in clinical manifestations (M. Gabriel, Integral Ecology Research Center, personal communication), but the upper end of this range (i.e., ~600 ppb) was consistent with levels that resulted in lethal toxicosis in fishers in California (Gabriel et al. 2012).

Although some illegal marijuana cultivation may occur in occupied fisher habitat in Idaho, infrequent grows of tens of plants are the norm (per communication with Idaho law enforcement). Although ACR use at small grows is possible, overall use is unlikely to occur at a scale comparable to that in California or Oregon where grows may involve hundreds of plants.

The source of some fisher exposure to ACRs is difficult to isolate. Agencies such as the USFS, Idaho Department of Lands, and private timber corporations use ACRs in Idaho to abate pocket gopher (*Thomomys spp.*) damage to tree seedlings, but they are not a likely source of ACRs in Idaho fisher. Open-field applications of ACRs to control pocket gophers are limited to first-generation ACR compounds, and by law, they must be placed directly into tunnels of pocket gophers, not spread on the surface. Only 1 of 9 Idaho fishers tested positive for this class of ACR; 8 of 9 positive samples contained second-generation ACRs (J. Sauder, IDFG, personal communication). Second generation ACRs (e.g., d-CON®) are federally regulated to be used within 50 ft of human dwellings and are not authorized for open-field applications.

***Trapping Activities*—**Regulated trapping is an important opportunity in Idaho. Data collected from trappers are used to track trends in species populations, and harvest of certain species can alleviate multiple forms of wildlife-human conflict at local scales. The fisher is classified as a furbearer, but no harvest has been allowed since 1940. A primary goal of translocations to Idaho in the early 1960s was re-establishment of fisher harvest opportunity, but that goal remains unrealized.

Creation of a fisher harvest season would create additional opportunity for trappers and fulfill a management goal of prior translocations. However, developing a sustainable and acceptable harvest framework (e.g., geographic and numeric limits) is challenging, and further confounded by competing biological, social, and political considerations.

Although harvest of fisher is closed, they are sometimes captured by trappers pursuing other furbearers, particularly bobcat and marten. Since IDFG began collecting non-target trapping data in 2000, 4–58 fisher captures/year have been reported by trappers, with an average of 5 fisher mortalities annually (Figure 3) . Through this period, available information does not indicate a relationship between non-target mortalities and any trend or pattern in fisher occupancy; fishers have at least maintained their general distribution or continued to expand.

Techniques are available to reduce non-target captures. When using foothold traps for bobcat and similar-sized or larger species, a pan tension of ≥4 lb can reduce likelihood of fisher being captured. Instruction about adjusting pan tension is included in IDFG's mandatory trapper education programs, and is an approach commonly used by trappers. Placing body-gripping traps into enclosures with openings of ≤2.5 inches generally allows entry by marten (where it is the target species) while preventing entry by fisher because of size difference between the 2 species. This technique involves additional gear, and trapper usage of this technique and perceptions of effectiveness on marten capture are unknown.

Illegal Take—Illegal take of fisher in Idaho is rare. In the past 5 years, IDFG conservation officers have documented one event when a person attempted to keep a fisher incidentally caught in a marten set.

Vehicle Collision—Vehicle collisions have been identified as a source of mortality for fisher in Yosemite National Park and surrounding Sierra National Forest (Rodriguez et al. 2012). In Idaho, no vehicle collisions have been documented for radio-tagged animals (J. Sauder, personal communication), or through IDFG's Roadkill Observation Database.

[2]Idaho law requires release of non-target animals captured alive; moribund and dead non-target animals must be reported and surrendered to the Department.

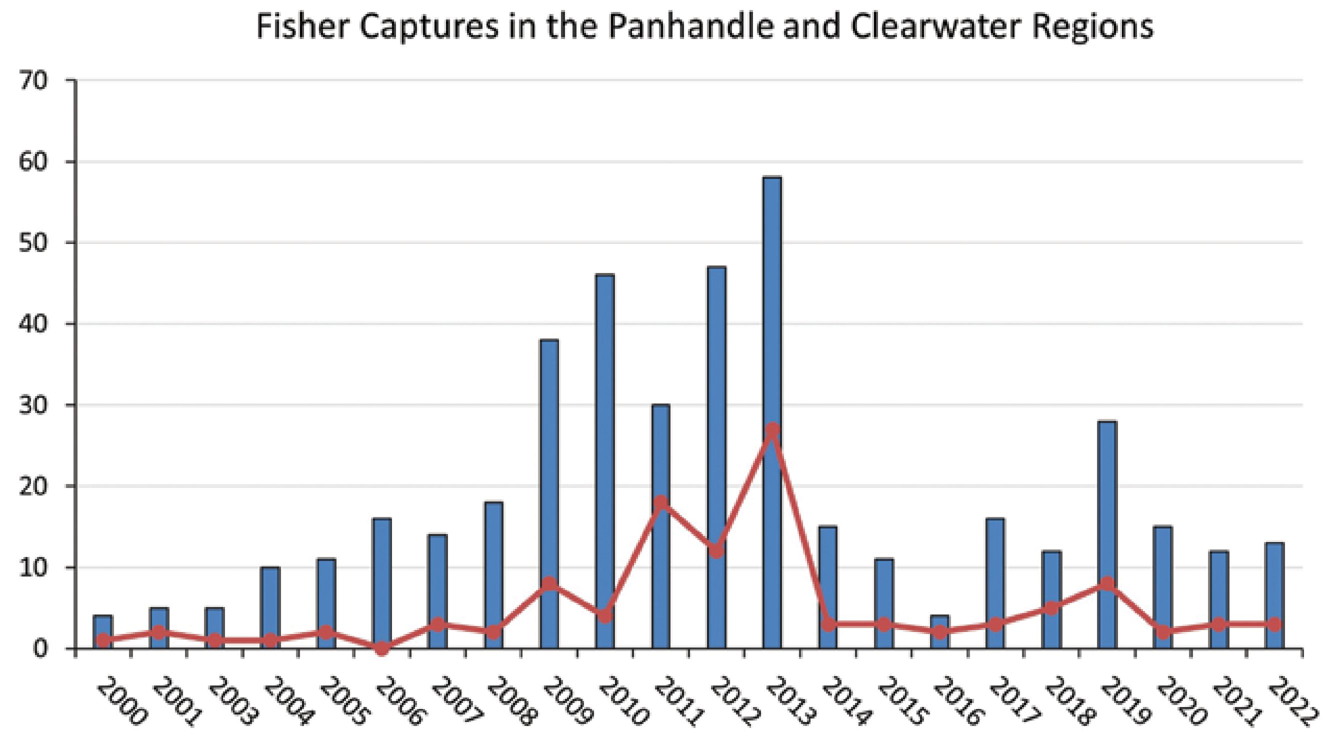

Figure 3.

Total reported non-target fisher captures (blue columns) and mortalities (orange line) per license year, Panhandle and Clearwater Regions, Idaho, 2000–2022.

Objective: Reduce incidental (lawful) and illegal human-caused mortality.	
Strategies	**Actions**
Ensure education about ACRs in fisher-occupied areas.	Coordinate with federal and state partners to provide training and information regarding ACR application to reduce potential impacts to fisher.
Monitor ACR prevalence in Idaho fisher populations.	Collect and submit liver samples opportunistically from non-target capture mortalities or other mortalities for testing and analysis.
Minimize non-target captures of fishers during bobcat and marten trapping seasons.	Include techniques for selectivity (minimizing non-target capture) in trapper education programs. Coordinate with Idaho trapper groups to promote techniques to capture target species while minimizing non-target captures.
	In coordination with trappers, investigate whether marten boxes with openings sized to exclude fisher impact marten harvest.

Wolverine

Ecology and Status

General Physical Description

The wolverine is the largest terrestrial member of the *mustelid* family. Wolverines have large feet with claws and powerful musculature that allow efficient travel on snow and access to carrion. Males and females are similar in appearance. Adult males are larger (~30 lbs) than adult females (~18 lbs).

Distribution and Population Status

Historical distribution in North America included most of Canada, Alaska, and the northern tier of the U.S., including the Rocky Mountains and as far south as northern New Mexico (Banci 1994). By the mid-1920s, wolverines were extirpated from much of the continental U.S., in part from broad-scale predator trapping and poisoning programs (Krebs et al. 2004, Aubry et al. 2007). Wolverine in Idaho might have been extirpated by 1939 or restricted in low numbers to the more inaccessible mountainous portions of the state (Davis 1939).

Since the mid-1900s, wolverines have expanded into some of their former range in the continental U.S. (Aubry et al. 2007). Currently, the southernmost extent of the known reproducing population includes northern and central Idaho, western Montana, western Wyoming, and central Washington (Figure 4). Verified records from the Wallowa Mountains in northeastern Oregon (A. Magoun, personal communication), the Sierra Nevada in California (Moriarty et al. 2009), in and near the Uinta Mountains in Utah (Utah Division of Wildlife, unpublished data), and Rocky Mountain National Park in Colorado (Packila et al. 2017) appear to represent solitary individuals from dispersal events.

The Western States Wolverine Conservation Project camera survey in 2015 and 2016 provided the first broad-scale evaluation of wolverine distribution in Idaho, Montana, Washington, and Wyoming since near extirpation. This project confirmed recolonization has progressed substantially since historical lows. However, probability of occupancy varies throughout the 4-state region, possibly linked to differences in habitat quality, wolverine survival, or time required to recover from historical absence (Figure 5; Lukacs et al. 2020).

Recolonization in Idaho occurred through natural expansion from Canadian populations (Newby and Wright 1955, Newby and McDougal 1964, Aubry et al. 2007, McKelvey et al. 2014). Distribution records (Figure 6) and occupancy estimates (Figure 5) suggest wolverines presently occur in most presumed historically occupied habitat in Idaho; however, we lack information to compare productivity or population stability.

Figure 4.

Modeled wolverine habitat and occupancy status in the western U.S.; derived from a composite of habitat models presented in Copeland et al. (2010) and Inman et al. (2013).

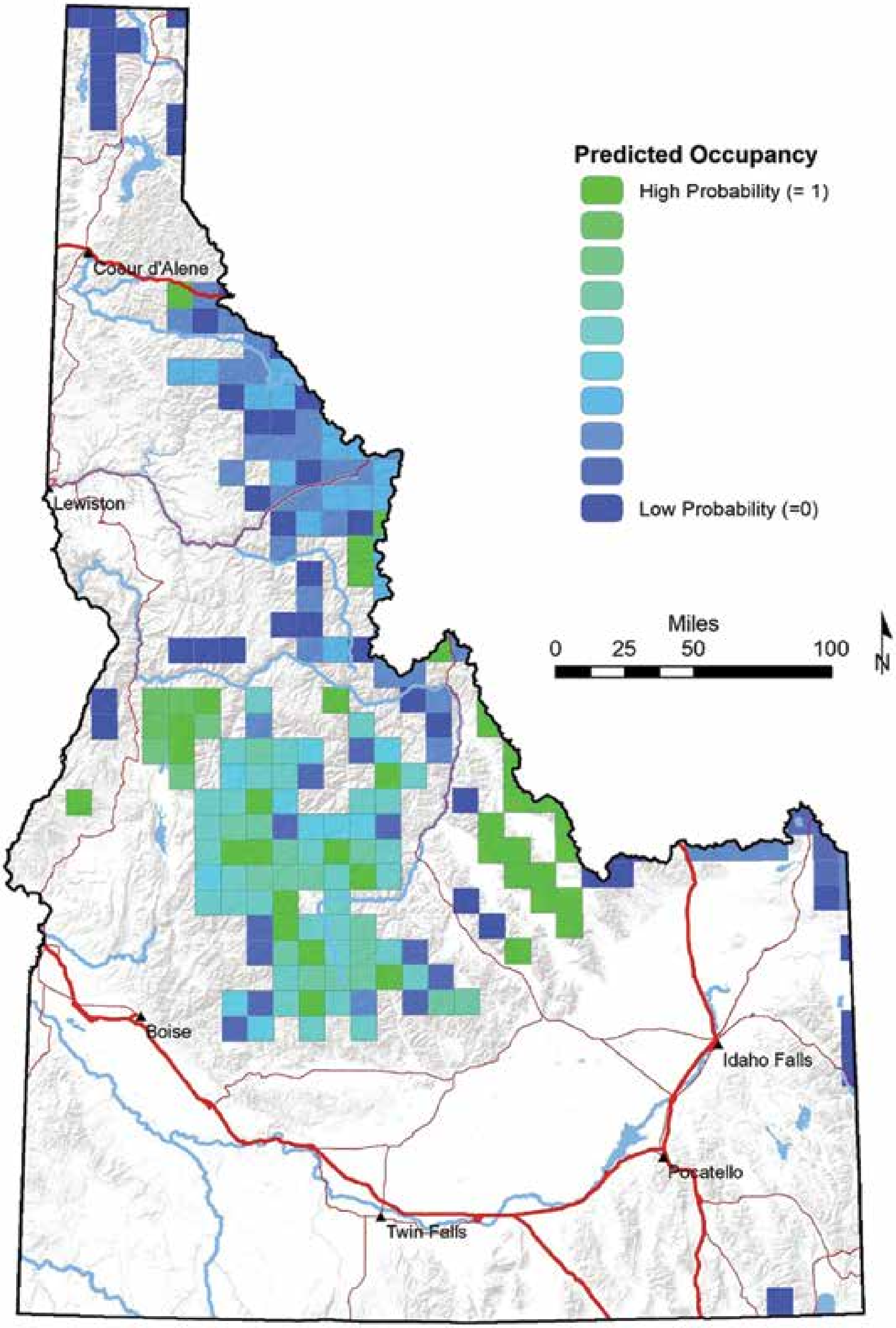

Figure 5.

Estimated occupancy probability for wolverines, Idaho, 2016 (Lukacs et al. 2020). Bright green colors indicate areas of higher predicted occupancy rates; dark blue colors indicate lower predicted occupancy rates.

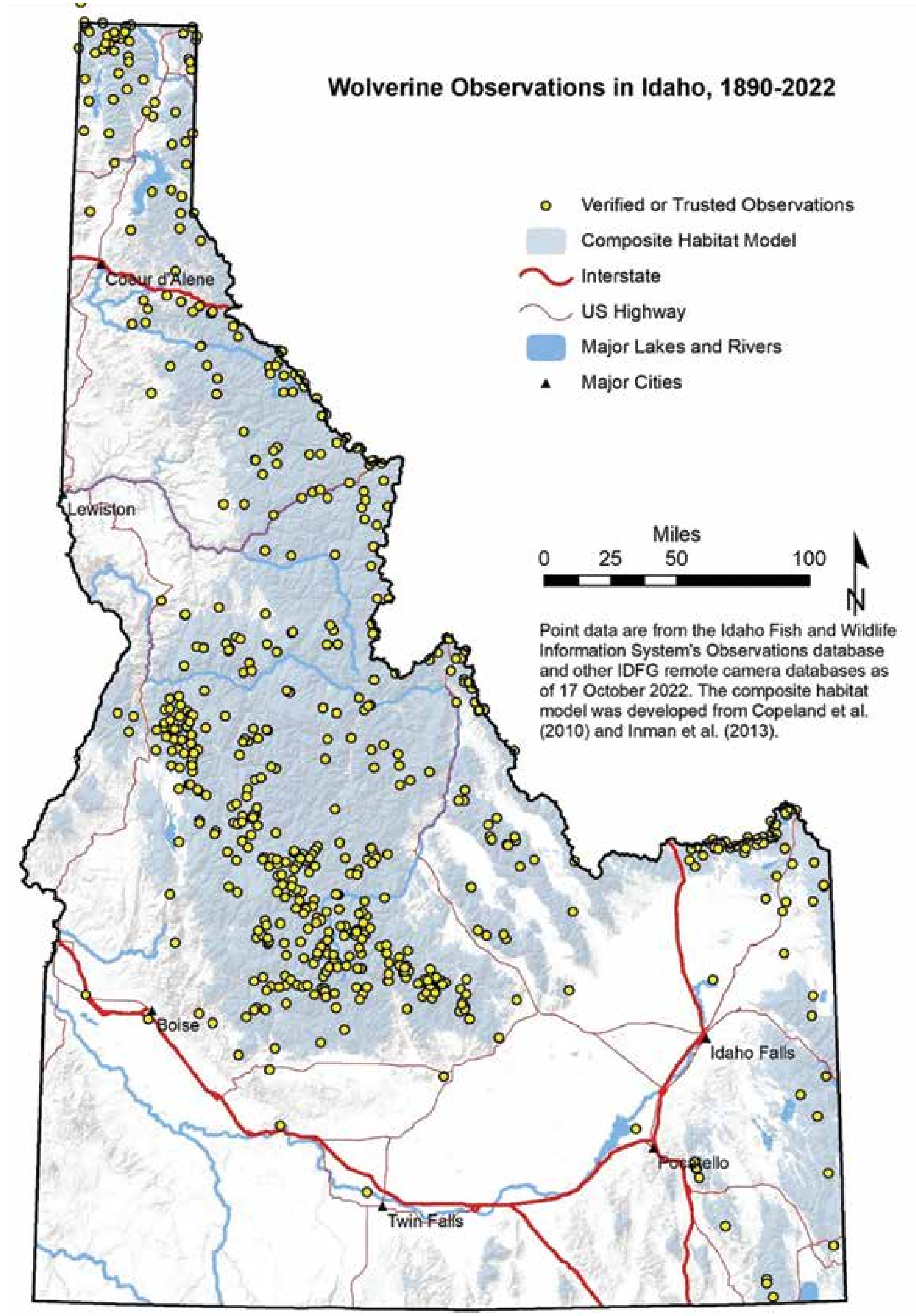

Figure 6.

Predicted wolverine habitat from composite of 2 wolverine habitat models (Copeland et al. 2010, Inman et al. 2013) and verified wolverine observations since 1890, Idaho, USA.

Abundance and Space Use

Inman et al. (2013) estimated approximately 300 individual wolverines inhabited the U.S. Rocky Mountains (Idaho, Montana, Wyoming, and Washington), based on projection of habitat use, home range size, and density of wolverine in the Greater Yellowstone area.

Spatial distribution of wolverines on the landscape is determined by territorial behavior, large home range size, habitat, and food availability. Males and females in Idaho displayed the largest home ranges reported for the species, averaging >492 mi2 for males and >112 mi^2 for females (Copeland 1996, Heinemeyer et al. 2017). These home ranges are generally intrasexually specific.

Wolverines disperse from natal ranges at 10-15 months, although some individuals remain closely associated with their natal home range for up to 2 years (Copeland 1996, Vangen et al. 2001). Dispersal distance for both sexes can exceed 93 mi (Copeland 1996, Inman et al. 2012b). Natural topographical features do not seem to block movements of wolverines, nor is there strong evidence human development is currently impeding dispersal movements (Hornocker and Hash 1981, Packila et al. 2007, Schwartz et al. 2009).

Habitat Use

Wolverines are generally associated with high-elevation alpine habitat and montane coniferous forests, inhabiting an elevational band above and below tree line. Most modeled wolverine habitat in Idaho (Figure 6) occurs on USFS land, which is managed for multiple use, including outdoor recreation, range, timber, minerals, energy, watersheds, and fish and wildlife values.

Research in central Idaho indicated wolverine habitat selection varies seasonally, likely reflecting seasonal food supply. Wolverines are opportunistic omnivores in summer and primarily scavengers in winter. Accordingly, higher-elevation rock and talus were used more in summer, perhaps reflecting hunting opportunities for marmots (*Marmota spp.*) and ground squirrels (*Sciuridae*). Northerly aspects were frequented year-round (Copeland 1996). Males and females use the landscape differently, at least in winter. Although both sexes select valleys, drainage bottoms, and forest edges, females select talus, more fragmented forest patches, and snowier, colder habitats than males. Males demonstrated a stronger selection of fir-dominated conifer forest and proximity to secondary roads (Heinemeyer et al. 2019).

Reproduction

Adult females appear to mate every year; however, the proportion that successfully rear young is low and average kits/female/year was <0.90 (Magoun 1985, Inman et al. 2012a, Heinemeyer et al. 2017). In Idaho, females enter dens and give birth to 1–3 kits in mid-February to mid-March (Magoun and Copeland 1998, Inman et al. 2012a, Heinemeyer et al. 2017). Natal dens were in high-elevation, snow-covered alpine and subalpine habitats associated with large wood or rock structures, such as large boulder talus or large-diameter downed logs that provided subnivean spaces (Figure 7). Persistent snow may enhance kit survival by providing reduced predation risk, thermal benefits, or proximity to quality rearing habitat (Magoun and Copeland 1998, Heinemeyer et al. 2019). Although persistent stable snow cover appears to be an important feature of denning habitat in multiple areas, Webb et al. (2016) did not identify any relationship between spring snow cover and evidence of reproduction in boreal forests of northern Alberta.

Figure 7.
Natal den sites in Beaverhead Mountains (left, Wildlife Conservation Society photo) and Salmon River Mountains north of McCall (right, IDFG photo).

Food Habits

Wolverine populations are presumed to be food-limited in the cold, low-productivity environments they occupy (Persson 2005). Starvation is likely an important mortality factor for young and very old wolverines (Banci 1994, Krebs et al. 2004). Large mammal carrion is particularly important, including that associated with hunter camps, wounding mortality, and avalanche mortality (Hornocker and Hash 1981, Banci 1994, Copeland 1996). Investigations at winter foraging sites of GPS-collared wolverines in central Idaho suggested mountain goat (*Oreamnos americana*) carcasses may be a locally important food source where goats overlap with wolverines (K. Heinemeyer, Round River Conservation Studies, personal communication). Food caching is a common behavior of wolverines in all seasons.

Mortality

Sources of mortality include starvation (particularly for dispersal-age individuals), attacks by other predators, and human-caused mortality. Predators included gray wolves (*Canis lupus*), mountain lions, American black bears (*Ursus americanus*), and golden eagles (*Aquila chrysaetos*) (Boles 1977; Banci 1994; Inman et al. 2008; J. Copeland, Wolverine Foundation, personal communication).

Legal and Conservation Status

The North American wolverine (*Gulo gulo luscus*) is recognized as a subspecies. The wolverine is classified by the State of Idaho as a Protected Nongame Species, and is identified as a SGCN in the SWAP (IDFG 2023). Wolverines are found in all National Forests in Idaho and are classified by the USFS as Species of Conservation Concern or Sensitive Species, depending on location.

Wolverine in the contiguous U.S. were petitioned for listing under the ESA twice in the past 25 years (1994, 2000), and were the subject of a series of lawsuits. In October 2020, after completion of a Species Status Assessment (USFWS 2018), the USFWS withdrew an earlier proposal to list the wolverine in the contiguous U.S. as a threatened DPS. The USFWS analysis of connectivity, genetic diversity, and climate considerations were the subject of scientific and legal debate. In response to litigation regarding withdrawal of the proposed listing and an appellate court decision regarding a different ESA listing decision, the USFWS voluntarily agreed in 2022 to reinstate the proposed listing rule for additional analysis. While this review is being conducted, wolverine in the contiguous U.S. is again a candidate (proposed) for ESA listing as a threatened DPS.

Conservation Challenges and Opportunities

In the absence of hunting and trapping seasons, primary drivers for wolverine population management in Idaho are actions that affect habitat suitability, connectivity, breeding success, and mortality.

Connectivity

Spatial Connectivity—Wolverines in Idaho are part of a larger population that requires regular movement of individuals among habitat patches for long-term persistence (Aubry et al. 2007, Inman et al. 2013). Connectivity depends on conditions at multiple scales, ranging from those supporting local dispersal and successful reproduction at a local population level to landscape permeability allowing for gene flow and occasional, but critical, long-distance dispersal events.

Central Idaho's wilderness and surrounding remote mountainous areas contain large, well-connected blocks of habitat. This area supports consistent, resident, local breeding populations of wolverines. Wolverines appear to move across this landscape readily, as demonstrated by 2 radio-collared animals that dispersed from the Sawtooth and White Cloud Mountains to the Salmon River Mountains north of McCall (Copeland 1996, Heinemeyer and Squires 2014), and by parent-offspring relationships derived from genetic analyses (Pilgrim and Schwartz 2018).

Some areas of the state provide habitat that is less suitable or peninsular (e.g., Idaho Panhandle, Lemhi and Lost River Mountains). Although these areas have supported resident animals (Lucid et al. 2016, Evans Mack 2019), occupancy by resident animals over time or existence and status of local populations is unclear. In addition, climatic projections for increasing temperatures and reduced snowpack could further amplify habitat fragmentation or further lessen habitat suitability over time. For example, Carroll et al. (2020) found dispersing wolverines do not move indiscriminately across the landscape, they move readily through low-quality habitat, traveling along lower-resistance pathways to reach high-quality habitat. Although wolverines dispersed through lower-quality habitat compared with habitat occupied by resident animals, some threshold likely exists, below which low-quality or unsuitable habitat will prevent dispersal.

In general, occupied wolverine habitat is spatially separated from human habitation, including roads and infrastructure. This relationship likely reflects wolverine preference for alpine and subalpine habitats, which are typically incompatible with infrastructure development, rather than avoidance of human activity (Copeland et al. 2007). Wolverines are more likely to encounter infrastructure as they cross lower-elevation habitat (i.e., valley bottoms) when moving between habitat areas or when dispersing. Although wolverines respond to road corridors at a fine scale by adjusting behaviorally, such as repeated approaches and retreats, altering course to avoid infrastructure, or choosing not to cross, wolverines have crossed U.S. and state highways (Packila et al. 2007). A wolverine that dispersed from Wyoming to Colorado successfully crossed Interstate 80, 3 U.S. highways, and 5 state highways (Inman et al. 2008). Overall, wolverines seem to demonstrate impressive dispersal ability, but infrastructure and roads in valleys between wolverine habitats could affect wolverine movement or increase mortality of dispersing individuals.

Genetics—The current population in Idaho and adjacent states is a result of reestablishment primarily by immigrants from southwestern Canada (McKelvey et al. 2014). Schwartz et al. (2007) found only 3 of 9 haplotypes known from wolverines in Canada occurred in the northern Rockies, and most samples from western U.S. populations exhibited only 1 haplotype. Wolverines in Idaho demonstrated the lowest genetic diversity levels among 8 populations evaluated across the Rocky Mountains (Cegelski et al. 2006). Thus, Idaho populations likely were genetically isolated, even from populations in Montana. However, the sample size for Idaho in these genetic analyses by Cegelski et al. (2006) was relatively small and did not include 24 animals from the wolverine–winter recreation study (Heinemeyer et al. 2019), or 39 new individuals from the western states camera survey in Idaho, Montana, Washington, and Wyoming (Pilgrim et al. 2018). If movement among subpopulations is limited, risk of inbreeding increases over the long-term (Kyle and Strobeck 2001, Cegelski et al. 2006, Schwartz et al. 2009). However, these analyses were limited in scope and inferences about genetic isolation could change with a broader sampling effort. Considering the wide-ranging nature of wolverines, additional monitoring is needed to determine whether management actions are needed to enhance gene flow among subpopulations.

Variables that most influence wolverine gene flow have differed when comparing movements within breeding ranges to long-distance dispersal events. Schwartz et al. (2009) found snow depth was the most important predictor for wolverine gene flow across all scales, especially up to distances of approximately 143 mi; whereas terrain ruggedness and housing density most influenced genetic connectivity at a broad scale (e.g., large distances representing occasional long-distance dispersal events; Balkenhol et al. 2020).

Schwartz et al. (2009) and Trail et al. (2010) identified the Bitterroot Mountains between Montana and Idaho as a critical artery of gene flow. This area genetically links wolverines of central Idaho to those in the Bob Marshall Wilderness and Glacier National Park in Montana, and through them on to Canada. The Centennial Mountains in Idaho also link wolverines in the Sawtooth Mountains to those in the Greater Yellowstone Ecosystem (Schwartz et al. 2009).

Objective: Maintain population connectivity.	
Strategies	**Actions**
Continue to characterize genetic connectivity with more robust sample sizes representative of the contiguous U.S. as well as adjacent Canadian provinces.	Contribute to and continue to support ongoing transboundary landscape genetics evaluation to examine gene flow and population structure.
Characterize wolverine movements and dispersal. Develop analytical products to support resource development and management decisions.	Develop analytical products that support project planning and review, including consideration for climate change.
	Develop voluntary partnerships to facilitate protection of areas important for wolverine movements and dispersal.
Collaborate with natural-resource-based industries, resource managers, landowners, and other stakeholders to plan and implement approaches to maintain genetic connectivity.	Provide technical assistance to licensing and permitting regulatory authorities, industry, and other stakeholders regarding opportunities to maintain wolverine movements and dispersal.
	Conserve wolverine populations and habitat with cooperative agreements (e.g., land exchanges, conservation easements, and Forest Legacy Program).

Climate

Wolverine may occupy a snowy bioclimatic niche because their physiology requires colder temperatures or because they face less competition with other large mammals that are not present in winter (Copeland et al. 2010). Snow cover is a commonly used metric to project change in wolverine habitat suitability resulting from a warming climate. Projections of increasing temperatures and a trend for more precipitation to fall as rain rather than snow represent a potential stress on wolverine depending on elevation and latitude. However, magnitude of projected change varies widely in time and space, and natural climate variability can reduce or amplify projected effects (e.g., Abatzoglou et al. 2014). Local climate conditions may continue to offer climate refugia (e.g., Moritz and Agudo 2013), and complexity of terrain in Idaho represents a challenge for many climate models. All these factors lead to uncertainty about how climate change could influence wolverine persistence in Idaho over the next 50 years.

Most projections for the Pacific Northwest predict progressively warmer and wetter conditions during the 21st century. Temperatures are predicted to increase in all seasons, with the largest increases in summer. Precipitation is predicted to increase during fall and winter, with little change or additional drying during summer. Much of the western U.S. is expected to transition from a snow-dominated system to one more rain-dominated. Spring snowpack is expected to decline, especially at warmer low to mid-elevations; and existing snow is expected to continue melting earlier (Pierce and Cayan 2013). These changes are expected to become most pronounced beyond 2035 (Kunkel et al. 2013).

Climate models provide credible estimates at global and continental scales under a given set of assumptions (IPCC 2007). Downscaling to more local geography, such as wolverine habitat in Idaho, presents challenges due to topographical complexity or lack of resolution of data. Analyses at smaller scales require more assumptions, which can lead to high variability among estimates of local climatic changes (e.g., Salathé et al. 2010). For example, elevations can range >7,000 ft within a single sampling unit within central Idaho's rugged terrain. Similarly, spatial scale of some remotely sensed data (e.g., Moderate Resolution Imaging Spectroradiometer [MODIS]) used to estimate snow cover, can result in unreliable estimates, particularly in fragmented landscapes.

Thus, although McKelvey et al. (2011) and Peacock (2011) predicted large declines in spring snow cover and depth by the end of the century, both studies recognized a large range of variation and uncertainty existed due to spatial scale of the data, particularly in topographically complex areas. A high-resolution projection of snowpack found snowpack loss was strongly dependent on topographical aspect, with northerly slopes retaining more snow longer, and snow was likely to persist into the mid-21st century within the upper one-half of an elevational band defining wolverine denning habitat (Barsulgli et al. 2020). Likewise, Carroll et al. (2018) concluded wolverine habitat is not expected to shift drastically between 2010 and 2050, although connective pathways shift spatially and become smaller into the future.

Perhaps the largest unknowns are wolverine sensitivity to climate, degree to which its association with snow is obligatory, and the species' adaptive capacity. Although snow cover is projected to decline, magnitude of decline will vary with elevation, topography, and geographic region. In addition, inter-annual variability likely will be substantial, and other factors (e.g., road density, human population density) may interact with climate changes to redefine suitable habitat for wolverines. Thus, the ability of wolverines to adapt behaviorally and physiologically will be relative to the magnitude of change experienced, and therefore variable through space and time.

Objective: Collect local-scale climate data, particularly data associated with snowpack.	
Strategies	**Actions**
Model localized climate-driven changes to wolverine habitat.	Support efforts to establish long-term climate monitoring stations (e.g., remote cameras, light sensors, temperature sensors) at locations representative of Idaho's complex topography.

Human-Caused Mortality

Incidental Trapping—Wolverines in Idaho are classified as protected non-game animals and no harvest is allowed. However, wolverines have been incidentally captured in traps legally set for other species. IDFG documented 27 incidental captures since 1965 (the year wolverines were designated as state-protected). Of those, 11 resulted in direct mortalities, and 16 animals were released alive, some with documented injuries. Prior to 2004, reports of non-target captures were sporadic. Incidental captures increased since 2004, with ≥1 incident almost annually, and up to 3 events in some years.

Illegal Take—No illegal take of wolverines has been documented in the last 5 years by IDFG.

Vehicle Collisions—Vehicle collisions with wolverine are rare. IDFG roadkill database includes one confirmed mortality and 2 unconfirmed mortalities of wolverine.

Objective: Reduce incidental and illegal human-caused mortality.	
Strategies	**Actions**
Minimize non-target capture of wolverine in trap sets.	Continue to provide guidance on reducing non-target take and minimizing injury to wolverine in biennial upland game bird, turkey, and furbearer regulation booklets.
	Continue to teach wolverine avoidance techniques in mandatory trapper and wolf-specific trapper education classes.

Knowledge Gaps

Wolverine Abundance - A population estimate is fundamental to assessing conservation status, extirpation risk, population changes over time, and effects of resource management actions. However, ability to obtain a reliable abundance metric on a low-density, far-ranging animal such as wolverine is difficult. Due to sample size and difficulty of tracking change over time, genetic-based methods have limitations. The Western States Wolverine Conservation Project (WSWCP) opted for an occupancy metric because an estimate of abundance required a sampling intensity that was logistically beyond reach. For example, Ellis et al. (2014) estimated 100 - 150 camera stations (1/39 mi^2 cell) would be needed to reach an 80% probability of detecting a 50% decline in the current U.S. Rocky Mountain wolverine population. As an alternative to estimating abundance, the WSWCP established a robust method for quantifying wolverine distribution and probability of occupancy at the metapopulation scale and tracking changes in these metrics over time (Lukacs et al. 2020).

Wolverine Denning Habitat and Association with Snow Cover—The relationship between wolverine dens and snow cover has become less clear in recent years. Copeland et al. (2010) found a very high spatial correlation between locations of dens known globally at the time and a model of persistent spring snow. More recently, wolverine dens have been documented in areas with minimal or no persistent spring snow (Makkonen 2015, Webb et al. 2016, Aronsson and Persson 2017, Jokinen et al. 2019). In the context of a warming climate, understanding the nature of the den site–snow relationship and its effect on reproductive success is critical to projecting persistence of Idaho's wolverine subpopulations. Magoun et al. (2017) suggested remote sensing techniques were not adequate to assess snow conditions at the den-site level at all locations, and therefore, different scales and resolutions would be required to examine relationships between persistent spring snow and den-sites.

Objective: Increase base knowledge of wolverine to inform conservation efforts.	
Strategies	**Actions**
Investigate the relationship between wolverine natal denning habitat and snow cover.	Identify den sites through radio-collared female wolverines and aerial surveys.
	If feasible, develop a model to characterize and predict maternal denning areas to inform land management planning efforts.

Lynx

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Ecology and Status

General Physical Description

The Canada lynx is a medium-sized member of the *felid* family, similar in size to a bobcat, but differentiated by its light-colored coat, prominent ear-tufts, long legs, and large feet. Large feet are a prominent characteristic of lynx and allow efficient travel over deep, unconsolidated snow. Males and females are similar in appearance. Adult males are larger (~26 lb) than adult females (~22 lb).

Distribution and Population Status

Lynx are closely tied to boreal forests and their historical distribution in North America largely reflects historical distribution of boreal forest. Reports of lynx outside of this habitat type exist, with observations extending to places such as Nevada, Iowa, and New York (McKelvey 1999). However, these reports may paint an inaccurate depiction of historical and present-day lynx range, as many of these observations were likely of transient or dispersing lynx, not resident animals. A review by the USFWS suggested inclusion of areas that do not include lynx habitat fosters a misperception of historical range of the species in the contiguous U.S. (USFWS 2003). Review of this subject identified only a few areas in the contiguous U.S. with sufficient quality habitat to maintain resident lynx populations (e.g., northern Maine, northeastern Minnesota, western Montana, and north-central and northeastern Washington; USFWS 2003).

Though lynx sightings have occurred throughout much of Idaho (Figure 8), these observations should not be interpreted as reflective of lynx distribution or habitat suitability. IDFG has documented only 81 verifiable lynx detections, with most of these sightings occurring outside of high-quality habitat (Figure 8). These sightings are best attributed to transient or dispersing individuals. In Idaho, high-quality lynx habitat is limited, with most existing in small, isolated, and fragmented parcels (Figure 8) that can only support a small number of individuals, even if fully occupied.

Space Use and Abundance

Given limited suitable habitat and limited observations in Idaho, no abundance estimates or studies of home ranges exist for Idaho. The number of lynx in Idaho is likely very small, and should only be considered in a population context relative to its connection to larger areas of contiguous, occupied habitat outside the state.

Densities of lynx can fluctuate greatly across their range, depending on primary prey (i.e., snowshoe hare) densities. In northwest Montana, median female home range was 8.8 mi^2 (range 7–25 mi2; Holbrook et al. 2019). Male home ranges in northwest Montana were not reported, but home range analyses in other areas demonstrated male home ranges were 1.5–3 times larger than those of females (Quinn and Parker 1987). In areas with greater lynx occupancy, home ranges overlap, particularly among different ages and sexes (Nellis et al. 1972, Brand et al. 1976).

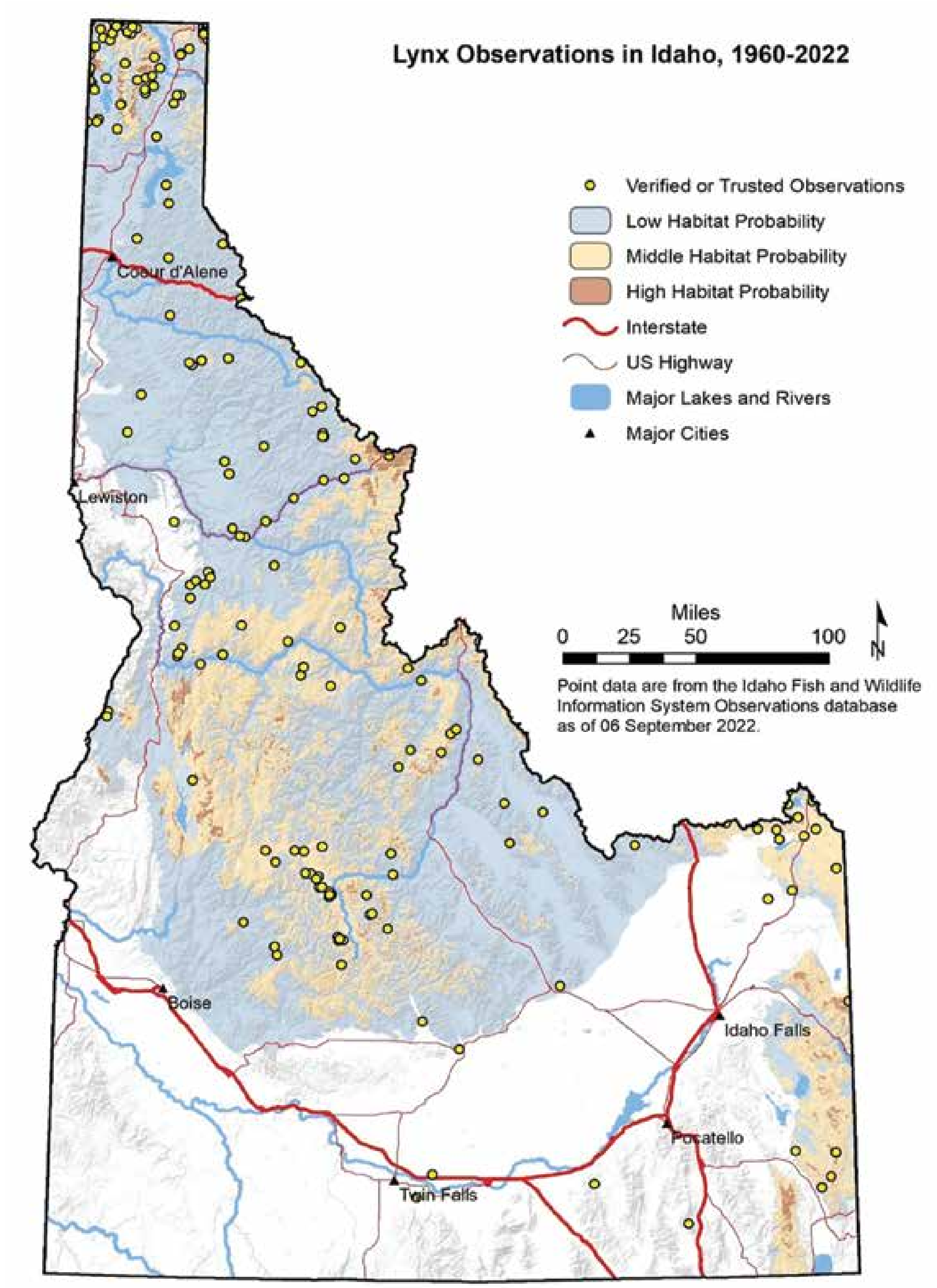

Figure 8.

Categorical representation of Canada lynx habitat, Idaho (Olson et al. 2021). Low habitat probability indicates unlikely use, middle habitat probability indicates some level of use, potentially by single animals or animals more likely to be dispersing or moving among territories, and high habitat probability indicates higher probability of use, particularly by resident individuals. Yellow circles represent verified or trusted lynx observations between 1960 and 2022.

Habitat Use

Suitable lynx habitat consists of forest structure that supports: 1) snowshoe hare density >0.2/acre (Berg et al. 2012), 2) enough horizontal cover to allow for efficient hunting (Vashon et al. 2008; Squires et al. 2010), and 3) winter conditions that promote unconsolidated snowpack to provide Canada lynx an adaptive advantage over other mesocarnivores due to their foot loading.

In the northern Rockies of the U.S., these components tend to be found in mid- to high-elevation forests (i.e., 4,900–6,500 ft) with a spruce (*Picea spp.*)-fir overstory, and a midstory that provides complex structure and abundant horizontal cover (Squires et al. 2010). These characteristics tend to be associated with late-seral forests. However, additional aspects of forest structure may contribute to habitat quality for lynx. Holbrook et al. (2018) surmised a high-quality habitat mosaic for female lynx consisted of 50–60% mature forest and 18–19% advanced regenerating forest.

Reproduction

Reproduction, recruitment, and population densities of lynx were closely tied to snowshoe hare population cycles across much of their range (Elton and Nicholson 1942). However, cyclical population performance has not been observed within the southern periphery of lynx range (i.e., south of Canada), likely due to absence of strong snowshoe hare population cycles. Mean litter size (n = 53) was approximately 2.5 kittens in northwestern Montana, without variation by age or year (Kosterman et al. 2018). Kosterman et al. (2018) found lynx reproductive success was tied to abundant and connected mature forest, in a mosaic with intermediate amounts of small-diameter regenerating forest. Age-related variation in litter size has been documented in northern portions of lynx range (i.e., Yukon Territory, Canada; Mowat et al. 1996).

Food Habits

Throughout the species' range, snowshoe hare is the primary food item. In northwestern Montana, snowshoe hares accounted for 96% of winter prey biomass (Squires and Ruggiero 2007). Although snowshoe hares were an important food source for introduced lynx in Colorado, red squirrels (*Tamiasciurus hudsonicus*) were also an important prey item, accounting for >20% of diet biomass in 7 of 11 years (Ivan and Shenk 2016). Although secondary prey items (i.e., prey other than snowshoe hare) may supplement lynx diets in some populations, snowshoe hares remain the primary food item and suitable snowshoe hare densities are a requirement for lynx persistence.

Mortality

Lynx are subject to a variety of mortality factors across their range. Quinn and Parker (1987) stated starvation and malnutrition were dominant mortality factors. However, predation by other carnivores can be important. Predation was the leading cause of lynx mortality in Maine, with fisher accounting for 14 of 18 predation events (McLellan et al. 2018). Bobcats, gray wolves, mountain lions, and even other lynx may also prey on lynx. Human-caused mortality is an important source of mortality in some populations where lynx are open to harvest, such as Alaska and parts of Canada.

Legal and Conservation Status

The lynx is classified as a furbearer in Idaho, but no harvest is permitted. The SWAP (IDFG 2023) identifies lynx in the Purcell Mountains in the northeast corner of the Panhandle as a SGCN, consistent with federally designated critical habitat under the ESA. Lynx that occur south of the U.S.-Canada border have been identified as a DPS and listed as threatened under the ESA since 2000. In 2017, the USFWS recommended delisting lynx as part of their 5-year status review and started the delisting process. These efforts were ultimately halted by litigation, which resulted in legal settlements that involved development of a recovery plan for lynx in the contiguous U.S. and review of critical habitat designations by the USFWS.

Conservation Challenges and Opportunities

Lynx in Idaho pose a unique situation from a conservation perspective. Suitable lynx habitat is extremely limited in the state. Persistence of lynx in these areas is primarily dependent on status of lynx in neighboring jurisdictions (British Columbia and Montana), where enough suitable habitat exists to support reproductively viable populations. As an example, if we consider 'high habitat probability' identified in Olson et al. (2021) in western Montana and northern Idaho, Idaho contains approximately 5% of habitat suitable for resident animals. This limited amount of habitat is insufficient to influence the overall lynx population.

Population Monitoring

Although IDFG has little ability to impact lynx populations from a biological standpoint, continued contribution to providing the best-available science is important to inform determinations under the ESA. IDFG collaborates with neighboring state agencies on development and implementation of lynx population monitoring strategies. With most identified habitat for lynx existing in Montana, continued coordination will be critical for gathering scientifically robust information on status of lynx in Idaho and adjacent states.

Objective: Maintain accurate understanding of Canada lynx status and distribution in Idaho.	
Strategies	**Actions**
Monitor population status and distribution.	Continue collaboration with FWP and Wyoming Game and Fish Department to refine and implement a robust occupancy monitoring effort that informs state and federal agencies about current lynx status and distribution in Idaho and surrounding states.

Human-Caused Mortality

Non-Target Captures—Since 2000, 7 lynx have been caught in foothold traps set for other species with open trapping seasons, with 6 of the captures by trappers targeting bobcat. There was one mortality related to these captures (illegally shot while in the trap). The remaining 6 lynx were released, presumably unharmed, with 1 animal radio-collared and monitored by IDFG after release. Although these few unintended captures do not impact lynx at a population level, minimization of non-target capture is prudent.

Illegal Take—Illegal take of lynx is rare in Idaho. In the past 5 years, IDFG conservation officers documented one incident where a person shot and killed a Canada lynx they thought was a bobcat when it attacked their chickens.

Vehicle Collisions—No records of lynx-vehicle collisions exist in IDFG's Roadkill Observation Database.

Objective: Minimize incidental or illegal human-caused mortality of Canada lynx.

Strategies	Actions
Educate the trapping community on measures to reduce non-target captures.	Continue to provide guidance on reducing non-target take and minimizing injury to Canada lynx in biennial upland game bird, turkey, and furbearer regulation booklets.
	Continue to discuss non-target take reduction and injury minimization with the trapping community at events, such as fur auctions, conferences, and trapper education classes.

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Idaho

Fisher, Wolverine and Canada Lynx

Management Plan

2023-2028