

SOUTH DAKOTA BOBCAT ACTION PLAN 2024–2028



**SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS
PIERRE, SOUTH DAKOTA**

WILDLIFE DIVISION REPORT 2024–01AP

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This document is for general, strategic guidance for the South Dakota Department of Game, Fish and Parks (SDGFP) and serves to identify what we strive to accomplish related to bobcat management. By itself this document is of little value; the value is in its implementation. This process will emphasize working cooperatively with interested publics in both the planning process and the regular program activities related to bobcat management. This plan will be used by Department staff and Commission on an annual basis and will be formally evaluated every four years. Plan updates and changes, however, may occur more frequently as needed.

ACKNOWLEDGEMENTS

This plan is a product of substantial discussion and input from many wildlife professionals and the South Dakota public sector. In addition, those comments and suggestions received from private landowners, trappers, hunters, and those who recognize the value of bobcats and their associated habitats were also considered.

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All text and data contained within this document are subject to revision for corrections, updates, and data analyses.

Cover photo courtesy of Brady Neiles.

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EXECUTIVE SUMMARY

The bobcat (*Lynx rufus*) is an impressive predator that can hunt by stalking or ambush and can survive in a wide variety of different terrain and habitat. Their uncanny ability to get close to prey is remarkable and such behavior has been described in detail as a “hunting bed” or a lookout where they lay and wait for prey to walk by. This species is a member of the mesocarnivore guild in North America and plays a vital role in ecological communities through trophic cascades as well as nutrient and energy cycling within food webs. Trophic cascades can occur through population-level effects where predators prey on herbivores and consequently decrease the abundance of herbivores that may negatively impact certain plant communities. Bobcat population abundance and growth rates may be tied closely with prey availability and predator-prey relationships.

This management plan provides important historical background and relevant biological information for the sustainable management of bobcats in South Dakota. Current bobcat research information, survey information, and relevant biological literature are presented, along with a thorough discussion of objectives and strategies to guide management of this important resource into the future. This plan is intended to guide managers and biologists over the next five years but should be considered a working document that will be amended as new biological and social data provide opportunities to improve management of the bobcat resource in South Dakota.

The following objectives have been identified for the successful management of bobcats: 1) Annually determine status of bobcat populations; 2) Bi-annually review and set bobcat management objectives and use harvest strategies to maximize sustainable recreational opportunity; 3) Maintain, manage, and protect existing bobcat habitat and prey base in South Dakota. Bobcats occur across a wide range of habitat types which makes it difficult to manage for specific habitats. Therefore, it would be more appropriate to manage for wild turkey and lagomorph (e.g., eastern cottontail rabbit [*Sylvilagus floridanus*]) habitat needs as a primary prey base; 4) Continue to use science-based research and surveys to answer questions related to public attitudes towards bobcat management; and 5) Inform and educate the public on bobcat ecology, management, and research.

The “*South Dakota Bobcat Management Plan, 2024-2028*” will serve as the guiding document for decision making and implementation of actions to ensure bobcat populations and their habitats are managed appropriately. South Dakota Department of Game, Fish, and Parks (SDGFP) will work closely with United States Forest Service (USFS), Bureau of Land Management (BLM), National Park Service (NPS), private landowners, and sportsmen and women to overcome challenges and take advantage of opportunities regarding the management of bobcats in South Dakota.

Introduction

The bobcat (*Lynx rufus*) is an impressive predator that can hunt by stalking or ambush. Their uncanny ability to get close to prey is remarkable and such behavior has been described in detail as a “hunting bed” or a lookout where they lay and wait for prey to walk by (Rollings 1945, Marshall and Jenkins 1966, McCord 1974). This amazing behavior was observed by researchers in the Black Hills where a radiomarked bobcat was waiting for a prairie dog to emerge for over 45 minutes before successfully capturing its prey (personal observation, SDGFP). This species is a member of the mesocarnivore guild in North America and plays a vital role in ecological communities through trophic cascades as well as nutrient and energy cycling within food webs (Lesmeister et al. 2015). Trophic cascades can occur through population-level effects where predators prey on herbivores and consequently decrease the abundance of herbivores that may negatively impact certain plant communities (Schmitz et al. 1997). Bobcat population abundance and growth rates may be tied closely with prey availability and predator-prey relationships; undoubtedly lagomorph (i.e., rabbits [*Sylvilagus* spp. and *Lepus* spp.]) abundance plays an important role in bobcat survival and reproduction (Anderson and Lovallo 2003).

Population Modeling

A study was conducted in the Black Hills of South Dakota where adult and yearling bobcat survival was monitored from 2016 through 2023 and kitten (first 90 days) and juvenile (275 days) survival were monitored from 2019-21. These vital rates were combined into a matrix projection model and the mean population growth rate was 0.85 (95% CI = 0.72, 1.02; Lehman et al. 2024). Elasticity and sensitivity analysis both indicate that population growth rate is most strongly influenced by female adults. Both analyses also indicate the transition of kittens and juveniles to yearlings and adult reproductive contribution were the 2nd and 3rd most influential variable, though the rank of each matrix element is different between the two analyses. Both analyses agree that the remaining matrix elements have little influence on population growth rates (Lehman et al. 2024). Life stage simulations indicate that adult survival is important, but also illustrate how the lower-level juvenile portion of year 1 (91 days to 1 year) is more important than the kitten phase (first 90 days).

Harvest Strategy

The use of genetic structure from harvested bobcats in South Dakota identified distinct eastern and western populations based on 2 genetic clusters being most supported statistically (Fetherston 2021). However, management should also take into consideration easily definable geographic areas and bobcat demographics to potentially provide for management at finer levels of structure. Research has also identified unique demographic characteristics for bobcat populations from the Black Hills and West River areas (Tycz 2016, Morrison 2022, Lehman et al. 2024). Using a combination of genetic structure, geographic area, and demographic characteristics harvest management could be strategically implemented in 3 management zones (Figure 1). The Black Hills area is unique in that the forested system differs from the open habitats further east. The West River area is unique in that the open rugged terrain has much

less agriculture when compared to the East River system (Figure 1). Each management zone has two harvest strategies that can be implemented: 1) Moderate Harvest- a 52-day season that allows for unlimited bobcat harvest per trapper or hunter in that zone; and 2) Low Harvest- a 52-day season that allows for the harvest of only one bobcat per trapper or hunter in that zone.

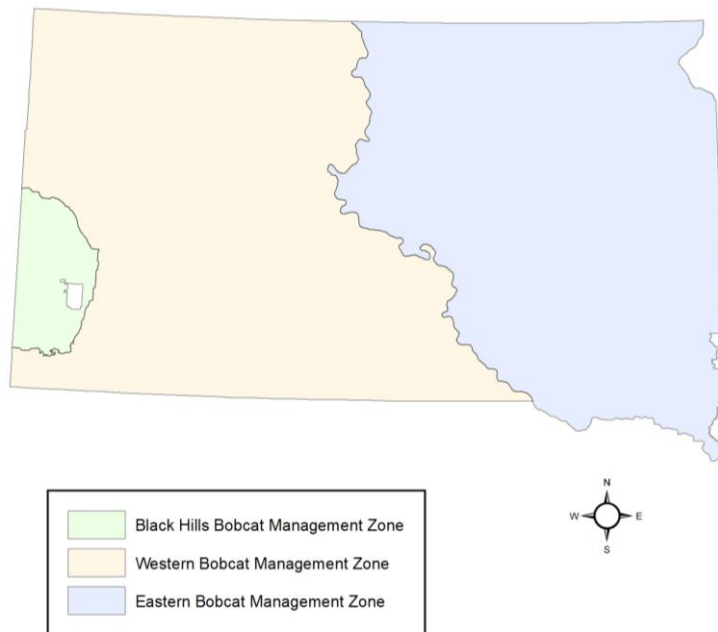


Figure 1. Bobcat management zones based on geographic features, bobcat demographics, and genetic structure. Management zones also differ in vegetation and topography for bobcats in South Dakota.

Black Hills Management Zone

In the Black Hills of South Dakota research demonstrates that juvenile survival (91 days to 1 year) is important in bobcat population growth and highly correlated with low juvenile-to-adult harvest ratios (Lehman et al. 2024). Life-stage simulation analysis also demonstrated that the ratio of juveniles and yearlings to adults is highly correlated with population growth rate. Harvest of juveniles in the Black Hills population was 4% in 2020 and 0% in 2021 (Lehman et al. 2020, Lehman et al. 2021), while the probability a juvenile survives its first year was 18% during those 2 years (Lehman et al. 2024). A portion of South Dakota trapping and hunting methods such as snaring and shooting are a random method of take (35-37% of harvest; Lehman et al. 2020, Lehman et al. 2021) and juvenile-to-adult harvest ratios should provide an indicator of age structure in the population. In Montana, the best predictor of population growth was the ratio of number of juveniles per adults harvested with higher ratios indicating positive growth rates (Newell and Podruzny 2018).

For the Black Hills Management Zone, if the juvenile-to-adult harvest ratio falls below 10% for two or more consecutive years the Black Hills zone will enter into a “Low Harvest” strategy (Table 1). Managers have the flexibility to use a more conservative strategy (i.e., Low Harvest) even if the zone has data to support a “Moderate Harvest” strategy such as $\geq 10\%$ juvenile-to-adult harvest ratio and $\lambda \geq 1.0$. It could be possible to have $\geq 10\%$ juvenile-to-adult harvest ratio and $\lambda < 1.0$ based on research. If that occurs the strategy should default to the “Low Harvest” strategy. If the Black Hills Zone stays below 10% for 4+ years, it should be a candidate for additional research and survey monitoring. For instance, in the Black Hills, infrared cameras could provide supplemental survey information which would inform abundance, or research information could provide growth rate information. If the additional research or survey information confirms a negative growth rate for 4+ years, harvest closure would be considered. It could potentially be reopened 2 years after the closure to collect juvenile-to-adult harvest ratios and additional research information could be collected which would inform future management direction.

Table 1. Decision support table to guide harvest strategy of bobcats in the Black Hills, South Dakota.

Guiding Factors	Low Harvest ^a	Moderate Harvest ^b
Juvenile-to-Adult harvest ratio (two-year trend)	<10%	$\geq 10\%$
Demographic data available	$\lambda < 1.0$	$\lambda \geq 1.0$

^aA 52-day season that allows for the harvest of only one bobcat per trapper or hunter.

^bA 52-day season that allows for the harvest of an unlimited number of bobcats per trapper or hunter.

West River Management Zone

Research from within the West River Zone has provided vital rate information for use in a Leslie matrix population growth model (Tycz 2016). Adult female survival with harvest mortality removed in combination with juvenile-to-adult ratios, and harvest percentages provide estimates of λ values, or growth rates. Growth rates are displayed as they relate to low (0.79), moderate (0.84), and high (0.89) survival rates. Also, as it relates to poor (0.05), low (0.10), moderate (0.20), and high (0.30) recruitment rates (i.e., juvenile-to-adult ratios), and as it relates to 0%, 5%, and 10% harvest rates (Table 2). It should be noted Table 2 should be used as a general guide as adult survival is not up to date and the percentage of harvest was reported at 8% from collared bobcats when sample sizes were highest the final year of the study (Tycz 2016). Our modeling allowed for flexibility in juvenile-to-adult ratios, annual female survival, and harvest rates so managers could examine potential population growth rates at varying levels (Table 2).

Using the growth rate table (Table 2) managers can utilize the juvenile-to-adult harvest ratio collected from harvested bobcats from the West River Zone. Managers would apply the collected juvenile-to-adult harvest ratio, as well as a 5% harvest rate, and a moderate adult survival rate. If the juvenile-to-adult harvest ratio falls below 10% (or below the low

recruitment category) for two or more consecutive years, the West River Zone could enter into a “Low Harvest” strategy. If the juvenile-to-adult harvest ratio falls below 10% it would equate to $\lambda < 0.98$ when at a 5% harvest rate and at a moderate adult survival rate (Table 2).

Table 2. Leslie matrix growth rate estimates based on adult female survival, recruitment, and percentage of harvest for the management of bobcats in the West River Zone of South Dakota.

		Poor Recruitment (5 juv:100 adults) ^a			Low Recruitment (10 juv:100 adults) ^a			Mod. Recruitment (20 juv:100 adults) ^a			High Recruitment (30 juv:100 adults) ^a		
		Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
Annual Female Survival ^b	Population Growth Rate Based on												
	Female Harvest Rate ^c												
	10%	0.83	0.88	0.93	0.88	0.93	0.99	0.94	0.99	1.05	1	1.06	1.12
	5%	0.87	0.93	0.99	0.92	0.98	1.04	0.99	1.05	1.11	1.05	1.12	1.18
	0%	0.92	0.98	1.04	0.97	1.03	1.1	1.04	1.11	1.17	1.11	1.18	1.25

^aPoor recruitment at 5% or at 5 juv:100 adults would be adjusted to 33 juv:100 adults.

Pregnancy rate 35% at 2.7 kittens/adult with a simulation of 30 females would add 28 kittens to our ratio and would now be 33 juv:100 adults.

Low recruitment at 10% or at 10 juv:100 adults would be adjusted to 46 juv:100 adults.

Pregnancy rate 44% at 2.7 kittens/adult with a simulation of 30 females would add 36 kittens to our ratio and would now be 46 juv:100 adults.

Moderate recruitment at 20% or at 20 juv:100 adults would be adjusted to 63 juv:100 adults.

Pregnancy rate 53% at 2.7 kittens/adult with a simulation of 30 females would add 43 kittens to our ratio and would now be 63 juv:100 adults.

High recruitment at 30% or at 30 juv:100 adults would be adjusted to 80 juv:100 adults.

Pregnancy rate 62% at 2.7 kittens/adult with a simulation of 30 females would add 50 kittens to our ratio and would now be 80 juv:100 adults.

^bAnnual female survival rates in the absence of harvest are categorized as follows:

- 1) Low=0.79.
- 2) Moderate=0.84.
- 3) High=0.89

^cPercent of female pre-hunt population that is harvested.

East River Management Zone

Research from within the East River Zone has been limited. However, a survey studying the spatial patterns of bobcats in Charles Mix and Brule counties indicated bobcats were most likely to use woodland and shrubland patches (Dart 2021). This type of habitat is very limited in eastern South Dakota and a Low Harvest Strategy should be implemented unless demographic information is collected that suggests a growing population that can support a more liberal harvest strategy.

GUIDING PRINCIPLES

The following statements have guided the development of bobcat management goals and objectives (Table 3) and reflect the collective values of the SDGFP in relation to management of bobcats in South Dakota:

- Wildlife, including bobcats, contributes significantly to the quality of life in South Dakota and therefore must be sustained for future generations.
- Recreational hunting and trapping are legitimate uses of bobcats and must be encouraged and preserved.
- Collaboration among various agencies, including NPS, USFS, BLM, Tribes, and the State, is critical for the future of bobcats and their habitats in South Dakota, and is deserving of recognition and respect.
- Reasonable regulations are necessary for equitable distribution of the benefits of wildlife, including bobcats, and to promote ethical and safe behavior.
- Future of wildlife, including bobcats, depends on a public that appreciates, understands, and supports wildlife and wildlife conservation and in the public's right to participate in decisions related to wildlife issues.

GOALS, OBJECTIVES & STRATEGIES

The goal for bobcat management in South Dakota is to maximize user opportunity while maintaining populations consistent with ecological, social, aesthetic, and economic values of the people of South Dakota and our visitors.

Objectives and Strategies

Objective 1. Annually determine status of bobcat populations.

Strategy A. Where adequate data exist, use statistical population reconstruction and matrix projection models to predict abundance and population growth.

Strategy B. Where feasible, utilize surveys including mark-recapture, hunter harvest, and harvest composition.

Strategy C. Supplement survey data with research findings when available.

Objective 2. Bi-annually review and set bobcat management objectives; use harvest strategies to maximize sustainable recreational opportunity.

Strategy A. Bi-annually review bobcat harvest strategies, which will be used to develop 2-year recommendations based on available biological data, public input, and staff recommendations.

Strategy B. Generally, bobcat harvest will be monitored relative to population estimates, vital rates (when collected), and juvenile-to-adult ratios. We will take into account the following criteria: 1) Statewide population size based upon statistical population reconstruction or other estimates; 2) Vital rates such as adult and kitten survival from research conducted in areas across the state to estimate population growth rates (when collected); and 3) Juvenile-to-adult harvest ratios.

Strategy C. Each bobcat management zone will implement a harvest strategy based on criteria if data are available. Two harvest strategies that can be implemented include: 1) Moderate Harvest- a 52-day season that allows for unlimited bobcat harvest per trapper or hunter; and 2) Low Harvest- a 52-day season that allows for harvesting only one bobcat per trapper or hunter. Strategies will be guided by juvenile-to-adult harvest ratios and demographic data if available.

Objective 3. Maintain, manage, and protect existing bobcat habitat and prey base in South Dakota. Bobcats occur across a wide range of habitat types and makes it difficult to manage for any specific habitats. Therefore, it would be more appropriate to manage for wild turkey and lagomorph (i.e., rabbit) habitat needs as a primary prey base.

Strategy A. Maintain existing partnerships with the USFS, BLM, NPS, private landowners, and other state, local, and private conservation partners to support programs and practices encouraging proper bobcat habitat management on public and private lands.

Strategy B. Manage for wild turkey (*Meleagrididae*) and lagomorph (e.g., eastern cottontail rabbit [*Sylvilagus floridanus*]) habitat needs as a primary prey base.

Objective 4. Continue to use science-based research and surveys to answer questions related to public attitudes towards bobcat management.

Strategy A. Annually evaluate and prioritize research and survey needs for bobcats. Develop research and survey proposals and seek funding opportunities.

Strategy B. Use research and survey findings to guide bobcat management where available and feasible.

Objective 5. The GFP will inform and educate the public on bobcat ecology, management, and research.

- Strategy A. By March 2024, provide an electronic copy of the “South Dakota Bobcat Management Plan 2024–2028” on the GFP’s website. Printed copies will be available upon request.
- Strategy B. Use all available media to educate and inform the public regarding bobcat status, ecology, and harvest.

Table 3. Implementation schedule and primary responsibility, 2024-2028.

Goals, Objectives & Strategies	2024	2025	2026	2027	2028	Primary Responsibility
GOAL: The goal for bobcat management in South Dakota is to maximize user opportunity while maintaining populations consistent with ecological, social, aesthetic, and economic values of the people of South Dakota and our visitors.						
OBJECTIVE 1: Annually determine status of bobcat populations.						
Strategies						
Strategy A: Where adequate data exist, use statistical population reconstruction and matrix projection models to predict abundance and population growth.	✓	✓	✓	✓	✓	Regional Staff Senior Biologists Game Survey Coordinator
Strategy B: Where feasible, utilize surveys including mark-recapture, hunter harvest, and harvest composition.	✓	✓	✓	✓	✓	Senior Biologists Regional Terrestrial Resource Supervisors
Strategy C: Supplement survey data with research findings when available.	✓	✓	✓	✓	✓	Senior Biologists
OBJECTIVE 2: Bi-annually review and set bobcat management objectives; use harvest strategies to maximize sustainable recreational opportunity.						
Strategies						
Strategy A: Bi-annually review bobcat harvest strategies, which will be used to develop 2-year recommendations based on available biological data, public input, and staff recommendations.	✓		✓		✓	Senior Biologists Regional Terrestrial Resource Supervisors Administration
Strategy B: Generally, bobcat harvest will be monitored relative to population estimates, vital rates (when collected), and juvenile-to-adult ratios. We will take into account the following criteria: 1) Statewide population size based upon statistical population reconstruction or other estimates; 2) Vital rates such as adult and kitten survival from research conducted in areas across the state to estimate population growth rates (when collected); and 3) Juvenile-to-adult harvest ratios.	✓		✓		✓	Senior Biologists Regional Terrestrial Resource Supervisors Administration
Strategy C: Each bobcat management zone will implement a harvest strategy based	✓		✓		✓	Senior Biologists

on criteria if data are available. Two harvest strategies that can be implemented include: 1) Moderate Harvest- a 52-day season that allows for unlimited bobcat harvest per trapper or hunter; and 2) Low Harvest- a 52-day season that allows for harvesting only one bobcat per trapper or hunter. Strategies will be guided by juvenile-to-adult harvest ratios and demographic data if available.						Regional Terrestrial Resource Supervisors Administration
OBJECTIVE 3: Maintain, manage, and protect existing bobcat habitat and prey base in South Dakota. Bobcats occur across a wide range of habitat types and makes it difficult to manage for any specific habitats. Therefore, it would be more appropriate to manage for wild turkey and lagomorph (i.e., rabbit) habitat needs as a primary prey base.						
Strategies						
Strategy A: Maintain existing partnerships with the USFS, BLM, NPS, private landowners, and other state, local, and private conservation partners to support programs and practices encouraging proper bobcat habitat management on public and private lands.	✓	✓	✓	✓	✓	Regional Staff Regional Terrestrial Resource Supervisors Administration
Strategy B: Manage for wild turkey (<i>Meleagrididae</i>) and lagomorph (e.g., eastern cottontail rabbit [<i>Sylvilagus floridanus</i>]) habitat needs as a primary prey base.	✓	✓	✓	✓	✓	Regional Staff Regional Terrestrial Resource Supervisors Administration
OBJECTIVE 4: Continue to use science-based research and surveys to answer questions related to public attitudes towards bobcat management.						
Strategies						
Strategy A: Annually evaluate and prioritize research and survey needs for bobcats. Develop research and survey proposals and seek funding opportunities.	✓	✓	✓	✓	✓	Senior Biologists Regional Terrestrial Resource Supervisors Administration
Strategy B: Use research and survey findings to guide bobcat management where	✓	✓	✓	✓	✓	Senior Biologists

available and feasible.						Regional Terrestrial Resource Supervisors Administration
OBJECTIVE 5: The GFP will inform and educate the public on bobcat ecology, management, and research.						
Strategies						
Strategy A: By March 2024, provide an electronic copy of the “South Dakota Bobcat Management Plan 2024–2028” on the GFP’s website. Printed copies will be available upon request.		✓	✓	✓	✓	Communications Administration
Strategy B: Use all available media to educate and inform the public regarding bobcat status, ecology, and harvest.		✓	✓	✓	✓	Communications Administration