From: terri register
To: GFP Mountain Lion Plan
Cc: info@mountainlion.org
Subject: [EXT]
Date: Saturday, August 24, 2019 8:46:10 PM

To whom it may concern:

Your proposed plan needs more consideration based on the following points:

- This draft plan is not geared towards conservation, it is designed favor trophy hunting.
- Mountain lions can manage their own numbers and do not need concentrated human effort.
- Hunting is not effective because it kills the lions least likely to come into conflict with people, pets and livestock. What is left is young dispersing lions that are most likely to come into conflict.
- Non-lethal management is more effective.
- Killing female mountain lions leaves behind orphaned kittens. Hunting leaves kittens to die a cruel death from starvation, dehydration, and exposure.
- Mountain lions are a critical species in their ecosystems, maintaining biological diversity and other benefits to people.

Please reconsider your proposed plan and create a more humane and ecologically sound proposal.

Respectfully,

Terri Register
Trphx@hotmail.com

From:	Dean Parker
To:	GFP Mountain Lion Plan
Subject:	[EXT] Comments on 2019-2029 South Dakota Mountain Lion Plan
Date:	Sunday, August 25, 2019 7:10:29 PM

Please remove the arbitrary and unnecessary population objective/cap on mountain lions in the Black Hills, currently listed as 200 to 300 cats in the draft plan. The Black Hills is able to safely accommodate a much larger population of mountain lions than 200-300.

Trophy hunting is not an effective way to prevent conflicts with mountain lions. Killing mountain lions is harmful to their social structure and actually increases conflicts with humans, pets and livestock. The draft plan allows for high levels of trophy hunting to address conflicts with livestock. However, as the plan shows, mountain lions rarely prey on livestock.

South Dakota Game Fish and Parks should prioritize managing mountain lions for the social and ecological benefits they provide to all South Dakotans and our natural landscape, rather than manage mountain lions for maximum trophy hunting opportunity as the draft plan does.

Dean Parker

2905 East 33rd Street

Sioux Falls, SD 57103

605-360-3571

From:	Sara Parker
To:	GFP Mountain Lion Plan
Subject:	[EXT] Comments on the South Dakota Mountain Lion Draft Plan
Date:	Sunday, August 25, 2019 6:54:41 PM

I'm writing to ask you to remove the arbitrary and unnecessary population objective/cap on mountain lions in the Black Hills, currently listed as 200 to 300 cats in the draft plan. The Black Hills is able to safely accommodate a much larger population of mountain lions, as the 2017/18 preseason population estimate for the Black Hills was approximately 532 total mountain lions.

Trophy hunting is not an effective way to prevent conflicts with mountain lions. Killing mountain lions is harmful to their social structure and actually increases conflicts with humans, pets and livestock. The draft plan allows for high levels of trophy hunting to address conflicts with livestock. However, as the plan shows, mountain lions rarely prey on livestock.

Please prioritize managing mountain lions for the social and ecological benefits they provide to all South Dakotans and our natural landscape, rather than manage mountain lions for maximum trophy hunting opportunity as the draft plan does.

Thank you,
Sara Parker
Sioux Falls, SD
605-376-9073

From: Brett Koenecke
To: GFP Mountain Lion Plan
Subject: [EXT] Comments
Date: Tuesday, August 13, 2019 11:39:35 AM

I am a landowner in the Black Hills. I also have a vacation business and have domestic animals. I think the stated goals in the management plan are too high. 150 is plenty. 50 is ok. 0 would be perfectly fine.

I am unconvinced that the population goals should be raised at all. This is a bad decision to make and the Commission should reject it.

Brett Koenecke
Custer, SD

From: Anna Br-An
To: GFP Mountain Lion Plan
Cc: info@mountainlion.org
Subject: [EXT] Draft Lion Management Plan 2019-2029
Date: Sunday, August 25, 2019 5:20:41 AM

South Dakota Game, Fish and Parks
523 E Capitol
Pierre SD 57501

Sir, madam, to whom it concerns:

I read your draft plan and find that unfortunately it is designed to manage mountain lions for maximum trophy hunting opportunity, not for conservation!

Mountain lions regulate their own numbers and do not require intense management to limit their populations.
Hunting is a bad tool, killing the lions least likely to come into conflict with people, pets and livestock, and creating more space for young dispersing lions that are most likely to come into conflict.
Non-lethal methods are more effective and last longer.
Killing female mountain lions results in the orphaning of their kittens. Hunting leaves kittens to die from starvation, dehydration, and exposure.

Mountain lions are a keystone species in their ecosystems, maintaining biological diversity and other benefits to people.

I urge you to end the hunting of these precious mountain lions.
There's just too little habitat, too much human-caused mortality, and too few mountain lions to justify a hunt.

Remember, South Dakota's wildlife belongs to everyone, not to killers!

Sincerely: Anna Brewer, Tina Beurtels; John Summers; Henry T.; Vickey Osborn; Teddy Miller , New York; Amanda Fields; Jurgen Sorens; Rita Suffolk; Mary Dalton; Joseph Pritchard; Kimberley Fields; Simon Sears; Beverly Woods; Anita Brewer; Daniel Russel; Petra Stafford; Kim Wright; Daphne Harlington, New Mexico; Kathy Stafford, Joan Butterfield, Kenneth Lawson, Myrthe Low, Diane Bremer, US

From: Andrea Sreiber
To: GFP Mountain Lion Plan
Cc: info@mountainlion.org
Subject: [EXT] Draft Lion Management Plan 2019-2029
Date: Sunday, August 25, 2019 9:53:30 AM

South Dakota Game, Fish and Parks
523 E Capitol
Pierre SD 57501

Sir, madam, to whom it concerns,

I read your draft plan and find that unfortunately it is designed to manage mountain lions for maximum trophy hunting opportunity, not for conservation!

Mountain lions regulate their own numbers and do not require intense management to limit their populations.
Hunting is a bad tool, killing the lions least likely to come into conflict with people, pets and livestock, and creating more space for young dispersing lions that are most likely to come into conflict.
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There's just too little habitat, too much human-caused mortality, and too few mountain lions to justify a hunt.

Remember, South Dakota's wildlife belongs to everyone, not to killers!

Sincerely,
Andrea Sreiber
Serbia

From: elisabeth.bechmann@kstp.at
To: GFP Mountain Lion Plan
Cc: Mountain Lion Foundation
Subject: [EXT] Draft Lion Management Plan 2019-2029
Date: Sunday, August 25, 2019 2:40:14 PM

South Dakota Game, Fish and Parks
523 E Capitol
Pierre SD 57501

Sir, madam, to whom it concerns:

I read your draft plan and find that unfortunately it is designed to manage mountain lions for maximum trophy hunting opportunity, not for conservation!

Mountain lions regulate their own numbers and do not require intense management to limit their populations.
Hunting is a bad tool, killing the lions least likely to come into conflict with people, pets and livestock, and creating more space for young dispersing lions that are most likely to come into conflict.
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Killing female mountain lions results in the orphaning of their kittens. Hunting leaves kittens to die from starvation, dehydration, and exposure.

Mountain lions are a keystone species in their ecosystems, maintaining biological diversity and other benefits to people.

I urge you to end the hunting of these precious mountain lions.
There's just too little habitat, too much human-caused mortality, and too few mountain lions to justify a hunt.

Remember, South Dakota's wildlife belongs to everyone, not to killers!

Sincerely:
Dr. Elisabeth Bechmann
Austria

From: Sau Sang
To: GFP Mountain Lion Plan
Cc: info@mountainlion.org
Subject: [EXT] Draft Lion Management Plan 2019-2029
Date: Sunday, August 25, 2019 6:45:09 AM

South Dakota Game, Fish and Parks
523 E Capitol
Pierre SD 57501

Sir, madam, to whom it concerns:

I read your draft plan and find that unfortunately it is designed to manage mountain lions for maximum trophy hunting opportunity, not for conservation!

Mountain lions regulate their own numbers and do not require intense management to limit their populations.
Hunting is a bad tool, killing the lions least likely to come into conflict with people, pets and livestock, and creating more space for young dispersing lions that are most likely to come into conflict.
Non-lethal methods are more effective and last longer.
Killing female mountain lions results in the orphaning of their kittens. Hunting leaves kittens to die from starvation, dehydration, and exposure.

Mountain lions are a keystone species in their ecosystems, maintaining biological diversity and other benefits to people.

I urge you to end the hunting of these precious mountain lions.
There's just too little habitat, too much human-caused mortality, and too few mountain lions to justify a hunt.

Remember, South Dakota's wildlife belongs to everyone, not to killers!

Sincerely:

Sang

From: Kate Kenner
To: GFP Mountain Lion Plan
Cc: info@mountainlion.org
Subject: [EXT] Draft Lion Management Plan 2019-2029
Date: Sunday, August 25, 2019 8:39:41 AM

South Dakota Game, Fish and Parks
523 E Capitol
Pierre SD 57501

Good day,

I have read your plan to manage mountain lions and sadly it seems more designed for trophy hunters than anything else. Mountain lions (wildlife in general) do not need to be managed as nature works very well when left alone.It is only because of the interference of humans that it is considered necessary.To “manage” them through killing is cruel and unethical.

Hunting is a bad tool, killing the lions least likely to come into conflict with people, pets and livestock, and creating more space for young dispersing lions that are most likely to come into conflict.
Non-lethal methods are more effective and last longer.
Killing female mountain lions results in the orphaning of their kittens. Hunting leaves kittens to die from starvation, dehydration, and exposure.

I urge you to end the hunting of these precious mountain lions. They do not exist to boost the egos of hunters, provide room decor, or the pleasure of killing. Humans are not special or the most important species, though clearly many think otherwise, but are merely the one with the power-power that is too often abused.

There's just too little habitat, too much human-caused mortality, and too few mountain lions to justify a hunt.

Remember, South Dakota's wildlife belongs to everyone, not just to hunters!

Sincerely,
Kate Kenner
Vermont

From:	Frédéric Jaubert
To:	GFP Mountain Lion Plan
Cc:	info@mountainlion.org
Subject:	[EXT] Draft Lion Management Plan 2019-2029
Date:	Sunday, August 25, 2019 10:29:20 AM

South Dakota Game, Fish and Parks
523 E Capitol
Pierre SD 57501

Sir, madam, to whom it concerns:

I read your draft plan and find that unfortunately it is designed to manage mountain lions for maximum trophy hunting opportunity, not for conservation!

Mountain lions regulate their own numbers and do not require intense management to limit their populations.
Hunting is a bad tool, killing the lions least likely to come into conflict with people, pets and livestock, and creating more space for young dispersing lions that are most likely to come into conflict.
Non-lethal methods are more effective and last longer.
Killing female mountain lions results in the orphaning of their kittens. Hunting leaves kittens to die from starvation, dehydration, and exposure.

Mountain lions are a keystone species in their ecosystems, maintaining biological diversity and other benefits to people.

I urge you to end the hunting of these precious mountain lions.
There's just too little habitat, too much human-caused mortality, and too few mountain lions to justify a hunt.

Remember, South Dakota's wildlife belongs to everyone, not to killers!

Sincerely:

Frédéric Jaubert
38230, Pont de Chéruy
France

From: paavilaineneeva
To: GFP Mountain Lion Plan
Cc: info@mountainlion.org
Subject: [EXT] Draft Lion Management Plan 2019-2029
Date: Sunday, August 25, 2019 1:09:30 PM

To whom it concerns:

I read your draft plan and find that unfortunately it is designed to manage mountain lions for maximum trophy hunting opportunity, not for conservation!

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Killing female mountain lions results in the orphaning of their kittens. Hunting leaves kittens to die from starvation, dehydration, and exposure.

Mountain lions are a keystone species in their ecosystems, maintaining biological diversity and other benefits to people.

I urge you to end the hunting of these precious mountain lions.
There's just too little habitat, too much human-caused mortality, and too few mountain lions to justify a hunt.

Remember, South Dakota's wildlife belongs to everyone, not to killers!

Sincerely,
Eeva Paavilainen

From: Thesmophoros
To: GFP Mountain Lion Plan
Cc: info@mountainlion.org
Subject: [EXT] Draft Lion Management Plan 2019-2029
Date: Monday, August 26, 2019 12:16:41 AM

South Dakota Game, Fish and Parks
523 E Capitol
Pierre SD 57501

Sir, madam, to whom it concerns:

I read your draft plan and find that unfortunately it is designed to manage mountain lions for maximum trophy hunting opportunity, not for conservation!

Mountain lions regulate their own numbers and do not require intense management to limit their populations.
Hunting is a bad tool, killing the lions least likely to come into conflict with people, pets and livestock, and creating more space for young dispersing lions that are most likely to come into conflict.
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I urge you to end the hunting of these precious mountain lions.
There's just too little habitat, too much human-caused mortality, and too few mountain lions to justify a hunt.

Remember, South Dakota's wildlife belongs to everyone, not to killers!

Sincerely:
Maria Schneider

From: sara youhas
To: GFP Mountain Lion Plan
Cc: info@mountaainlion.org
Subject: [EXT] Draft Lion Management Plan
Date: Monday, August 26, 2019 4:31:23 PM

Dear Sirs:

I am making a public comment in regard to your upcoming draft lion management plan, in which you plan to annually reduce the mountain lion population by half. All of that for trophy hunting!

Coming from a state that has banned trophy hunting I need to speak out against this practice.

Mountain Lion population is self regulating, many cubs do not even make it to the first birthday. Hunting them completely disrupts their social hierarchy, you kill the large experience lions that know how to hunt and avoid mankind, and allow the inexperienced juveniles to take their place. This makes encounters with people more dangerous. Look at Colorado as an example of this happening. You also kill the females with cubs that end up dying of starvation.

There is good science based evidence that harvesting lions to keep their population down is counter productive if what you are interested in is keeping people, pets and livestock safe. I can tell you from living with lions that there is no lack of deer, they are everywhere here, just moving around as the lions do. This is how nature intends it.

As we have learned in S. Ca and in Florida if the population is too small there is the very real possibility of too small of a gene pool, birth defects, and eventually extinction. It appears to me as if this is where you plan to go. You do not even have a good idea of how many lions there are in a given area. They are very hard to count, as any researcher will tell you.

Please consider good science and abandon the harvesting plan. There is more to nature than trophy hunting.

Thank You

Sara Youhas
250 Keller Drive
Boulder Creek, CA 95006

From: Amy Brown
To: GFP Mountain Lion Plan
Cc: info@mountainlion.org
Subject: [EXT] Draft Management Plan
Date: Sunday, August 25, 2019 9:07:19 PM

To Whom It May Concern,

My name is Amy Brown, I currently reside in Ellendale North Dakota, but was raised in the Black Hills and consider Rapid City my home town. I am strongly invested in the welfare of the area and it's wildlife.

I am writing in opposition of the Draft Management Plan 2019-2029.

Since 1890, there have been only 25 confirmed fatal cougar attacks on people in all of North America—that's only 25 deaths in about 130 years—according to Dr. Paul Beier, recognized wildlife expert on cougar/human conflicts.

To put these numbers in perspective, you are at far greater risk from being shot by a hunter, killed by lightning, bees, dogs, or cattle. For example, every year about 100 people in the U.S. and Canada are fatally shot by hunters and 20-30 are killed by dogs.
Mountain lions regulate their own numbers and do not require intense management to limit their populations.

Hunting is a bad tool, killing the lions least likely to come into conflict with people, pets and livestock, and creating more space for young dispersing lions that are most likely to come into conflict. Research at the Washington State University Carnivore Conservation Laboratory found that heavy hunting of cougars actually increases conflicts between humans and cougars. These findings run contrary to presumptions of wildlife management programs designed to continually increase kill numbers. Non-lethal methods are more effective and last longer.

Killing female mountain lions results in the orphaning of their kittens. Hunting leaves kittens to die from starvation, dehydration, and exposure. Juvenile lions that haven't developed the skill set needed to hunt prey animals are more likely to target opportunistic prey such as domesticated livestock and pets.

Mountain lions are a keystone species in their ecosystems, maintaining biological diversity for both prey animals and plant species. They are a necessary part of the Black Hills and keeping it the wild and beautiful place that it is.

Thank you for your time,
Sincerely,
Amy Brown
605-209-6902

From: Joanne Hegg
To: Lindbloom, Andy
Subject: [EXT] Draft Mountain Lion Management Plan Comment
Date: Thursday, August 08, 2019 9:02:35 PM

Do you want to kill all our great wild life?? Disgusting

Sent from my iPad

From: Starla Mayer
To: Lindbloom, Andy
Subject: [EXT] Draft Mountain Lion Management Plan Comment
Date: Thursday, August 08, 2019 6:06:39 PM

Would like to see the black hills season dates last longer into Spring, while shed hunting it is not uncommon for us shed hunters to run into mountain lions face to face, it would be beneficial for us to be able to protect ourselves and fill our tags when this happens.

From: Colton Benson
To: Lindbloom, Andy
Subject: [EXT] Draft Mountain Lion Management Plan Comment
Date: Thursday, August 08, 2019 6:38:12 PM

Residents of South Dakota only should be able to use dogs to hunt mountain lions and harvest up to a certain number (depending upon the number of estimated lions) of female lions a year in a open over the counter tag and chase permit (after a online test on basic ethics and training on how to track and find lions without kittens etc...for the chase permits) and no outfitters that kill the little guy who can’t afford it need equal chances for everyone and resident tags only because we pay taxes And there’s plenty of residents that will participate so there’s no reason for putting us at the end of the line for more revenue

From:	Raymond Oyen
To:	Lindbloom, Andy
Subject:	[EXT] Draft Mountain Lion Management Plan Comment
Date:	Sunday, August 11, 2019 9:46:19 AM

Looks to me like there has been a lot of time and money spent on the Mountain lion plan. I know the lions are taking a lot of our deer and elk. CSP has seen what the lions are doing to the elk and new born calves. The quota of lions killed is not being met. I see a lion once in a while when elk and deer hunting but can't shot because of the season not being open. Where I live in the Hills I'm am unable to get around because most roads are impassable. I'm 68 years old and my walking days are limited.

One thing you need to do is open the season on Oct. 1st while a person can still get around and are in the woods hunting anyway. Lions are killing our elk our deer you have a hard time finding a bobcat and never see a pokypine and more. You can shoot a coyote any time and there still to many of them maybe you should do the same with the lions.

Thankyou

Ray

Sent from Mail for Windows 10

r

From: Sharon Cavallo
To: GFP Mountain Lion Plan
Cc: info@mountainlion.org
Subject: [EXT] Draft South Dakota Mountain Lion Management Plan
Date: Sunday, August 25, 2019 7:02:02 PM

August 24., 2019

South Dakota Game, Fish and Parks
523 E. Capitol Ave
Pierre SD 57501

Email: LionPlan@state.sd.us

RE: Draft South Dakota Mountain Lion Management Plan 2019-2029

Dear Commissioners,

I am writing to urge significant changes to the proposed lion management plan. Trophy hunting of mountain lions is not a scientific or ethical way to try to control a lion population. Trophy hunters target the largest and most dominant cougars, those with established territories, hunting prowess, and the least need to interact with humans or livestock.

Female cougars killed by hunters leave their kittens vulnerable to death from starvation, exposure, and dehydration before they are ready to hunt and survive on their own. Hunters are usually unable to distinguish the sex of a cat up a tree or to determine if a female has kittens in her care, as the young stay with the mother for up to two years learning how to survive.

Scientists tell us that cougars do not need management to keep their population numbers under control. They limit their reproduction to comply with available prey and habitat conditions. Further, mountain lion populations are at risk from loss of habitat, roadkill, poisons, traps, poaching, and predator control measures, in addition to their greatest source of mortality, trophy hunting.

Mountain lions are magnificent animals that are the top predators in their ecosystems. They should be valued for the role they play in maintaining biological diversity and a healthy environment. They help keep prey species numbers in check, reducing rodent numbers and culling sickly wildlife.

Most people admire and value mountain lions and want to protect them for future generations to enjoy and cherish. Trophy hunting is cruel, unnecessary, and scientifically unsupported as a management tool. Please stop allowing our cougars to be harassed, chased by dogs, shot out of trees, and cruelty killed for no other reason than “sport.”

Thank you for the opportunity to comment on your draft Mountain Lion Management Plan.

Sincerely yours,

Sharon P. Cavallo
2812 Stevens Drive
Auburn, CA 95602

From: Debbie Holley
To: GFP Mountain Lion Plan
Subject: [EXT] GF & P
Date: Sunday, August 25, 2019 9:47:44 PM

I live in Watertown, SD and I am ashamed of our State for allowing dogs. Several sportsmen's groups opposed dogs but this State and the GF & P rammed that one down our throats. Please No More!!!!):
John Holley
Watertown, SD

From: DKGHOO@vtext.com
To: GFP Mountain Lion Plan
Subject: [EXT] Leave the cats alone and no hunting them
Date: Thursday, August 22, 2019 1:18:53 AM

Leave the cats alone and no hunting them

From:	Sau Sang
To:	GFP Mountain Lion Plan
Subject:	[EXT] Lion hunting
Date:	Saturday, August 24, 2019 5:44:41 PM

Dear Sir,

Please end the hunt of the few hundreds of mountain lions because there are just too few in the first place . If you take out adult females, cubs will be orphans ! And if the adult males are taken out , the sub adults will only target your local livestock!

According to experts, hunting does not conserve wildlife at all. On the contrary, the taking of livestock will increased instead !

Sau

Las Vegas , Nevada

From: madam poulet
To: GFP Mountain Lion Plan
Subject: [EXT] Lion Management Plan 2019-29
Date: Sunday, August 25, 2019 9:19:40 AM

Hello,

I am writing regarding your lion management plan. It is not written with conservation in mind but rather allows for maximum trophy hunting.
Mountain lions are not the problem.

Unfortunately we are as ranchers and developers continue to move into their territory.
Mountain lions are are important to our ecosystem.

Please stop the hunting of these great animals. I look forward to your response.

Thank you,

Angela Willmes

Sent from my iPhone

From: RICHARD LINDA HORAK
To: GFP Mountain Lion Plan
Subject: [EXT] Lion Plan comments
Date: Sunday, August 04, 2019 9:56:44 AM

I have lived on the edge of Spearfish for 25 years now. In that period of time I have seen great changes in the wildlife in our neighborhood – I believe primarily due to the drastic increase in lions over that period of time. Lions are seen frequently in our neighborhood. Deer numbers have dropped substantially. Fawn survival is diminishing, thus so are the numbers of adult deer. We got rid of our dog a year ago due to fears we might lose her to a lion, as one of our neighbors has. The number of lions needs to be drastically reduced. A much longer season and the use of dogs needs to be allowed.

I have grown very tired of hearing how people outside the Black Hills, and even South Dakota, want the lions to be managed. They do not live with the impacts of lions. The trite argument that "you chose to live in their home" is not accurate. When I made the choice to live here 25 years ago there were very few lions anywhere in the Hills. The lions are the ones who now live in MY home and have made big changes to MY home.

Please take strong steps to reduce the number of lions. A much longer season and the use of dogs would be a good start. So would increasing the harvest cap – or eliminating it all together.

Thank you.

Dick Horak

Spearfish, SD

From: Margaret Southwell
To: GFP Mountain Lion Plan
Subject: [EXT] Lionplan
Date: Friday, August 16, 2019 3:21:12 AM

SDGFP should prioritize managing mountain lions for the social and ecological benefits they provide to all South Dakotans and our natural landscape, rather than manage mountain lions for maximum trophy hunting opportunity as the draft plan does.

Further killing these animals disrupts their social structure which makes for more human-lion encounters.

Hunting with dogs should be banned. It is unsportsmanlike.

Mountain lions are germane to the ecosystem.

Stop killing mountain lions.

Margaret Southwell
113 Glenwood Rd
Fanwood
NJ
07023

--
Margaret Southwell

MenageriebyM.com

Margaretsouthwellceramicrestoration.com

From: Troy Thompson
To: GFP Mountain Lion Plan
Subject: [EXT] Mountain lion hunting
Date: Monday, August 26, 2019 6:41:31 PM

I'm sending this email to voice my opinion about the hunting proposal for mountain lions. We have a responsibility to protect our mountain lions because there populations are falling every year and one day they will be gone. Trophy hunting is wrong. There is no glory in releasing dogs to chase a cat up a tree, then shooting it while it's trapped up there. Please make the right decision with matter

Thank you for your time

Sent from my iPhone

From: anne@sio.midco.net
To: GFP Mountain Lion Plan
Subject: [EXT] Mountain Lion Management Plan
Date: Monday, August 26, 2019 7:46:08 PM

Regarding updating the ML Management Plan:

Mountain lions are being over hunted by both predator-control agents and trophy hunters and it leads to increased human-animal conflicts. Mountain lions play a critical role in our South Dakota ecosystem. We need to be doing more to protect mountain lions by not giving them reason to come into our areas and having effective, non-lethal options for removing them when they do. Killing them only leaves space for more mountain lions to come into the area and is not an effective solution for preventing conflicts.

SDGFP should prioritize managing mountain lions for the social and ecological benefits they provide to all South Dakotans and our natural landscape, rather than manage mountain lions for maximum trophy hunting opportunity as the draft plan does.

SDGFP must not justify trophy hunting as an effective means to prevent conflicts with mountain lions. The draft plan allows for high levels of trophy hunting to address conflicts with livestock. However, as the plan shows, mountain lions rarely prey on livestock and demand for SDGFP response to livestock depredation from mountain lions is incredibly low.

SDGFP must no longer allow trophy hunting and intense lethal removal of mountain lions if the agency seeks to keep conflicts low, as killing mountain lions is harmful to their social structure and actually increases conflicts with humans, pets and livestock. GFP must address the potential for increased conflicts with mountain lions caused by the agency's management of the species through trophy hunting.

SDGFP must remove the arbitrary and unnecessary population objective, or cap, on mountain lions in the Black Hills currently listed as 200 to 300 cats in the draft plan.

Thank you

Anne Fuehrer
Sioux Falls, SD

From: Vickie hauge
To: GFP Mountain Lion Plan
Subject: [EXT] Mountain Lion Management Plan
Date: Monday, August 26, 2019 12:32:48 PM

I would like to comment on your upcoming management plan. I live in the Custer Peak area of the Black Hills & enjoy the diversity of animals in this area. I have lived in the middle of the hills for 12 years now & have walked the woods and have seen the mountain lion tracks in the winter. I have seen one on our property about 7 years ago & was amazed at the grandeur of the beautiful animal. I have also seen 2 since & that has been while driving the hills. I know as well as you, that the hills are not crawling with lions. They live their lives daily in secret & very seldom are they seen.

I am concerned with the numbers that have been chosen for the amount of lions in the state of South Dakota. Scientific is not what I would call the estimation of lions in the state when they are from 111 to 970. Many deer are killed on the highways as we can see all over this state & I realize that the state of South Dakota has to keep the hunters paying for the permits for the hunting of deer & elk, but killing the mountain lion population to keep the money coming into the state is horrible. As you know, the kittens & young lions need their mother to teach them how to hunt & survive & this is a long 18 month or more learning time. When the mothers are hunted as they have been for years now, the kittens & young lions are on their own to survive or die. Why would you make decisions that endangers the lions as well as the things they are going to learn on their own if they do survive. They are not learning how to hunt & what to hunt & this is going to be an endless cycle until there are no more because of the destroying of the animals who are where they are not suppose to be.

Hunting with hounds is the worst of all. When the lions are hunted by not one pack of hounds but a fresh pack of hounds if needed, until the lions are worn out & then shot by hunters who enjoy killing them for the sport, this is totally inhumane & disgusting. Money has to be put a side somehow in this state. Also as you have seen, the amount of lions each year for the past few years, have been below the amount of 60 set. Doesn't this make you wonder if you are making the correct decisions? It is telling us that you really do not have the mountain lion population a priority & realizing that they are a very important part of the Black Hills & the entire state of South Dakota's ecosystem. It shows us that whether it be to keep the governor happy & your jobs secure or you really don't have the animals best interest in mind at all, but the hunters best interest instead. Please do not make this 2019-2029 management plan a hunters delight. Our State is better than that, I hope!

Vickie Hauge

From: arnseh@rap.midco.net
To: GFP Mountain Lion Plan
Subject: [EXT] Mountain Lion Plan
Date: Wednesday, August 21, 2019 6:07:28 PM

I feel compelled to state that hunters and developers are not the only people with rights. Please place severe restrictions on the use of public lands and parks, take every precaution possible when approving the decimation of our already very limited and rapidly diminishing resources and habitat. There are people who sincerely believe it is wrong and arrogant to consume habitat and then authorize hunting because we have encroached upon the very limited habitat for wildlife. Killing, killing, and more killing ti simply sickens me. Every time a hunter kills an animal that is one less animal I, and people who share my values, can spend time observing and appreciating. Please consider everyone who lives in South Dakota, not only the wealthy and hunters. Thanks.

Harold J. Arns
Box Elder, South Dakota.

From: Julie
To: GFP Mountain Lion Plan
Subject: [EXT] Mountain Lion Plan
Date: Sunday, August 25, 2019 9:04:45 PM

As a resident of Rapid City, South Dakota, I have just attended a meeting to kill the urban deer because their numbers are too high. The hunters of South Dakota complain because they claim the deer population in the Black Hills is too low because of mountain lions. The ranchers claim the mountain lions are killing their livestock. People living in the Black Hills complain because there are mountain lion sightings in their backyards or close to schools. The hound hunters want to kill mountain lions for recreation, as do trophy hunters.

Since a mountain lion season in the Black Hills was initiated, every year there are more and more complaints. This is because you are allowing the taking of the healthiest animals who would never come into conflict with humans for trophy and hound hunters, thus creating juvenile lions with no hunting skills who will predate on anything that will sustain them. The 2nd Century Initiative has thrown out science as any basis for wildlife and the killing to preserve hunting and trapping traditions is now this department's priority.

The majority of the public abhors trophy and hound hunting, and giving the majority a voice should be a main priority of this agency. Mountain lions are self-regulating in their numbers and hunting them to sustain the population is incorrect.

This agency needs to reassess the science involved with their decision making and give these animals a place to live where they won't be hunted, and their natural live cycles and habits can be observed. You also need to consult other agencies like the Humane Society of the United States and work in conjunction with their biologists, who have lots of information that would help reduce conflicts with lions and people.

GF&P needs reassessment of what drives their decisions to kill mountain lions, like quality mountain lion recreational opportunities (page 80, Strategy 2E).

Lastly, it is never stated in your plan that these animals feel, raise families and show love and affection like all felines. This is never taken into consideration when factoring in a season. These animals have a right to exist without human interference in Custer State Park. There is absolutely no need to kill any of these animals in the park to satisfy the blood thirst of trophy or hound hunters.

I implore you to please, listen to your constituents who do not hunt, and wish to see these animals alive and in their natural habitat, not on someone's wall.

Sincerely,

Julie Anderson
845 Virginia Lane
Rapid City, SD
57701

From: Kody Keefer
To: GFP Mountain Lion Plan
Subject: [EXT] Mountain Lions
Date: Wednesday, August 21, 2019 12:00:02 AM

Hello,

My name is Kody Keefer and I am a resident of Madison,South Dakota. I feel the state of South Dakota should do what Nebraska did a few years ago and sell mountain lion permits for $15 apiece and allowing any individual to buy up to three mountain lion tags in which case placing a quota on the state population as a whole. a
Allowing only I handful of cats to be taken throughout the state and maybe even putting a stipulation that if two or more females are taken then the season closes. Personally I see absolutely no problem with managing that species by selling permits and allowing quotas. The state will make their money off of the permits being sold and still gets to limit the amount of tats taken.

From: Mark Warren
To: GFP Mountain Lion Plan
Subject: [EXT] Mt Lions
Date: Monday, July 29, 2019 9:28:39 AM

Hi,

GF&P treats SD like a ranch. Deer, pheasant, and other game animals have value. They are the product that produces income. Any animal, including Mt Lions, that reduce the population of game animals are dealt with harshly. Personally I think there should be a more holistic approach to wildlife management, and GF&P should lean more towards being advocates for the animals, than advocates for the hunters. You won't, but I wish you would reduce the hunting pressure on lions dramatically and just let nature manage itself.

Thanks, Mark

Sent from my iPhone

From: Little Elk Cabins - Kathleen Schmidt
To: GFP Mountain Lion Plan
Subject: [EXT] Mt. Lion hunting
Date: Monday, August 26, 2019 10:38:08 PM

TO WHOMEVER READS THIS:
These comments have to do with your program that kills mountain lions. There are only a few points we would like to tell you, which doesn't seem to make a difference with your final decision anyway but, nevertheless, here they are:

1. The quota should absolutely be lowered since it has not even been met in recent seasons. We have lived in the Vanocker Canyon area for nearly 42 years and have NEVER seen a mountain lion.
2. Killing females with cubs is inhumane and should be stopped. These kittens need their mother to teach them to hunt as well as other survival skills--otherwise, we are left with rogue young lions who are going into towns and have no fear of humans.
3. Custer State Park should be off limits for mountain lion hunting. It should be a sanctuary for lions, since it is close to other less populated areas in the Black Hills where they could roam freely.
4. Stop using lions as the reason the elk population seems to have decreased--do your research and realize it is not from them.
5. Take into consideration all the lions that are killed (even accidentally) for your so-called number "counts".
6. Raise the ridiculous $28 permit fee for hunters.
7. Get public input and opinions from Black Hills residents besides hunters--we should ALL HAVE A SAY IN THIS. Your panel is making far too many decisions on your own and not listening to what the general population wants. We would certainly hope that democracy is not being lost in South Dakota, with all the decisions your panel and the legislature are making on your own and behind closed doors. It is about time the citizens are allowed to have a voice!

Wolfang & Kathleen Schmidt, Nemo SD

From: Al
To: GFP Mountain Lion Plan
Subject: [EXT] Mt. Lion Management Plan
Date: Friday, August 09, 2019 2:34:23 PM

I feel we have way to high mountain lion population. The season quota has not been reached in several yea rs. I feel the population should be drastically reduced. Let the hunters use dogs!! Maintain the population at a much lower level and you may be able to increase the deer tags. These lions are coming into human populated areas. One recently killed several chickens and geese in the Brookview area of Spearfish.

Thank you,
Al Ruckdaschel

Sent from Mail for Windows 10

From: Denise Peterson
To: GFP Mountain Lion Plan
Subject: [EXT] Mt. Lion Management Plan
Date: Wednesday, August 21, 2019 4:37:41 PM

Greetings,

I am writing on behalf of the Mountain Lion Foundation. We would like to submit comments the SDGFP's draft mountain lion management plan. I see that comments are due by August 26. Can you tell me if there is a cutoff time for comment submission that day?

Thank you in advance,

Denise Peterson

GIS Analyst/ Visibility Specialist
MOUNTAIN LION FOUNDATION

M: 801.628.1211

FACEBOOK | TWITTER | INSTAGRAM
PLEASE CONSIDER DONATING TO MOUNTAIN LION CONSERVATION
WWW.MOUNTAINLION.ORG/GIVE

From:	Janine
To:	GFP Mountain Lion Plan
Subject:	[EXT] No hunting mountain lions
Date:	Sunday, August 25, 2019 1:03:52 AM

Dear Sirs,

Please, no more hunting of mountain lions.

There's just too little habitat, too much human-caused mortality, and too few mountain lions to justify a hunt. South Dakota's wildlife belongs to everyone, not only to hunters.

Thank you,
Janine Vinton
Hastings, Victoria, Australia

From:	Nancy Hilding
To:	GFP Mountain Lion Plan
Cc:	Switzer, Chad; Helen McGinnis
Subject:	[EXT] PHAS Alert on the SD Mountain Lion Management Plan Revision.
Date:	Monday, August 26, 2019 2:38:58 PM

Nancy Hilding
President
Prairie Hills Audubon Society
P.O. Box 788
Black Hawk, SD 57718
August 26th, 2019
605-7871248

Dear SD GFP Staff....Andy, Chad, John and others,
cc Helen McGinnis

Here is a copy of the PHAS latest alert on the SD Mountain Lion Management Plan Revision. This alert represents those concepts we are concerned about with respect to the Revised Plan, that we thought the average people could absorb and think about and perhaps inspire them to send you some comments of their own. Unfortunately I only got it out today (Monday). It is currently up on our web page. I send it to you before I start writing detailed and more thorough comments on the Plan Revision. You can think of this like a summary page for our concerns.

One of the missing items in the revised Plan is a discussion of Washington State's theories: that increased level of conflicts between humans/lions occur when you have overly aggressive hunting. I know that John Kanta does not believe Wielgus theories apply to the Black Hills, but you should have a section on the Washington State theories and in that section discuss why you don't believe it applies to the Black Hills or to the Prairie unit. But I will go into this stuff more in a formal letter.

The Prairie Unit contains Pine Ridge Ecosystem, which is in three states: Wyoming, Nebraska and SD. Now that you have breeding in SD portion of the Pine Ridge, you also need to discuss whether Wielgus theories apply there, as well as to the Black Hills. Oglala Sioux Tribe has a 2019 hunting harvest limit of 20 lions, with a female sub limit of 10. If that limit was actually achieved perhaps it would obliterate all lions down there, but it certainly is overly aggressive hunting. So how does Wielgus theories relate to a 20/10 lion harvest limit in the Pine Ridge, when their objective/goal as explained to me, seems to be to drive lions away from populated areas, but not to obliterate the lion population?

Link to Wielgus video:
https://www.youtube.com/watch?v=2_ZD-PAKhSo

Thanks,
Nancy Hilding

Reminder to Send Comments on the SD Mountain Lion Management Plan Revision by Monday

August 26th Deadline:

Deadline to Comment - Monday, August 26th
Draft revised SD Mountain Lion Management Plan

Draft copy of revised SD Mountain Lion Management Plan was released July 23th, with a 33 day public comment period ending August 26th.

A draft of the revised mountain lion management plan can also be found online at
https://gfp.sd.gov/management-plans/
under button titled "Plans Up for Revision".

How to Comment
Written comments on the plan can be sent to 523 E. Capitol Ave., Pierre, S.D. 57501, or emailed to LionPlan@state.sd.us. Comments must be received by Monday, August 26, 2019, and include your full name and city of residence. (No specific time of day/night on 26th is specified in the notice for deadline's time of day so we assume a midnight deadline, but I have an e-mail from Chad Switzer of GFP, saying they will accept comments that arrive "early" Tuesday morning and maybe even later comments, but only if they have time to consider any later comments). To request a printed copy of the draft plan, please call 605.773.3387. This feedback will then be shared, reviewed and considered by the planning team."
In Pierre - Andy Lindbloom | Senior Big Game Biologist &
Chad Switzer | Wildlife Program Administrator,
<Chad.Switzer@state.sd.us> , have been in charge of this

Commission Review (another and later comment opportunity)
The revision is to be presented at the Sept. 5th/6th GFP Commission meeting in Spearfish and formally adopted at either the Sept. GFP Commission meeting or at the Oct 3rd/4th GFP Commission meeting in Oacoma, at which any changes to the hunting season limits (that may be proposed - or not - in September.) would be adopted. If you miss sending comments in by 26th, you could also go comment to the Commission in person or send in writing. (Scroll down to Sept 5th Item

for commenting instructions).
Given the need to supplement the Draft with more prairie lion information, another supplemented version is needed for public review and hopefully they will decide to do that.

Guidance on Commenting on SD Mountain Lion Management Plan Revision.

The Mountain Lion Foundation has an excellent letter written, which you can access and read on their web site (scroll down for a link).
Humane Society of the United States also has an excellent letter, but you must contact Haley Stewart for a copy:
Haley Stewart <hstewart@humanesociety.org>, (240) 660-0427
PHAS is still writing ours, contact Nancy Hilding for a copy, (nhilding@rapidnet.com, 605-787-1248)..

PHAS's Commenting Guidance on Draft Revision:

The status quo allows for overly aggressive hunting of cougars both in the Black Hills and in the Prairie. We question SD GFP 2017-2018 estimates of the cougar population numbers in the Black Hills, as confidence intervals are too large (occasionally the SDGFP annual cougar population estimate, is not believable due to inadequate field data collected.) A stable mountain lion population requires about 12-16% or 12-14% “harvest” of the adult/subadult population. PHAS supports management of the Black Hills area, as a "source" population to help recolonize eastern areas with cougars. To manage the overall area as a " source" population SDGFP needs "harvest objectives" below 12% of estimated adult/subadult population. The SD GFP plans to manage for population of 200-300 lions of all ages, which seems to be a "decreasing" population or "sink" objective (compare Plan’s Figures 13 and 15). Managing the Black Hills as a "sink" is also Wyoming's objective for the Black Hills. A "sink" means the habitat will always have fewer lions than it can support and younger lions will be migrating in to fill vacant habitat. Mountain lion populations are self regulated and don’t over populate. There is proof in some states in the USA, that aggressive hunting seasons replace experienced adult lions with inexperienced, younger lions who get into conflict with humans more

and replacement males may engage in more cougar infanticide.

One of the objectives of the Plan is: " Manage mountain lion populations for both maximum and quality recreational hunting opportunities, considering all social and biological inputs." (see page xi). We believe this prioritization of hunter wishes, is unbalanced. Mountain lions have important ecological roles and USFWS shows that wildlife watching is much more popular than hunting; Total wildlife watcher 86.million vs total big game hunters: 9.2 million. (2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: National Overview -- https://wsfrprograms.fws.gov/subpages/nationalsurvey/national_survey.htm). The Plan should discuss creating a way for wildlife watchers or wildlife enthusiasts to donate to SD GFP lion management efforts, as to a certain extent GFP is funded by dollars earned from hunting/fishing licenses, which creates an imbalance in relative influence of interest groups.

Depredation by lions on livestock and pets is low in SD, yet this is used repeatedly as a justifications for recreational hunting. Plan needs to show more details on any actual depredations and differentiate for when actions or policy are driven by actual confirmed depredations vs. by landowner's fear of depredations. We object to the killing of native wildlife predators to maximize production of a prey species for a better prey "harvest" by human predators. Desire to maximize elk calf survival is the justification for hound hunting allowed in Custer State Park. In the past concerns by hunters about cougar predation of ungulates helped drive up the entire lion "harvest" limits in the Black Hills.

GFP's current goal is not to manage for having cougar populations on the prairie, they just manage for a sustainable population on the Black Hills. Thus the prairie SD has a 365 day season & unlimited "harvest". Hunting with hounds is allowed on prairie private land & also allowed starting on private land and moving onto some public lands by SDGFP. Hound hunting is much more effective than "boot hunting". There are also animal cruelty issues for both the hounds and lions, trespass issues and "fair chase" issues. Oglala Sioux Tribe and Standing Rock Sioux Tribe have lion hunting seasons. Rosebud allows for trapping by tribal members, but not cougar hunting.

We support protection of small breeding populations or breeding individuals in suitable habitat on the SD prairie. GFP's understanding of & discussion of prairie lions & prairie habitat section is woefully

inadequate (just 2 pages, starting at page 76 of 112 pages). There is evidence of 4 dead lactating females & a few kittens (dead & alive) - this breeding has been occurring Oglala, Mellette, Bennet and probably in Todd Counties and in past possibly it was at Yankton Sioux Tribe lands. The 4 mother prairie lions who were lactating or with evidence of past lactation were killed by hunters or trappers. We believe SDGFP needs to disclose more data on prairie lions & their habitat. GFP needs to discuss the conditions needed for viable cougar populations on the prairie. The inadequacy of discussion on the prairie is one of the most egregious failings of this Plan.

GFP needs to discuss the conditions needed for sustaining viable cougar populations on the prairie and have viability goals on at least some prairie subsets, but when habitat & connectivity corridors involve joint jurisdictions, consultation and cooperation with tribes should occur first. SDGFP needs more aggressive education programs about lions for prairie communities and if Native American Governments want help, grants or resources could be given to help them study their mountain lion populations and this could be discussed in the Plan Revision. Given the need to supplement the Draft with much more prairie lion information, another supplemented version is needed for public review.

Both the Black Hills and the Prairie Units need to be broken up into smaller subsets, creating an option for different management goals in different subsets. SDGFP needs the option to manage the subsets of the prairie area with good lion habitat and/or evidence of breeding differently than other prairie areas without good habitat.

We also support creating a sanctuary area as a subset in the Black Hills, in addition to the federal Parks, where lion hunting is not allowed. We support designating Custer State Park as a sanctuary area in the Black Hills. It is contiguous with Wind Cave National Park, where hunting is prohibited. A state park should be a place where people can view wildlife, not kill animals.

The current cougar hunting license fee of $28 dollars needs to be raised. Trapping/snaring of lions should remain illegal, but "incidental take" of lions in snares/traps should count against the hunting "harvest limit".

Other Alerts

Humane Society of US Alert on 2019 Revision of SD Mt Lion Management Plan:
https://www.facebook.com/HSUSSouthDakota/photos/a.789658854396114/2745759722119341/?type=3&theater

Mountain Lion Foundations Alert on 2019 Revision of SD Mt Lion Management Plan:

https://mountainlion.org/ActionAlerts/070119SDmgmtplan/070119SDmgmtplan.php?fbclid=IwAR3aiWU6MJLuKn9TQZh7ZivKJ3wwf7y887uGKAF8vffGNFvOSrOhEy3lpWI

or
http://mountainlion.org/us/sd/-sd-action.php

Mountain Lion Foundation's Comments on 2019 Revision of SD Mt Lion Management Plan:
https://mountainlion.org/ActionAlerts/070119SDMgmtPlan/2019-08-22-SD-Comment-Letter.pdf

Other References:

Wielgus's and Washington State's Research discuss how aggressive hunting (harvests above 16% of adult/subadult population) can result in more conflicts between lions and humans.
A video on the research can be found at this link:
https://www.youtube.com/watch?v=2_ZD-PAKhSo

The Humane Society of the United States has recently finalized the first of three videos on hunting of mountain lions. “Myths Behind Trophy Hunting: Mountain Lions” is now live on their mountain lion webpage and through YouTube. Here is the video description for social media
shttps://www.youtube.com/watch?v=2_ZD-PAKhSo

Cougar Fund's SD Summary (not updated for Plan Revision yet - but

they may do so eventually):
https://www.cougarfund.org/state/south-dakota/

Mountain Lion Foundation SD Summary
http://mountainlion.org/us/sd/-sd-portal.php

Other older reference resources:
A 2017 biennial report on SD mountain lions provides mountain lion data that was more recent than found in the current (2010-2015) SDGFP Mt. Lion Management Plan. This report can be found at the bottom of the mountain lion webpage at
https://gfp.sd.gov/mountain-lion/
SDGFP hosted a cougar stakeholder group on Oct 3rd, 2018 in Rapid City. Nancy Hilding went for PHAS. There is a nice powerpoint for that meeting that Nancy can e-mail you (nhilding@rapidnet.com)

At the Oct 2018 Commission meeting SDGFP staff presented an update on lion management. An audio of meeting is here
https://gfp.sd.gov/commission/archives/

Denise Petersen (staff of MLF) has mapped data from the SD GFP cougar Mortality data spreadsheets.
MAP LINK - 22 YEARS OF SD COUGAR MORTALITY DATA, sorted by year of death, Click on the dot to learn about dead lion, it's age, sex and cause of death. Thanks to Denise Petersen of MLF for creating this map & thanks to SDGFP for sharing their records..
http://bit.ly/SDlionmap
==========

==========
Nancy Hilding
6300 West Elm, Black Hawk, SD 57718
or
Prairie Hills Audubon Society
P.O. Box 788, Black Hawk, SD 57718
nhilshat@rapidnet.com
605-787-6779, does not have voice mail
605-787-6466, has voice mail

605-877-2620, cell (currently lost)
http://www.phas-wsd.org
https://www.facebook.com/phas.wsd/
Skype phone -605-787-1248, nancy.hilding

From: M D
To: GFP Mountain Lion Plan
Subject: [EXT] Please maintain maintain populations logically
Date: Saturday, August 24, 2019 6:50:27 PM

You may be getting a lot of emails about needing to "save" and "protect" all the mountain lions.

I am imploring you to use science and logic to make your decisions, not emotion and lies.

Those clamoring to "save them all" have never seen a horse or cow in excruciating pain with shredded skin from mountain lion claws from a survived attack.

Those crying to "have a heart" have never lost a livestock guardian dog or family pet to a mountain lion attack.

Those who say to "be gentle" have never talked to a farmer or rancher who's family has survived a mountain lion encounter out on the prairie.

We can and we must co-exist with wildlife, including mountain lions, but not at the risk of human life by allowing populations to get out of hand.

Please, be responsible and logical and know that many of the emails that claim we need to "save them all" are also not South Dakota residents, let alone in rural areas.

V/r
Melissa Dassinger,
Rapid City SD
Mead County

Sent from my iPhone

From:	Dan Gingert
To:	GFP Mountain Lion Plan
Subject:	[EXT] Please stop the mountain lion killing
Date:	Monday, August 26, 2019 3:36:36 PM

We are not sure how many are alive in the state. Please do not let any more be killed and risk a serious danger to their existence.

Thank you,
Dan Gingert
646-932-9391

From: Cameron Mellin
To: GFP Mountain Lion Plan
Subject: [EXT] Protecting our predators
Date: Monday, August 26, 2019 9:04:37 PM

To the Game & Fish Department of South Dakota,

I implore you as a conservationist, veterinary student, and citizen to not pass this puma management strategy. As the office states, there are somewhere between 111-970 lions in SD- this is simply too vague an estimate to make conservation decisions based on. If the puma population is on the lower side of the estimate, Allowing 50-60 permits promotes significant genetic bottlenecking within the remaining population, casting further doubt on the future of this beautiful carnivore.

The state of SD cannot allow game hunters to drive predator management, rather our decisions must be motivated by what is best for the ecosystems & biodiversity of South Dakota. Mountain lions are ecosystem engineers- that is their presence and actions helps to fuel the survival of other species. Without predators ecosystems crumble, just look at the eastern US, and how overrrun it has become with white tail deer, spreading disease, and decimating plant and songbird diversity in turn. Please don’t bend to the wishes of the vocal “sportsman”. for a hunt this misguided and lacking iron clad data to support it, is not in any manner sporting.

Thank you for your time.

From: PAUL and JANE BERRY
To: GFP Mountain Lion Plan
Subject: [EXT] Suggestions for Lion hunting management
Date: Sunday, July 28, 2019 9:12:53 AM

I have been fortunate enough to hunt and harvest 4 lions. I did not use dogs. I invest probably 30 to 40 sessions of hunting to accomplish one successful harvest. I thoroughly enjoy it, even when I am not successful, and feel hunting without a dog is a challenge and is what I would define “hunting”. It took me 6 years to harvest my first lion, and since that time I have been real successful. People who complain about how diffficult it is to get a lion, for the most part, are not willing to do the work for it. They want it to be easy. Please do not allow dogs in the Black Hills. That will turn it in to commercial hunting like the pheasant season is today. I used to enjoy hunting pheasant but now dont even get an opportunity to hunt for birds like I used to. I cant rationalize spending $150 per day, which is the average cost, to harvest on commercial ground for pheasant. Public land is often crowded, and unpleasant to hunt. Money should not be the driving force when we are talking about our beautiful animals who populate our area. Hunting with dogs is not hunting, and is inhumane. It is downright killing. I would be happy to share my view at a venue near me, however I am travelling now and wont be home for the 15th. Please read my letter at the meeting. Very sincerely, Paul Berry

Sent from my iPad

Commission, South Dakota Game, Fish and Parks

Subject: Mountain Lion Plan

Commissioners:

I am writing to express my opposition to the current mountain lion hunting program in South Dakota.

- The data that the program is based on seems faulty at best. The estimate for the total number of lions in the Black Hills is between 100 and 900 and from this data a happy medium is selected and a quota set. This is statistical garbage. Basically this says we have no clue as to the Black Hills Lion population. No company, person or organization would make a decision based on this kind of data and GF&P should not either.

- The season starts far too soon. It does not give the kittens time to mature sufficiently should their mother be killed. In South Dakota, it is illegal to kill a female with kittens. But what hunter ramped up on adrenalin and looking at a lion through his scope is going to hold off and scan the area for kittens and possibly miss a kill. Very few, if any. This means we are leaving a lot of orphaned kittens out there.

- Hound hunting is an embarrassment to the state and the whole sport of hunting. In no way can this be called sporting or hunting. The dogs tree a cat and the hunters shoot the cat out of the tree. I watched a video showing the killing of a cat in Custer Park. The dogs had the cat in a tree and with a tremendous amount of screaming and yelling the "hunters" blasted it out of the tree. Quite a feat. Very similar to a shooting gallery at the fair.

We live in the Black Hills, near Custer Peak and we have seen 1 lion in 35 years of living here. This kind of frequency would suggest that 100 lions might be the number rather than 500 or 900. It was a thrill to see this one cat. When we have company, everyone is interested in seeing a lion, but they don't and we don't. I believe the general population would like to live in harmony with the lions, not see them killed off.

What would I like to see?

- Do away with the sport entirely, except for problem cats. Then hunt those cats only with authorization and a permit from GF&P

In lieu of that:

- Suspend the season for several years until the lion population is quantified and a reasonable plan can be developed.
- Limit the season to February and March
- Eliminate the year round season on the prairie.
- Abolish hound hunting in the entire state.

In closing, I would like to thank the Commission and GF&P for the job they do. Everyone I have met in both groups are dedicated professionals trying to do the best job they can under very difficult circumstances and considerable political pressure.

Yours truly,

John Hauge
11898 Holso Rd.
Deadwood, SD 57732

I cannot close without a parting shot. Our esteemed governor has taken it upon herself to spend over $1M of scarce GF&P funds to fund an ill conceived predator reduction plan that has virtually no support from the hunting and wildlife community and has a history of failure when tried previously. Management at its worst. She is a huge disappointment. May she never have a second term.

MOUNTAIN LION FOUNDATION

Saving America's Lion

30 YEARS OF Saving America's Lion 1986 ~ 2016

Post Office Box 1896
Sacramento CA 95812
www.mountainlion.org
info@mountainlion.org
(916) 442-2666

August 22, 2019

Gary Jensen, Commission Chair
South Dakota Game, Fish and Parks
523 East Capitol Avenue
Pierre SD 57501

Tony Leif, Wildlife Division Director
South Dakota Game, Fish and Parks
523 East Capitol Avenue
Pierre SD 57501

Email: LionPlan@state.sd.us

RE: Draft South Dakota Mountain Lion Management Plan 2019-2029

Dear Chairman Jensen, Members of the Wildlife Board, and Director Leif,

The Mountain Lion Foundation respectfully requests that you make substantial changes to the South Dakota 2019-2029 Mountain Lion Management Plan that is currently in draft. While we appreciate the efforts of South Dakota Game, Fish and Parks (SDGFP) to update the management plan for mountain lions, we want to be certain that valid and reliable science is guiding the plan.

The concerns expressed below are the official position of the Mountain Lion Foundation as we represent our 7000 supporters nationwide.

The draft plan is based on invalid assumptions that mountain lion populations in South Dakota require human intervention in order to control lion expansion and mitigate conflict.

Except in rare instance, mountain lion populations do not require management to control growth, because their populations are self-regulating based on the abundance of prey and the carrying capacity of the land to support prey populations.

Mountain lions occur at low densities relative to their primary prey (Stoner et al. 2006). In order to survive, mountain lions must increase or decrease the sizes of their territories relative to prey populations (Wallach et al. 2015). Lions kill other lions to defend territorial boundaries, or starve without a territory sufficient to meet their needs.

In other words, when prey populations decline, so do mountain lion populations. Because of these predator-prey dynamics, mountain lion populations do not need to be managed by humans.

And recreational hunting is the wrong tool for addressing conflicts, because hunting targets the wrong lions.

Trophy hunting targets large adult lions with established territories and habits. Those lions are not only the least likely to come into repeated conflicts with humans, but their stable presence reduces the number of young dispersing lions most likely to enter human-occupied areas and to attack domestic animals.

Recent science has demonstrated that because hunting results in a younger overall age structure, hunting pressure can predictably increase the number of conflicts with humans and domestic animals (Creel and Rotella 2010, Ausband et al. 2015, Darimont et al. 2015, Cooley et al. 2009).

A study in Washington State showed that, as wildlife officials increased quotas and lengthened hunting seasons, mountain lion complaints increased rather than decreased. The heavy hunting pressure resulted in a higher ratio of younger males in the population as a result of immigration and emigration (Tiechman et al. 2016). Contrary to popular belief, hunting mountain lions results in an increase in complaints and livestock depredation due to disruption of their social structure, and increased immigration of young dispersing lions (Tiechman et al. 2016, Peeble et al. 2013).

Conflicts with mountain lions are exceedingly rare, and coexistence is possible.

Throughout the West, people have learned to live alongside lion populations with little conflict. The same could be true in South Dakota if the state were to make a more concerted effort to bring valid biological and behavioral information about mountain lions to the attention of the public. With such additional understanding, the public will recognize that conflicts with mountain lions are exceedingly rare, easily resolved, and that the value of mountain lions is significant.

When conflict does occur, intervention can occur at the level of a specific lion, rather than at the population level, for more cost-effective and biologically sustainable conflict resolution. It makes much more sense to assess what might be done to limit the behavior of particular lions when and where a conflict happens, rather than to try to control entire populations in the vain hope that the unwanted behaviors of specific lions will be limited.

When one looks beyond simple counts of mountain lions, it becomes clear that a scientific assessment of the stability of subpopulations, age and sex ratios, and health and stability of breeding populations is essential. A rise in numbers alone might be indicative that stable breeding populations have been disrupted and replaced by unsustainable numbers of young dispersing lions fighting over territory and likely to create conflicts. Counterintuitively, if hunting were to cease, social structures and population size might stabilize and conflicts become less common.

Recreational hunting of mountain lions results in additive and unsustainable mortality and a high risk of potential extirpation for the mountain lions of South Dakota.

Even though it is an ineffective tool, trophy hunting is unfortunately the greatest source of mortality for mountain lions throughout the majority of their range in the United States (WildFutures 2005). Hunting mountain lions results in additive mortality – rates that far exceed what would happen in nature – and can lead to population instability and decline (Vucetich et al. 2005, Eberhardt et al. 2007, Darimont et al. 2015).

In order to sustain viable populations of mountain lions, prevent human-wildlife conflict, and avoid compromising the long-term viability by failing to account for all human-caused sources of mortality, hunting of adult lion populations should not exceed the intrinsic growth rate of the population of interest (Beausoleil et al. 2013).

The intrinsic growth rate for mountain lion populations is established by researchers to be between 15-17% (Robinson and DeSimone 2011). Assuring that human-caused mortality is limited to well below this threshold facilitates the maintenance of home ranges and social stability, reducing the likelihood of increased conflict with humans and population decline (Maletzke et al. 2014).

Additionally, trophy hunting of mountain lions leads to an increase in kitten mortality in heavily hunted populations (Stoner et al. 2006, Wielgus et al. 2013). Killing an adult female with kittens results in the death of her dependent young by dehydration, malnutrition, predation and exposure;

even those who are at least six months to a year old (Stoner et al. 2006). This impacts a population's ability to recruit new members if too many adult females are removed, making the population less resilient to hunting and other causes of mortality, both human-caused and natural (Anderson and Lindzey 2005).

The previous quota far exceeds the sustainable threshold of 12-14% for **total** anthropogenic (human-caused) loss within a population that is widely accepted by western state agencies and the majority of mountain lion researchers (Beausoleil et al. 2013). In terms of this threshold, the word sustainable means that should anthropogenic mortality exceed the threshold over time, populations will decrease, and eventually extirpation will occur. As this management plan will remain in effect for a decade, and because lion populations in South Dakota are so low, any error in determining the likely percentage of anthropogenic mortality has potentially dire consequences.

SDGFP currently estimates that there are anywhere from 111 to 970 mountain lions. Managing lions through the use of trophy hunting with a population that is potentially as small as 111 individuals is gambling with the future of lions in South Dakota. If the actual mountain lion population falls along the lower end of the confidence interval, then the previous quotas of 60 hunting permits would represent a 54% loss to the population, exceeding the 12-14% threshold set by experts by more than 40%.

Although suitable habitat exists for mountain lions in the prairies of South Dakota, the hunting of mountain lions outside of the Black Hills is unlimited in quota and season length. The quota setting has failed to consider that uncontrolled killing outside of the hunting zones can increase lion mortality substantially.

The agency has also failed to consider other forms of anthropogenic mortality, including vehicle strikes, incidental snaring or trapping, poisoning, poaching, and public safety removal which all must be included in order to effectively stay below the extirpation threshold.

Using hounds to pursue mountain lions is unethical and is not considered to be fair chase.

Hounding is an inhumane and outdated sport that has been banned in two-thirds of the United States. Hounding poses significant risk to the hounds as well as to young wildlife, including dependent kittens and cubs, who may be attacked and killed by hounds (Lindzey et al. 1992, Logan and Sweanor 2001, Elbroch et al. 2013). Hounds also disturb or kill non-target wildlife and trespass onto private lands (Hristienko and McDonald 2007). This practice is not fair chase and is highly controversial, even among hunters (Posewitz 1994, Teel et al. 2002, WildFutures 2005).

Fair chase hunting is based upon the premise of giving the animal an equal opportunity to escape from the hunter (Posewitz 1994). Using hounds, especially those equipped with GPS collars, provides an unfair advantage to hunters.

Many proponents of hound hunting claim that hunters can be more selective using this technique. Since hunters can get so close to a treed animal, hound hunting advocates assert that hunters can determine the sex, size, and general age of an animal before determining whether or not they are permitted to harvest that individual. Knowing the sex and other demographic status of the individual being hunted could be helpful in maintaining a viable population. However, a review of 30 years of records from game managers throughout the western United States found that, although technically feasible, most hunters could not tell the size and sex of an animal up a tree. Hunters had roughly 50% accuracy when determining sex; the same as if they had determined the sex with a coin toss.

We recognize that there is pressure to reduce mountain lion populations in order to satisfy deer hunters that they will not be competing with mountain lions for deer, and note that reduction

of mountain lion populations will not increase ungulate populations unless lion populations are decreased unsustainably.

Hunting mountain lions has long been thought to bolster populations of game species like mule deer, while reducing competition for this shared resource.

On the East Coast of the United States, it has become clear that when mountain lions are extirpated entirely, deer populations do increase. However, it is not true that simply decreasing the number of mountain lions relative to deer populations will cause deer populations to increase or remain healthy over the long term. Mountain lions and deer have co-evolved to create a natural balance. Suitable available habitat will continue to determine deer numbers (even given limited long-term impacts from mountain lions), and lion numbers will fluctuate in response, unless mountain lions are nearly extirpated.

In other words, an agency cannot adjust prey numbers by reducing predators without risking extirpation of the predator population.

A recent study evaluated the impacts that heavy hunting of mountain lion has on mule deer and elk. The study found that heavy hunting pressure on these apex predators had the opposite effect on mule deer (Elbroch and Quigley 2019). As trophy hunters often target the large, dominant male, they inadvertently reduce the age structure of mountain lions in the area, leaving younger, less experienced lions on the landscape. According to the study, these younger predators typically selected for mule deer instead of larger prey species like elk. As a result, the researchers noted that, despite increased survival of fawns and females, the removal of mountain lions did not yield a growth in the mule deer population. Instead, they suggested that hunting may actually be increasing the number of mountain lions that specialize in targeting deer.

Killing mountain lion kittens dependent upon nursing mothers is not acceptable to most South Dakotans. However, current hunting rules make orphaning very common.

While it is not permitted in South Dakota to kill any females accompanied by spotted kittens, dependent young may not always be in the presence of their mother, and spotted kittens have been taken by hunters in the state. Without kittens in her presence, a hunter may not be aware that a female has offspring and may kill her. As mountain lions offspring are dependent on their mothers for survival up to around 18 months of age, the loss of their mother prior to reaching adulthood would likely result in the death of her young, even if they are around a year old.

A recent study has shown that delaying the start of hunting seasons until December 1 would protect about 91 percent of kittens from perishing as a result of being orphaned by hunters (O'Malley et al. 2018). By better aligning any hunting seasons with denning periods, hunters will have the best opportunity to identify females with kittens. This, ultimately, will benefit both mountain lions and hunters that want to ensure that their populations remain healthy into the future.

While we appreciate that the Department took this date into account for the hunting of mountain lions in the Black Hills Unit, this is not the case in other areas of the state. Landowners on their own land do not count toward the quota outside of the season dates for the Black Hills Hunting Unit.

Based on the information above, the Mountain Lion Foundation respectfully requests that:

- **The Department provide a comprehensive annual assessment of anthropogenic mortality in South Dakota, readily available to the public in a timely manner and well in advance of proposed changes to lion policy.**

There is substantial and generally unavoidable human-caused mortality of mountain lions due to vehicle strike, incidental snaring or trapping, poaching, hunting on tribal lands, conflicts with domestic animals, public safety removal and other causes which have not been quantified in the draft plan. Because these numbers contribute the threshold for sustaining a mountain lion population without risk of extirpation, the Department and Commission should err on the side of caution to maintain the small breeding population of lions in South Dakota.

This will require that the Department assess anthropogenic mortality more effectively, and make these numbers available for public scrutiny on a timely annual basis.

- **South Dakota suspend mountain lion hunting entirely, given the relatively small amount of available habitat in the state, high anthropogenic mortality, and the value of mountain lions to South Dakotans and to recolonization of eastern states.**
- **Restrict killing of mountain lions in all parts of the state to department issued permits or actions targeting individual lions in specific situations where it will demonstrably and effectively resolve a serious conflict.**
- **Hold multi-state discussions with other neighboring state agencies so that lions may recover in their historic ranges.**
- **If suspension of hunting is rejected, we ask that at a bare minimum the Department and Commission reconsider quotas annually and reduce quotas to below the 12% sustainable limit, less the full tally of annual anthropogenic mortality described above.**
- **Delay the start of all mountain lion hunting seasons in *all* areas until December 1 to protect dependent kittens from being orphaned by hunters, and that killing of mountain lions throughout the remainder of the state be similarly restricted to reduce orphaning.**
- **Eliminate the use of hounds to pursue mountain lions as a socially disruptive, inhumane and unethical practice.**
- **If the Commission decides to continue to allow the use of dogs then, at the very least, GPS collars should be prohibited as the practice does not align with fair chase values.**

Thank you for your consideration. Please make this comment letter a part of the official record regarding this decision.

Respectfully,

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Klandagi: Puma Rewilding Facebook

August 26, 2019

Comments on 2019-2029 Draft South Dakota Mountain Lion Management Plan

I have been interested in mountain lions since 1972, when a friend lent me his copy of the new book, THE EASTERN PANTHER: A QUESTION OF SURVIVAL by Bruce Wright. Wright led me to believe cougars somehow had survived in the East. But by 2005, I had concluded they had not, but should be restored. I learned mountain lions were turning up in the Midwest from time to time, and that they were coming mainly from the Black Hills. My goal is the restoration of cougar population to eastern North American outside of southern Florida. The benefits of restoration would include restoring ecological balance to eastern forests and adding a sense of "wildness" to them. Further, it would be a big step toward righting a moral wrong, when our European forebearers extirpated them and other species of large mammals.

Since an article was published in the National Geographic in 2012, it has become "common knowledge" that cougars are in the process of recolonizing the Midwest, and from there, the East. Confirmation maps in the Geographic article depict each confirmation as a dot, going back to the first, in Minnesota in 1990. More dots are added for each confirmation. The main source of the cougars is still assumed to be the Black Hills, although lions with similar genetics are also found in the mountains of eastern Wyoming and NW Nebraska. The lions in Nebraska and some of the individuals in a small population in the Badlands of SW North Dakota came from the Black Hills.

The SD GFP decided to reduce the lion population of the Black Hills beginning in the 2011-2012 hunting season. Since then, the GFP and the wildlife agencies of Nebraska and North Dakota have adopted similar strategies for managing their recolonized populations: set harvest limits that will prevent them from growing or reduce their numbers. Outside of these "islands" of good habitat, cougars may be killed at any time in South Dakota,during the long lion hunting seasons in the ND Badlands, or when they are threaten people are prey on pets and livestock in Nebraska.

A 2015 study of the potential for cougars to recolonize Minnesota and Wisconsin concluded it was unlikely because of the lack of "stepping stones," patches of suitable habitat in which a female or two and male inhabit and might breed. Some of their kittens would continue east. Actually, stepping stones do exist, but have been designated as unsuitable habitat by the state wildlife agencies in South Dakota and North Dakota. Apparently "unsuitable habitat" means socially unsuitable for humans and those including areas of private land.
https://www.duluthnewstribune.com/news/3883415-study-cougars-unlikely-settle-minnesota-wisconsin

The proposed section on lion management in the Black Hills in the GFP draft management plan is an improvement on the last version. I would like the GFP to reduce the harvest limit in the Black Hills to allow the population to increase so that dispersers, including females, can recolonize smaller areas of suitable habitat in South Dakota and ultimately, states and Canadian provinces in the East and Midwest.

The GFP is the Number One source of information on South Dakota wildlife, at least for those that are hunted. I have been the principal admin of the Klandagi: Puma Rewilding Facebook since January 2016. Most of the people who comment on this Facebook love cougars, but not all of them. I have become aware of two major misconceptions about lions: (1) many cougar lovers believe that cougar hunting, as managed by state wildlife agencies, threatens lions with extinction, and (2) many hunters believe cougar numbers must be controlled. As for controlling, it's not clear to me if these hunters think cougars will eliminate deer and elk or if they think that God created game solely for them, or somewhere in between. The GFP is in the position to address both these misconceptions.

The sections on cougar impact on deer and elk is vague on the subject of whether or not they reduce these populations. It's my understanding that weather is much more important than predation in determining ungulate numbers. The fact that the GFP has used helicopters to herd elk from Wind Cave National Park, where cougars occur but aren't hunted, into Custer State Park where they can be hunted, indicates they aren't having a significant effect on elk in the National Park.

It is inappropriate for Custer State Park to be managed for hunting. Why not give visitors chance to see the wildlife and the GFP the opportunity to educate them?

Missing from the document: How many domestic animals were killed by lions in the Black Hills and on the Prairie? How many cattle and how many calves? Be specific.

Is disease a problem? Apparently not, although some might like to think so to justify recreational hunting or even extirpation of lions in South Dakota. The possibility that lions help control the spread of Chronic Wasting Disease needs to be further explored. A study published in 2008 determined that lions preferentially prey on prion-infected deer.
https://doi.org/10.1371/journal.pone.0004019

The GFP is focused on meeting the desires of hunters, who support them with their license fees and excise taxes, and ranchers, who might suffer significant financial loss if lions prey on their livestock. It's my understanding that most of the GFP's revenue comes from hunting licenses & excise taxes. The GFP should investigate methods of engaging non-hunters and deriving revenue from them. Such actions should include giving non-consumptive users a voice in wildlife management.

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Mountain Lion Attack: Page 71 of the draft plan: No mountain lion attacks on humans have been verified in South Dakota. I have been keeping track of mountain lion attacks since January

2000 - http://tchester.org/sgm/lists/lion_attacks_mcginnis.html I have learned of two unconfirmed attacks:

Late April, 2006 at Ramona in SE part of state. Cougar swiped at 16-year-old Kurt Clark and tore his shirt. Scats collected at the site were identified as cougar by the SD Department of Game, Fish and Parks based on size and the presence of cougar hairs on the outside of one of the scats. *Source: http://bigcatrescue.blogspot.com/2006/04/teen-says-lion-attacked-him.html*

March 1, 2008 at Sheridan Lake in the Black Hills, Sheridan Lake. Ryan Hughes, 33, was ice-fishing on the lake. He went on shore and stepped into the woods. There he encountered a cougar with a fresh kill in its mouth. He said that the cougar jumped on him and knocked him backwards. He tried to get his hands in front of his face and kicked with his legs. The cougar left, leaving Hughes with scratches and puncture wounds on his face and hand. The GFP brought in a pack of trained hounds. The dogs could not locate cougar scent. Hair on Hughes' shirt was not cougar. Hughes had drunk four cans of beer prior to the event. The GFP considers the incident "probable but unconfirmed." https://rapidcityjournal.com/news/local/top-stories/man-defends-account-of-lion-attack/article_fc96a1f3-277b-512f-848f-9b28e5b1744b.html

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Number of lions in the Black Hills: Fig. 15 on Page 30 of the draft is misleading. It shows a significant increase in the estimated population in 2017-2018 even though the hunter harvest of lions continued to decline during that season and continues to decline, to only 21 in the 2018-2019 season, which is not included in the report. I presume the uptick in the estimated population is a result of using biopsy darting that than recapturing collared cougars as a basis for the estimate. Elsewhere, the draft report says that the number of man hours required to harvest a lion has remained constant. Does this mean that fewer people are hunting lions?

PROPOSED MANAGEMENT OF LIONS IN PAIRIE HABITAT OUTSIDE THE BLACK HILLS: The current hunting season structure does not "maximize hunter opportunity." The way to accomplish that goal is to temporarily protect lions outside the Black Hills so that breeding populations can be established. I support the suggestions of Nancy Hilding/the Prairie Hills Audubon Society that refuges in lion habitat outside the Black Hills should be established.

The fringe of the Black Hills outside I-90 and State Highway 79 is currently a "ring of death" for lions attempting to disperse from the Hills. Areas immediately outside these highways that are within the Black Hills ecosystem should be managed as part of the Black Hills, not open to year-round hunting.

Other "islands" of potential cougar habitat may include the units of the Sioux Ranger District of the Custer National Forest, the extension of Nebraska's Pine Ridge into South Dakota (in the Pine Ridge Indian Reservation) and in Gregory and Charles Mix counties along the Missouri River. Dispersal corridors along riparian corridors should also be protected.

Lions in Indian Reservations: Mountain lions are now breeding in the extension of the Pine Ridge from Nebraska into the Pine Ridge Reservation. The yearly harvest limit on the reservation is 20 lions. It's dubious that 20 lions exist there, so this is an extirpation decision whether not this is the actual objective. Game Fish & Parks needs to work with the tribes to allay their fear of attacks.

Page 78: The GOALS, OBJECTIVES & STRATEGIES lists are excellent. GFP needs to do more to inform people that lions add to the quality of life and play important roles in ecosystems—that these roles are more important than serving as trophies for hunters

Page 79-80: The Objective and Strategies section needs to include efforts to outreach to non-hunters and non-ranchers. Methods need to be developed for these large segments of the public to support GFP financially, while simultaneously giving them the opportunity to have a voice in decision making.

From:	australian animal care
To:	GFP Mountain Lion Plan
Subject:	RE: [EXT] Draft South Dakota Mountain Lion Management Plan 2019-2029 Dear Chairman Jensen, Members of the Wildlife Board, and Director Leif, The Mountain Lion Foundation respectfully requests that you make substantial changes to the South Dakota 2019-2...
Date:	Saturday, August 24, 2019 6:44:23 PM

While we appreciate the efforts of South Dakota Game, Fish and Parks (SDGFP) to update the management plan for mountain lions, we want to be certain that valid and reliable science is guiding the plan. The concerns expressed below are the official position of the Mountain Lion Foundation as we represent our 7000 supporters nationwide. The draft plan is based on invalid assumptions that mountain lion populations in South Dakota require human intervention in order to control lion expansion and mitigate conflict. Except in rare instance, mountain lion populations do not require management to control growth, because their populations are self-regulating based on the abundance of prey and the carrying capacity of the land to support prey populations. Mountain lions occur at low densities relative to their primary prey (Stoner et al. 2006). In order to survive, mountain lions must increase or decrease the sizes of their territories relative to prey populations (Wallach et al. 2015). Lions kill other lions to defend territorial boundaries, or starve without a territory sufficient to meet their needs. In other words, when prey populations decline, so do mountain lion populations. Because of these predator-prey dynamics, mountain lion populations do not need to be managed by humans. And recreational hunting is the wrong tool for addressing conflicts, because hunting targets the wrong lions. Trophy hunting targets large adult lions with established territories and habits. Those lions are not only the least likely to come into repeated conflicts with humans, but their stable presence reduces the number of young dispersing lions most likely to enter human-occupied areas and to attack domestic animals.

Recent science has demonstrated that because hunting results in a younger overall age structure, hunting pressure can predictably increase the number of conflicts with humans and domestic animals (Creel and Rotella 2010, Ausband et al. 2015, Darimont et al. 2015, Cooley et al. 2009). A study in Washington State showed that, as wildlife officials increased quotas and lengthened hunting seasons, mountain lion complaints increased rather than decreased. The heavy hunting pressure resulted in a higher ratio of younger males in the population as a result of immigration and emigration (Tiechman et al. 2016). Contrary to popular belief, hunting mountain lions results in an increase in complaints and livestock depredation due to disruption of their social structure, and increased immigration of young dispersing lions (Tiechman et al. 2016, Peeble et al. 2013). Conflicts with mountain lions are exceedingly rare, and coexistence is possible. Throughout the West, people have learned to live alongside lion populations with little conflict. The same could be true in South Dakota if the state were to make a more concerted effort to bring valid biological and behavioral information about mountain lions to the attention of the public. With such additional understanding, the public will recognize that conflicts with mountain lions are exceedingly rare, easily resolved, and that the value of mountain lions is significant. When conflict does occur, intervention can occur at the level of a specific lion, rather than at the population level, for more cost-effective and biologically sustainable conflict resolution. It makes much more sense to assess what might be done to limit the behavior of particular lions when and where a conflict happens, rather than to try to control entire populations in the vain hope that the unwanted behaviors of specific lions will be limited. When one looks beyond simple counts of mountain lions, it becomes clear that a scientific

assessment of the stability of subpopulations, age and sex ratios, and health and stability of breeding populations is essential. A rise in numbers alone might be indicative that stable breeding populations have been disrupted and replaced by unsustainable numbers of young dispersing lions fighting over territory and likely to create conflicts. Counterintuitively, if hunting were to cease, social structures and population size might stabilize and conflicts become less common. Recreational hunting of mountain lions results in additive and unsustainable mortality and a high risk of potential extirpation for the mountain lions of South Dakota. Even though it is an ineffective tool, trophy hunting is unfortunately the greatest source of mortality for mountain lions throughout the majority of their range in the United States (WildFutures 2005). Hunting mountain lions results in additive mortality – rates that far exceed what would happen in nature – and can lead to population instability and decline (Vucetich et al. 2005, Eberhardt et al. 2007, Darimont et al. 2015). In order to sustain viable populations of mountain lions, prevent human-wildlife conflict, and avoid compromising the long-term viability by failing to account for all human-caused sources of mortality, hunting of adult lion populations should not exceed the intrinsic growth rate of the population of interest (Beausoleil et al. 2013). The intrinsic growth rate for mountain lion populations is established by researchers to be between 15-17% (Robinson and DeSimone 2011). Assuring that human-caused mortality is limited to well below this threshold facilitates the maintenance of home ranges and social stability, reducing the likelihood of increased conflict with humans and population decline (Maletzke et al. 2014). Additionally, trophy hunting of mountain lions leads to an increase in kitten mortality in heavily hunted populations (Stoner et al. 2006, Wielgus et al. 2013). Killing an adult female with kittens results in the death of her dependent young by dehydration, malnutrition, predation and exposure;

even those who are at least six months to a year old (Stoner et al. 2006). This impacts a population's ability to recruit new members if too many adult females are removed, making the population less resilient to hunting and other causes of mortality, both human-caused and natural (Anderson and Lindzey 2005). The previous quota far exceeds the sustainable threshold of 12-14% for total anthropogenic (human-caused) loss within a population that is widely accepted by western state agencies and the majority of mountain lion researchers (Beausoleil et al. 2013). In terms of this threshold, the word sustainable means that should anthropogenic mortality exceed the threshold over time, populations will decrease, and eventually extirpation will occur. As this management plan will remain in effect for a decade, and because lion populations in South Dakota are so low, any error in determining the likely percentage of anthropogenic mortality has potentially dire consequences. SDGFP currently estimates that there are anywhere from 111 to 970 mountain lions. Managing lions through the use of trophy hunting with a population that is potentially as small as 111 individuals is gambling with the future of lions in South Dakota. If the actual mountain lion population falls along the lower end of the confidence interval, then the previous quotas of 60 hunting permits would represent a 54% loss to the population, exceeding the 12-14% threshold set by experts by more than 40%. Although suitable habitat exists for mountain lions in the prairies of South Dakota, the hunting of mountain lions outside of the Black Hills is unlimited in quota and season length. The quota setting has failed to consider that uncontrolled killing outside of the hunting zones can increase lion mortality substantially. The agency has also failed to consider other forms of anthropogenic mortality, including vehicle strikes, incidental snaring or trapping, poisoning, poaching, and public safety removal which all must be included in order to effectively stay below the extirpation threshold. Using hounds to pursue mountain lions is unethical and is not considered to be fair chase.

Hounding is an inhumane and outdated sport that has been banned in two-thirds of the United States. Hounding poses significant risk to the hounds as well as to young wildlife, including dependent kittens and cubs, who may be attacked and killed by hounds (Lindzey et al. 1992, Logan and Sweanor 2001, Elbroch et al. 2013). Hounds also disturb or kill non-target wildlife and trespass onto private lands (Hristienko and McDonald 2007). This practice is not fair chase and is highly controversial, even among hunters (Posewitz 1994, Teel et al. 2002, WildFutures 2005). Fair chase hunting is based upon the premise of giving the animal an equal opportunity to escape from the hunter (Posewitz 1994). Using hounds, especially those equipped with GPS collars, provides an unfair advantage to hunters. Many proponents of hound hunting claim that hunters can be more selective using this technique. Since hunters can get so close to a treed animal, hound hunting advocates assert that hunters can determine the sex, size, and general age of an animal before determining whether or not they are permitted to harvest that individual. Knowing the sex and other demographic status of the individual being hunted could be helpful in maintaining a viable population. However, a review of 30 years of records from game managers throughout the western United States found that, although technically feasible, most hunters could not tell the size and sex of an animal up a tree. Hunters had roughly 50% accuracy when determining sex; the same as if they had determined the sex with a coin toss. We recognize that there is pressure to reduce mountain lion populations in order to satisfy deer hunters that they will not be competing with mountain lions for deer, and note that reduction

of mountain lion populations will not increase ungulate populations unless lion populations are decreased unsustainably. Hunting mountain lions has long been thought to bolster populations of game species like mule deer, while reducing competition for this shared resource. On the East Coast of the United States, it has become clear that when mountain lions are extirpated entirely, deer populations do increase. However, it is not true that simply decreasing the number of mountain lions relative to deer populations will cause deer populations to increase or remain healthy over the long term. Mountain lions and deer have co-evolved to create a natural balance. Suitable available habitat will continue to determine deer numbers (even given limited long-term impacts from mountain lions), and lion numbers will fluctuate in response, unless mountain lions are nearly extirpated. In other words, an agency cannot adjust prey numbers by reducing predators without risking extirpation of the predator population. A recent study evaluated the impacts that heavy hunting of mountain lion has on mule deer and elk. The study found that heavy hunting pressure on these apex predators had the opposite effect on mule deer (Elbroch and Quigley 2019). As trophy hunters often target the large, dominant male, they inadvertently reduce the age structure of mountain lions in the area, leaving younger, less experienced lions on the landscape. According to the study, these younger predators typically selected for mule deer instead of larger prey species like elk. As a result, the researchers noted that, despite increased survival of fawns and females, the removal of mountain lions did not yield a growth in the mule deer population. Instead, they suggested that hunting may actually be increasing the number of mountain lions that specialize in targeting deer. Killing mountain lion kittens dependent upon nursing mothers is not acceptable to most South Dakotans. However, current hunting rules make orphaning very common. While it is not permitted in South Dakota to kill any females accompanied by spotted kittens, dependent young may not always be in the presence of their mother, and spotted kittens have been taken by hunters in the state. Without kittens in her presence, a hunter may not be aware that a female has offspring

and may kill her. As mountain lions offspring are dependent on their mothers for survival up to around 18 months of age, the loss of their mother prior to reaching adulthood would likely result in the death of her young, even if they are around a year old. A recent study has shown that delaying the start of hunting seasons until December 1 would protect about 91 percent of kittens from perishing as a result of being orphaned by hunters (O'Malley et al. 2018). By better aligning any hunting seasons with denning periods, hunters will have the best opportunity to identify females with kittens. This, ultimately, will benefit both mountain lions and hunters that want to ensure that their populations remain healthy into the future. While we appreciate that the Department took this date into account for the hunting of mountain lions in the Black Hills Unit, this is not the case in other areas of the state. Landowners on their own land do not count toward the quota outside of the season dates for the Black Hills Hunting Unit. Based on the information above, the Mountain Lion Foundation respectfully requests that: • The Department provide a comprehensive annual assessment of anthropogenic mortality in South Dakota, readily available to the public in a timely manner and well in advance of proposed changes to lion policy.

There is substantial and generally unavoidable human-caused mortality of mountain lions due to vehicle strike, incidental snaring or trapping, poaching, hunting on tribal lands, conflicts with domestic animals, public safety removal and other causes which have not been quantified in the draft plan. Because these numbers contribute the threshold for sustaining a mountain lion population without risk of extirpation, the Department and Commission should err on the side of caution to maintain the small breeding population of lions in South Dakota. This will require that the Department assess anthropogenic mortality more effectively, and make these numbers available for public scrutiny on a timely annual basis. • South Dakota suspend mountain lion hunting entirely, given the relatively small amount of available habitat in the state, high anthropogenic mortality, and the value of mountain lions to South Dakotans and to recolonization of eastern states. • Restrict killing of mountain lions in all parts of the state to department issued permits or actions targeting individual lions in specific situations where it will demonstrably and effectively resolve a serious conflict. • Hold multi-state discussions with other neighboring state agencies so that lions may recover in their historic ranges. • If suspension of hunting is rejected, we ask that at a bare minimum the Department and Commission reconsider quotas annually and reduce quotas to below the 12% sustainable limit, less the full tally of annual anthropogenic mortality described above. • Delay the start of all mountain lion hunting seasons in all areas until December 1 to protect dependent kittens from being orphaned by hunters, and that killing of mountain lions throughout the remainder of the state be similarly restricted to reduce orphaning. • Eliminate the use of hounds to pursue mountain lions as a socially disruptive, inhumane and unethical practice. • If the Commission decides to continue to allow the use of dogs then, at the very least, GPS collars should be prohibited as the practice does not align with fair chase values. Thank you for your consideration. Please make this comment letter a part of the official record regarding this decision. Respectfully,

Ursula K Victoria Australia

From:	Nancy Hilding
To:	GFP Mountain Lion Plan
Cc:	Helen McGinnis
Subject:	Fwd: [EXT] Comments on the draft South Dakota Mountain Lion Management Plan, 2019-2029
Date:	Monday, August 26, 2019 2:59:10 PM
Attachments:	2019-8-26 - HJMs Comments on Draft Mgt Plan.docx ATT00001.htm

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Nancy Hilding
President
Prairie Hills Audubon Society
P.O. Box 788
Black Hawk, SD 57718

SD Game, Fish and Parks
Pierre, SD 57501

Dear Chad, Andy and other GFP staff members,

Prairie Hills Audubon Society is a SD non-profit corporation and was invited to the Stakeholder group on lions in October 2018.
Helen McGinnis lives in West Virginia, but she has been the treasurer of Prairie Hills Audubon Society for a long time and is a leading light
in setting our Mountain Lion policies and helping with our Mountain Lion Campaign.

We attach her personal comments to this e-mail and incorporate her comments by reference, with one clarification. Helen states: *" I support the suggestions of Nancy Hilding/the Prairie Hills Audubon Society that refuges in lion habitat outside the Black Hills should be established."* Our actual position is that some areas on the prairie need to be maintained for viable cougar populations, that might mean establishing cougar "refuges" but we don't care via what land area management allocation/land use title the "viable populations" are maintained...just that the goals of management are that they are maintained in those areas.

Thanks,

Nancy Hilding
President
Prairie Hills Audubon Society

Begin forwarded message:

THE HUMANE SOCIETY
OF THE UNITED STATES

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August 21, 2019

Gary Jensen, Commission Chair
South Dakota Game, Fish and Parks
523 East Capitol Ave
Pierre, SD 57501

Tony Leif, Wildlife Division Director
South Dakota Game, Fish and Parks
523 East Capitol Ave
Pierre, SD 57501

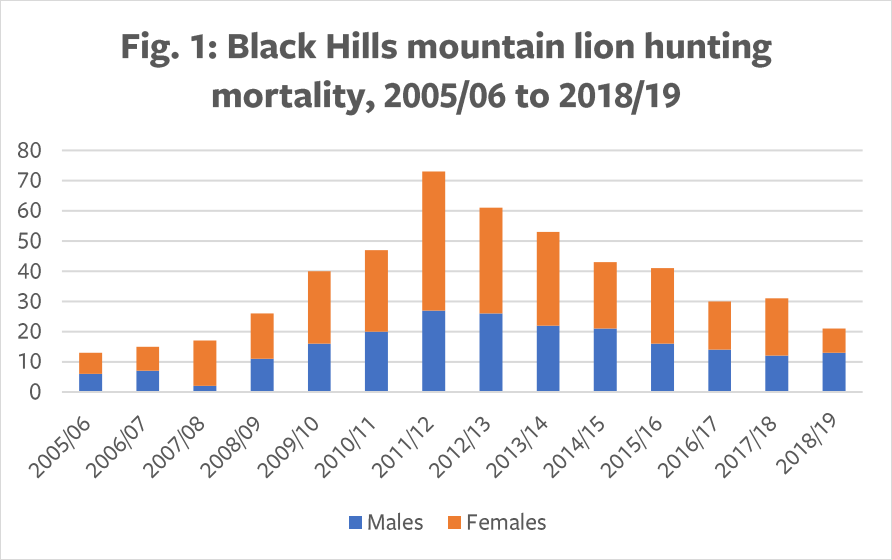
Email: LionPlan@state.sd.us

RE: Draft South Dakota Mountain Lion Management Plan, 2019-2029

Dear Chairman Jensen, Director Leif and Members of the Commission,

On behalf of the Humane Society of the United States and our supporters in South Dakota, I thank you for this opportunity to submit comments on the draft South Dakota Mountain Lion Management Plan, 2019-2029 ("Plan"). We support South Dakota Game, Fish and Parks' ("GFP") efforts to update the agency's mountain lion (*Puma concolor*) management objectives using the best available science to provide universal guidance to wildlife managers. However, we strongly recommend the Plan not include trophy-hunting[i] as a primary management technique. The practice is unnecessary for sound management and harmful to mountain lions, livestock and people as we explain herein.

Since peaking in the 2011/12 hunting season, mountain lion mortality from trophy hunting in the Black Hills has steadily declined (Fig. 1).[ii] During the 2018/19 season, trophy hunters killed 21 mountain lions. This is despite a robust number of license sales and the use of hounds to hunt mountain lions in Custer State Park, as well as GFP's purported dramatic increase in South Dakota's mountain lion population. GFP claims that the Black Hills population now numbers 532 total mountain lions, or 413 adults/subadults. This amounts to an increase of more than 200 cats compared to the agency's 2016/17 population estimate of 300 total mountain lions, or 230 adults/subadults.[iii] This increase in population is biologically impossible and must be re-evaluated for accuracy. Furthermore, the confidence intervals on the current mountain lion population estimate are extremely broad, such that the population could number anywhere between 111 to 970 mountain lions according to GFP's data.[iv] If the lower end of this estimate is representative of the actual population, the current quota of 60 total mountain lions in the Black Hills would allow the killing of more than 54 percent of the population. Given the planetary extinction threat facing Earth, wildlife managers must ensure they are using the best available science and the precautionary principle to conserve and protect wild, native large-bodied mammals.



While anecdotal evidence and trophy hunting mortality counts are not clear indicators of population size, the decreasing trend in trophy hunting mortality despite robust hunter numbers may be representative of a declining mountain lion population (Fig. 1). Additionally, the number of mountain lion observations has steadily decreased according to the Plan. As such, we urge GFP to halt any trophy hunting of mountain lions in the state until a reliable population estimate can be established and externally peer reviewed, and the agency can obtain a clearer understanding of the effects trophy hunting may be having on the species in South Dakota and beyond.

If GFP is to continue allowing trophy hunting of mountain lions, their management must be conducted in a moderate manner to be sustainable and avoid social disruption to lion communities, preventing human and livestock conflicts. Above all, we urge the agency to make the following changes within the management plan:

- **Set sustainable quotas based on reliable research and population estimates in order to prevent over-persecution**. We recommend GFP establish within the Plan a cap on trophy hunting quotas of no more than 14 percent based on adult and subadult mountain lion population estimates for the Black Hills. Multiple studies throughout the western U.S. have shown that this limit can prevent the killing of mountain lions above intrinsic growth rates.[v] Setting such a cap on trophy hunting quotas across the state will help ensure the long-term sustainability of mountain lions in South Dakota.

- **Restrict trophy hunting of mountain lions outside of the Black Hills to protect mountain lion kittens and allow dispersing cats the opportunity to establish themselves in territories throughout South Dakota and beyond**. The Plan acknowledges that suitable habitat exists for mountain lions in South Dakotas prairies. Yet, hunting of mountain lions outside of the Black Hills is unlimited both in quota and season length. GFP must rely on the sound science to regulate mountain lion hunting throughout the state, including in the prairies, to allow them to recover in their historic range in Midwestern and Eastern states where they have been extirpated.

- **Prioritize the use of non-lethal methods when responding to conflicts with mountain lions.** As we detail below, research shows that trophy hunting of mountain lions exacerbates conflicts with humans, pets and livestock. Furthermore, lethal predator control can further disrupt the delicate social structures of mountain lions. In cases where non-lethal predator control can be utilized, such as hazing, relocation, and letting animals leave on their own, GFP should prioritize these methods above lethal options.

For the reasons that follow, we urge GFP to incorporate these recommendations into the Plan:

I. Trophy hunting of mountain lions is unsustainable, cruel and harmful to family groups

Trophy hunting is the greatest source of mortality for mountain lions throughout the majority of their range in the United States.[vi] The practice is harmful to more than just the wild cats who are killed. Conservation biologists have derided this practice as unnecessary and wasteful. Batavia et al. (2018) write: Compelling evidence shows that the animals hunted as trophies have sophisticated levels of "intelligence, emotion and sociality" which is "profoundly disrupted" by trophy hunting.[vii] For these reasons, GFP must not allow trophy hunting of mountain lions in our state:

1.) *Trophy hunting is unsustainable and cruel:* Large-bodied carnivores are sparsely populated across vast areas, invest in few offspring, provide extended parental care to their young, have a tendency towards infanticide, females limit reproduction and social stability promotes their resiliency.[viii] Human persecution affects their social structure,[ix] and harms their persistence.[x]

Research shows that trophy hunting results in *additive mortality*—trophy hunters increase the total mortality to levels that far exceed what would occur in nature.[xi] In fact, the effect of human persecution is "super additive," meaning that hunter kill rates on large carnivores has a multiplier effect on the ultimate increase in total mortality over what would occur in nature due to breeder loss, social disruption and its indirect effects including increased infanticide and decreased recruitment of their young.[xii] When trophy hunters remove the stable adult mountain lions from a population, it encourages subadult males to immigrate, leading to greater aggression between cats and mortalities to adult females and subsequent infanticide.[xiii]

Biologists Wolfe et al. (2015) recommend that states manage mountain lions at a metapopulation level rather than at the single population level. They further add: "We recommend a conservative management approach be adopted to preclude potential over-harvest in future years."[xiv] Instead, South Dakota's mountain lions experience *additive* levels of mortality.[xv] Extensive research shows that this additive mortality caused by high levels of hunting results in population sinks.[xvi] High hunting mortality does not result in decreased numbers and densities of mountain lions because of compensatory emigration and immigration responses, typically by dispersing subadult males.[xvii]

2.) *Trophy hunting is particularly harmful to kittens and their mothers:* In heavily hunted populations, female mountain lions experience higher levels of intraspecific aggression (fights with other cats) resulting in predation on themselves and their kittens.[xviii] Over-hunting harms a population's ability to recruit new members if too many adult females are removed.[xix] A Utah study shows that trophy hunting adult females orphans their kittens, leaving them to die by dehydration, malnutrition, and/or exposure.[xx] Kittens are reliant upon their mothers beyond 12 months of age.[xxi]

3.) *Trophy hunting harms entire mountain lion communities:* A recent study on mountain lions shows that mountain lions are quite social animals and live in "communities," with females sharing kills with other females, their kittens and even with the territorial males. In return for these meals, the adult males protect the females and their kittens from incoming males.[xxii] Disrupting these communities leads to deadly intraspecific strife, including infanticide and social chaos within the family groups.[xxiii] Trophy hunting destabilizes mountain lion populations, which may cause increased conflicts with humans, pets and livestock.[xxiv]

4.) *Trophy hunting is unnecessary, as mountain lions are a self-regulating species*: Mountain lions occur at low densities relative to their primary prey, making them sensitive to bottom-up (prey declines) and top-down (human persecution) influences.[xxv] Their populations must stay at a much smaller size relative to their prey's biomass or risk starvation.[xxvi] They do this by regulating their own numbers.[xxvii] When prey populations decline, so do mountain lion populations.[xxviii] Mountain lion populations also require expansive habitat, with individual cats maintaining large home ranges that overlap with one another.[xxix]

5.) *Killing large numbers of mountain lions halts their ability to create trophic cascades in their ecosystems, which benefits a wide range of flora, fauna and people:* Mountain lions serve important ecological roles, including providing a variety of ecosystem services.[xxx] As such, conserving these large cats on the landscape creates a socio-ecological benefit that far offsets any societal costs.[xxxi] Their protection and conservation has ripple effects throughout their natural communities. Researchers have found that by modulating deer populations, mountain lions prevented overgrazing near fragile riparian systems, resulting in greater biodiversity.[xxxii] Additionally, carrion left from mountain lion kills feeds scavengers, beetles, foxes, bears and other wildlife species, further enhancing biodiversity.[xxxiii]

6.) *Hound hunting is harmful to mountain lions, hounds and non-target wildlife:* Using radio-collared trailing hounds to chase mountain lions and bay them into trees or rock ledges so a trophy hunter can shoot at close range is unsporting, unethical and inhumane.[xxxiv] Hounds kill kittens, and mountain lions often injure or kill hounds.[xxxv] The practice is exceedingly stressful and energetically taxing to mountain lions.[xxxvi]

To escape from the hounds, mountain lions use evasive maneuvers such as running in figure eights, scrambling up trees or steep hillsides and using quick turns to evade the pursuing pack of barking hounds. As a result, mountain lions could exceed their aerobic budgets causing their muscles to go anaerobic (while hounds are capable of running a steady pace with little ill effect).[xxxvii] For every one minute the hounds chased a mountain lion, it cost the cat approximately five times what it would have expended if the cat had been hunting. A 3.5-minute chase, according to Bryce et al. (2017), likely equaled 18 minutes of energy the mountain lion would have expended on hunting activities necessary to find prey.[xxxviii]

Hounding is not considered "fair chase" hunting by most.[xxxix] Fair chase hunting is predicated upon giving the animal an equal opportunity to escape from the hunter.[xl] The use of hounds provides an unfair advantage to trophy hunters who rely on hounds to do the bulk of the work in finding and baying a mountain lions. Hounds also chase and stress non-target wildlife, from porcupines to deer,[xli] and trespass onto private lands.[xlii]

II. Trophy hunting mountain lions does not boost prey populations but it could exacerbate ungulate diseases

Research shows that ungulates are ultimately limited more by their food resources and other habitat factors ("bottom-up" limitations), rather than by their predators ("top down" regulators).[xliii] However, when herds lose their predators, they suffer poorer health and body condition, as well as more degraded habitats.[xliv] With a healthy assemblage of native carnivores, ecosystems enjoy the benefits from top-down regulation, which increases the health of ungulate herds with which they are integrally coevolved.[xlv]

Mountain lions reduce deadly deer-vehicle collisions[xlvi] and help maintain the health and viability of ungulate populations by preying on sick individuals, reducing the spread of disease such as chronic wasting disease (CWD).[xlvii] This ecosystem benefit is increasingly important as CWD infection continues to infiltrate ungulate herds in South Dakota and neighboring states.[xlviii]

Hunters likely cannot substitute for mountain lions as providers of ecological services such as stopping the spread of disease.[xlix] During a three-year study on Colorado's Front Range, researchers found that mountain lions preyed on mule deer infected with CWD.[l] The study concluded that adult mule deer preyed upon by mountain lions were more likely to have CWD than deer shot by hunters. According to the study, "The subtle behaviour changes in prion-infected deer may be better signals of vulnerability than body condition, and these cues may occur well before body condition noticeably declines."[li] This suggests that mountain lions select for infected prey and may be more effective at culling animals with CWD than hunters who rely on more obvious signs of emaciation that occur in later stages of the disease. Moreover, the lions consumed over 85 percent of carcasses, including brains, removing a significant amount of contamination from the environment.[lii]

The best available science demonstrates that killing native carnivores to increase ungulate populations is unlikely to produce positive results. Numerous recent studies demonstrate that predator removal actions "generally had no effect" in the long term on ungulate populations.[liii] Because ecological systems are complex, heavily persecuting mountain lions will fail to address the underlying malnutrition problems that deer face. Research also shows that disruption by oil and gas drilling does, in fact, greatly harm mule deer populations.[liv] If South Dakota wants to grow its ungulate populations, then GFP must foster survival of adult female mule deer and elk to stem declines; and it must increase nutritional conditions for ungulates as these factors are the most important for mule deer survival.[lv]

Persecuting mountain lions will not help bighorn sheep recruitment, either. It is clear from the literature that bighorn sheep populations are in decline in the U.S. because of unregulated market hunting, trophy hunting, disease from domestic sheep,[lvi] resource competition by livestock, and loss of habitat.[lvii] Sawyer and Lindzey (2002) surveyed over 60 peer-reviewed articles concerning predator-prey relationships involving bighorn sheep and mountain lions, concluding that while predator control is often politically expedient, it often does not address underlying environmental issues including habitat loss, loss of migration corridors, and inadequate nutrition.[lviii] The best available science suggests that persecuting mountain lion populations is not a solution for enhancing bighorn sheep numbers. That is because mountain lion predation upon bighorn sheep is a learned behavior conducted by a few individuals who may not repeat their behavior.[lix] Similar behavior has been documented on endangered mountain caribou in the southern Selkirk Mountains – as trophy hunting disrupted sensitive mountain lion communities, female lions took to higher altitudes to avoid incoming, infanticidal young males, and preyed upon mountain caribou.[lx]

South Dakota can better plan for bighorn sheep management by selecting relocation sites for bighorn sheep that have little stalking cover.[lxi] Escape terrain that contains cliffs, rocks, and foliage makes excellent ambush cover for a mountain lion and should be avoided.[lxii] Also, the amount of mountain lion predation is generally greater on small-sized bighorn sheep populations (those that are under 100 individuals) than on other larger bighorn sheep populations.[lxiii] A host of authors reviewed by McKinney et al. (2006) and Ruth and Murphy (2010) recommend only limited mountain lion removals to benefit bighorn sheep populations.[lxiv]

III. Trophy hunting increases human-mountain lion conflict and livestock depredation

In March 2019, the Humane Society of the United States published a report on livestock losses from mountain lions using the U.S. Department of Agriculture's data.[lxv] For South Dakota's cattle and sheep ranchers, 2015 data show that most livestock losses came from maladies (illnesses, birthing problems, weather and theft) with far fewer losses coming from native carnivores and domestic dogs together.[lxvi] In 2015, nearly 96 percent of unwanted cattle losses in South Dakota were from maladies with only 0.17 percent coming from mountain lions, according to the USDA.[lxvii] According to 2014 data, zero sheep were lost to mountain lions in South Dakota.[lxviii]

Human-mountain lion conflict is higher in areas with mountain lion trophy hunting.[lxix] Trophy hunting and predator control of mountain lions results in increased conflicts because lions' social structures are destabilized.[lxx]

A recent review of predator-removal studies found that the practice is "typically an ineffective and costly approach to conflicts between humans and predators" and, as a long-term strategy, will result in failure.[lxxi] Instead, the authors concluded, non-lethal alternatives to predator removal, coupled with coexistence (husbandry techniques) may resolve conflicts.[lxxii]

A Washington state study shows that as mountain lion complaints increased, wildlife officials lengthened seasons and increased bag limits to respond to what they believed was a rapidly growing mountain lion population. However, the public's perception of an increasing population and greater numbers of livestock depredations was actually a result of a declining female and increasing male population.[lxxiii] Heavy hunting of mountain lions skewed the ratio of young males in the population by causing compensatory immigration and emigration by young male mountain lions, even though it resulted in no net change in the population.[lxxiv]

Study authors found that the sport hunting of mountain lions to reduce complaints and livestock depredations had the opposite effect. Killing mountain lions disrupts their social structure and increases both complaints and livestock depredations.[lxxv] Peebles et al. (2013) write:

> . . . each additional cougar on the landscape increased the odds of a complaint of livestock depredation by about 5%. However, contrary to expectations, each additional cougar killed on the landscape increased the odds by about 50%, or an order of magnitude higher. By far, hunting of cougars had the greatest effects, but not as expected. Very heavy hunting (100% removal of resident adults in 1 year) increased the odds of complaints and depredations in year 2 by 150% to 340%.[lxxvi]

Hunting disrupts mountain lions' sex-age structure and tilts a population to one that is comprised of younger males, who are more likely to engage in livestock depredations than animals in stable, older population.[lxxvii]

Rather than allowing trophy hunting of mountain lions, GFP must make a concerted effort to utilize non-lethal methods when rare conflicts occur, prioritizing these above lethal removal of mountain lions. The current reliance on lethal removal for mountain lions that enter a human community is cruel and not in line with best management practices for mountain lion conservation. Techniques such as hazing and relocation are viable options that prevent unnecessary killing and are largely supported by the majority of South Dakotans, as detailed within the Plan.[lxxviii] According to surveys of South Dakota residents in 2018, public education, relocation and hazing are by far the most widely supported methods for addressing human, pet and livestock conflicts with mountain lions.[lxxix]

Furthermore, GFP must work with livestock owners to ensure they are adequately and appropriately employing nonlethal predator deterrence techniques. Installing predator-proof enclosures, using livestock guardian animals, or utilizing frightening devices are all effective strategies to prevent conflicts with mountain lions and other carnivores. Other livestock husbandry practices are also essential at reducing conflicts with carnivores. Livestock operators should:

- Keep livestock, especially maternity pastures, away from areas where wild cats have access to ambush cover.[lxxx]
- Keep livestock, especially the most vulnerable—young animals, mothers during birthing seasons and hobby-farm animals—behind barriers such as electric fencing and/or in barns or pens or kennels with a top.[lxxxi] The type of enclosure needs to be specific for the predator to prevent climbing, digging or jumping.[lxxxii]
- Move calves from pastures with chronic predation problems and replace them with older, less vulnerable animals.[lxxxiii]
- Concentrate calving season (i.e., via artificial insemination) to synchronize births with wild ungulate birth periods.[lxxxiv]
- In large landscapes, use human herders, range riders and/or guard animals.[lxxxv] Guard dogs work better when sheep and lambs are contained in a fenced enclosure rather than on open range lands where they can wander unrestrained.[lxxxvi]
- Suspended clothing; LED flashing lights (sold as "Foxlights"); radio alarm boxes set off to make alarm sounds/noises near pastures are some of the low-cost sound and or visual equipment that deters wild cats.[lxxxvii]

According to USDA data from 2015, only an estimated 11.2 percent of cattle and calf operations in South Dakota used any nonlethal predator control methods.[lxxxviii] Expanding the use of suitable techniques that are landscape and animal specific is essential to reducing conflicts and preventing the death of livestock as well as wild carnivores.

IV. Trophy hunting of mountain lions is not economically sound or supported by the majority of Americans who want to see wildlife protected

Trophy hunting of mountain lions is not in the best interest of these iconic species, nor does it represent the interests of the public majority. The practice deprives citizens of their ability to view or photograph wild mountain lions. Nonconsumptive users are a rapidly growing stakeholder group who provide immense economic contributions to the communities in which they visit.[lxxxix] The U.S. Fish and Wildlife Service's 2016 wildlife-recreation report indicates that wildlife watchers nationwide have increased 20 percent from 2011, numbering 86 million and spending $75.9 billion, while all hunters declined by 16 percent, with the biggest decline in big game hunter numbers, from 11.6 million in 2011 to 9.2 million in 2016.[xc] Altogether, hunters spent $25.6 billion in 2016, about one-third that spent by wildlife watchers (Fig. 2).[xci]

Figure 2: Wildlife recreation participation & expenditures, 2011 vs. 2016 data

Numbers	**2011**	**2016**	**Change**
Wildlife watchers	71.8M	86.0M	+14.2M (+20%)
All hunters	13.7M	11.5M	-2.2M (-16%)
Big game	11.6M	9.2M	-2.4M (-20%)
Small game	4.5M	3.5M	-1M (-22%)
Migratory birds	2.6M	2.4M	-0.2M (-8%)
Other animals	2.2M	1.3M	-0.9M (-41%)
Expenditures	**2011**	**2016**	**Change**
Wildlife watchers	$59.1B	$75.9B	+$16.8B (+28%)
All hunters	$36.3B	$25.6B	-$10.7B (-29%)

The public values mountain lions and views them as an indicator of healthy environments while posing little risk to people living near them.[xcii] A new study indicates that Americans highly value wildlife, including top carnivores such as mountain lions, and are concerned about their welfare and conservation.[xciii] Surveys also show that the majority of Americans do not support trophy hunting.[xciv] An additional study showed that most believe mountain lions are the best representative of the Southern Rockies heritage and landscape.[xcv] Authorizing a trophy hunting season is not in the best interest of South Dakotans who prefer that these large cats remain on the landscape, without threat of persecution.

V. Conclusion

As detailed above, trophy hunting of mountain lions, especially at unsustainable and excessive rates, can harm the long-term survival of the species and increase conflicts with humans, pets and livestock. Moreover, high rates of killing can be damaging to ecosystems and to other wildlife, including South Dakota's ungulate populations which benefit from mountain lion predation on individuals infected with chronic wasting disease.

For reasons stated above, the Humane Society of the United States recommends the Plan not include trophy hunting of mountain lions as a management strategy. South Dakota's mountain lions are an important component of our natural wild heritage and deserve reasoned management so that their populations are

conserved for future generations.[xcvi] If trophy hunting of mountain lions is to continue in South Dakota, GFP must include within the Plan a cap on trophy hunting quotas to not exceed 12 percent of the adult mountain lion population. Furthermore, GFP must restrict trophy hunting of mountain lions in the remainder of the state in order to protect both dispersing and breeding mountain lions and their kittens. Lastly, we call on GFP to prioritize the use of non-lethal methods to address conflicts with mountain lions as lethal removal can harm not only individual mountain lions but entire populations and because lethal methods are not supported by the majority if South Dakotans. Thank you for your consideration.

Sincerely,

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[i]The Humane Society of the United States defines trophy hunting as the practice of killing—or pursuing with the intent to kill—wild animals to display their body parts, not primarily for food or subsistence (The Humane Society of the United States 2017).
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[vi] See e.g., The Humane Society of the United States, "State of the Mountain Lion: A Call to End Trophy Hunting of America's Lion," (Washington, DC2017); Cougar Management Guidelines, *Cougar Management Guidelines* (Bainbridge Island, WA: WildFutures, 2005).
[vii] Batavia et al. (2018) write: "...nonhuman animals are not only physically, socially, and emotionally disrupted [by trophy hunters], but also debased by the act of trophy hunting. Commoditized, killed, and dismembered, these individuals are relegated to the sphere of mere things when they are turned into souvenirs, oddities, and collectibles. We argue this is morally indefensible. Nonhuman animals are not mere objects but living beings with interests of their own, to whom we owe at least some basic modicum of respect (Regan, 1983). To transform them into trophies of human conquest is a violation of duty and common decency; and to accept, affirm, and even institutionalize trophy hunting, as the international conservation community seems to have done, is to aid and abet an immoral practice." Authors then argue that trophy hunting cannot be "presumed [to be] integral to conservation success."
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[xv] Ibid.; Robinson and Desimone, "The Garnet Range Mountain Lion Study: Characteristics of a Hunted Population in West-Central Montana: Final Report."; Robinson et al., "A Test of the Compensatory Mortality Hypothesis in Mountain Lions: A Management Experiment in West-Central Montana."; H. S. Robinson et al., "Sink Populations in Carnivore Management: Cougar Demography and Immigration in a Hunted Population," *Ecological Applications* 18, no. 4 (2008).
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Comments on the SD Mountain Lion Plan Revision,

General Topics

Prairie Lions

GFP's current goal is not to manage for having cougar populations on the prairie; you just manage for a sustainable population on the Black Hills. Thus the prairie SD has a 365-day season & unlimited "harvest". Hunting with hounds is allowed on prairie private land & also allowed starting on private land and moving onto some public lands by SDGFP. Hound hunting is much more effective than "boot hunting". We object to hound hunting, unlimited harvest & 365-day season everywhere on the prairie.

The most egregious problem with the Mountain Lion Plan Revision is the woeful inadequacy of the section on prairie lions, which is just 2 pages long on pages 76-78. Here and there in the rest of the text there are short references to prairie items, however these can be contradictory with facts. GFP needs to review all references to prairie lions to erase the claims that prairie lions are only dispersing males or there is no habitat in the prairie

There are almost 3 pages devoted to tribal coordination on page 57-59. We thank Kelly Hepler for appointing Ron Skates and thank GFP for at least having these 3 pages.

We believe in the Tribal section you should discuss hunting rights secured to Native Americans by treaties and the legal rational that GFP uses to argue that those hunting rights were lost and USA should no longer honor them. I think the hunting/fishing rights issue was not raised by Tribal Plaintiffs in the Supreme Court litigation over the loss of the Black Hills, for which the Supreme Court awarded the Lakota money, which the Lakota continue to refuse.

Article V of the 1851 Treaty provided in pertinent part:

> It is, however, understood that, in making this recognition and acknowledgement, the aforesaid Indian nations do not hereby abandon or prejudice any rights or claims they may have to other lands; and further, that they do not surrender the privilege of hunting, fishing, or passing over any of the tracts of country heretofore described. (Emphasis added)

Article 17 of the 1868 Treaty provided:

> 'It is hereby expressly understood and agreed by and between the respective parties to this treaty that the execution of this treaty and its ratification by the United States Senate shall have the effect, and shall be construed as abrogating and annulling all treaties and agreements heretofore entered into between the respective parties hereto, so far as such treaties and agreements obligate the United States to furnish and provide money, clothing, or other articles of property to such Indians and bands of Indians as become parties to this treaty, but no further. ' (Emphasis added)

We believe the document is woefully inadequate because of the prairie section and a prairie unit supplement is needed. In part this requires you to talk to tribes to gather their mountain lion data. We question if your mortality data is complete on the prairie, due to insufficient communications with tribes. We don't think tribes, especially Oglala Sioux Tribe have population estimates, however some of them have some idea of where resident lions may be living. However you may need to give grants to the tribes to do cougar surveys and to do research on tribal land to develop missing data on their lions (but only if they should be willing to receive such grants/resources and/or coordinate such activities with you). However the tribes should be able to provide you with maps of their suitable habitat.

It is our belief that there is evidence of a female kitten under 1 year of age found in a live trap on Oglala Sioux Tribe (OST) lands in January of 2015, near Kyle, that was moved about 10 miles north of site she was found at. We believe at least one road kill kitten, likely aged less than one year old, has been found on OST lands. You discuss 3 females who were lactating or had proof of lactation on OST lands and Bennett County and 1 female with lactation history in Mellette County, near the boundary with Todd County.

You need to provide more information on the prairie's lactating females: 1.) Where were they found in those counties? 2.) Was lactation current? 3.) Was there a search for kittens? & 4.) How were they killed? You need to provide more information on the dead kittens recorded by SD GFP's mortality database in non-tribal jurisdictions in the prairie unit; there have been 2 kitten deaths recorded. You need to evaluate the Cheyenne River leaving the Black Hills as possible high-level habitat & notice the dead females & dead kitten found near it.

Bennett County was once part of the Pine Ridge Reservation, Mellette, Gregory, Tripp & part of Lyman Counties were once part of Rosebud Sioux Tribe Reservation till federal court rulings modified reservation boundaries.

The Prairie Unit contains Pine Ridge Ecosystem, which is in three states: Wyoming, Nebraska and SD. Now you have breeding documented in SD portion of the Pine Ridge. Oglala Sioux Tribe has a 2019 hunting harvest limit of 20 lions, with a female sub limit of 10. If that limit was actually achieved, perhaps hunting would obliterate all lions down there, but it certainly is overly aggressive hunting limit. So how do Wielgus theories relate to a 20/10 lion harvest limit in the Pine Ridge, when their objective/goal (as explained to me), seems to be to drive lions away from populated areas, but not to actually obliterate the lion population?

Washington State researchers did extensive research and proved that Washington State's aggressive recreational hunting of cougars did not bring about the expected/anticipated results due to the increase in younger male lions in the lion population. After all this research, Washington State believes in an "equilibrium hunt"; a 14% kill of adult/sub-adult is the appropriate hunting strategy. As a result the State of Washington has created 49 cougar hunting units, and if the kill in any unit exceeds 16% of the adult females, sub-adult females, adult males or sub-adult males, the hunt in that unit is closed. Video on Wielgus and Washington State research can be found at this link: https://www.youtube.com/watch?v=2_ZD-PAKhSo

John Kanta does not believe that these Washington State theories apply to the Black Hills, if so Wielgus/Washington State theories need to be discussed & challenged for the Black Hills in the Revised Plan. But we also ask - do they apply to Oglala Sioux Tribe or Rosebud Sioux Tribes whose resident lion populations are small & are close to both Nebraska's Pine Ridge & Niobrara populations & Black Hills? In other words is the capacity to support cougars on the biologically suitable habitat on Oglala Sioux Tribe, Rosebud Sioux or Yankton Tribe lands small relative to the immigration rate from nearby source populations & thus do some of Wielgus's theories apply on some of SD's Reservations?

You need to talk to the wildlife biologists at all tribes responsible for mountain lions and record their reports on their lion populations and lion management goals and issues in the Draft Revision. We have heard possible evidence of breeding at Oglala, Rosebud & Yankton and evidence of resident lions at Cheyenne River. With changes in wildlife staff, past knowledge can be lost. Reservations were allotted and the areas around Reservations can have checkerboard ownership patterns. Due to intermixed jurisdictions, the tribal knowledge and goals needs to be included in the Plan.

We support the breaking up of the Prairie unit into subsets to allow for management of areas with biologically suitable habitat in a different way than biologically unsuitable habitat. If an area has the potential to support some breeding cougars, that opportunity needs to be identified and the area needs its own boundaries. Also connectivity corridors may need to be protected. You don't necessary need to always manage them differently from the rest of the prairie, but if you identify them, you have an option to do so during hunting season's biennial rule making.

We will attach a map with some suggested subset areas. But we believe reservations should be prairie unit subsets, but especially the reservations of Cheyenne River, Oglala, Rosebud and Yankton need to be sub-set units. While we believe you need to consult with and cooperate with tribal government, their goals can change with elections, new leaders, new data, changing biological conditions or changes in public opinion, so the management goals identified by tribes and/or GFP, in any year can change in the future. What you need to do is create prairie subset areas for them, where at any point of time, you and tribes may agree to set different goals than in the rest of the prairie (or not). We suggest Custer National Forest Area needs a subset, as does the lower Missouri River Breaks. We suggest you need a buffer zone subset(s) around the Black Hills Fire Protection District, but especially when hogback habitat is outside the

District.

Lions in Cities or Suburban Areas

Please go into more depth on your policies to remove lions found in urban or suburban areas, when lions are guilty of no threatening or aggressive action, except to be guilty of being found in the wrong place and people being afraid. We find your actions sometimes bizarre, for example the cougar hiding in the dirt cave in Wall. We hope you will think of translocation for some of those "innocent" cougars.

Depredations

You provide a chart of the lions killed for the sake of depredations relief, however the dead lions did not necessarily engage in depredations -- included in that chart are lions killed because folks feared they would depredate. Please differentiate between "conflict" lions who actually depredated and those "conflict" lions some one was merely afraid of.

Please also provide the exact number of livestock or pets that were depredated. This depredation is a main reason for the aggressive hunting on the prairie, however as we remember the discussion at Commission meeting Pierre in January 2015 about the prairie unit's depredation history, that occurred during the hound hunting finalization, some staff folks thought there was no record of prairie livestock depredations, but a staff member alleged there had been a few and if I remember correctly, they might have been pet depredations. Please very clearly explain confirmed domestic animal depredations in the prairie unit, please list confirmed lion kills and the years and locations. We don't mean events when people were afraid after seeing/hearing lions near the yard, the barn or house, but actual kills of livestock or pets by lions.

Please also specify very clearly the confirmed kills in the Black Hills, and what year, location and animal killed. We believe only confirmed kills have been hobby livestock or pets & not many of those. In the text somewhere in the discussion of contents of lion stomachs, it indicates 1% of stomach contents was beef. This 1% rate does not seem to match the SD beef depredation records in SD given the number of lions we have.

We strongly suspect the depredation issue is based on mythic fear.

People Attacks

Please clearly explain the history of attacks on people in the State, We believe no one has been killed, but there have been 2 alleged "attacks", that left "victims" with very little or no harm & one was not really verified. Please review the nationwide cougar kill record statistics and compare to other risks from animals, like number of persons killed by mosquitoes, dogs, deer collisions, cattle vs. those killed by cougars. There have been 27 deaths due to cougars in North America since 1890 - https://en.wikipedia.org/wiki/List_of_fatal_cougar_attacks_in_North_America

Public Education

Please explain SDGFGP's attempts to teach people about their own and their animals risk from cougars. Please offer resources to the Tribes to have some public education meetings on cougars, that in addition to biology and behavior info, includes realistic discussions of risks and disclose the SD and national actual attack statistics not the myths and that train people how to act during cougar encounters.

Values:

One of the objectives of the Plan is: " Manage mountain lion populations for both maximum and quality recreational hunting opportunities, considering all social and biological inputs." (See page xi). We believe this prioritization of hunter wishes, is unbalanced. We believe the number of hunter advocates vs. not hunter advocates invited to the October stakeholder meeting, clearly displayed SD GFP bias towards hunting and hunters. Mountain lions have important ecological roles and USFWS shows that wildlife watching is much more popular than hunting; Total wildlife watchers are: 86.million vs. total big game hunters are: 9.2 million. (2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: National Overview -- https://wsfrprograms.fws.gov/subpages/nationalsurvey/national_survey.htm).

People who live in the Hills come up to me and tell me of their delight at having a mountain lion walk on their property or in their area. They proudly show me photos of their lions. Not all folks in the Hills are afraid of lions or want to kill them. Some are wildlife watchers and wildlife advocates. The Plan should discuss creating a way for wildlife watchers or wildlife enthusiasts to donate to SD GFP lion management efforts, as to a certain extent GFP is funded by dollars

earned from hunting/fishing licenses or Pitman-Robertson.

SDGFP seems to believe that when hunters pay these fees/taxes it is like voluntary donations, and this creates an imbalance in relative influence of interest groups. However Pitman-Robertson with its taxes on hand guns, rifles and ammunition, is not just supported by hunters, but also by folks who use guns for not hunting purpose. The wildlife belongs to all citizens of the state (including card carrying PETA members) & hunters pay for the privilege to hunt this publicly owned resource at below market value for meat or furs. They aren't giving donations.

Prairie Hills Audubon Society (PHAS) strongly objects to hunting any native predator in order to maximize the number of prey species such as deer/elk/pheasants, that human hunters want to kill. We don't believe that the wildlife exists just for human predators to execute. Mountain lions have important ecological roles and they have a right to kill prey. We believe that the fluctuations in popular prey species numbers are more dependent on other factors like the weather. We hope SDGFP explains that in the Plan.

We don't think the Plan disclosed well enough the history of many hunters advocating that SDGFP increase harvest limits to insure mountain lions killed less deer, elks, mountain goats and/or rocky mountain sheep. We believe that historic lobbying was a very significant factor in the increase of the "harvest limit". (We were there). As you may realize from the Nest Predator Bounty fiasco, not all SD citizens like you killing native predators to maximize prey available for hunters to kill. We hope you make this historic lobbying by a stakeholder group (ungulate hunters) & their powerful influence on you, more transparent.

Cougar Population Goals

The status quo allows for overly aggressive hunting of cougars both in the Black Hills and in the Prairie. We object to the high harvest rates. We question SD GFP 2017-2018 estimates of the cougar population numbers in the Black Hills, as confidence intervals are too large. We believe this is because not enough cougars that were darted were later killed. The SDGFP 2017-18 annual cougar population estimate is not believable due to inadequate field data collected. We hope you calculate & include the 2018-2019 data before giving to the Commission. We read your entire Plan and some of the facts and research results seem to contradict. We are not sure of the reliability of your population estimates and how many lions there really are.

A stable mountain lion population requires about 12-14% “human killing” of the adult/sub-adult population. PHAS supports management of the Black Hills area, as a "source" population to help recolonize eastern areas with cougars. To manage the overall area as a " source" population SDGFP needs “human killing” below 12% of estimated adult/sub-adult lion population.

SD GFP should clearly provide charts for all years since 2005, where you explain the number of male, female adults and sub-adults and the number of kittens. We need a chart with these numbers (not a graph of all ages of lions) so we can calculate what percent of the adult/sub-adult population the harvests have killed and evaluate the sink, source, stable quality of the harvest. All graphs & charts should go back to 2005, when hunting began. The 2005 population numbers are referenced in text & thus we need to see what they were. Why did you leave the first few years of the harvest off the charts and graphs?

The bar chart on Figure 13 shows the Wyoming and SD populations against increasing, stable and decreasing thresholds. SD GFP should provide us with the km2 values used by both states to calculate that bar chart. Wyoming's lion habitat area values have increased in size with time, as they get better data. This means at first they were dividing by too small a number. SD GFP should clearly explain the theories & data sets Wyoming uses to generate their share of the bar chart & juxtapose the theories & data sets SD uses to estimate their bars within the chart. As far as we know you all use different data & calculate via different theories/models.

SD GFP give Fescke's km2 value for Black Hills area & high quality habitat. Fescke's Black Hills area refers to Wyoming & SD and her high quality habitat value just refers to Forest Service lands (excluding other state, federal & private lands). Please explain the area value you use for the Black Hills Fire Protection District.

The SD GFP plans to manage for population of 200-300 lions of all ages, it is not really clear why you picked this number - except it fulfills value objectives, but it seems to be a "decreasing" population or "sink" objective (compare Plan’s Figures 13 and 15). Managing the Black Hills as a "sink" is also Wyoming's objective for the Black Hills.

Mountain lion populations are self-regulated and don’t over populate. There is proof in some states in the USA, that aggressive hunting seasons replace

experienced adult lions with inexperienced, younger lions who get into conflict with humans more and replacement males may engage in more cougar infanticide. We have asked before in this letter that you discuss the Wielgus/Washington State theories and why you all don't believe they apply to the Black Hills.

As SD has not reached the harvest limit in years and the yearly take of lions keeps dropping, we believe the harvest limit is a joke and it is the season length that determines or limits the harvest, not the official "harvest limit".

Subsets in the Black Hills

We believe that the Black Hills Fire Protection District should be broken up into more subsets than just Custer State Park and everywhere else. We object to hunting in Custer State Park, as Parks should be for wildlife watchers, not hunters. We believe that Wyoming is managing the Black Hills as a more aggressive sink than SD and we suspect that Wyoming is sucking out SD lions to keep their aggressive harvests supplied. As they use hounds, they are more likely to reach their quotas. We request a lion sanctuary area in the Black Hills, in addition to the federal Parks.

Other comments:

The cost of a mountain lion hunting license needs to be greater than $28.
The incidental take of mountain lions by traps and snares should be counted against the "harvest limit" for hunting each year.

Thanks,

Nancy Hilding
President
Prairie Hills Audubon Society

From:	Jil Jennewein
To:	GFP Mountain Lion Plan
Subject:	Re: [EXT] Trophy killing mountain lions
Date:	Monday, August 19, 2019 7:06:26 AM

This has to stop! No trophy killing mountain lions.
It's quite simple. People can protect themselves, be wise and use caution. Mountain lions are natural to this area. They are just following natural instincts. We do not want another species to become extinct.
Please, if you can't help protect the mountain lion at least don't help to kill it off. Leave the mountain lion alone.
No more trophy killings!
Jil Jennewein
141 Terraville Ave.
Lead, S.D. 57754

Public Comment

for

Draft Revision of the South Dakota Mountain Lion Management Plan

Name: Lisa Sanders

City: Hermosa

State: SD

Under Objective 2:
Strategy 2E. "Provide the public with access to public land for quality mountain lion hunting opportunies.

Currently, hunting with hounds is permitted on the prairie providing it begins on private property. The hunt may then be continued / cross over or culminate on property owned by the Office of School and Public Lands or BLM property. Request that hunting (in this context) also be Allowed on US Forest Service land - on the prairie.

Thank you for your consideration

- Lisa Sanders

Public Comment

for

Draft Revision of the South Dakota Mountain Lion Management Plan

Name: Craig Schochenmaier

City: Spearfish

State: SD

Myself and other sportsman often chat about the use of dogs in the hills for mountain lion hunting. I believe the general concensus among us is that the current set up of allowing dogs in custer state park is working very well. It allows boot hunters to hunt and not worry about dogs running past them after tracking a cat for 4 miles.

Keeping the dog hunting in the set unit seems to be working great and leaving the season as is would be my vote.

Overall we are very happy with the population and hunting offortunities.

Public Comment

for

Draft Revision of the South Dakota Mountain Lion Management Plan

Name: Tyler Hoffman

City: Spearfish

State: SD

as an avid Cat hunter who has been actively hunting cats in the hills and enjoying it for approximately 10 years I would just like to advocate for the plan in it's current form. I think the management for areas designated for hounds (outside the hills + Custer State park) is a good compromise ~~to~~ I am an advocate to keep the majority of the hills as a fair chase hunt. Hound, in my opinion, would turn it into a "Rich mans" sport, and greatly impede the hunt I have so much enjoyed the last 10 years.

The Cougar Fund The Cougar Fund
125 N. Cache St
PO Box 122
Jackson WY 83001

South Dakota Game Fish and Parks
Rapid City, SD

August 26th 2019

Thank you for the opportunity to comment on the latest iteration of the South Dakota Mountain Lion Management Plan (MLMP).

The Cougar Fund has many constituents in South Dakota and we submit this letter on their behalf.

The Board, Staff and supporters of The Cougar Fund have deep and genuine discomfort with the hunting of mountain lions for recreation, but feel that we can make observations and suggestions that are in the common interest of helping conserve and protect these magnificent animals.

We must clearly state that we understand SDGFP already knows the direction it intends to go in providing mountain lion hunting opportunity, and utilizes science to prevent additive mortality.

We note that South Dakota Game Fish and Parks (SDGFP) continues to closely research and monitor the semi-island population of mountain lions within the Black Hills Fire Prevention District (BHFPD) and appreciate access to that information both on-line form, and at a meeting I personally attended on July 31st.

John Kanta, who presented the analysis, noted some unexpected and unexplained anomalies with regard to the most recent data. We would encourage the department to err on the side of caution going forward with season setting responsibilities where the confidence interval for population estimation has such a wide margin. Please use the next two-year cycle to be very conservative when deciding on harvest mortality limits. We respectfully ask you to explore the possibility of a limited draw to manage hunter overcrowding and possible over-harvesting of a lion population that your monitoring suggests may be in decline?

It is of great interest to us that the draft MLMP will be adopted for the next ten years and the following comments are specific to adding flexibility to the MLMP that will allow changes to be made as conditions change.

Prairie region

Currently this large portion of the state has year-round unlimited hound hunting with no boundaries except for those of private landowners who may not allow hunting on their land. The philosophy behind this has always been the lack of suitable habitat and the possibility of conflict with livestock. We recognize the difficulty hard working ranchers have when a large carnivore that has not been present in their lifetime once again becomes part of the landscape.

Social tolerance and cultural acceptance are difficult concepts when it comes to protecting public health and family interests. The prairies of South Dakota, North Dakota, and Nebraska, are on the leading edge of mountain lion dispersal and recovery and we understand there is some resistance based on real fears.

SDGFP may be able to help mitigate some of these concerns by expanding their program of outreach and education in rural areas of the state, together with a trusted, professional, response to conflict situations. We know from the process of mountain lion recovery in source states and the resulting increase in public tolerance (and switch to more conflict prevention awareness) that sharing appropriate landscapes is possible, but does take time and knowledge and a willingness to be situationally-aware.

Mountain lions are already dispersing out of states with confirmed populations. As generalists they are able to utilize the less–than-suitable habitat of the prairies as a stepping stone to more appropriate habitat that will support them with less proximity to human interest and development. The Cougar Fund would like to emphasize the positive role SDGFP can play in setting parameters for future management of the prairie.

We very respectfully suggest the following possibilities be considered for the 2019 MLMP

- Divide the prairie into hunt areas, even if they all remain 'unmanaged' as they are now. This will provide you with the opportunity to follow up on the breeding populations you have already discovered and the flexibility to manage hunting in the future in areas specific to recovery and eastward dispersal.

- Identify areas of suitable habitat, whether semi-island, or riparian, and designate them as refuge areas (where no-or very limited hunting- is allowed) for the purpose of connectivity to appropriate recovery locations.

- Continue with your conscientious monitoring of breeding females and kittens on the prairie to enhance the research you have already been conducting. Respond to what you find through the adaptive management process.

General considerations

- Thank you for providing a self guided resource for lion identification to your hunters. Perhaps there is an opportunity to incentivize new and inexperienced hunters to take the course as a prerequisite of obtaining a license?

- Please give your full support to the department's law enforcement officers who have had to deal with crimes related to mountain lion poaching, and hunting violations. Lack of respect for both the animals and the statutes governing their management casts everyone in a bad light and should not be tolerated.

- Consider the ecological contributions of mountain lions. By dispersing large herds into smaller units they can help with forage restoration, waterbed erosion and the culling of weak, sick or old animals. Dispersed herds have lower disease transmission rates and with Chronic Wasting Disease a very real threat these days, the benefits of compensatory predation are apparent.

- Remember…predator and prey evolved together. Lions have not managed to wipe out their food source in all the millennia of cohabiting the landscape and they are probably not about to in the future!

- Please explore ways for your non-hunting wildlife enthusiasts to be contributing members of your agency's mission.

In conclusion, may I express my sincere appreciation of the SDGFP biological staff who study and manage mountain lions. They have always treated me with great respect, provided me with the information I have been seeking and also educated me along the way! I have enjoyed warm, two-way communication, and hope to continue to have a productive relationship in the future. A future, which I hope will expand the scope and diversity of the traditional constituent and thereby increase the revenue stream that conserves wildlife for *all* South Dakotans.

Very respectfully submitted,

Penelope Maldonado
Executive Director,
The Cougar Fund
penny@cougarfund.org

Nancy Hilding
President
Prairie Hills Audubon Society
P.O. Box 788
Black Hawk, SD 57718
August 26th, 2019
605-787-1248 (Skype phone)
nhilshat@rapidnet.com

SD Game, Fish & Parks
Joe Foss Building
523 Capital Ave.
Pierre, SD 57501

Attachments to our Comments on the SD Mountain Lion Plan Revision listed,

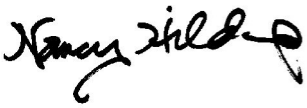
1. We include a suggested map of subset areas on the Prairie Unit

2. We include a letter we sent the GFP Commission on Washington State/Wielgus Research & the Black Hills

3. We include a spreadsheet of prairie unit mt. lion mortalities as of July.

4. Beier's 1993 Article - "Determining Minimum Habitat Areas and Habitat Corridors for Cougars"

Thanks,



Nancy Hilding
President
Prairie Hills Audubon Society

From:	Nancy Hilding
To:	GFP Mountain Lion Plan
Cc:	nhilshat@rapidnet.com
Subject:	[EXT] PHAS"s attachment letter Mt Lion Plan Revise
Date:	Tuesday, August 27, 2019 2:09:12 AM
Attachments:	Attachments Mt Lion Plan Revise.pdf ATT00001.htm Map of Prairie Unit broken up.pdf ATT00002.htm PHAS.OctWielgus.Weilgus_Letter3. copy.doc ATT00003.htm Prairie_Lions_mortality-xM1.xlsx ATT00004.htm Beier 1993 minimum habitat corridors pumas.pdf ATT00005.htm

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Nancy Hilding
Prairie Hills Audubon Society
to GFP Staff

Below find our "Attachment Letter" as PDF...a letter that lists 4 attachments to our comment letter that we sent in earlier tonight.
Letter will be followed by 4 attachments

Nancy Hilding
President
Prairie Hills Audubon Society
P.O. Box 788
Black Hawk, SD 57718,
phas.wsd@rapidnet.com

Nancy Hilding
6300 West Elm
Black Hawk, SD 57718
nhilshat@rapidnet.com
Oct 3rd, 2013

Attn: GFP Commission
South Dakota Game, Fish and Parks
523 E. Capitol Ave.
Pierre, SD 57501

In late July we wrote to ask the Commissioners to watch a twenty-two minute You-tube video about Washington State cougar research. We requested that you ask your staff questions about it's implications to SD, at the August Commission meeting. Some of you did so and we thank you.

When asked about applicability of Washington State's research to SD, the GFP staff replied that:

1. It did not apply well to SD - as in areas of Washington State studied, they used hound hunting, which allowed for selection for larger males by hunters & such selection doesn't happen in the SD boot hunt.
2. The sample size on some of the studies was too small
3. SD habitat is different from Washington State, as Washington has a larger percent of state in mountain lion habitat.

We attach a transcript of the above Question and Answer from the Commission meeting.

We agree that Washington State has more lion habitat than SD. The Black Hills is in the far corner of our state; lions have no clue where state boundaries are and we need look at SD and corners of ND, NE, Wyo & Montana to create a larger area. But Washington State is in an area with more lion habitat than our Black Hills and immediate surrounding area.

Wielgus provides references below each of his slides for the research cited. We have transcribed that list and attach it. His powerpoint references 13 different studies. The studies publishing dates range from 2002-2012. Different studies justify different arguments. I asked John Kanta on Sept 7th, which studies had the too small sample sizes. He could not remember. I have sent him the list, but have not yet heard back. I suggest you find out which studies John has problems with.

We believe the argument about hound hunting may be a red herring. In 1995 Washington state voters passed an initiative outlawing hound hunting. (Ban effective as of 1996). The State responded with increasing levels of hunting allowed via the boot hunt. Eventually recreational hound hunting of cougars was allowed in very small areas with small quota to address "problem lions" and another law(s) allowed a pilot project area to have hound hunting for 4 years, in a quarter of Washington State area. Commissioners should ask SD GFP staff, if data for all of the 13 research papers was collected in the 4 years, overlapping the quarter of the state, where hound hunting was temporarily allowed? Commissioners should also remember that we share the Black Hills with Wyoming, and Wyoming has always allowed hound hunting. Male lions in Washington State have a 300 square mile home range. 17.5 squared equals about 300, thus a 17.5 mile square box creates 300 square miles. Male lions in SD & Wyoming have an average

home range of about 641.1 square kilometers (about 400 square miles) (Dan Thompson - 2009 PhD Thesis, page 116). A box with 20 miles sides, creates 400 square mile area. A certain percent of our lions will always venture into Wyoming and thus be exposed to hound hunting. SD has for about 3 years allowed hound hunting in Custer State Park and we are about to close on our 4th year. How are we different? Also just because hound hunting occurs, does not mean that hound hunters will be more selective. We assume selective hunting would only occur if the hunters who forgo a kill, can be confident (due to lion numbers, competition for lions and season length) they will have another chance to kill a lion.

Dr. Robert Wielgus's response to a question, with respect to his own research, sent by e-mail Sept 23, 2013 to Helen McGinnis, is as follows:

> "My research incorporated both boot-hunting and hound hunting (cougars were removed using hounds in specific public safety hunts during the studies). Regardless, it does not matter if a cat is killed using hounds or not. A dead cat (& a vacant territory) is a dead cat (& vacant territory) regardless of method. We showed that hunting mortality rates in excess of 14%/year caused a whole bunch of problems. End of story."

Washington State researchers did extensive research and proved that Washington State's aggressive recreational hunting of cougars did not bring about the expected/anticipated results due to the increase in younger male lions in the lion population. After all this research, Washington State believes in an "equilibrium hunt"; a 14% recreational kill of adult/sub-adult is the appropriate hunting strategy. As a result the State of Washington has created 49 cougar hunting units, and if the recreational kill in any unit exceeds 16% of either the adult females, sub-adult females, adult males or sub-adult males, the hunt in that unit is closed.

We suggest that SD adopt something similar.

Below, in the section on Washington State, we re-iterate arguments we presented in August. If you read it in August - thanks, you don't need to read it again, skip down to the discussion on Lincoln-Peterson modeling.

Washington State Research

Research in Washington State over the last 15 years, overturns many traditional assumptions about sport hunting of lions and shows that (at least in Washington state environs), aggressive sport hunting of lions, does not reduce lion conflicts with people, pets or livestock or even some “at risk” wildlife prey and may increase such conflicts. Although such conflicts are small to begin with, for some folks just seeing a cougar is actually a “conflict”. Young teenage male lions are kicked out by adult males or just naturally disperse. What happens in sport hunts, is hunters kill both adult males and adult females. Young “teenage” males, move in to replace them. The young males have much larger home ranges with more overlap in home ranges (so humans and wildlife encounter more of them). They are more prone to venturing into human occupied territory, and are more prone to conflicts with pets. Male and female lions tend to hunt different prey. The teenage males engage in infanticide and may cause lion mothers with small kittens to move to avoid teenage males. As females eat somewhat different wildlife than males, aggressive hunting can shift some female lions about and as it also results in more males than females, it thus changes use of prey by lions. This might impact rare wildlife prey.

The aggressive sport hunting of cougars (vs. removal of “problem lions”) can open “Pandora’s box” and create the problems it seeks to fix and it may become a vicious cycle, where people see more lions, (because the teenagers move around a lot and are more likely to visit people’s ranches and yards), so people demand more “sport hunt”, which in turn creates more cougar teenager visits and more perceived and/or real "problem lions".

We believe this “Pandora’s box” phenomena may be occurring in SD and Wyoming Black

Hills/Bear Lodge Mountains and it will take a while for the new science to be dispersed and absorbed by wildlife managers and public.

Wielgus and Washington State Research can be found at this link:

https://www.youtube.com/watch?v=2_ZD-PAKhSo

Published on Dec 20, 2012
Presented by Washington State University professor of wildlife ecology and Large Carnivore Lab director Dr. Rob Wielgus at the 2012 International Conference of the Wildlife Society. "This presentation offers 15 years of research in 15 minutes," says Dr. Wielgus. Watching this takes 22 minutes. If you look at the video in the small print below many of the graphs, the powerpoint lists the research source, many of which are peer reviewed journals and include "The Journal of Wildlife Management" ,"Ecological Applications", "Ecology", "Conservation Biology", or "Canadian Journal Of Zoology"

At the end of the video he refers you to Large Carnivore Conservation Lab for more info.
rs.wsu.edu/research/Carnivore/

Here is a list of publications by Wielgus and associates,
http://www.experts.scival.com/wsu/expertPubs.asp?n=Robert+B+Wielgus&u_id=251

South Dakota State Supportive Research

How SD research supports Washington State Research:
Brian Jansen wrote a PhD thesis at SDSU in 2011 titled: ANTHROPOGENIC FACTORS AFFECTING MOUNTAIN LIONS IN THE BLACK HILLS OF SOUTH DAKOTA

Quotes from Brian Jansen's thesis relative to this issue:
Jansen in his 2011 thesis writes at page viii:

> "We found that subadult males were more frequently involved in conflicts of all types than other sex and age classes within the population. Both subadult and adult males were predominantly involved in livestock conflicts, however an important distinction was that livestock conflicts occurred with "hobby" livestock (e.g., Llamas, miniature donkeys), rather than domestic cattle or sheep so prevalent in livestock-lion conflicts in western states. Subadult male and female mountain lions were normally involved in public safety and domestic pet incidents. Adult female mountain lions consistently occurred less frequently in conflicts than they occurred in the population. "(Jansen 2011)

Jansen on page 1 of his Thesis says:

> Subadult male dispersal from the study area was consistently high (> 88%) regardless of period or areas. (Jansen , 2011)

Jansen on page 2 of his thesis says:

> "Although, the Black Hills are isolated by >90 km of open prairie, mortality seemed to be numerically offset by immigration, similar to other populations. Because of the low survival rates of adult males and high emigration rates of subadult males, we suggest that the ability of the Black Hills population of mountain lions to withstand hunting is dependent on the population dynamics of adjacent populations, even though those populations are separated from the Black Hills by expanses of apparently unsuitable habitat." (Jansen , 2011)

The powerpoint shown in August by GFP staff, shows SD hunter kills have a larger component

of sub-adults now than in the past, indicating that this shift is happening in SD.

Lincoln-Peterson Model and Immigration

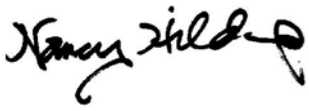
When SD does their Lincoln/Peterson modeling they always assume: cougar immigration = migration. We however believe SD doesn't have data to support this assumption. We request that the Commission ask the staff, if they have data to support the assumption that immigration = migration. If they admit they don't have data, ask them what are the implications on the validity of the Lincoln-Peterson model, if it is dependent on an unsupported assumption, which is wrong or assumption's validity may change over time.

Population objectives of the 2010 -2015 SD Mountain Lion Management Plan are to reduce total lion numbers, but also to reduce lion dispersion by 24% (Plan at page 15). Immigration has been alleged to equal migration for many years by SDGFP. If you have in fact reduced lion numbers, have you also reduced migration out and to what degree? If so, how can immigration continue to equal migration, unless immigration has also reduced? So at what point does decreasing lion numbers result in decreasing migration and how does that effect reliability of the Lincoln-Peterson model? This is "having your cake and eating it too". You believe if you reduce the population, you reduce dispersals, but are blind to the impact that would have to the assumptions that underlie and justify the Lincoln Peterson model.

Also as the cougars you are killing during the recreational season are now shifting statistically to younger ages, you may have more sub-adult males who engage in more infant mortality, which may mean your kitten survival statistics, which are based on earlier times, are too high.

Also your hunters disproportionately kill along the eastern edges of the Black Hills. John Kanta believes this is due to snow and road access. This odd distribution of kills has been happening in past years. We wonder if it is not due to snow and roads, but occurring because Wyoming season starts sooner and Wyoming is beating you to the lions whose territories or home ranges are in both states. However if your researches place collars evenly across the landscape, and your hunters only hunt in some areas, this will skew the Lincoln Peterson modeling.

Sincerely,



Nancy Hilding
President
Prairie Hills Audubon Society
For Self and Society

Attachments

1) A list of the references cited in Wielgus Powerpoint

2) A Partial Transcript of the August Commission meeting, where Q & A about Wielgus occurs.

Determining Minimum Habitat Areas and Habitat Corridors for Cougars

PAUL BEIER*

Department of Forestry and Resource Management
University of California
Berkeley, CA 94720, U.S.A.

Abstract: *I simulated population dynamics of cougars to predict the minimum areas and levels of immigration needed to avoid population extinction caused by demographic and environmental stochasticity for a period of 100 years. Under most plausible parameter values, the model predicted very low extinction risk in areas as small as 2200 km², and (in the absence of immigration) increasing risk as area decreased below 2200 km². If as few as one to four animals per decade could immigrate into a small population, the probability of population persistence increased markedly. Thus a corridor for immigration will benefit a small population in an area where further loss of habitat will occur.*

The model was applied to the cougar population in the Santa Ana Mountain Range of southern California (2070 km², with about 20 adults). Field data support the model's conclusion that this population is demographically unstable. There will be a high risk of extinction if the habitat is reduced to currently protected and connected areas (1114 km²). A movement corridor allowing immigration from the adjacent population and intra-range corridors would greatly enhance the prognosis. However, the last corridor for immigration has been degraded by recent human activity. Within the mountain range, cougars recently became extinct in a 75-km² habitat fragment recently isolated by development, and cougars will become extinct in another 150-km² of habitat if a proposed housing project occludes a critical corridor. Radio tracking has confirmed use of this and other important corridors.

Neither the model nor the field data alone would have much influence in the face of development pressure; together they have stimulated interest in restoring and protecting critical corridors in this range. Nonetheless, the long-term prognosis for this population is bleak, because 22 local governments review potential impact on a case-by-case basis.

Determinando áreas mínimas de hábitat y hábitat en corredes para pumas

Resumen: *Simulé la dinámica de la población de pumas para predecir áreas mínimas y niveles de inmigración necesarios para evitar la extinción de la población debido a estocasticidad demográfica y ambiental por un período de 100 años. Usando los parámetros más viables, el modelo predice riesgos de extinción muy bajos en áreas tan pequeñas como 2200 km², y (en ausencia de inmigración) un riesgo creciente a medida que el área decrece por debajo de 2200 km². Si tan solo 1–4 animales por década pudiesen inmigrar a una pequeña población, la probabilidad de persistencia se incrementaría marcádamente. Por consiguiente, un corredor para la inmigración puede beneficiar una pequeña población en un área dónde ocurrirá una mayor pérdida del hábitat.*

El modelo fue aplicado a la población de pumas en la cadena Montañosa de Santa Ana, al Sur de California (2070 km², con unos 20 adultos aproximádamente). Datos de campo apoyan las conclusiones del modelo, que indican una población demográficamente inestable. Si el hábitat es reducido a las actuales áreas protegidas y conectadas (1114 km²) habría un alto riesgo de extinción. La prognosis se podría mejorar ampliamente con un corredor de movimiento que permitiera la inmigración desde poblaciones en áreas adyacentes y corredores dentro del área de distribución. Sin embargo, el último corredor para la inmigración ha sido degradado por el reciente impacto humano. Dentro de la cadena montañosa, los pumas se han extinguido recientemente en un fragmento de hábitat de 75 km² aislado a causa del desarrollo; los pumas se extinguirían en otros 150 km² de hábitat si un proyecto de viviendas propuesto obstruye un corredor crítico. El uso de este y otros importantes corredores ha sido confirmado a través de telemetría.

Ni el modelo ni los datos de campo por si solos tendrían mucho impacto ante la presión por el desarrollo; juntos han estimulado el interés en restaurar y proteger corredores que son críticos en esta cadena. A pesar de todo, la prognosis a

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Effective land-use planning must be spatially explicit and regional in scope. Because cougars need corridors and because telemetered cougars can quickly identify movement corridors, cougar research is an efficient and appropriate way to inject biological data into such planning efforts.

largo plazo para esta población es yerma ya que 22 gobiernos locales revisaron los impactos potenciales caso por caso. Una effectiva planificación del uso de la tierra debe ser explícita espacialmente y regional en extensión. La investigación sobre pumas es una vía eficiente y apropiada de introducir datos biológicos en los esfuerzos de planificación. Esto es así porque los pumas necesitan corredores y al estar marcados telemétricamente permiten identificar rápidamente los corredores de movimiento.

Introduction

As landscapes are fragmented into ever-smaller patches of habitat isolated by high-speed barriers (Harris & Gallagher 1989), it has become important to determine the minimum area needed to preserve functioning ecosystems. Because there are no methods to determine the minimum areas of reserves with reference only to ecosystem properties, biologists are forced to conduct viability analyses for a few "indicator" or "umbrella" species as an efficient way to address the viability of the whole system (Soulé 1987*a*:8; Noss 1991).

Species such as the grizzly bear (*Ursus arctos horribilis*), the wolf (*Canis lupus*), and the cougar or mountain lion (*Felis concolor*) make ideal candidates for such analysis because they exist at low density and require large areas. Of these, only the cougar plays a significant ecological role in much of the lower forty-eight states. Therefore, viability analysis for this species would have widespread utility. Shaffer (1983) presented an analysis for the grizzly bear. In this paper, I present such an analysis for the cougar.

I focus solely on the issue of identifying the minimum area and immigration rate needed to avoid extinction caused by demographic and environmental stochasticity, ignoring inbreeding effects. Previous analyses have shown that the areas needed to avoid inbreeding depression in the long term are so large "that the only recourse in most situations will be to establish the species in several sites since there won't be enough space in any given site" (Soulé 1987*b*:177). My analyses address the issue of how large each of these "several sites" must be so that management intervention can be limited to that needed to maintain genetic variability.

Simulation models are superior to analytic models when addressing a particular species, because the analytic calculations are possible only for unduly simplified models (Ewens et al. 1987:67). But there are pitfalls to the simulation approach, especially with small populations. For example, most simulation models account only for females and make no allowance for an "Allee effect" whereby animals at low density may have difficulty finding mates. This creates an inverse density-dependence in fecundity when numbers of one sex are very low (Begon & Mortimer 1981:30), which has been documented in a cougar population (Padley 1990). Another problem is that most subroutines for incorporating stochastic variation in survival rates introduce crucial errors when simulated populations become small (see Methods section). Most important, even though "habitat fragmentation ... is the primary cause of the present extinction crisis" (Wilcox & Murphy 1985: 884), few simulation models allow analysis of the effects of movement corridors; such analysis requires explicitly modeling various levels of immigration.

In this paper I describe a model that realistically simulates the population dynamics of small populations of cougars. My goal was to predict the conditions under which a cougar population can avoid extinction in the short term (100 years), ignoring inbreeding effects. My main conditions of interest were those that humans can control, namely, area of habitat (controlled by restrictions on human development) and the amount of immigration into the population (controlled via provision for wildlife movement corridors to adjacent populations). In addition, I examined how estimates of extinction risk depends on estimates of life history parameters, many of which vary geographically or are difficult to measure.

Finally, I apply the model to the cougar population in the Santa Ana Mountains of southern California, which I have studied since 1988, and I summarize some of the relevant field observations from that study. This real-world application illustrates that model results have little impact on land-use decisions unless they are supplemented by field study to identify actual or potential movement corridors. My goals in this illustration are to promote the use of data from telemetered cougars to identify and protect wildlife corridors, and to advocate that regional planning efforts based on geographic information systems (GIS) replace current piecemeal approaches.

Methods

Simulation Model

The simulation model used standard Leslie-matrix computations, with subroutines that controlled immigration

and adjusted survival and fecundity rates for density-dependence, demographic and environmental stochasticity, and an Allee effect. For each combination of input conditions, the population dynamics were simulated 100 times; each simulation was 100 years in duration. In each case, the initial number of adults (animals 2 or more years of age) was set equal to the carrying capacity and evenly distributed among age classes. Initial numbers of 0-year-olds and 1-year-olds were set at a half and a quarter, respectively, of the number of adult females.

The question of what constitutes preservation is "the most crucial and least addressed" issue in conservation biology: "Does a 95% probability of persistence for 100 years make extinction sufficiently remote or all too immanent?" (Shaffer 1987:81,84). I advocate planning for an extinction risk of less than 1%, and I label "significant" any extinction risk 2% or more.

For each set of 100 runs, the program recorded the population trajectory by sex and age class, the number of runs on which the population went extinct, mean population size in year 100, and other summary statistics.

INPUT CONDITIONS

The main factors of concern were area of habitat and level of immigration. Simulations were run with habitat areas as small as 200 km^2 and in increments of 200 km^2 until extinction risk declined to less than 2%. Four levels of immigration were considered. The first level depicted no wildlife movement corridor (no immigration). The second and third levels reflected a marginal corridor, allowing immigration of one or two males per decade, respectively. The fourth level of immigration was three males plus one female per decade. These levels reflect the finding that about 80% of juvenile males, but only about 25% of juvenile females, dispersed out of their natal mountain range, often crossing inhospitable desert habitat to reach another range (Ashman et al. 1983).

For each combination of habitat area and level of immigration, simulations were run under many combinations of estimates for life history and environmental attributes (Table 1). We have poor estimates for some of these parameters (for example, male and female equilibrium densities, juvenile survival rates) and some parameters may vary geographically, so I used many combinations initially. A smaller subset was obtained by dropping values that produced unrealistic outcomes and variables that did not influence the results.

Litter size. Mean litter size (Table 1) was based on reports of Robinette et al. (1961), Ashman et al. (1983), and Anderson's (1983:34) compilation of data from 407 litters. In the simulations, up to 40% of the 2-year-old females bred each year and no kittens or yearling females bore young, based on minimum and mean ages of primiparous females of 25 and 32 months (Ashman et al. 1983). Because the mean interval between births (except when a litter dies) is usually about 24 months (Hornocker 1970:16, Robinette et al. 1961:215), the model excluded from breeding those females with surviving litters from the previous year. The model assumed that a female whose litter dies comes into estrus and breeds the next year (Hornocker 1970:16; Seidensticker et al. 1973:56; Eaton & Velander 1977:65).

Table 1. Input states for biological parameters used in simulating population dynamics of cougars.

Parameter	*Possible States*
Mean litter size	2.4[a]
	2.8
	3.2[b]
Juvenile[c] survival	0.55 (0.50)[d]
	0.65 (0.60)
	0.75 (0.70)
Adult[c] survival	0.65[a]
	0.75
	0.85
Carrying capacity (breeding adults per 100 km^2)	Sex ratio of 2 femles per male:
	0.4 females, 0.2 males
	0.6 females, 0.3 males
	0.8 females, 0.4 males
	1.0 females, 0.5 males
	1.2 females, 0.6 males
	Sex ratio of 3–4 females per male:
	0.8 females, 0.2 males
	1.2 females, 0.4 males
	Sex ratio near unity:
	0.4 females, 0.4 males
	0.8 females, 0.6 males
	None (constant carrying capacity)
Severity of catastrophe (loss of carrying capacity)	20% in years 25–27, 50–53, 75–77
	40% in years 25–27, 50–53, 75–77[f]

[a] This value was dismissed because it produced unrealistically low population sizes even when used in concert with optimistic estimates for other variables. See first section of Results.
[b] This value was dismissed because it produced extinction probabilities that did not differ from those under a mean litter size of 2.8, and this value is best supported by field studies. See first section of Results.
[c] 0- and 1-year olds of both sexes, and 2-year-old males.
[d] Survival of 1-year-old males indicated in parentheses.
[e] Females ≥2 years old and males ≥3 years old.
[f] This value was dismissed because extinction probabilities varied only trivially from the 20% case. See first section of Results.

Juvenile survival rates. There are few estimates of survival of 0-year-olds. Comparing mean litter sizes near birth and at 12 months (not the same litters followed through time) Ashman et al. (1983) suggested a value of 0.78. Similar data in Robinette et al. (1961:213, inferring age from weight) suggested a survival rate of 0.73. To the extent that entire litters died, this is a high estimate (Robinette et al. 1961:213); it is also higher than the adult survival rate reported by Lindzey et al. (1988). Survival rates of African felid cubs (lion, cheetah) are about 0.50 (Schaller 1972:191,300). Preliminary analy-

sis of 172 cougar-months of telemetry data (0- and 1-year-olds combined) suggests an annual survival rate for cougar cubs of 0.48 (Beier, unpublished data). Hemker et al. (1986) reported a survival rate of 72% for cubs between 3 and 10 months of age in an area of extremely low cougar density (gross density of 0.5 cougars per 100 km^2); this rate may reflect density-dependent enhancement of survival rates at low density. In any event, if additional mortality during 0–3 months of age is considered, 0.75 is probably a high estimate and was used as the highest estimate in the simulations.

There are no published estimates of survival of 1-year-olds. Hemker et al. (1986) reported a survival rate of 92% for cubs from 10 months to dispersal at 16–19 months, from the same low-density population. This figure ignores higher post-dispersal mortality (Hornocker 1970:18). Lacking better evidence, I set yearling survival rates equal to 0-year-old survival rates. In the simulations kittens died when orphaned in the year of birth, but kittens orphaned in the year after birth had the same survival rate as nonorphans.

Adult survival rate. I used adult survival rates of 65% (Robinette et al. 1977:123, Ashman et al. 1983), 75% (Lindzey et al. 1988), and 85% (Anderson et al. 1989).

Longevity. A maximum longevity of 12 years was used in all simulations. The longest lifespan reported for a wild cougar is 13–15 years (Hopkins 1989:23); I found no other reports of wild cougars living past 12 years of age. Extreme longevities for captive cougars are 12, 15, and 18 years (Young 1946:59), and 12 and 19 years (Eaton & Velander 1977:56). My preliminary analyses showed that risk of extinction decreased only slightly as maximum longevity increased past 12 years, especially in the critical right tail (Figs. 3–6) of the extinction curve.

Carrying capacity. Although they are not territorial, social intolerance among adult females is thought to regulate their density, whereas territoriality among males separately regulates male density (Seidensticker et al. 1973). Apparently female density is calibrated to vegetation, topography, and prey availability, whereas males compete for access to females (Seidensticker et al. 1973:59,56). To model density-dependent survival rates, separate estimates of carrying capacity for males and females were needed.

Estimates of densities for male and female adult cougars vary widely (Hornocker 1970; Seidensticker et al. 1973; Sitton & Wallen 1976; Currier et al. 1977; Shaw 1977; Hemker et al. 1984; Logan et al. 1986; Neal et al. 1987; Hopkins 1989). Because many study sites were selected because of expected high cougar density, some reported densities are atypically high. Also, not all studies reported how many of these adults were nonbreeding transients as described by Hornocker (1970) and Seidensticker et al. (1973).

In light of these uncertainties, I ran the model under a variety of carrying capacities (Table 1). Because most studies (excluding male-biased summaries of hunting returns) report a 2:1 ratio of breeding adults (females: males) (Seidensticker et al. 1973:17, first 3 years; Currier et al. 1977; Ashman et al. 1983; Murphy 1983; Hemker et al.1984; Logan et al. 1986; Neal et al. 1987; Hopkins 1989:23), most simulations used this ratio between carrying capacities for males and females. However, other adult sex ratios have been reported, for example, 3:1 (Currier et al. 1977; Shaw 1977; Quigley et al. 1989; M. Jalkotzy and I. Ross, Calgary, Alberta, unpublished data), 1.3:1 (Hornocker 1970:15), and 1:1 (Seidensticker et al. 1973:17, last 3 years; Hopkins 1981). Therefore I also used similar ratios (Table 1).

I excluded high densities due to winter concentration. The markedly lower gross density of 0.4/100 km^2 reported by Hemker et al. (1984) and the markedly higher adult density of 3/100 km^2 reported by Neal et al. (1987) were also excluded as outliers which may deviate from the actual long-term carrying capacity.

Catastrophic reductions in carrying capacity. On each run, simulated carrying capacity decreased by either 0%, 20%, or 40% during years 26–28, years 51–53, and years 76–78. This modeled prey die-offs due to droughts or severe winters.

DENSITY-DEPENDENCE IN FECUNDITY

Because the gestation period is only 92 days and neonates weigh only 500 grams (Anderson 1983:33–34), cougar pregnancy is relatively cheap; therefore simulated litter sizes were independent of density and maternal age. When the simulated number of adult females was less than carrying capacity, all females over 2 years old (except those with a surviving litter from the previous year) and 40% of 2-year-old females (Ashman et al. 1983) bore litters. The program allowed females in excess of carrying capacity to breed with probability equal to 0.20, and assigned the youngest females to nonbreeding status, reflecting the inhibition of reproduction in young females until home range establishment (Seidensticker et al. 1973).

The probability of a female breeding was inversely density-dependent when numbers of breeding males were below the carrying capacity for adult males. When there were vacant male territories, the proportion of adult females that were bred was reduced by a factor of

$$\frac{KM - \#AdM}{KM} * 1.15^{KM - \#AdM},$$

where KM = carrying capacity for breeding males and #AdM = number of adult males. Under this expression, each adult male increases his home range size by 15% for each "deficit male"; thus the effect is very mild ex-

cept at very small population sizes; for example, when KM = 5 and #AdM = 4, 92% (not 80%) of the females are bred.

DENSITY DEPENDENCE IN SURVIVAL RATES

In preliminary analyses, some simulations were run without any density dependence in survival rates; resulting extinction rates were about ten times higher than those produced using density-dependent survival rates for all ages. Other simulations were run with mild density dependence in juvenile survival rates (Fig. 1, curve A) and density independent adult survival rates, producing extinction rates about five times higher than when survival rates for all ages were density-dependent. In simulations lacking density-dependent survival rates, the mean number of adults in year 100 (in surviving populations) far exceeded carrying capacity. Because density independence produced such unrealistic ending population sizes, I ran all remaining simulations with density-dependent survival rates (Fig. 1, Table 2).

In the model, density dependence operated most strongly on 0- and 1-year-olds, whose survival rates depended on the number of adult females; survival of 1-year-old males also varied with the number of adult

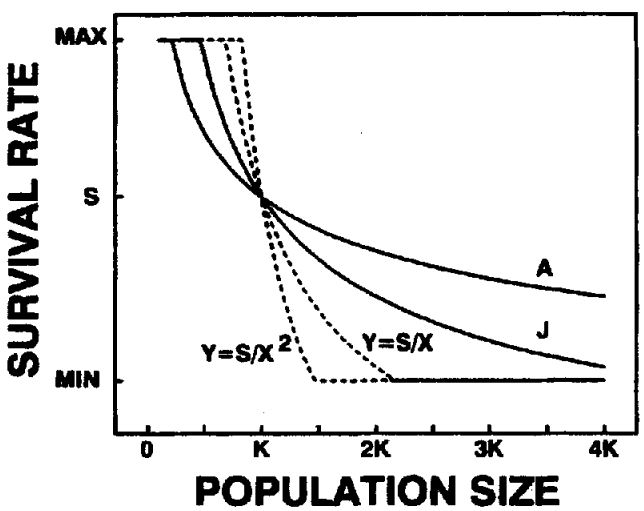

Figure 1. Density-dependent functions relating survival rates to population density. Lines A and J, respectively, illustrate the adult and juvenile survival functions (Table 2) used in all simulations illustrated in Figures 3–7. Simulations using stronger density-dependent functions (dashed lines) did not change the risk of extinction. In all simulations the juvenile survival function was one line steeper than the adult survival function. K = Carrying capacity for the appropriate sex. Max = 0.95 (adults) or 0.9 (juveniles). Min = 0.5 (adults) or 0.3 (juveniles). S = Survival rate at carrying capacity.

Table 2. Equations used to create density-dependence in cougar survival rates. S = the 12-month survival rate at carrying capacity; KF and KM = carrying capacity for breeding females and males respectively; #AdFemales and #AdMales = number of ≥2-year-old females and males, respectively.

Age	*Sex*	*Expression for Density-Dependent Survival Rate*[a]
0	both	$S * (KF/\#AdFemales)^{0.5}$
1	F	$S * (KF/\#AdFemales)^{0.5}$
	M	Minimum of: $S * (KF/\#AdFemales)^{0.5}$ or $S * (KF/\#AdFemales)^{0.5} * (KM/\#AdMales)^{0.5}$
2	F	$S * (KF/\#AdFemales)^{0.5}$
	M	$S * (KM/\#AdMales)^{0.5}$
3+	F	$S * (KF/\#AdFemales)^{0.25}$
	M	$S * (KM/\#AdMales)^{0.25}$

[a] *To avoid unrealistic results that the above expressions yield under certain conditions (such as when a divisor approaches or equals zero), the program truncated all survival rates to values between 0.3 and 0.9 for animals under 3 years of age, and between 0.5 and 0.95 for adults.*

males, reflecting density-dependent mortality of young males during dispersal. Density-dependence was relatively mild for animals less than 2 years old. There is no empirical data to support these particular functions (Table 2); they were chosen for computational simplicity. In light of the markedly changed outcomes when density dependence was added to the model (above), I tested the model using more severe density-dependent functions. Neither risk of extinction nor ending population size varied among the functions illustrated in Figure 1.

STOCHASTIC VARIATION

Most simulation models introduce stochastic variation into survival rates by randomly selecting a rate from a normal distribution and then multiplying this rate by the number of individuals in an age-sex class. When there are only one or two animals in a sex-age class, this approach introduces rounding errors that increase the survival rate to near 100% and, ironically, eliminate stochastic variation (Beier, unpublished data). To avoid this problem, the model applied the appropriate probability to each individual animal in the population. For example, if the survival rate for yearling males was 0.60 and there were two yearling males in a given year, all outcomes (2, 1, or 0 survivors) were possible (with binomial probabilities 0.36, 0.48, and 0.16, respectively) in a biologically realistic manner.

Similar procedures introduced stochasticity into primary sex ratio, litter sizes, and immigration rates. Each newborn had a 50% chance of being male. Each litter had two, three, or four cubs with probabilities appropriate to the specified mean value. Each year one male or one female immigrated with the appropriate probability, and the immigrant was assigned to the 1-year,

2-year, or 3-year age class with probability equal to 0.3, 0.5, and 0.2, respectively.

Field Work in the Santa Ana Mountains

The cougar population in the Santa Ana Mountain Range of southern California consists of about twenty adults on about 2070 km^2 of habitat (Fig. 2) (Beier & Barrett 1992*b*). The surrounding urban areas do not offer even marginal cougar habitat. About 1270 km^2 of this habitat (61%) is protected from urban uses, primarily within lands owned by the U.S. Forest Service and U.S. Navy (Table 3). Of the protected land, about 1114 km^2 forms a contiguous block; if all private lands were developed,

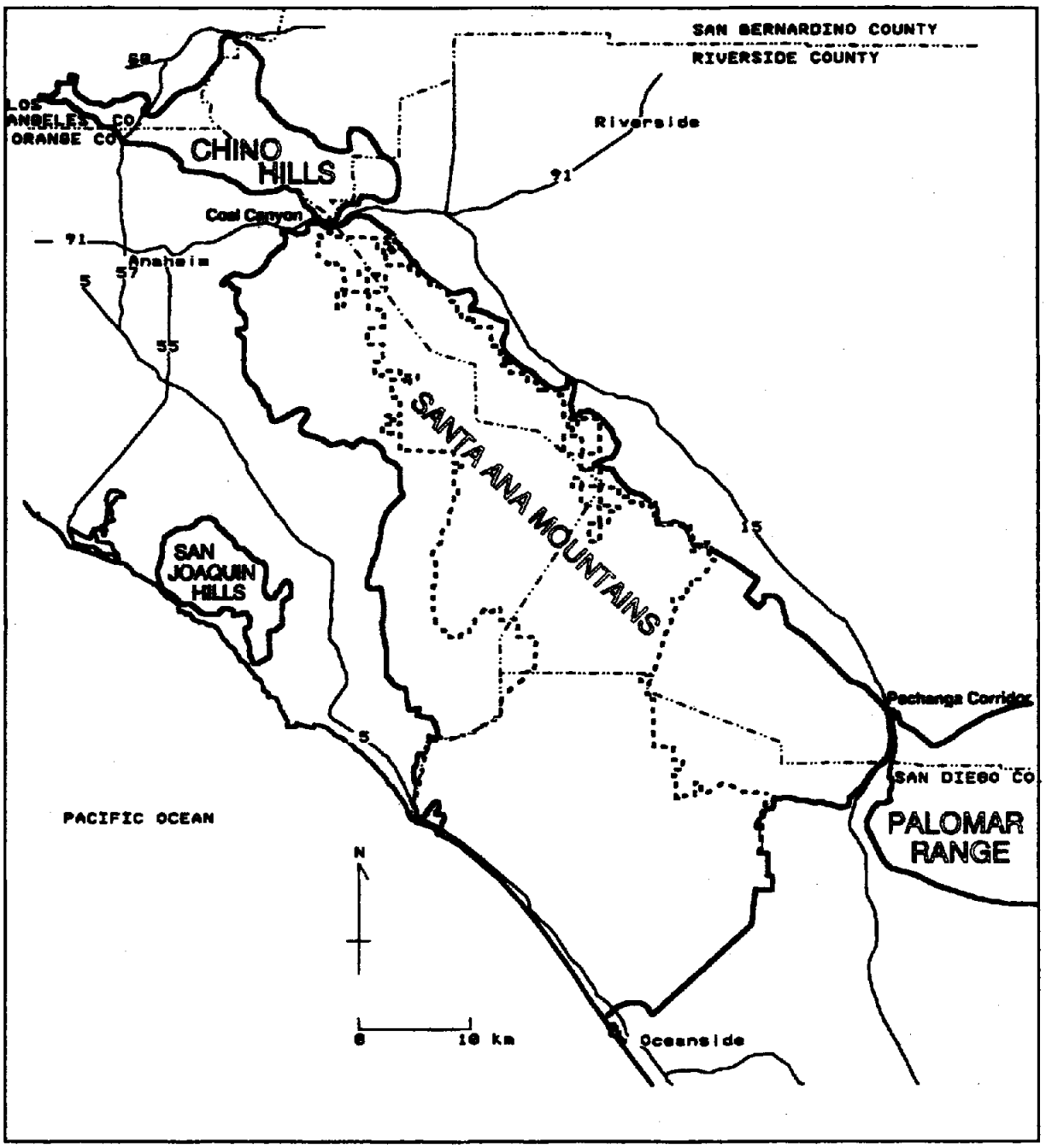

Figure 2. The heavy solid line encloses three areas: 2070 km^2 of cougar habitat in the Santa Ana Mountain Range (including the Chino Hills); 75 km^2 of suitable habitat in the San Joaquin Hills (recently extinct); and (east of Highway 15) a portion of the habitat in the adjacent Palomar Range. The heavy dashed line encloses 1114 km^2 of protected and connected parcels (Table 3). All roads shown are 6- to 10-lane freeways.

Table 3. Area in hectares of protected lands contained within cougar habitat in the Santa Ana Mountain Range, California.

Ownership and Parcel Name	*Areas Forming a Large Contiguous Block*	*Areas Surrounded by Unprotected Land*
Federal		
Cleveland National Forest	53,604[a]	
Cleveland National Forest (6 parcels)		626
Camp Pendleton	49,292[b]	
Fallbrook Naval Weapons Station	3,099	
Bureau of Land Management (7 parcels)		550
Bureau of Land Management (1 parcel)	364	
State		
Chino Hills State Park		5,059
San Diego State University Field Station		1,805[c]
Dept Fish & Game Coal Canyon Preserve	385	
Orange County Parks		
Caspers	3,085	
Limestone Canyon		2,169[d]
O'Neill		805
Whiting Ranch		632
Irvine		193
Wagon Wheel		178
Santiago Oaks		142
Private Reserves		
Santa Rosa Plateau Preserve		2,803[e]
National Audubon Society Starr Ranch	1,578	
Rancho Mission Viejo Conservancy		486
Total	111,407	15,448

[a] *Excludes private inholdings.*
[b] *Includes land leased to San Onofre Beach State Park; excludes 1700 hectares in urban use and airfield; includes some severely affected bombing ranges that may not be suitable habitat.*
[c] *Includes 510 hectares of Bureau of Land Management land administered by the field station.*
[d] *Expected to be transferred to county from private ownership.*
[e] *Administered by The Nature Conservancy (TNC); includes lands owned by TNC, State of California, and Riverside County.*

the other 154 km^2 of protected land would be isolated into fragments unusable by cougars.

The six counties of southern California contain 5% of the U.S. human population. The human population of the eastern half of Orange County and the western sixth of Riverside County is projected to grow from 1.15 million in 1987 to 2.09 million by 2010 (Anonymous 1989). Most of this growth is expected to occur in tract homes built in privately-owned open spaces, including most of the best cougar habitat. In addition to outright habitat destruction, some wildlands are lost to the cougar population because they become isolated by freeways and other development. For example, after urbanization isolated a 75-km^2 fragment of cougar habitat (Fig. 2, San Joaquin Hills) in the late 1970s, cougars became extinct there by June 1990 (Beier & Barrett 1990*a*).

In early 1988, field work began in the southern half of the range, focusing on seven telemetered adult females. In January 1988, one such female had 3-month-old triplets and a second had a single yearling cub at heel. After the death of a mature male cougar in February 1988, there was no additional reproductive activity and no sign of a breeding male for over 12 months (Padley 1990:40–43). When two young males established themselves as breeders in early 1989, their tracks and vocalizations were obvious. In April 1989 we heard copulatory vocalizations involving four telemetered females, and that summer six of the seven females bore cubs (Padley 1990). The presumed sires of these litters (two adult males subsequently captured and radio-tagged) were both 2 years old at the time they became breeders. Therefore, all evidence suggests that there was no adult male and no reproduction in the southern half of the range for a full year.

In 1989 the study expanded to include the entire mountain range. We intensified our efforts to collar predispersing animals, and four times per month we selected a focal animal whose location was determined every 15 minutes from 1 hour before sunset until 1 hour after sunrise. This research has focused on (1) identification of existing or potential corridors for immigration into the population as a whole; (2) identification of lands within the mountain range that connect nearly-isolated patches of habitat; and (3) documentation of the travel paths used by cougars, especially dispersing animals, and especially paths between areas designated as permanent open space. If protected, such paths can be expected to become corridors as future human activities affect the adjacent habitat.

Results

Rejection of Unrealistic or Uninformative Parameter Values

To reduce the results to a digestible mass, I first rejected parameter values that produced unrealistic outcomes or that did not influence the results. For example, the mean number of adults in year 100 was 70–80% of carrying capacity whenever adult survivorship equalled 0.65, even with a habitat area of 3000 km^2 and the highest estimates for juvenile survival rate, mean litter size, and carrying capacity. If carrying capacity is ever to be observable in nature, it should be so under these conditions, so I excluded the adult survival rate of 0.65 from consideration.

Similarly, because a mean litter size of 2.4 tended to produce ending population sizes about 15% below carrying capacity, this litter size was excluded. Extinction rates decreased only trivially when mean litter size increased from 2.8 to 3.2. Because available data best support a mean litter size of 2.8, the mean litter size of 3.2 was also excluded from further consideration. Finally, extinction risk increased only trivially as the severity of the catastrophe (temporary loss of carrying capacity) increased from 0% to 20% to 40%. All results reported herein used the 20% reduction.

Influence of Habitat Area and Level of Immigration

The main factors of interest were those under human control, i.e., area of habitat and the presence (or absence) of a corridor allowing various levels of immigration. As expected, both factors influenced the probability of extinction (Figs. 3–5).

Despite variation in model predictions due to uncertainty in biological parameters, 98% or more of simulated populations persisted for 100 years when there was 2200 km^2 or more of habitat available, except under the most pessimistic estimates of biological parameters (carrying capacity of 0.4 or fewer adult females and 0.2 adult males per 100 km^2, in concert with adult survivorship of 0.75 or less).

As expected, the probability of extinction increased as area of habitat decreased. With only 1000 km^2 of habitat and no immigration, simulated populations had 98% persistence only under the most optimistic estimates of biological parameters (carrying capacities of 1.0 or more adult females and 0.5 adult males per 100 km^2, in concert with adult survivorship of 0.85 or more and juvenile survivorship of 0.65 or more). In the absence of an immigration corridor, therefore, the critically small habitat area lies between 1000 and 2200 km^2. Within this range, the critical size depends on demographic parameters (next section).

Immigration improved the probability of survival at surprisingly low levels—as low as one male per decade. For any given combination of biological parameter estimates, the critical habitat area was 200–600 km^2 smaller with an immigration corridor than without. Immigration had no influence on the mean size of the adult population in year 100 for populations that survived.

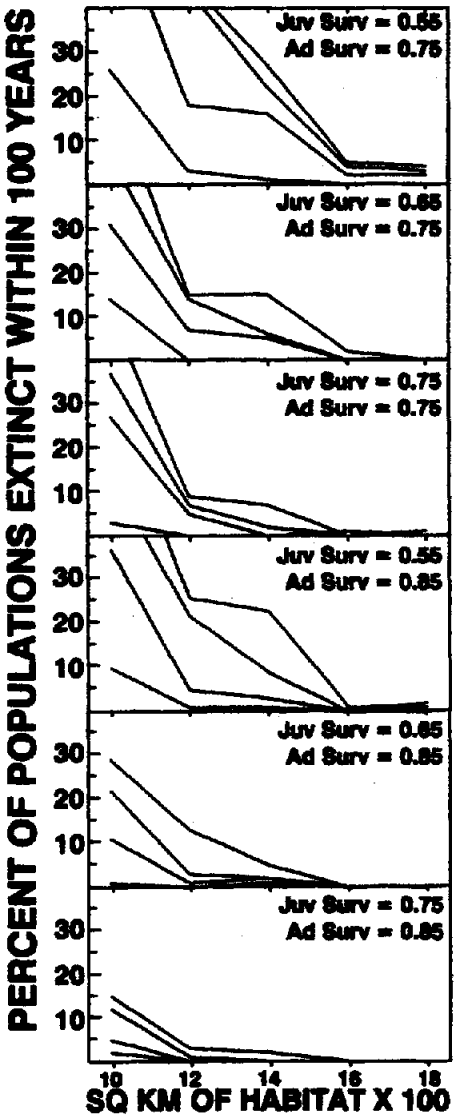

Figure 3. Effect of habitat area and immigration on cougar population persistence, given a carrying capacity of 0.6 breeding adult females and 0.3 breeding adult males per 100 km^2. In each graph the top through bottom lines give the percent of simulated populations that went extinct within 100 years when the numbers of immigrants per decade were 0, 1 male, 2 males, or 3 males and 1 female, respectively. Juv Surv (juvenile survival rate) and Ad Surv (adult survival rate) are defined in Table 1.

Influence of Biological Parameters

Predictions were sensitive to all of the biological parameters, especially the estimates of carrying capacity (Figs.

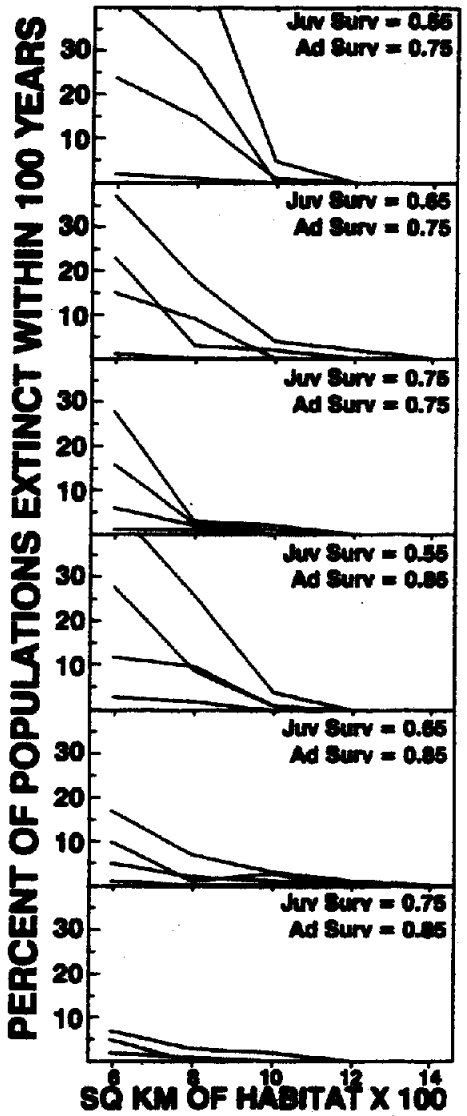

Figure 4. Effect of habitat area and immigration on cougar population persistence, given a carrying capacity of 1.2 breeding adult females and 0.4 breeding adult males per 100 km². In each graph the top through bottom lines give the percent of simulated populations that went extinct within 100 years when the numbers of immigrants per decade were 0, 1 male, 2 males, or 3 males and 1 female, respectively. Juv Surv (juvenile survival rate) and Ad Surv (adult survival rate) are defined in Table 1.

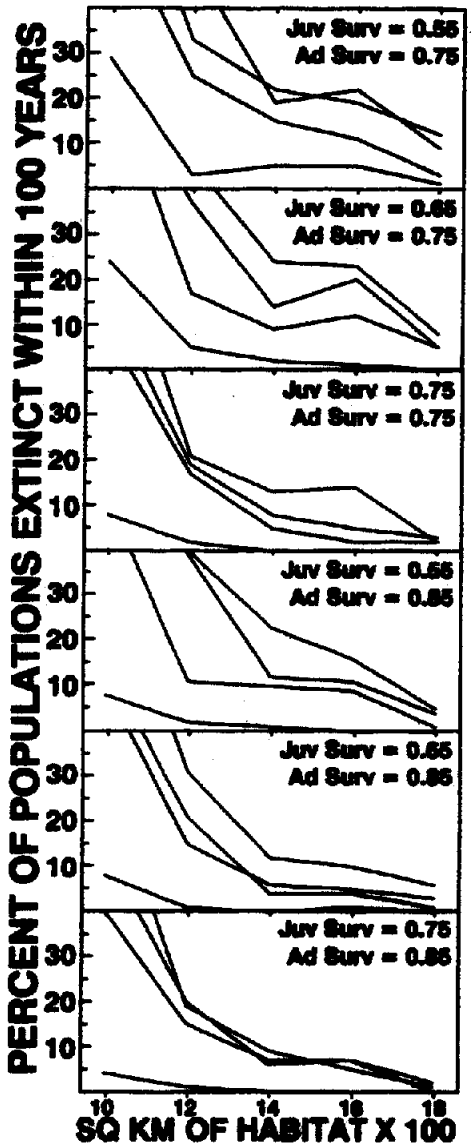

Figure 5. Effect of habitat area and immigration on cougar population persistence, given a carrying capacity of 0.4 breeding adult females and 0.4 breeding adult males per 100 km². In each graph the top through bottom lines give the percent of simulated populations that went extinct within 100 years when the numbers of immigrants per decade were 0, 1 male, 2 males, or 3 males and 1 female, respectively. Juv Surv (juvenile survival rate) and Ad Surv (adult survival rate) are defined in Table 1.

3–5; graphs for carrying capacities listed in Table 1 but not illustrated herein are available on request). Both juvenile and adult survivorship values also had important influences on model results (Figs. 3–5).

The adult sex ratio (the ratio of carrying capacity for females to that for males) was also important. When the adult sex ratio was skewed toward females (Figs. 3–4), immigration of one or two males per decade had the most pronounced rescue effects. This was most evident with a highly skewed sex ratio (Fig. 4). In contrast, immigration of one or two males had a relatively muted rescue effect on populations with equal sex ratios. These populations, however, benefited dramatically from a corridor that allowed four immigrants (including one female) per decade (Fig. 5).

Population Trajectory

For populations with low extinction risk, the population trajectory on a run of 100 years fluctuated near carrying capacity (for example, see Fig. 6A). Despite this relative stability, the age and sex composition of the simulated population showed considerable variation, even when smoothed by taking 5-year running means (Fig. 6B). Surprisingly, most trajectories showed no response to the simulated "catastrophes," despite 20–40% reductions in carrying capacity in years 26–28, 51–53, and 76–78 (see Fig. 6A).

Populations at greater risk of extinction showed even greater demographic instability (Fig. 6C). When the sex ratio was skewed toward females, the most common extinction scenario was loss of breeding males at a time when no male cubs survived.

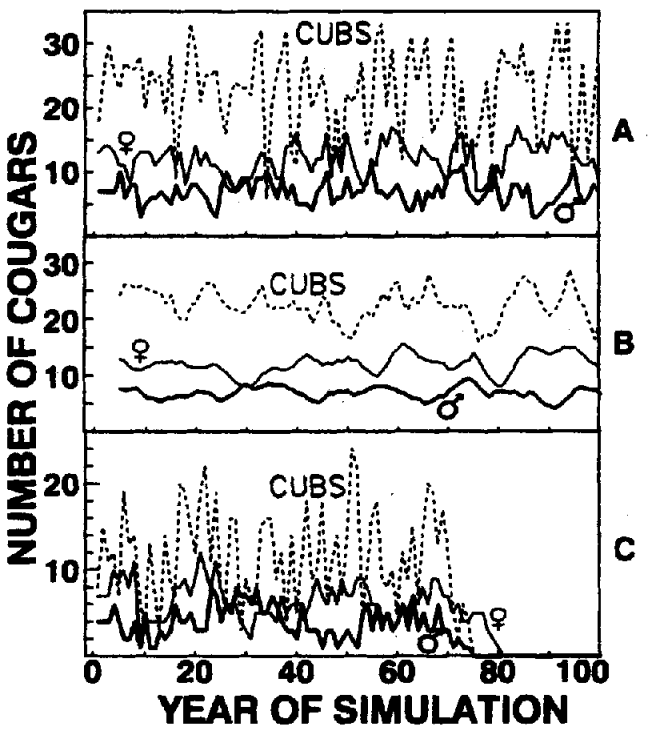

Figure 6. Trajectories of simulated cougar populations with juvenile survivorship = 0.55, adult survivorship = 0.85, carrying capacity = 0.6 female and 0.3 male adults/100 km², no immigration, and a 20% loss of carrying capacity lasting 3 years every 25 years. **A.** *With 2200 km² of habitat, all populations persisted. As in this typical trajectory, age and sex composition of the population varied markedly over time.* **B.** *Five-year running means from panel A, showing that even with five years of observation, population demographics varied considerably.* **C.** *With 1200 km² of habitat, demographic instability increased and 25% of the simulated populations went extinct. As in this typical trajectory, extinction was usually initiated by loss of adult males.*

Applying the Population Model in the Santa Ana Mountains

Given the best local estimates for survivorship rates and carrying capacity, the model predicted that the cougar population in the Santa Ana Mountains is clearly endangered. Although there is less than 3% risk of extinction in the next 100 years with the current 2070 km² of habitat and no immigration, every parcel of habitat lost increases the risk of extinction (Fig. 7). If the population is confined to the 1114-km² block of contiguous protected lands, extinction risk rises to about 33%; an immigration corridor, necessarily including some lands now in private ownership, would greatly improve the prognosis.

Inter-Range Corridor

The only population that can potentially supply immigrants to the cougar population in the Santa Ana Mountain Range is that in the Palomar Range. Interstate Highway 15 and the urban developments along it present the most formidable barrier to wildlife movements between these ranges. A bridged river provides the only safe undercrossing of Highway 15, and there is only one potential corridor between the Palomar range and this un-

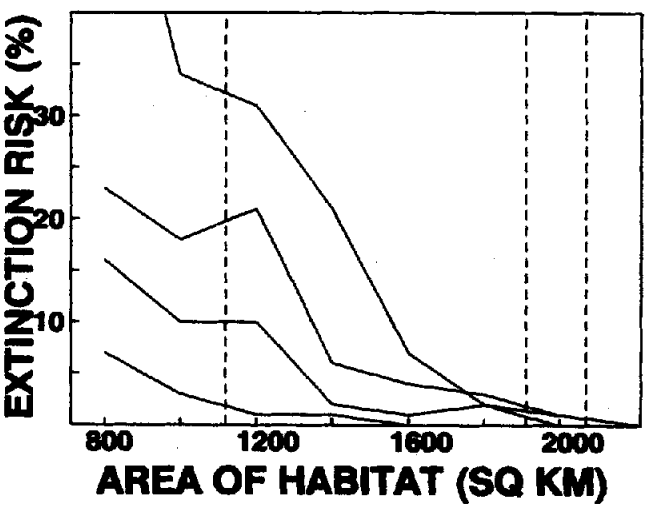

Figure 7. Extinction risk for the cougar population in the Santa Ana Mountains. The top through bottom lines give the percent of simulated populations that went extinct within 100 years when the numbers of immigrants per decade were 0, 1 male, 2 males, or 3 males and 1 female, respectively. From right to left, the vertical lines indicate total available habitat in 1992, total available habitat if the Chino Hills is lost, and total area of the protected and interconnected habitat block. Simulations were run with the following estimates: carrying capacity = 0.7 adult females and 0.35 breeding adult males/100 km², juvenile survivorship = 0.50, and adult survivorship = 0.80.

derpass (Beier & Barrett 1990*b*, 1992*b*). The potential corridor is about 4.5 km long and follows an intermitent watercourse (Pechanga Creek) and the wooded ridges south of this creek (Fig. 2: Pechanga Corridor). Although creeks tend to be natural travel corridors, the utility of lower Pechanga Creek as a corridor is compromised by night lighting from adjacent tract homes, streambed degradation by recent construction, a concrete embankment on portions of the north bank, and removal of woody vegetation for golf courses on the south bank. There are also several residences, an abandoned quarry, a two-lane paved road, and a golf course in the wooded ridges south of the creek.

Although no single one of these obstacles occludes the corridor, collectively they probably prevent immigration by mountain lions into the Santa Ana Range. Field evidence suggests that the corridor *almost* works. On 3 August 1990, a dispersing male mountain lion failed to negotiate the corridor, wandering into a rural residential area where he was captured by wardens. On 29 October 1990, another cougar was killed on I-15 just south of the bridged underpass. On 21 January 1992, a telemetered dispersing male successfully used the corridor to emigrate from the Santa Ana Mountains to the Palomar Range. However, he avoided the bridged undercrossing and the lower 4 kilometers of Pechanga Creek, and was lucky not to have been struck crossing I-15. The pattern of topography and habitat degradation makes it even less likely that a west-bound immigrant would successfully find the undercrossing (Beier & Barrett 1992*b*).

Intra-Range Corridors and Travel Paths

Our data on cougar travel paths (including detailed observations on dispersal routes) have identified specific areas that now prevent intra-range fragmentation. The most threatened link is that connecting the Chino Hills (about 150 km^2 of cougar habitat, including a 57-km^2 state park) to the rest of the mountain range (Fig. 2: Coal Canyon Corridor). State Route 91 and adjacent developments present the greatest obstacle to movement between these areas. The Coal Canyon corridor provides an excellent natural travel route to the freeway and two usable passageways under it (Beier & Barrett 1990*a*, 1991). At least two (probably three) cougars successfully used the Coal Canyon corridor and its underpasses to cross Route 91 into the Chino Hills. In addition, one telemetered cougar was struck by a vehicle attempting to cross the freeway at the mouth of Coal Canyon. One telemetered male dispersed from over 60 kilometers away to establish a home range that now straddles Route 91; he has used the Coal Canyon corridor to cross the freeway at least 16 times during May–December 1991. A pending proposal to build 1500 homes on a 150-ha parcel in Coal Canyon would sever this link, eliminating cougars from the Chino Hills.

Discussion

Population Model

In the absence of immigration, a habitat area of 1000–2200 km^2 (depending on the demographics of a particular population) is needed to support a cougar population with a 98% or more probability of persistence for 100 years; these minimum areas would hold about 15–20 adult cougars. These areas are far smaller than the area assumed necessary to support a population of large carnivores for several centuries without loss of genetic variability (Franklin 1980). It must therefore be stressed that provision of the minimum areas suggested by this model will not guarantee long-term survival of a population. In cases where no immigration corridor is provided, populations confined to such small areas will require monitoring and perhaps periodic intervention—such as introduction of new genetic material through translocation.

The attempt to eliminate some of the values for biological parameters (Table 1) yielded two biological insights. First, natural catastrophes of moderate severity (up to 40% loss of carrying capacity), frequency (every 25 years), and duration (3 years) appear unimportant to cougar population persistence. Shaffer (1983) similarly concluded that catastrophes were relatively unimportant to the population dynamics of grizzly bears. Future modeling efforts can investigate whether this surprising result also holds for disturbances of greater severity and frequency. Second, because adult survivorship of 0.65 or less prevented simulated populations from reaching carrying capacity, management of small populations should include attempts to control factors—such as depredation permits, construction of road undercrossings—that might influence adult survival rate.

These minimum areas and the number of cougars present therein are comparable to the minimum area and number suggested by Shaffer (1983) for grizzly bears. Both my model and Shaffer's incorporated density dependence and produced minimum areas and populations much smaller than predicted by analytic models (see Belovsky 1987) or simulation models lacking density dependence (Captive Breeding Specialists Group 1989; Ginzburg et al. 1990; this paper, Methods).

Ginzburg et al. (1990) advocated use of density-independent models to generate conservative estimates of extinction risk when it is highly sensitive to the shape of the density-dependent function (assuming the true function is unknown). However, to the extent that a density-independent analysis misclassifies viable populations as "hopelessly" small, it can be a *less* conservative approach. Furthermore, extinction risk in my model was not sensitive to the shape of the density-dependent function (Fig. 1). Therefore I chose a density dependent model because it is more realistic. In general, "all natural populations are ... influenced by density-dependent

processes" (Begon & Mortimer 1981:162). For cougars in particular, long-term observation in Idaho (Hornocker 1970; Seidensticker et al. 1973; Quigley et al. 1989) and the Ruby Mountains of Nevada (Ashman et al. 1983) show the stability characteristic of populations with density-dependent regulation. The data of Quigley et al. (1989) also suggest that cougar numbers track major long-term changes in carrying capacity (prey abundance). Finally, simulated populations with density-independent survival rates (when they persisted) often had unrealistically high ending densities (see Methods, Density-Dependence in Survival Rates).

If a wildlife movement corridor is available to allow immigration of up to three males and one female per decade, an area as small as 600–1600 km^2 (depending on the demographics of a particular population) can support a cougar population without significant extinction risk in 100 years. Doubtless higher levels of immigration would allow even smaller areas to support cougars. Thus, in areas where isolation or fragmentation of a cougar population appears imminent, protection and enhancement of any remaining corridor is valuable.

The model predicts that south Florida, with 8800 km^2 of occupied range and an adult density of about 0.6 adults per 100 km^2 (Maehr 1990) has adequate habitat for demographic persistence. Captive Breeding Specialists Group (1989), also using a simulation approach, concluded that the Florida population faced a high risk of extinction. These predictions do not necessarily conflict, however, because the CBSG model included extinctions caused by inbreeding effects and excluded enhancement of survival rates when populations were below carrying capacity. In any event, the best panther habitat in Florida is privately owned (Maehr 1990), and rapid agricultural and urban development could soon fragment this habitat into dangerously small parcels. The aggressive protection of habitat and movement corridors is essential to ensure the persistence of Florida panthers.

Two Caveats in Applying this Model

Two caveats apply to this model. First, the model is sensitive to the estimates for carrying capacities for adult males and females. Uncritical use of estimates from a different area or habitat type should be avoided. Because cougars are K-selected, it is probably reasonable to estimate carrying capacity from locally observed densities. However, the great variation in sex and age composition in simulated populations suggests that at least five years of study are needed for reliable estimates (Fig. 6A–B). Also, the carrying capacities used in this model must be estimated by numbers of breeding adult males and females, excluding the pool of nonbreeding male and female transients that characterize most populations (Seidensticker et al. 1973). Categorizing all individuals over 1 year of age as adult breeders would lead to overly optimistic predictions.

Second, survival rates observed for a population occupying a large area will probably decrease as area decreases and degree of isolation increases, due to increased highway mortality (Beier & Barrett 1992*a*) and decreased dispersal success. A conservative approach necessitates use of lower-than-observed survival rates in making projections for a population that has not yet been fragmented or isolated.

Application to the Santa Ana Mountain Range: Site-Specific Data along with Model Conclusions Can Save Land

If survival of this population is a goal, the model yields several clear conclusions (Fig. 7). Developments that isolate or destroy large tracts of habitat should be avoided. A corridor for immigration is of paramount importance. Within the mountain range, corridors are also needed to interconnect the protected parcels (Table 3).

Unfortunately, these conclusions alone have little power to save land in the prodevelopment political climate of southern California. For example, although the admonition to "avoid destroying large tracts" can be implemented without additional data, few planning decisions involve tracts that are "large" relative to the habitat needed to support a cougar population. The other conclusions cannot be heeded without additional data, especially on the location of movement corridors.

Field data suggest that habitat degradation probably prevents any regular inflow via the last potential corridor for immigration (Fig. 2: Pechanga Corridor). Except for the 15-year-old freeway, the obstacles to the Pechanga Corridor are less than 5 years old. If a regional, spatially-explicit land-use plan had been in place in 1986, the importance of this corridor would have been obvious and the obstacles preventable. Strict protection of the remaining habitat and additional habitat modification and restoration will now be necessary if the Pechanga Corridor is to function (Beier & Barrett 1992*b*). The Nature Conservancy is actively interested in taking such steps but faces an uphill struggle.

Our work has also spotlighted a critical corridor necessary to prevent intra-range fragmentation (Fig. 2: Coal Canyon). The City of Anaheim is now considering approval of a housing project that would destroy this corridor. Our documentation of both the importance and use of this corridor should result in a scaled-back project that leaves the corridor intact. The population model convincingly predicts that loss of this corridor would guarantee the extinction of cougars from the 150 km^2 of habitat north of the freeway, reducing by 7.5% the total habitat available to our population and pushing the population leftward to the steeply rising part of the risk curve (Fig. 7). The field work shows that the corridor is in fact used. Thus the model and the field work

together may provide sufficient documentation to protect this corridor; certainly neither could do so alone.

In another application, the model and complementary fieldwork are having limited success in mitigating the effects of a planned freeway; its proposed route slices through a pristine area with no human residents along its 21-kilometer length (Anonymous 1990). This freeway would affect wildlife movement between the bulk of habitat on one side of the road and five smaller areas of dedicated open space on the other side. By all-night radio-tracking of individual focal animals, we have learned the actual routes by which cougars travel among these areas. Although these routes now traverse pristine open space, they will become corridors (at best) as freeway-induced growth removes the adjacent habitat. The transportation agency has responded to this information by planning bridged undercrossings at the five most important crossing points. Previously, the agency had planned on only one of these bridges, and the location was based on geological rather than biological considerations.

Unfortunately, preserving a corridor is not as simple as building a bridge at one point along the corridor. The road-building agency has acknowledged that the freeway, by providing "critical infrastructure to large expanses of open space," will induce massive urban growth (Anonymous 1990:5.13); such growth could sever all of the wildlife corridors, rendering the underpasses pointless. The agency has refused requests to purchase easements to the three most important corridors as mitigation for this induced growth, and it currently faces a lawsuit on this issue.

Conclusions

The cougar is an ideal species for identification of movement corridors for two reasons. First, cougars are an area-sensitive species; therefore a corridor identified on the basis of cougar use will benefit at least one species. Second, a hunting cougar travels an average of 5.5 miles per night (Beier, unpublished data) and thus generates a lot of corridor data in a short time. Collection of comparable data for a less wide-ranging species may take years or generations.

I do not advocate using cougars as a proxy for all species of concern. However, management decisions will not await the conclusion of long-term studies on more sedentary species. In western North America, use of data from telemetered cougars may be the most expedient way to interject biological facts into the analysis of environmental impact and mitigation related to movement corridors. It is certainly a big step above current practices, which include (1) looking at aerial photos in an office and guessing where a corridor ought to be; or (2) labeling the leftover shards of habitat, or the bridge built according to geological constraints, as the "wildlife corridor."

Effective protection of wildlife corridors requires *putting them on the map.* Unfortunately, the current mechanism for such protection is for concerned citizens to detect and force mitigation on each proposed project that threatens the corridor. For the cougar population in the Santa Ana Mountains, this requires monitoring and being prepared to litigate decisions made by five county governments, seventeen municipal governments, two transportation authorities, and the world's largest water district. Because a corridor is only as strong as its weakest link, a single oversight or failure on the part of conservationist volunteers is sufficient to lose the linkage.

Putting wildlife corridors and critical habitat on a planner's map can best be done through a geographic information system covering a *regional* landscape. Although General Plans are mandated for each county in California, such plans are rarely site-specific in any recommendations and are almost never tied to a GIS. Furthermore, as the present case illustrates, a single population or wildland may span several counties, and land-use planning is nonexistent at the regional level.

A spatially-explicit planning tool such as a GIS is essential because it provides the only efficient means of addressing cumulative impact and an accessible forum on which developers, conservationists, and other citizens express their vision of the regional landscape at build-out. Scott et al. (1990) describe a GIS-based approach that would admirably serve a regional plan, and Hollings (1978) gives practical advice that should inspire such planning.

Acknowledgments

This paper is dedicated to agency personnel and biological consultants who risk their jobs to share information that their superiors or clients want to suppress. I thank Dave Bontrager, who first nudged me toward this research in 1989. Field work was supported by California Agricultural Experiment Station Project 4326-MS, California Department of Fish and Game, the County of Orange, and the U.S. Marine Corps. Donna Krucki, Doug Padley, and Duggins Wroe were invaluable in the field. R. H. Barrett of the University of California and T. M. Mansfield of the California Department of Fish and Game provided logistic and moral support that kept the project alive. I thank Reed Noss, David Ehrenfeld, and an anonymous reviewer for constructive comments on the manuscript. I will send a diskette with the simulation program and the Pascal source code for cost of media (IBM-compatible) and postage.

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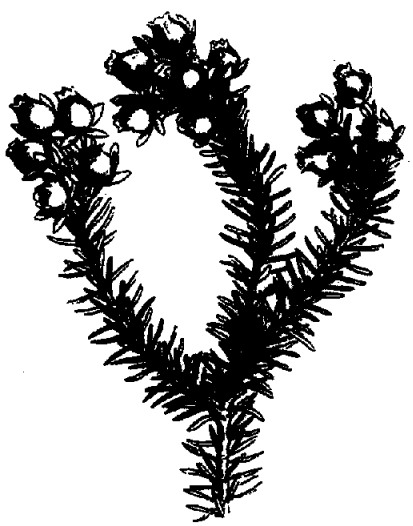


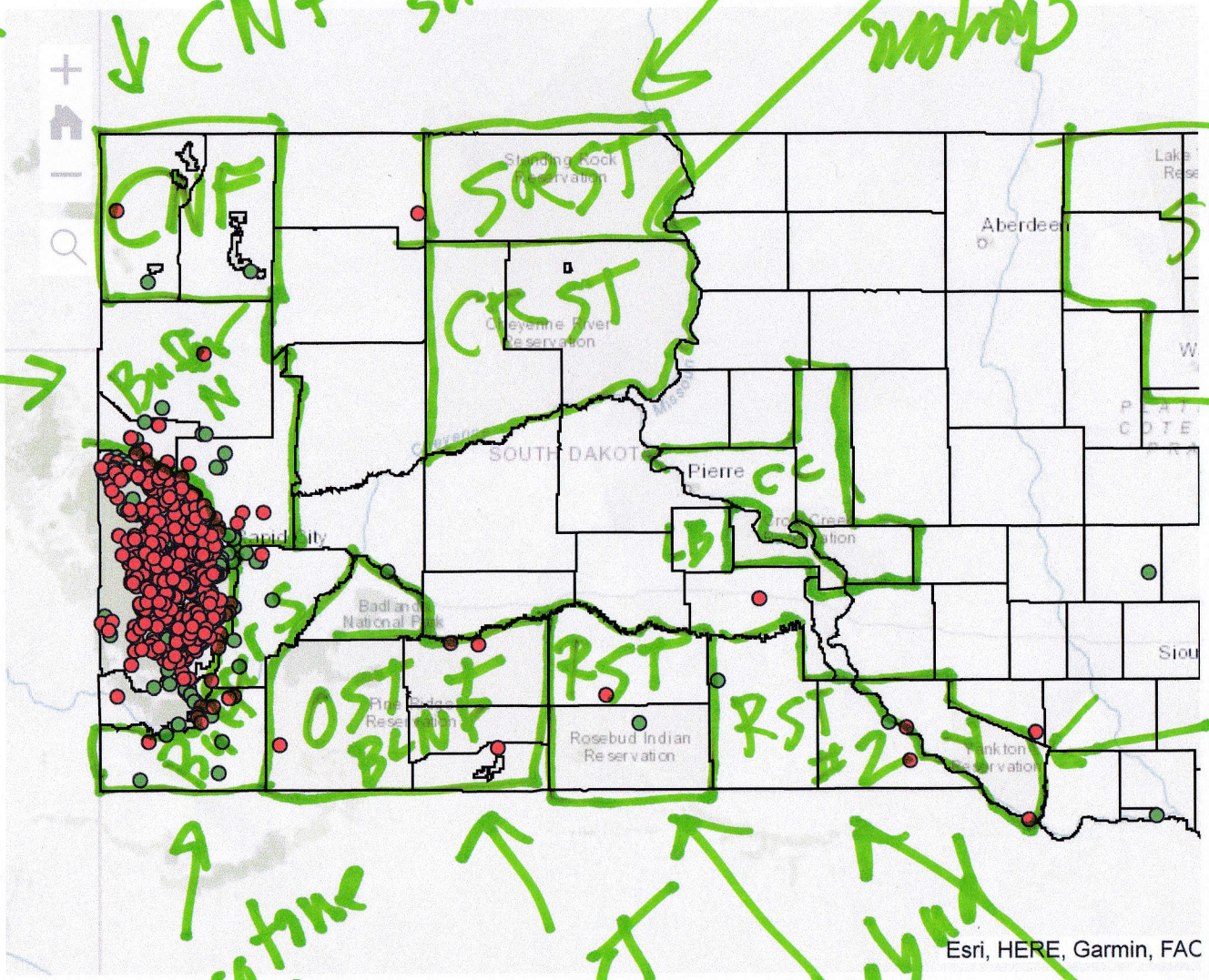
Causes of Mountain Lion (Puma concolor) Mortality in South Dakota (1996-2017)

Legend

Hunter harvest

Public removal

Deer Hunting Units (2014)



824	01/30/2015	M	2-3	SA	Hunter Harvest	Hunter Harvest	9.5 E of Martin	Bennett	Prairie	43.19786	-101.54797
980	06/09/2017	M	2	SA	Incidental Snare	Incidental	6 N of Allen, SD	Bennett	Prairie	43.36512	-101.95530
989	10/27/2017	F	4	A	Incidental Snare	Incidental	6 N of Allen, SD	Bennett	Prairie	43.36500	-101.95500
991	11/15/2017	M	1.5	SA	Hunter Harvest	Hunter Harvest	8 NE of Vetal, SD	Bennett	Prairie	43.26500	-101.23300
1009	01/04/2018	M	4-5	A	Hunter Harvest	Hunter Harvest	3 SE of Allen	Bennett	Prairie	43.25051	-101.87858
1011	01/14/2018	F	4	A	Hunter Harvest	Hunter Harvest	12 N of Martin, SD	Bennett	Prairie	43.34238	-101.75633
1078	01/28/2019	F	2	SA	Incidental Snare	Incidental	8 N of Allen, SD	Bennett	Prairie	43.38886	-101.96998
17	03/03/2002	M	1-1.5	SA	Illegal shooting	Illegal kill	Belle Fourche; Kitzan Lion	Butte	Prairie	44.78032	-103.58804
18	10/07/2001	M	1.5	SA	GFP Removal	Removal	Owl Creek by BOR Mitigation GPA; .5 Mile E of Orman Dam T9N R4E Sec 17 S1/2 44.73806 103.65871	Butte	Prairie	44.73806	-103.65871
232	03/17/2008	M	1-2	SA	GFP Removal	Removal	East of Belle Fourche E 598280 N 4947601	Butte	Prairie	44.67504	-103.76002
251	11/17/2008	M	2	SA	GFP Removal	Removal	City of Vale N44.61982 W103.40453	Butte	Prairie	44.61982	-103.40453
394	07/16/2010	M	1.5	SA	Vehicle	Vehicle	3 NW of Belle Fourche	Butte	Prairie	44.69042	-103.91572
499	09/07/2011	M	1.5	SA	GFP Removal	Removal	Fruitdale, SD	Butte	Prairie	44.65706	-103.67654
513	12/25/2011	M	2.5	SA	Public Removal	Public Removal	1 E of Vale	Butte	Prairie	44.61860	-103.37624
774	03/03/2014	M	2	SA	Hunter Harvest	Hunter Harvest	1 SE of Fruitdale	Butte	Prairie	44.65841	-103.67617
833	02/14/2015	M	1.5	SA	Hunter Harvest	Hunter Harvest	4 S of Belle Fourche	Butte	Prairie	44.60331	-103.84639
988	10/24/2017	M	1.5	SA	Public Removal	Public Removal	1.5 W of Belle Fourche	Butte	Prairie	44.66849	-103.88621
1052	07/23/2018	F	1.5	SA	Vehicle	Vehicle	3.5 S of Belle Fourche	Butte	Prairie	44.60162	-103.86105
1061	11/04/2018	M	2	SA	Hunter Harvest	Hunter Harvest	1.5 W of Belle Fourche	Butte	Prairie	44.66809	-103.88676
420	12/17/2010	M	2-3	SA	Hunter Harvest	Hunter Harvest	Charles Mix Co-South of Wagner	Charles Mix	Prairie	42.85786	-98.20834
883	12/28/2015	M	2	SA	Hunter Harvest	Hunter Harvest	9.5 SW of Platte,SD	Charles Mix	Prairie	43.28575	-98.97933
224	01/03/2008	M	5-6 Months	K	Shooting	Public Removal	1/4 South of Fairburn T 4S R 8E Sec 19	Custer	Prairie	43.68741	-103.20868
872	09/10/2015	F	1.5-2	SA	GFP Removal	Removal	8 SE of Fairburn	Custer	Prairie	43.56879	-103.16589
97	11/25/2005	F	10+	A	Hunter Harvest	Hunter Harvest	Douglas County Near Delmont	Douglas	Prairie	43.25609	-98.16105
12	09/22/2000	F	1.5-2.5	SA	Shooting	Public Removal	East of Oral;100yards SE of Duster Home; Fall River County	Fall River	Prairie	43.42630	-103.22312
74	07/12/2005	M	1.5-2.5	SA	Shooting	Removal	2 S of Edgemont	Fall River	Prairie	43.25423	-103.63013
153	12/10/2006	M	3	A	Hunter Harvest	Hunter Harvest	T 8S R 6E Sec 4 South of Cheyenne River	Fall River	Prairie	43.38338	-103.41139
241	07/17/2008	F	1-2	SA	Shooting	Public Removal	12 SE of Hot Springs 43.34514 103.34502	Fall River	Prairie	43.34514	-103.34502
323	11/19/2009	F	2-2.5	SA	Hunter Harvest	Hunter Harvest	6.5 SE of Edgemont 43.22749 -103.74215	Fall River	Prairie	43.22749	-103.74215
325	12/02/2009	M	1.5	SA	Hunter Harvest	Hunter Harvest	NE of Oral 43.43404 -103.20403	Fall River	Prairie	43.43404	-103.20403
414	11/19/2010	F	1-1.5	SA	Hunter Harvest	Hunter Harvest	N of Oral	Fall River	Prairie	43.42579	-103.24059
515	12/30/2011	M	2.5	SA	Hunter Harvest	Hunter Harvest	SE of Cheyene River SW of Maverick Jnc	Fall River	Prairie	43.35059	-103.42934
602	05/12/2012	M	6 months	K	Public Removal	Public Removal	Oral area	Fall River	Prairie	43.38868	-103.34640
618	10/13/2012	F	2	SA	Unknown	Unknown	1 S of Oral on Sherbarth GPA	Fall River	Prairie	43.39170	-103.26721
623	11/12/2012	F	1.5	SA	Hunter Harvest	Hunter Harvest	2 NE of Oral	Fall River	Prairie	43.42694	-103.24000
708	05/05/2013	M	2.5	SA	GFP Removal	Removal	Angostura State Park	Fall River	Prairie	43.32597	-103.41282
859	04/05/2015	M	2	SA	Public Removal	Public Removal	4 NW of Oelrichs	Fall River	Prairie	43.22900	-103.27940
921	03/20/2016	M	2	SA	Public Removal	Removal	7.5 SW of Oelrichs	Fall River	Prairie	43.08409	-103.30664
935	08/20/2016	F	1-1.5	SA	Vehicle	Vehicle	3 S of Maverick Junction	Fall River	Prairie	43.35587	-103.40328

972	02/26/2017	M	2	SA	Hunter Harvest	Hunter Harvest	3 SW of Oral	Fall River	Prairie	43.38678	-103.33072
996	12/24/2017	M	2	SA	Hunter Harvest	Hunter Harvest	4.5 NE of Oral	Fall River	Prairie	43.44089	-103.19101
1094	02/23/2019	M	2.5	SA	Hunter Harvest	Hunter Harvest	2.5 SE of Maverick Junction	Fall River	Prairie	43.36629	-103.36807
1095	02/24/2019	M	2.5	SA	Hunter Harvest	Hunter Harvest	2.5 SE of Maverick Junction	Fall River	Prairie	43.36812	-103.37303
1096	03/08/2019	M	3	A	Hunter Harvest	Hunter Harvest	4.5 NE of Oral	Fall River	Prairie	43.44080	-103.18988
247	10/14/2008	M	2-3	SA	Shooting	Public Removal	Gregory County T 98N R 70W E 1/2 Sec 14	Gregory	Prairie	43.30624	-99.08358
324	11/26/2009	F	1-2.5	SA	Hunter Harvest	Hunter Harvest	4 N of Bonesteel, SD 43.13392 -98.94847	Gregory	Prairie	43.13392	-98.94847
990	11/12/2017	M	2.5-3	SA	Hunter Harvest	Hunter Harvest	15 W of Platte	Gregory	Prairie	43.37049	-99.15901
1024	02/10/2018	M	3	A	Hunter Harvest	Hunter Harvest	16 NE of Gregory	Gregory	Prairie	43.35180	-99.15910
110	03/15/2006	F	2-3	SA	Vehicle	Vehicle	Hwy 20 Slim Buttes-Harding Co E 642555 N 5043562	Harding	Prairie	45.53099	-103.17433
156	12/22/2006	M	3-4	A	Incidental Snare	Incidental	T17N R1E SW1/4 Sec13 West Short Pines	Harding	Prairie	45.43330	-103.95012
211	11/17/2007	M	2	SA	Hunter Harvest	Hunter Harvest	5 NE of Camp Crooks T119N R2E Sec 18	Harding	Prairie	45.61248	-103.93474
504	11/10/2011	M	2	SA	Public Removal	Public Removal	East Slim Buttes	Harding	Prairie	45.34476	-103.09289
507	11/19/2011	M	2.5	SA	Public Removal	Public Removal	20 miles SW of Buffalo	Harding	Prairie	45.29382	-103.74275
902	01/26/2016	M	2.5	SA	Incidental Snare	Incidental	N Cave Hills 5 W of Ludlow	Harding	Prairie	45.84200	-103.47700
1055	09/02/2018	F	3	SA	Hunter Harvest	Hunter Harvest	13 S of Reva	Harding	Prairie	45.34897	-103.10658
885	12/29/2015	F	2	SA	Hunter Harvest	Hunter Harvest	7 N of Wanblee, SD	Jackson	Prairie	43.66726	-101.66459
940	12/10/2016	M	2.5-3	SA	Hunter Harvest	Hunter Harvest	8 SE of Interior	Jackson	Prairie	43.67051	-101.84507
985	10/15/2017	M	1.5	SA	Hunter Harvest	Hunter Harvest	6 SE of Interior	Jackson	Prairie	43.68397	-101.87745
992	11/17/2017	M	1.5	SA	Hunter Harvest	Hunter Harvest	10 E SE of Interior	Jackson	Prairie	43.69460	-101.79060
1016	01/24/2018	F	3-4	SA	Hunter Harvest	Hunter Harvest	7.5 W of Wanblee	Jackson	Prairie	43.55243	-101.80759
204	11/11/2007	F	2	SA	Hunter Harvest	Hunter Harvest	1 N of Exit 17 and I-90 T6N R3E NW 1/4 Sec 15	Lawrence	Prairie	44.48519	-103.74355
240	07/11/2008	M	2-3	SA	Shooting	Public Removal	3 SW of St Onge T7N R3E Sec 33 NW1/4	Lawrence	Prairie	44.52872	-103.76335
255	12/04/2008	M	3-4	A	Hunter Harvest	Hunter Harvest	3 W of ST Onge	Lawrence	Prairie	44.54736	-103.78137
294	03/08/2009	M	2-3	SA	Hunter Harvest	Hunter Harvest	W of St Onge	Lawrence	Prairie	44.54631	-103.76336
326	12/04/2009	M	1.5	SA	Shooting	Public Removal	NW of St Onge 44.59659 -103.81822	Lawrence	Prairie	44.59659	-103.81822
441	01/10/2011	M	2.5	SA	Hunter Harvest	Hunter Harvest	2 NE of Whitewood	Lawrence	Prairie	44.49513	-103.61857
500	09/30/2011	F	1.5	SA	Vehicle	Vehicle	MM 26 Hwy 34 N of Whitewood	Lawrence	Prairie	44.48481	-103.64948
689	03/22/2013	M	2.5	SA	Hunter Harvest	Hunter Harvest	2 N of Whitewood	Lawrence	Prairie	44.49634	-103.61948
796	10/18/2014	M	1-1.5	SA	Public Removal	Public Removal	1.5 NE of Whitewood	Lawrence	Prairie	44.48545	-103.61802
827	02/04/2015	M	3	A	Hunter Harvest	Hunter Harvest	3.5 NE of Spearfish	Lawrence	Prairie	44.53189	-103.81617
981	07/22/2017	M	2.5	SA	Vehicle	Vehicle	.5 SE of St Onge	Lawrence	Prairie	44.54172	-103.71705
984	09/27/2017	M	2.5	SA	Hunter Harvest	Hunter Harvest	3 N of Whitewood	Lawrence	Prairie	44.51023	-103.62448
1080	02/05/2019	M	2	SA	Hunter Harvest	Hunter Harvest	3 N of Whitewood	Lawrence	Prairie	44.51331	-103.62843
1090	02/20/2019	M	2	SA	Hunter Harvest	Hunter Harvest	3 N of Whitewood	Lawrence	Prairie	44.51517	-103.64364
726	12/20/2013	M	1.5	SA	Hunter Harvest	Hunter Harvest	S of Kennebec, SD	Lyman	Prairie	43.87479	-99.89593
299	04/26/2009	M	2	SA	Shooting	Public Removal	NE of Sturgis 44.47111 -103.29070	Meade	Prairie	44.47111	-103.29070
305	06/22/2009	M	1-2	SA	Unknown	Unknown	2 NW of Sturgis 44.44371 -103.54168	Meade	Prairie	44.44371	-103.54168
409	10/28/2010	M	2	SA	Hunter Harvest	Hunter Harvest	8165 Deerview Rd	Meade	Prairie	44.23131	-103.34738
437	01/08/2011	M	1.5	SA	Incidental Snare	Incidental	6 miles SE of Sturgis	Meade	Prairie	44.34352	-103.41874

468	02/19/2011	M	2	SA	Hunter Harvest	Hunter Harvest	2.5 N of Tilford	Meade	Prairie	44.34198	-103.44062
485	05/05/2011	M	1.5-2	SA	GFP Removal	Removal	SD Hwy 34 and Bear Butte	Meade	Prairie	44.47383	-103.30829
505	11/12/2011	F	2	SA	GFP Removal	Removal	15 miles NE of Sturgis	Meade	Prairie	44.53058	-103.25530
506	11/19/2011	M	1.5	SA	Public Removal	Public Removal	22345 West Nike Road	Meade	Prairie	44.16335	-103.20716
596	03/10/2012	F	2	SA	Hunter Harvest	Hunter Harvest	3 N of Tilford	Meade	Prairie	43.34195	-103.43357
604	05/15/2012	M	2.5	SA	Hunter Harvest	Hunter Harvest	2 E of Piedmont	Meade	Prairie	44.23892	-103.36044
605	06/12/2012	M	2.5	SA	Hunter Harvest	Hunter Harvest	15 NE of Rapid City	Meade	Prairie	44.26310	-103.01495
609	06/26/2012	M	1.5	SA	GFP Removal	Removal	3 North of Rapid City	Meade	Prairie	44.15067	-103.20231
653	01/22/2013	M	2-3	SA	Hunter Harvest	Hunter Harvest	2.5 N of Piedmont	Meade	Prairie	44.26531	-103.37014
659	01/31/2013	M	2-3	SA	Hunter Harvest	Hunter Harvest	4 N of Black Hawk	Meade	Prairie	44.20449	-103.30002
707	04/18/2013	M	2	SA	Hunter Harvest	Hunter Harvest	3 E of Piedmont	Meade	Prairie	44.23954	-103.32355
718	08/26/2013	M	1.5	SA	GFP Removal	Removal	Weston Heights N Haines Avenue	Meade	Prairie	44.16496	-103.23554
723	11/27/2013	M	2	SA	Hunter Harvest	Hunter Harvest	E of Summerset	Meade	Prairie	44.17812	-103.30641
786	05/23/2014	M	2	SA	Hunter Harvest	Hunter Harvest	12 E of Piedmont	Meade	Prairie	44.26956	-103.15019
869	08/07/2015	M	2	SA	Hunter Harvest	Hunter Harvest	8 NE of Black Hawk	Meade	Prairie	44.21679	-103.18211
879	12/17/2015	M	2	SA	Hunter Harvest	Hunter Harvest	2 N of Piedmont	Meade	Prairie	44.25697	-103.36827
886	12/30/2015	M	2	SA	Hunter Harvest	Hunter Harvest	1 N of Tilford	Meade	Prairie	43.31344	-103.41343
917	02/28/2016	M	1	SA	Hunter Harvest	Hunter Harvest	5.5 N of Sturgis	Meade	Prairie	44.48834	-103.48455
938	11/08/2016	M	2	SA	Hunter Harvest	Hunter Harvest	2.5 NE of Piedmont	Meade	Prairie	44.26835	-103.37883
958	02/03/2017	M	4-5	A	Hunter Harvest	Hunter Harvest	2 E of Tilford	Meade	Prairie	44.29456	-103.39461
963	02/20/2017	M	2	SA	Hunter Harvest	Hunter Harvest	2.5 N of Piedmont	Meade	Prairie	44.26817	-103.38029
993	11/28/2107	M	2	SA	Hunter Harvest	Hunter Harvest	1.5 NE of Piedmont	Meade	Prairie	44.25414	-103.37583
1077	01/23/2019	M	8	A	Hunter Harvest	Hunter Harvest	2.5 N of Piedmont	Meade	Prairie	44.26832	-103.38121
1087	02/16/2019	M	2	SA	Hunter Harvest	Hunter Harvest	3 N of Piedmont	Meade	Prairie	44.27250	-103.39575
1101	06/14/2019	F	1.5-2.0	SA	Hunter Harvest	Hunter Harvest	7 NE of Sturgis	Meade	Prairie	44.46651	-103.37124
804	12/17/2014	F	3	A	Hunter Harvest	Hunter Harvest	11 SW of White River	Mellette	Prairie	43.43145	-100.86310
1100	05/26/2019	M	3	A	Public Removal	Removal	11 SW of Okaton, SD	Mellette	Prairie	43.74017	-100.97826
219	12/03/2007	F	1.5	SA	Shooting	Public Removal	Near Howard- Miner County SW 1/4 Sec16 T 106N R 55W	Miner	Prairie	43.98107	-97.44433
410	11/09/2010	M	3-4	A	Public Removal	Public Removal	NW Moody County	Moody	Prairie	44.15351	-96.86529
916	02/24/2016	F	7	A	Hunter Harvest	Hunter Harvest	9 W of Oglala	Oglala Lakota	Prairie	43.20633	-102.91626
1046	04/29/2018	M	4	A	GFP Removal	Removal	Manderson, SD tribal removal	Oglala Lakota	Prairie	43.23494	-102.47129
114	05/10/2006	M	3	A	Electrocution	Electrocution	3N 1E of Caputa,SD T1N R10E Sec 18	Pennington	Prairie	44.04562	-102.95959
233	03/24/2008	M	1.5	SA	GFP Removal	Removal	NE Rapid City E 644165 N 4885128	Pennington	Prairie	44.10513	-103.19868
246	09/23/2008	M	1.5	SA	GFP Removal	Removal	T 1N R 9E Sec 16 Just E of Rapid Regional Airport	Pennington	Prairie	44.04566	-103.04015
607	06/23/2012	F	1.5	SA	GFP Removal	Removal	425 N Reservoir Road	Pennington	Prairie	44.08649	-103.13173
724	12/10/2013	M	2	SA	GFP Removal	Removal	Wall, SD	Pennington	Prairie	43.99551	-102.23310
932	05/02/2016	F	2	SA	Unknown	Unknown	.5 N of I-90 and I-190 intersection	Pennington	Prairie	44.11382	-103.23778
1059	10/26/2018	M	2	SA	GFP Removal	Removal	Box Elder	Pennington	Prairie	44.13699	-103.05482
1060	09/26/2018	F	1.5	SA	Hunter Harvest	Hunter Harvest	15 N of Wall	Pennington	Prairie	44.20778	-102.31913
861	04/15/2015	F	2	SA	Hunter Harvest	Hunter Harvest	10 NE of Meadow, SD	Perkins	Prairie	45.59219	-102.03388
245	09/05/2008	M	2	SA	Vehicle	Vehicle	1E of Gordon Junction E 727496 N 4769811	Shannon	Prairie	43.04686	-102.20688

113	05/06/2006	M	2-3	SA	Tribal GFP Removal	Removal	Mission, SD-- City Limits	Todd	Prairie	43.30581	-100.65825
217	11/27/2007	M	2-3	SA	Illegal shooting	Illegal kill	W of Intersection of BIA 5 and BIA 501 T 37N R31 E Sec 10	Todd	Prairie	43.19291	-100.97344
256	12/09/2008	M	3+	A	Illegal shooting	Illegal kill	Rosebud Reservation	Todd	Prairie	43.24144	-100.95028
620	10/29/2012	M	2	SA	Vehicle	Vehicle	10 NE of Mission,SD	Todd	Prairie	43.38000	-100.47173
725	12/14/2013	F	2.5	SA	Public Removal	Public Removal	Near Witten, SD	Tripp	Prairie	43.49809	-100.16547
787	06/21/2014	F	2	SA	Vehicle	Vehicle	17 S of Winner	Tripp	Prairie	43.12576	-99.86976
46	06/14/2004	M	2	SA	GFP Removal	Removal	City of Yankton	Yankton	Prairie	42.87489	-97.40204