

# Outcomes of the Region 2, Montana, Lion Work Group May 2014



## Region 2 Lion Work Group

Pictured (*right to left*): Steve Kamps, Toby Walrath, Ken Francisco, Casey Richardson, Ray Rugg, Jack Rich, Jason Cataldo, Keith Kubista, Tim Aldrich, Bob Driggers, Rod Bullis (*not pictured*), Cody Hensen

**Facilitator:** Dr. Mike Mitchell, Leader, Montana Cooperative Wildlife Research Unit, The University of Montana, Missoula (*pictured, standing*)

**Facilitation Support:** Sarah Sells, MSc Candidate, Wildlife Biology Program, The University of Montana, Missoula (*pictured, far left*)

**Science Team:** Justin Gude, Wildlife Research Chief, Montana Fish, Wildlife & Parks, Helena  
Dr. Hilary Cooley, U. S. Fish and Wildlife Service, Boise, Idaho  
Dr. Kelly Proffitt, Wildlife Research Biologist, Montana Fish, Wildlife & Parks, Bozeman  
Josh Nowak, Wildlife Biology Program, The University of Montana, Missoula  
Jay Kolbe, Wildlife Biologist, Montana Fish, Wildlife & Parks, Seeley Lake

Compiled by Mike Thompson, Region 2 Wildlife Manager, Montana Fish, Wildlife & Parks, Missoula

# INTRODUCTION

## Region 2 Lion Work Group

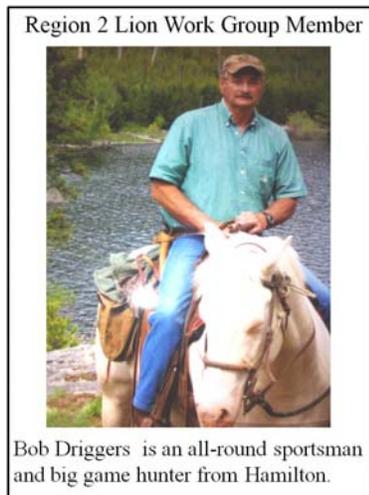
The Region 2 Lion Work Group (hereafter, Work Group) is a panel of 12 citizen volunteers, each with a vested interest in the harvest quotas for the 2014 mountain lion hunting season in West-central Montana. Work Group members applied to the Region 2 Office of Montana Fish, Wildlife & Parks (FWP) for a seat on the panel.

## Work Group Selection Process

On March 19, 2014, FWP Region 2 issued a news release to regional media outlets, seeking applications from volunteers to form a lion work group. FWP also solicited applications directly from constituents with a demonstrated interest in mountain lion management in Region 2, to ensure that a broad spectrum of opinion would be represented. Due to the nature of the issue at hand, FWP sought official representation from the Bitterroot Houndsmen's Association and the Ravalli County Fish and Wildlife Association. The application period closed at 5:00 P.M. on April 4, by which time applicants were asked to submit their contact information, their commitment of availability for four full days of meetings in Missoula, and a written explanation of their interest in serving on the Work Group.



FWP set the selection criteria for membership before soliciting applications. The Work Group would be comprised of at least 2 members from each of the four major watersheds in Region 2: the Bitterroot, Blackfoot, East Clark Fork and West Clark Fork. All members would be stakeholders in wildlife management in Region 2.



Constituencies would include lion hunting outfitters, non-outfitting lion hunters, hound handlers, big game (other than lion) hunters and outfitters, group affiliations and non-affiliated stakeholders. All members were required to commit to a collaborative approach toward the goal of achieving a consensus outcome, and a limit of 12 members was imposed as a constraint of the consensus driven process.

Region 2 Supervisor Randy Arnold, with a team of FWP Region 2 staff, made his selections from a pool of 17 applicants on April 7, 2014. All selection criteria were met or exceeded, except for more than one member from the East Clark Fork; however, a Missoula resident contributed decades of hunting experience from that area.

The group-size limitation of 12 constrained FWP from reaching out to a broader constituency. FWP found it challenging to capture the diversity of local hunter interests within a

panel of 12 members, and consciously erred on the side of reasonably representing those interests. As a result, FWP did not select lion scientists, national constituency groups, or individuals without a demonstrated background in the local issues to serve on this Work Group.

**Work Group Purpose**

In March 2014, FWP Region 2 originated the concept of a Region 2 Lion Work Group to help reconcile opposing public interests in mountain lion management. FWP recognized three main camps of public interest: (1) hunters who made a living outfitting resident and nonresident lion hunters, (2) resident houndsmen who represented a personal connection with the resource and lifestyle, and (3) resident hunters who supported reducing lion numbers to increase other big game (ungulates). While there is diversity within and overlap across these interest groups, and there are other interests in mountain lions besides these, FWP identified the growing gulf between these three interest groups as a barrier to setting lion harvest quotas for the 2014 hunting season.

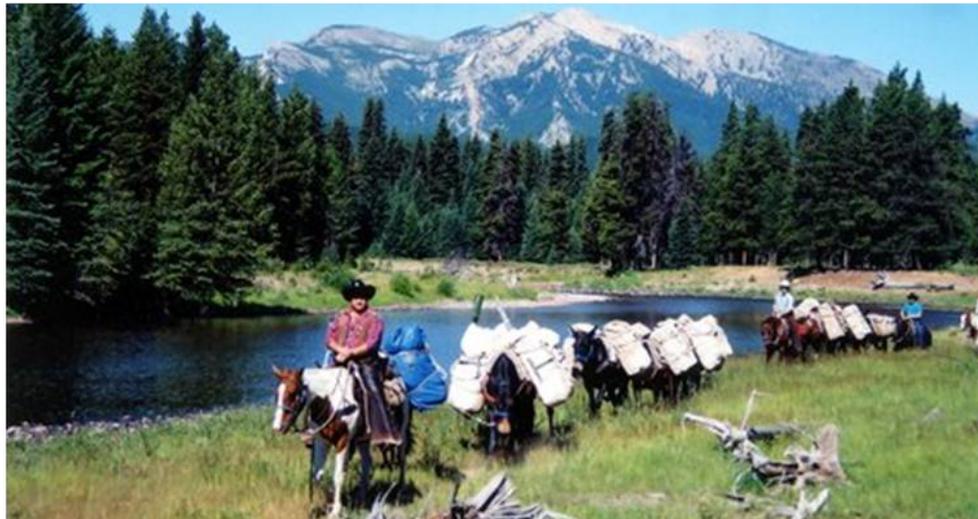
Region 2 Lion Work Group Member



Casey Richardson, from Huson, spends 75-100 days chasing lions each year.

FWP Region 2 had charted a management course that intended to reduce lion populations by 30 percent over a 3-year period across approximately two-thirds of the region, followed by an undefined period of lion population recovery. The fall-winter 2014 hunting season would be the third year of the prescribed lion reduction.

Region 2 Lion Work Group Member



Jack Rich is an outfitter, from Seeley Lake.

The setting of harvest quotas in 2012 and 2013, and adoption of a season structure in 2012 (i.e., “hybrid” season structure) to accomplish the prescribed female harvest levels,

Region 2 Lion Work Group Member



Tim Aldrich, of Missoula, is one of the originators of the conservation oriented “Hellgate Hunters and Anglers” group.

accentuated the differences between the three camps of public interest. Harvest quotas were simultaneously too high and too low, depending on the camp of public interest. Quota overruns and quota underruns were simultaneously unacceptable, again depending on the offended public interest. With great difficulty, key representatives in the three camps of public interest tolerated FWP’s negotiated proposals in 2012 and 2013, which were intended to move lion numbers toward a biologically measurable balance between predator and prey.

Positions hardened in January 2014, after FWP released the findings of the Bitterroot Mountain Lion Project to the public. The principal findings of this research were a minimum and an estimated number of independent mountain lions in Hunting Districts 250 and 270 in December 2012. Some people with certain interests felt that the findings vindicated their positions, while other people with other interests felt vilified.

Because the research results differed from FWP’s a priori assumptions for prescribing harvests in 2012 and 2013, FWP was unsure how best to proceed with developing its proposal for the third year of the intended 3-year harvest treatment.

By March, lines of communication had eroded to the point that FWP Region 2 realized it would not be able to deliver a publicly vetted proposal for lion harvest quotas for the Fish and Wildlife Commission to consider at its April 10 meeting, and FWP regional staff asked for help. The solution was to form the Region 2 Lion Work Group to gather the decision-driving public interests together, and to commit the time and resources necessary to rebuild and advance a constructive public dialogue about mountain lion harvest quotas.

Region 2 Lion Work Group Member



Cody Hensen is an outfitter of big game hunts, including mountain lion, from Philipsburg..

The expected outcomes of the Work Group’s deliberations were recommended lion harvest quotas for Region 2, and a recommended number of special lion licenses (i.e., permits) in each lion hunting district. The Work Group’s recommendations would be released for public

comment, and the Commission would render its final decision on quotas and permits for 2014 at its June 12 meeting. The Work Group was to supplement—not replace—the normal Commission process of inviting broad public input in setting lion harvest quotas and permit levels.



Work Group Facilitator, Mike Mitchell, is a wildlife researcher whose labors occasionally lead him to the Tibetan Plateau.

## **PROCESS**

### **Work Group Meeting Agendas**

The Work Group met on 4 days (April 21-22 and May 7-8, 2014), from 8:00 A.M. to 5:00 P.M., for a total of 32 contact hours. All 12 members attended all 4 meetings. The April meetings were held at the University Center on The University of Montana campus, and the May meetings were held at the Rocky Mountain Elk Foundation headquarters, in Missoula. In addition, Work Group members completed a homework assignment in the period between the April and May sessions.

FWP Region 2 released the meeting dates, times and locations to the regional media in advance of the April meetings, and again before the May meetings, inviting the public to attend and observe. Several members of the public attended one or more meetings, including scientists, local houndsmen and staff from The Cougar Fund. FWP offered an opportunity for the public to comment at the end of each meeting, before the Work Group adjourned, and several people provided input.

Dr. Mike Mitchell led the group through a “Structured Decision Making” process, and guided the Work Group sequentially through the steps of developing a recommendation on lion harvest quotas and permit levels, using this method.

### **Structured Decision Making**

FWP and the Montana Cooperative Wildlife Research Unit at The University of Montana have invested in developing local expertise for using and facilitating a process known as Structured Decision Making (SDM), and FWP decided that SDM would put Work Group members in a position to succeed. The following description of SDM is quoted from Gregory and Keeney (2002):

*A structured decision making approach helps resource managers by splitting a tough decision into its parts (referred to here as “elements”). For many complex decisions, making a better choice requires that eight key elements be considered... The first five elements – Clarifying the Problem, Identifying Key Objectives, Creating Alternatives, Assessing Consequences, and Explicitly Addressing Tradeoffs (leading to the acronym ProACT, a reminder to be proactive) – constitute the core of a structured approach to decision making (Hammond et al., 1999).*

And:

*[We emphasize] the importance of using a structured decision process to specify and organize values, use these values to create alternatives, and assess tradeoffs to help achieve a desired balance across key objectives. Although these decision making steps are based on common sense, they are often neglected or poorly carried out as part of the complex evaluations of natural resource options...some of the benefits of using a structured, decision focused approach: new and better solutions, increased and more productive participation by stakeholders, and greater defensibility and acceptance of the resource management evaluation process and its conclusions.*



Region 2 Lion Work Group Member

Toby Walrath is a trapper, hunter and writer, from Corvallis.



Region 2 Lion Work Group Member

Keith Kubista, a hunter, trapper and angler from Stevensville, works for wildlife with people of all ages.

FWP entered into the SDM process by first stepping back from the roundtable; the participants in the meeting discussions were the facilitator, the Work Group Members, and no others—unless called upon. In so doing, FWP recognized that the issue was one of competing social values for shared wildlife resources. The SDM process and the Work Group offered an opportunity for FWP to listen carefully to an unprecedented discussion by diverse hunting interests on the lion harvest issue—to recalibrate its

understanding of the social sideboards for public consensus around a biologically defensible outcome. FWP had confidence in the SDM outcome, and was predisposed to support it, owing

Region 2 Lion Work Group Member



Rod Bullis is a houndsman and an advocate for lions and lion hunting, from Helena.

to its trust that the Work Group would not arrive at a consensus recommendation that did not conserve the wildlife resource and perpetuate the traditions of its use; it was a measure of FWP's respect for the individuals at the table.

A science team was formally appointed alongside the Work Group, including independent, outside researchers, as well as FWP researchers and an FWP management biologist. The role of the science team was to estimate the biological consequences of quota alternatives identified by the Work Group, not to identify alternatives for the Work Group based on scientific evidence.

Montana Fish and Wildlife Commissioner, Dr. Gary Wolfe, attended all four meetings of the Work Group and provided valuable input regarding the process by which the Commission would consider the Work Group's recommendation in its final decision on lion harvest quotas and permit levels. In addition, FWP's Region 2 Supervisor, the Region 1 and Region 2 Wildlife Managers, Region 2 Wildlife Biologists and Technicians, and the Region 2 Enforcement Captain regularly attended the meetings, absorbed the Work Group's discussions, and answered questions when asked.

Following are the consensus products and outcomes of the Region 2 Lion Work Group. While the ultimate outcomes are the recommended lion harvest quotas and permit levels for Region 2 that have been released separately for public review and comment, the step-by-step points of consensus leading up to those recommendations serve to document the decision making process, and this transparency and accountability in decision making is an advantage of the SDM process.

Region 2 Lion Work Group Member



Ray Rugg is an outfitter for mountain lion and other big game, from Superior.

## ISSUES STATEMENT

The Work Group spent most of the first day working on the Issues (or "Problem") Statement. Mountain lion management is a broad topic, and it was easy for the Work Group to agree on the need to be clear and explicit about the issues at hand. Much of the work was accomplished in small groups of 3-4 members, with members rotating from group to group during the course of the day. It was an opportunity for the members to get to know each other, to begin exploring the roots of their own interests and concerns, and to begin the process of collaboration. Following is the result:

FWP is responsible for managing healthy sustainable wildlife populations.

FWP is responsible for supporting the continuation of Montana's hunting heritage.

The MT Fish and Wildlife Commission is in the process of establishing the mountain lion harvest quotas and permit numbers for 2014.

Mountain lion is a big game species in Montana and is a complex species to manage. There is no mountain lion management plan. Wildlife/human populations are changing along with habitat. As distribution of Montana's wildlife and Montana residents changes, the management strategies must remain flexible to adapt to those changes.

There is disagreement among stakeholders regarding:

- 1) Current lion population density estimates.
- 2) Desired lion population density and demographic structure of the lion population.
- 3) The harvest levels, and sex and age structure of the harvest that are needed to achieve the desired outcomes.
- 4) The impact of lion predation on ungulate population dynamics. In many areas ungulate populations are in serious decline and recruitment levels leave populations in jeopardy.

The differing expectations for opportunities of lion hunters and deer/elk hunters are in conflict. There is also disagreement regarding the allocation of the lion harvest between residents and nonresidents, and the impact of season structure options on local businesses—as well as how the various season structure options impact lion hunt quality and public perceptions of hunter ethics.

Insufficient education is available about living with lions.

## FUNDAMENTAL OBJECTIVES

The Work Group developed fundamental objectives (in other words, things that should be accomplished to address the identified issues well) over most of the second day, again by comparing and contrasting the products of small-group discussions. Conserving mountain lion populations is notably absent from the list of fundamental objectives, which serves to illustrate a crucial point for managers and decision makers who aspire to understand the context of the mountain lion discussion in west-central Montana. A conserved lion population has been biologically achieved, but a





Facilitation assistant, Sarah Sells, is a wildlife researcher, and recreationist.

conserved lion population is not the ultimate goal for lion management in Region 2, strange as that may seem before thinking and reading further. Rather, a conserved lion population is an overarching strategic objective that the 2014 lion hunting season in Region 2 will have minimal effect on; meeting social values and expectations are far more influential and fundamental for a decision about the 2014 lion hunting season in Region 2. Lion population management in Region 2, while biologically sustainable in the context of the larger lion populations across western North

America, will not meet with broad public acceptance unless it addresses the fundamental social values captured below.

Work Group's Consensus: Fundamental Objectives

1. Maximize satisfaction of resident lion hunters.
2. Maximize satisfaction of non-resident lion hunters.
3. Improve ungulate numbers in at risk districts in R2.
4. Maintain acceptable densities of mountain lions for:
  - a. ungulate hunters
  - b. landowners
  - c. houndsmen
  - d. outfitters
  - e. non-hunters
  - f. non-residents
  - g. urban/wildlife interface
5. Improve sportsman support for lion hunting.
6. Improve public support for lion hunting.

## ALTERNATIVES

The Work Group closed out the second day by developing 5 alternative sets of harvest quotas and permit levels for the 2014 lion hunting season in Region 2 hunting districts.

- Status Quo—was FWP’s initial recommendation and the Fish and Wildlife Commission’s adopted tentative proposal for 2014, which was intended to complete the third year of a 3-year lion reduction of 10% per year across about 2/3 of Region 2. This is the exact same season and quota/ permit levels as were implemented in 2013.
- Maintain Lion Population—was the Work Group’s modification of the Status Quo to maintain the lion population at current levels.
- Increase All Lions—was intended to increase lion numbers across Region 2.
- Reduce All Lions Where Ungulate Populations Are Of Concern—was the Work Group’s modification of the Status Quo to focus more intensively on lion harvest in districts where ungulate population recruitment is low, ungulate populations are below objective, and/ or ungulate population trends are down.
- Trophy Lion—was the Work Group’s proposed season option to recruit large male lions into the population.

Status quo (30% targeted reduction)			
2014/2015			
	Proposed Quota		Permit
	Males	Females	
200, 201	9	12	21
202, 203	14	19	33
204, 260, 261	2	3	5
210	3	0	3
211, 216	5	3	8
212, 215	6	0	6
213, 214	2	1	3
240	2	3	5
250	4	6	10
270	4	6	10
280, 281, 284, 293, portion of 298	5	7	12
283, 285	5	7	12
290, 291, 292, portion of 298	5	6	11
Msla spec mgmt	13	12	25
<b>Total</b>	<b>79</b>	<b>85</b>	<b>164</b>

Alt Maintain Lion Population			
2014/2015			
	Proposed Quota		Permit
	Males	Females	
200, 201	9	6	15
202, 203	14	9	23
204, 260, 261	2	2	4
210	3	0	3
211, 216	5	3	8
212, 215	6	0	6
213, 214	2	1	3
240	3	3	6
250	3	2	5
270	5	4	9
280, 281, 284, 293, portion of 298	5	4	9
283, 285	5	4	9
290, 291, 292, portion of 298	5	3	8
Msla spec mgmt area	13	12	25
<b>Total</b>	<b>80</b>	<b>53</b>	<b>133</b>

Alt Increase All Lions			
2014/2015			
	Proposed Quota		Permit
	Males	Females	
200, 201	9	3	12
202, 203	12	5	17
204, 260, 261	4	1	5
210	3	0	3
211, 216	5	2	7
212, 215	6	0	6
213, 214	2	1	3
240	6	2	8
250	6	1	7
270	6	2	8
280, 281, 284, 293, portion of 298	4	2	6
283, 285	4	2	6
290, 291, 292, portion of 298	4	2	6
Msla spec mgmt	13	12	25
Total	84	35	119

Alt Trophy Lion			
2014/2015			
	Proposed Quota		Permit
	Males	Females	
200, 201	6	6	24
202, 203	9	9	36
204, 260, 261	2	2	8
210	1	0	2
211, 216	3	3	12
212, 215	1	0	2
213, 214	1	1	4
240	3	3	12
250	2	2	8
270	4	4	16
280, 281, 284, 293, portion of 298	4	4	16
283, 285	4	4	16
290, 291, 292, portion of 298	3	3	12
Msla spec mgmt area	10	12	44
Total	53	53	212

Reduce all lions where ungulate Alt pop. is of concern			
2014/2015			
	Proposed Quota		Permit
	Males	Females	
<b>200, 201</b>	12	12	24
<b>202, 203</b>	20	19	39
204, 260, 261	2	3	5
210	3	0	3
211, 216	5	3	8
212, 215	6	0	6
213, 214	2	1	3
<b>240</b>	4	3	7
<b>250</b>	6	8	14
<b>270</b>	6	8	14
<b>280, 281, 284, 293, portion of 298</b>	7	9	16
<b>283, 285</b>	7	8	15
<b>290, 291, 292, portion of 298</b>	7	8	15
Msla spec mgmt area	13	12	25
Total	100	94	194

Red numbers indicate hunting districts where ungulate populations are of concern.



## CONSEQUENCES

The next step in the process was for the Work Group to predict the consequences for each quota alternative they developed, for each of the fundamental objectives they identified. During the intercession between the April and May meetings, the science team worked to predict the science-based consequences, and the Work Group members completed the following assignment:

1. Predict consequences for fundamental objectives that are not based on results produced by the science team.
2. Assign weights (in other words, relative importance) to the fundamental objectives.

Work Group members were provided a spreadsheet within which each member rated the consequences of each alternative on a scale from 1 to 5, relative to each fundamental objective. For example, to predict the consequence of the status quo alternative for maximizing satisfaction of resident lion hunters, members entered one of the following numbers:

- 1 = completely dissatisfied
- 2 = somewhat dissatisfied
- 3 = neither dissatisfied or satisfied
- 4 = somewhat satisfied
- 5 = completely satisfied

These scores were based only on the experience, expertise, or opinion of each Work Group member, working independently. Ideally, one might conduct an opinion poll of hunters or the public before the decision would be made. However, due primarily to time constraints, the expertise within the Work Group was used in place of more exhaustive opinion sampling.

The prediction of consequences was also the place for Work Group members to indicate whether some fundamental objectives should have more influence on the decision than others. So, each member was asked to independently assign weights to the fundamental objectives for the purpose of assessing the tradeoffs of implementing each alternative. Members assigned weights to the fundamental objectives by first ranking them from 1 (most important “to you”) to 12 (least important “to you”). If only those ranks were used as weights, it would mean that 1 is equally more important than 2, and 2 is more important than 3, and so on. Sometimes that can be the case, but more commonly people will feel that some objectives are much more important than others; for example, a person might feel the difference between 1 and 2 is much larger than the difference between 2 and 3. The Work Group was asked to capture how they might view these differences to further inform the analysis.

The Work Group members sent their completed spreadsheets to Dr. Mitchell before the third meeting, so that he and Sarah Sells could compile them and present them at the outset of the third meeting.

## Science Team Presentation

The science team opened the third meeting with a presentation to the Work Group on the biological consequences of the decision alternatives.

Dr. Hilary Cooley presented an overview of scientific knowledge on lion-prey relationships. She reported that lion predation effects on ungulate populations have been documented, that some reductions of lion numbers have resulted in positive ungulate responses, and that some reductions of lion numbers have not resulted in positive ungulate responses. She also reported on situations where lion predation was not found to have measurable effects on ungulate populations, and she discussed how variability in habitat, weather, predator-prey system complexity/simplicity, and other factors generally influence the magnitude of predation effects on prey. Her presentation emphasized uncertainty in whether lion density reductions will affect ungulate populations, and outlined some common factors that influence whether positive effects of lion density reduction

on ungulate populations are likely or not. The concepts that she presented fit very well and were relevant to the variety of situations that we experience in west-central Montana.

Jay Kolbe presented an overview of deer and elk status and historical trends in Region 2. He drew attention to changes in the calf: cow ratio (i.e., recruitment), as did Dr. Cooley, as the parameter to watch in elk populations for indications of predation effects, noting also that total population size, as well as recruitment, is the outcome of many factors. In consideration of weather, threshold levels of carnivore abundance relative to prey, hunting and habitat, he shared his hypothesis and rationale for a demonstrated predation effect on elk in the Blackfoot and West Clark Fork, in particular. He showed a graph depicting an increasing average age of harvested female elk through the Bonner Check Station, which tracks with declining calf survival and

### Predator – Prey Interactions

Factors that limit ungulate populations:

- 1. Human Harvest**
- 2. Stochastic Events**
  - Reduced maternity, recruitment, survival
  - Usually affects all ungulate populations in area
- 3. Food and Habitat (Carrying Capacity)**
  - Reduced maternity, recruitment, survival
  - Malnutrition, poor body condition

### Predator – Prey Interactions

Factors that limit ungulate populations:

- 4. Predation**
  - Regulating:
    - As prey population increases, predation rate increases
    - Density-Dependent
  - Limiting:
    - Predation limits prey to a low equilibrium – below carrying capacity
    - Predation primary cause of mortality
    - High maternity, low recruitment
    - Density Independent

recruitment into the population. If this trend is not reversed, a further decline of elk in the Blackfoot is predicted.

Following the presentations about lion prey-relationships and deer and elk status and trends in Region 2, the science team emphasized that the possible effects of the alternative lion seasons on ungulate populations in each Lion Management Unit are uncertain. Substantial scientific uncertainties, as well as unknown conditions relative to influential factors for the effect of lion density on ungulates in Region 2, make quantitative predictions impossible. The science team predicted that the “Status Quo” and “Reduce All Lions Where Ungulate Populations Are Of Concern” alternatives would have either neutral or positive effects on ungulate populations, with equal likelihood of either outcome. The science team predicted that the “Maintain Lion Populations,” “Increase Lions,” and “Trophy Lions” alternatives would have either neutral or negative effects on ungulate populations, with equal likelihood of either outcome. In making an assessment of whether each alternative set of lion quotas would meet fundamental objective #3 (“improve ungulate numbers in at risk districts in R2”), the Work Group was forced to deal with this uncertainty. Each Work Group member was asked to choose among possible outcomes of each alternative relative to fundamental objective #3, and to indicate which outcome they predicted.

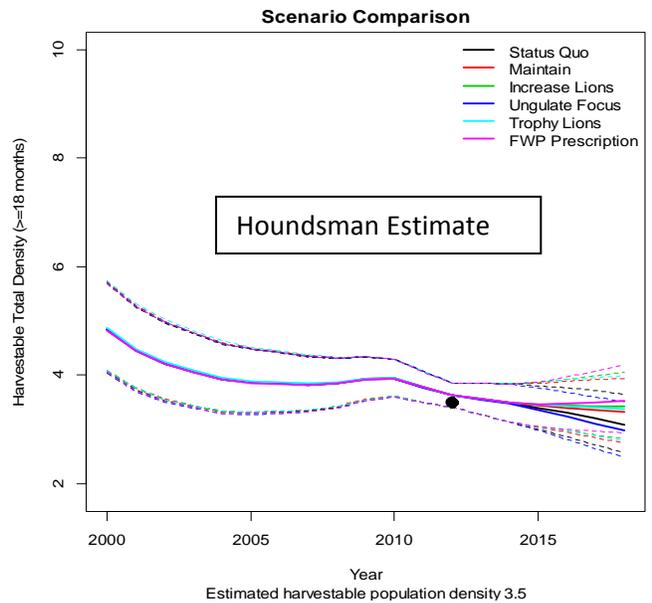
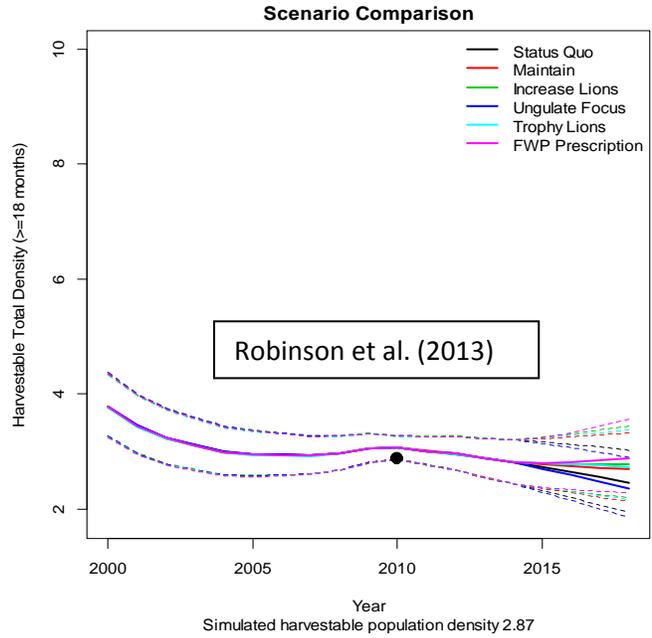
Justin Gude then presented a series of predicted consequences on lion density for each of the five alternative sets of lion quotas that the Work Group had developed. Justin, Josh Nowak and Dr. Kelly Proffitt collaborated on this analysis, having modeled a predicted “harvestable total density” of mountain lions for Region 2 in 2015, following the Work Group’s alternative harvest prescriptions for 2014. They modeled regional lion density using an integrated population model that included four different estimates of lion density across Region 2:

- Robinson et al. (2013)—was the density that guided FWP Region 2 in its initial prescription (2012) of a 30% lion reduction over a 3-year period.
- Hound-Hunter Adjusted Minimum Density—was the estimate given by a houndsman in testimony to the Fish and Wildlife Commission on April 10, 2014.
- Spatially Explicit Capture-Recapture Model (SCR), Lower Credible Interval Density (Proffitt et al. 2014)—was the most conservative estimate from the Bitterroot Lion Project.
- Spatially Explicit Capture-Recapture Model (SCR), Median Density (Proffitt et al. 2014)—was the point estimate from the Bitterroot Lion Project.

The densities were extrapolated across Region 2 because the current information for generating predicted lion densities is not adequate to account for immigration, emigration and other factors at a finer scale (i.e., the hunting district scale). Justin also explained that mountain lion populations function at a much larger scale than individual Lion Management Units, and that no matter the regional population trend, lion numbers in local areas are likely to vary more widely.

The graphed model output for the Robinson et al. (2013) model is pictured here (the scale of the y-axis is in the # of lions  $\geq 18$  months of age per 100 km<sup>2</sup>; solid lines are the median predictions, and dotted lines are 95% credible intervals). The black dot placed on the lower confidence interval for 2010 reflects the fact that this lion density estimate was current for 2010, and that it was a minimum possible density—not an estimate of the actual, larger number of lions. This 2010 density estimate had the effect of lowering estimates from the other components of the integrated population model, including estimates based on lion telemetry data and population reconstruction from age-at-harvest data. Integrated population model predictions that incorporated alternative density estimates in 2012 are included on the next page. The higher density estimates are more consistent with the other available data, as exemplified by the point predictions falling closer to the median prediction lines from the population model.

The pattern forming after 2014 shows the variable trajectories of the modeled regional lion population, depending on the quota alternative selected. The Status Quo and Ungulate Focus alternatives would likely decrease regional lion density the most, whereas the FWP Prescription and Increase Lions alternatives offer the greatest opportunity for the modeled population to grow. (The “FWP Prescription” evaluates the effect of 0 females harvested from 2015 forward, as originally outlined in the FWP Region 2 lion season recommendation for 2012.) Under every alternative, the predicted change in the regional lion population is small for a 1-2 year period until alternative harvest treatments are applied over succeeding years.

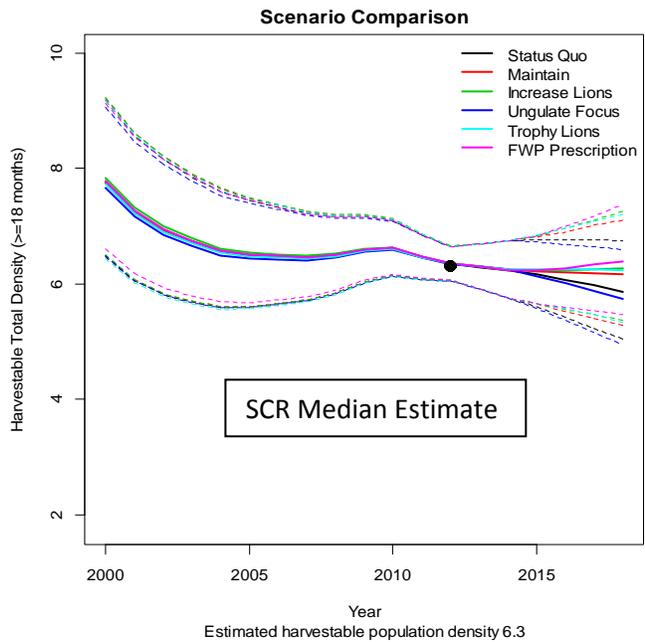
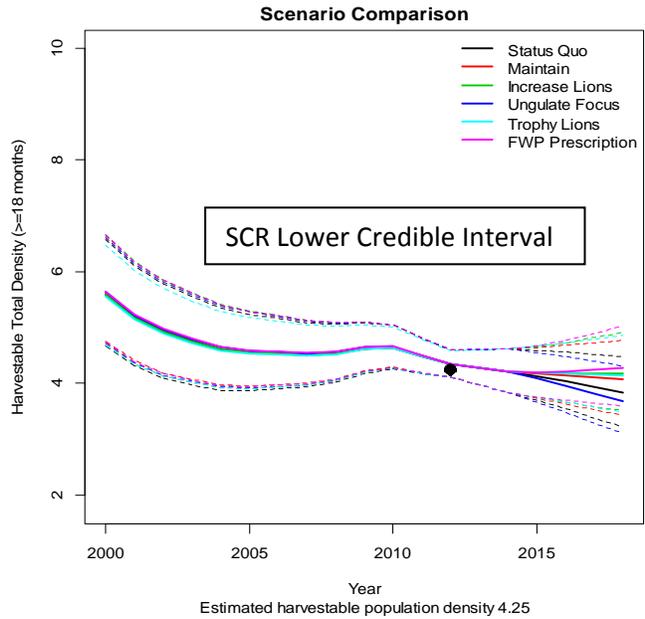


The presentation emphasized that scientific uncertainty exists in the available lion density estimates, and these different density estimates affect the predictions from the integrated population model. This uncertainty will not be resolved by the time the 2014 lion hunting seasons are set. However, this analysis demonstrates that the variation in lion density estimates that are available for Region 2 has no meaningful bearing on the predicted effects of the harvest alternatives generated by the Work Group. In other words, the FWP Prescription always moves the regional lion population upward over time and the Ungulate Focus always moves populations down, and so on for each alternative set of quotas, regardless of the lion density estimate that is used as the starting point. The effects on lion density of each alternative set of quotas is larger with lower density input (e.g., Robinson et al. 2013) versus with a higher density input (e.g., the SCR Median Estimate), but the direction of the predicted effects is always the same. This assured the Work Group that while they had to make a quota recommendation despite the existence of scientific uncertainty, there were no findings in the science to preclude them from proceeding with an evaluation of alternatives on the basis of the socially derived fundamental objectives.

Each Work Group member was therefore tasked with using these predictions for the effects of each alternative set of quotas on lion density at the regional scale to determine the acceptability of the lion densities that would be produced by each alternative set of quotas. For their predictions each Work Group member was asked to rely on a single set of integrated population model predictions (i.e., only use predictions from a single density input), and to record which density input they relied on. They used a scale of 1-5.

- 1=completely unacceptable
- 3=neither unacceptable or acceptable
- 5=perfectly acceptable

- 2=somewhat unacceptable
- 4=somewhat acceptable



## Consequence Table Instructions

The table below illustrates the instructions for scoring the alternatives.

FUNDAMENTAL OBJECTIVE	MEASURABLE ATTRIBUTE	DESIRED DIRECTION
Maximize satisfaction of resident lion hunters.	Satisfaction on scale of 1-5. <b>Scale: 1 = completely dissatisfied; 3 = neutral; 5 = perfectly satisfied.</b>	Max
Maximize satisfaction of non-resident lion hunters.	Satisfaction on scale of 1-5. <b>Scale: 1 = completely dissatisfied; 3 = neutral; 5 = perfectly satisfied.</b>	Max
Improve ungulate numbers in at-risk districts in R2.	<b>1= positive effect on ungulates; 0= neutral (no measurable) effect on ungulates; -1= negative effect on ungulates</b>	Max
Maintain acceptable densities of mountain lions for:	---	---
ungulate hunters	Acceptability on scale of 1-5. <b>Scale: 1 = completely unacceptable; 3 = neutral; 5 = perfectly acceptable.</b>	Max
landowners	Acceptability on scale of 1-5. <b>Scale: 1 = completely unacceptable; 3 = neutral; 5 = perfectly acceptable.</b>	Max
houndsmen	Acceptability on scale of 1-5. <b>Scale: 1 = completely unacceptable; 3 = neutral; 5 = perfectly acceptable.</b>	Max
outfitters	Acceptability on scale of 1-5. <b>Scale: 1 = completely unacceptable; 3 = neutral; 5 = perfectly acceptable.</b>	Max
non-hunters	Acceptability on scale of 1-5. <b>Scale: 1 = completely unacceptable; 3 = neutral; 5 = perfectly acceptable.</b>	Max
non-residents	Acceptability on scale of 1-5. <b>Scale: 1 = completely unacceptable; 3 = neutral; 5 = perfectly acceptable.</b>	Max
urban/wildlife interface	Acceptability on scale of 1-5. <b>Scale: 1 = completely unacceptable; 3 = neutral; 5 = perfectly acceptable.</b>	Max
Improve sportsman support for lion hunting.	Improvement of support on scale of 1-5. <b>Scale: 1 = substantial worsening; 3 = no change; 5 = substantial improvement.</b>	Max
Improve public support for lion hunting.	Improvement of support on scale of 1-5. <b>Scale: 1 = substantial worsening; 3 = no change; 5 = substantial improvement.</b>	Max

## Consequence Table Compiled

The following table displays the average scores, from 1-5, of the 12 Work Group members for each of the 5 alternatives. The tables allows a visual assessment of trade-offs between alternatives, based on a spectrum of green (positive consequence) to red (negative consequence). These unweighted, average scores strongly suggest that the “Increase All Lions” alternative (second column from the right) portends the most negative consequences for more of the fundamental objectives than any other alternative, based on the scoring of the Work Group. The “Status Quo” and “Maintain Lion Population” alternatives appear to be more neutral-to-positive across the board, whereas the “Reduce Lions Where Ungulate Population Is Of Concern” pits social values sharply against each other.

Objectives	Goal	Alt1: Status quo	Alt2: Maintain lion pop.	Alt3: Reduce all lions where ungulate pop. is of concern	Alt4: Increase all lions	Alt5: Trophy lions
Maximize satisfaction of resident lion hunters.	Max	2.33	3.92	2.17	3.75	3.58
Maximize satisfaction of non-resident lion hunters.	Max	3.25	2.75	3.25	2.83	3.25
Improve ungulate numbers in at-risk districts in R2.	Max	0.50	-0.17	0.58	-0.67	-0.67
Maintain acceptable densities of mountain lions for:	---					
ungulate hunters	Max	3.58	2.42	4.75	2.08	2.33
landowners	Max	3.58	2.75	4.08	1.92	2.00
houndsmen	Max	2.33	4.00	1.50	4.42	4.17
outfitters	Max	3.33	3.33	3.58	2.67	3.08
non-hunters	Max	3.00	3.17	2.83	2.83	2.92
non-residents	Max	3.00	3.17	3.33	2.92	2.92
urban/wildlife interface	Max	3.58	2.33	4.00	1.75	2.25
Improve sportsman support for lion hunting.	Max	3.50	3.00	3.83	1.67	2.75
Improve public support for lion hunting.	Max	2.92	3.08	3.17	2.33	2.75

## Normalized Scores

Normalizing simply fits the weighted scores on a common scale across alternatives:

Objectives	Goal	Alternatives				
		Alt1: Status quo	Alt2: Maintain lion pop.	Alt3: Reduce all lions where ungulate pop. is of concern	Alt4: Increase all lions	Alt5: Trophy lions
Maximize satisfaction of resident lion hunters.	Max	0.10	1.00	0.00	0.90	0.81
Maximize satisfaction of non-resident lion hunters.	Max	1.00	0.00	1.00	0.17	1.00
Improve ungulate numbers in at-risk districts in R2.	Max	0.93	0.40	1.00	0.00	0.00
Maintain acceptable densities of mountain lions for:	---					
ungulate hunters	Max	0.56	0.13	1.00	0.00	0.09
landowners	Max	0.77	0.38	1.00	0.00	0.04
houndsmen	Max	0.29	0.86	0.00	1.00	0.91
outfitters	Max	0.73	0.73	1.00	0.00	0.45
non-hunters	Max	0.50	1.00	0.00	0.00	0.25
non-residents	Max	0.20	0.60	1.00	0.00	0.00
urban/wildlife interface	Max	0.81	0.26	1.00	0.00	0.22
Improve sportsman support for lion hunting.	Max	0.85	0.62	1.00	0.00	0.50
Improve public support for lion hunting.	Max	0.70	0.90	1.00	0.00	0.50

## Weighted Scores

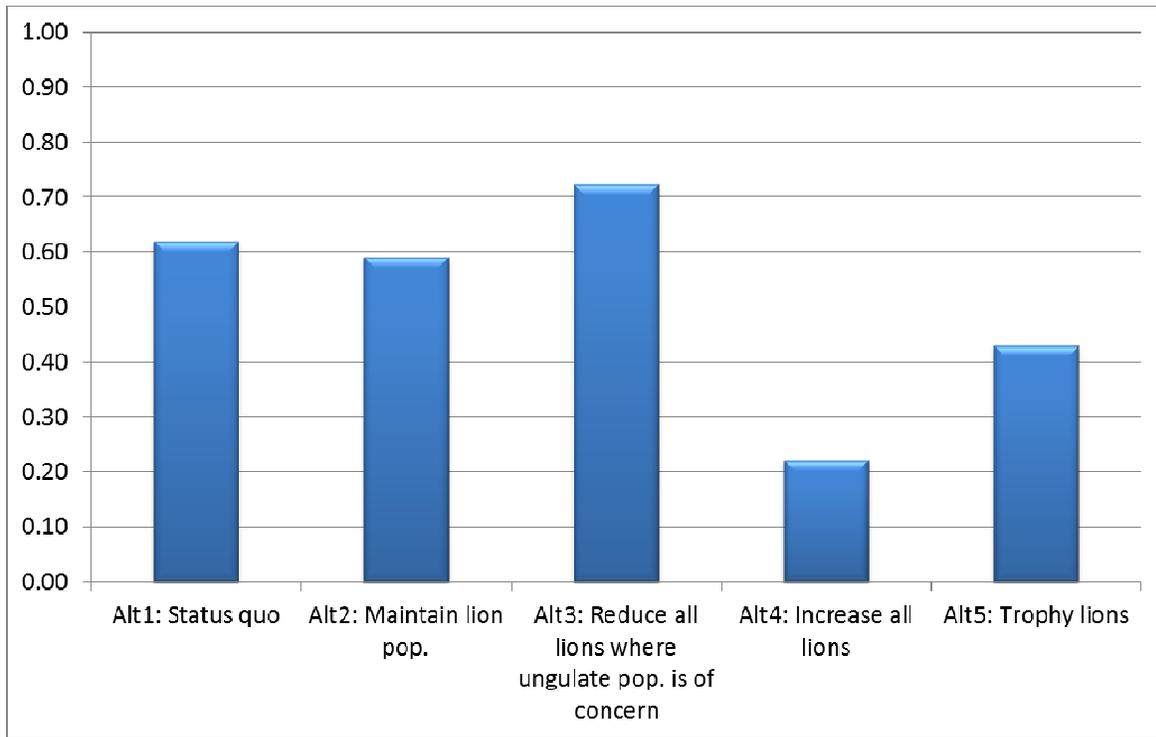
The most to least important fundamental objectives—relative to the decision on lion harvest quotas—were weighted and ranked by the Work Group as follows:

- 0.12 Maximize acceptable densities of mountain lions for houndsmen
- 0.11 Maximize acceptable densities of mountain lions for ungulate hunters
- 0.11 Maximize satisfaction of resident lion hunters
- 0.11 Improve sportsman support for lion hunting
- 0.10 Improve ungulate numbers in at-risk districts in Region 2
- 0.10 Improve public support for lion hunting
- 0.08 Maximize acceptable densities of mountain lions for the urban/wildland interface
- 0.07 Maximize acceptable densities of mountain lions for outfitters
- 0.06 Maximize acceptable densities of mountain lions for landowners
- 0.05 Maximize acceptable densities of mountain lions for nonhunters
- 0.05 Maximize satisfaction of nonresident lion hunters
- 0.03 Maximize acceptable densities of mountain lions for nonresidents

The weighted scores are displayed in the following table:

<b>WEIGHTED SCORES</b>		<b>Alternatives</b>				
<b>Objectives</b>	<b>Weight</b>	<b>Alt1: Status quo</b>	<b>Alt2: Maintain lion pop.</b>	<b>Alt3: Reduce all lions where ungulate pop. is of concern</b>	<b>Alt4: Increase all lions</b>	<b>Alt5: Trophy lions</b>
<b>Maximize satisfaction of resident lion hunters.</b>	<b>0.11</b>	0.01	0.11	0.00	0.10	0.09
<b>Maximize satisfaction of non-resident lion hunters.</b>	<b>0.05</b>	0.05	0.00	0.05	0.01	0.05
<b>Improve ungulate numbers in at-risk districts in R2.</b>	<b>0.10</b>	0.10	0.04	0.10	0.00	0.00
<b>Maintain acceptable densities of mountain lions for:</b>						
<b>ungulate hunters</b>	<b>0.11</b>	0.06	0.01	0.11	0.00	0.01
<b>landowners</b>	<b>0.06</b>	0.05	0.02	0.06	0.00	0.00
<b>houndsmen</b>	<b>0.12</b>	0.03	0.10	0.00	0.12	0.11
<b>outfitters</b>	<b>0.07</b>	0.05	0.05	0.07	0.00	0.03
<b>non-hunters</b>	<b>0.05</b>	0.03	0.05	0.00	0.00	0.01
<b>non-residents</b>	<b>0.03</b>	0.01	0.02	0.03	0.00	0.00
<b>urban/wildlife interface</b>	<b>0.08</b>	0.07	0.02	0.08	0.00	0.02
<b>Improve sportsman support for lion hunting.</b>	<b>0.11</b>	0.09	0.07	0.11	0.00	0.05
<b>Improve public support for lion hunting.</b>	<b>0.10</b>	0.07	0.09	0.10	0.00	0.05
Sum of Weights (for all objectives)	1.00					
Sum of weighted scores (for each alternative)		0.62	0.59	0.72	0.22	0.43
<b>Final Score (sum of weighted scores/sum of weights)</b>		<b>0.62</b>	<b>0.59</b>	<b>0.72</b>	<b>0.22</b>	<b>0.43</b>

While the “Reduce Lions Where Ungulate Population Is Of Concern” alternative scored highest overall, it comes at the cost of the most negative consequences to either of the highly weighted constituencies—lion hunters and houndsmen. The “Status Quo” and “Maintain Lion Population” alternatives appear viable, whereas the others do not.



### **WORK GROUP FINAL RECOMMENDATION**

On the afternoon of the third meeting and the morning of the fourth, the Work Group decided to select the “Maintain Lion Population” alternative and further negotiate the harvest quotas to better meet the interests of ungulate hunters, which were the primary objectives that this alternative failed to meet. This was a very hard-negotiated process, and struck to the core of each individual’s belief system as each quota in each district was sequentially addressed.

The final recommendation on lion harvest quotas and permit levels for Region 2 for the 2014 hunting season is as follows:

## Final Recommendation, Citizens Lion Working Group May 8 2014

Citizen lion working group Alt New: recommendation			
2014/2015			
	Proposed Quota		Permit
	Males	Females	
200, 201	12	8	20
202, 203	18	12	30
204, 260, 261	4	2	6
210	3	1	4
211, 216	5	3	8
212, 215	6	1	7
213, 214	2	1	3
240	4	3	7
250	5	3	8
270	5	4	9
280, 281, 284, 293, portion of 298	5	4	9
283, 285	7	8	15
290, 291, 292, portion of 298	7	3	10
Msla spec mgmt area	13	12	25
Total	96	65	161

The Work Group recommendation differs from the “Status Quo” alternative by 3 lions (lower) in the total allowable regional harvest, but allows harvest opportunity for 20 fewer females than the Status Quo. Compared with the “Maintain Lion Population” alternative, the Work Group recommendation allocates the opportunity to harvest 12 additional females, regionwide. The Work Group recommendation compares very closely to the alternative that would “Reduce Lions Where Ungulate Population Is Of Concern” in the relatively high allowable harvest of males—a strategy to reduce predation for a short-term benefit to ungulates without reducing the population through the harvest of more female lions. A comparison of harvest quotas across alternatives follows.

Alt1: Status quo (30% targeted reduction)			Maintain Lion Population				Citizen lion working Alt New: group recommendation				Reduce all lions where ungulate pop. is of concern		
2014/2015			2014/2015				2014/2015				2014/2015		
	Proposed Quota			Proposed Quota			Proposed Quota		Permit		Proposed Quota		
	Males	Females		Males	Females		Males	Females			Males	Females	
200, 201	9	12	200, 201	9	6	200, 201	12	8	20	200, 201	12	12	
202, 203	14	19	202, 203	14	9	202, 203	18	12	30	202, 203	20	19	
204, 260, 261	2	3	204, 260, 261	2	2	204, 260, 261	4	2	6	204, 260, 261	2	3	
210	3	0	210	3	0	210	3	1	4	210	3	0	
211, 216	5	3	211, 216	5	3	211, 216	5	3	8	211, 216	5	3	
212, 215	6	0	212, 215	6	0	212, 215	6	1	7	212, 215	6	0	
213, 214	2	1	213, 214	2	1	213, 214	2	1	3	213, 214	2	1	
240	2	3	240	3	3	240	4	3	7	240	4	3	
250	4	6	250	3	2	250	5	3	8	250	6	8	
270	4	6	270	5	4	270	5	4	9	270	6	8	
280, 281, 284, 293, portion of 298	5	7	280, 281, 284, 293, portion of 298	5	4	280, 281, 284, 293, portion of 298	5	4	9	280, 281, 284, 293, portion of 298	7	9	
283, 285	5	7	283, 285	5	4	283, 285	7	8	15	283, 285	7	8	
290, 291, 292, portion of 298	5	6	290, 291, 292, portion of 298	5	3	290, 291, 292, portion of 298	7	3	10	290, 291, 292, portion of 298	7	8	
Msla spec mgmt area	13	12	Msla spec mgmt area	13	12	Msla spec mgmt area	13	12	25	Msla spec mgmt area	13	12	
Total	79	85	Total	80	53	Total	96	65	161	Total	100	94	

From a biological perspective, all of the Work Group members understand that their recommendation may or may not have a positive effect on ungulate populations in areas of concern. They also understand that their recommended set of quotas will likely lead to a declining population of lions at the Region 2 scale, because the total female harvest is higher than the total female harvest in the “Maintain Lion Populations” alternative, for which the integrated population model predicted stable to slightly declining lion density. Beyond these biological realities, the Work Group season recommendation is intended to best meet fundamental objectives related to competing social values.

## FURTHER RECOMMENDATIONS

It would seem impossible to commit this level of thought and effort without identifying additional needs for mountain lion management. First among these was the Work Group’s recognition that a statewide mountain lion management plan is needed. The Work Group felt constrained by the short-term (1-year) scope of their efforts and were left to wonder how to move forward in the 2015 seasons, and beyond. Continued efforts such as the Work Group’s to recommend seasons one year at a time, in one region, without considering season structure and other tools at a statewide and long term scale seemed inefficient, at best, to contemplate.

**Recommendation:** Start development of statewide lion management plan this year.

There was general concern for the orphaning of dependent young through the harvest of female lions, and productive discussions about ways to minimize the risk of orphaning and maximize survival of dependent young. While discussions included innovative season structures that may be better left to a statewide planning process, education in the form of a required sex identification class was discussed as a tool to prevent unintentional harvests of misidentified females.

**Recommendation:** Required sex ID test for mountain lion hunters.

The Work Group wishes to clarify that the setting of harvest quotas is an annual process. FWP Region 2 just completed the second year of a three-year FWP lion management strategy that was begun in 2012. The 2014-2015 quotas presented by this Work Group were created with the expectation that this is a foundation to work from for future lion harvest. If FWP's lion management strategy were to be carried out as foreseen in 2012, then female harvest quotas would be reduced to zero in many districts across Region 2, beginning in 2015-2016. However, the Work Group considered this and agreed that the 2015-2016 female quotas should not automatically fall to zero, and that discussions and recommendations for the 2015-2016 quotas should be based on an assessment of the circumstances that prevail at that time.

## **CLOSING COMMENTS**

**--by Work Group members**

*With the future of all our wild life at stake, with all the science and studies completed, it is noteworthy that this process brought us to a result that was just three lions away from the FWP original proposal —Bob Driggers*

*I personally value **all wildlife** on the landscape, for viewing as well as hunting. I appreciated the chance to work with a group of folks with such diverse perspectives. It made for some interesting discussions. And I for one learned a few things in the process —Jack Rich*

*I have never been more impressed with individuals having such strong passion and a deep knowledge on a subject, with significant diverse interests yet were able to value their input and respect one another. I am also grateful for the personal investment all science team and FWP employees made to help the group work through the process to reach our final decision. —Keith Kubista*

*I do have to admit that I came in thinking that the biologists were on the right track. I do talk to Vickie about this area a lot. Some of my ideas changed over the course of the meetings. There was a lot of give & take in the final recommendation but I think that all aspects or sides did benefit from the exchange. I was amazed at how close our recommendation came to what FWP proposed. —Ray Rugg*

*Just wanted to say thanks for offering the citizens lion working group. I think you have been as fair to everyone with an interest in lion management in Reg. 2 as you could possibly be. I certainly enjoyed seeing the SDM process work, learned a lot from the science, and met some great new people that share similar interests in managing our wildlife. —Cody Hensen*

*While none of the Working Group members got the exact quotas they would have ideally wanted, in the true spirit of consensus building and compromise the final product was seen as something every member could live with while considering the diverse interests of the group. Hopefully the work of the group did can be built on into the future and can be used to help balance predator/prey populations in Region 2 in the long run. —Steve Kamps*

*My experiences in working with eleven other individuals to develop recommendations for lion quotas for 2014-15 in FWP Region 2 is one I will always value. In the face of a contentious and often seemingly irresolvable issues that divided hunter groups, outfitters, residents and non-residents and wildlife managers and scientists, I saw a willingness in all participants to check their “I, Me and Mine” perspectives at the door and adopt a “We, Us and Ours” attitude. I appreciated and accepted the “imperfect”, yet good science supported decisions” resulting from our work, work that was enabled by: a proven decision-making process, skilled facilitation, the best available science, professional wildlife manager’s respected explanations, clarifications and encouragement and participant’s knowledge of the issues, respect and appreciation for all wildlife and values reflecting personal responsibility to make sure our kids and grandkids can see and enjoy the amazing wealth of wildlife resources we inherited. —Tim Aldrich*

*We can rest assured that wildlife in Montana has a bright future and is in good hands when we all place a high value on our great animals and the habitat they need. It was great to be part of a working partnership between the public and FWP to find a working balance for the lions on our landscape. —Casey Richardson*

*Thank you and everyone for your recent effort. My guess is wildlife management in Region 2 will continue to have debate that is quite emotional and polarized, especially on the social front. I hope our cougar working group promotes better on-the-ground resource management and deals with the concerns of affected parties. —Rod Bullis*

*Success could be measured by the creation of a proposed mountain lion quota or by any other attribute, but I believe the success of this group was showcased by everyone's embracement of diversity and a keen willingness to listen. —Toby Walrath*



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