



PROCEDURE MANUAL

VOLUME	SECTION	SUBSECTION	PAGE
4	7	01.07.5	1 of 9
SUBJECT			
Bighorn Sheep Harvest Management			

This Procedure Replaces:

None

Staff, Organizations Directly Affected:

- Director
- Regional Managers
- Wildlife Management Staff
- Resident Hunters
- Guide Outfitters

Policy Cross-Reference:

Ministry Policy Manual, Volume 4, Section 7

Subsections:

- 01.07 Game Harvest Management

Other Cross-References:

Ministry Policy Manual, Volume 4, Section 7

Subsections:

- 01.01 Allowable Harvest
- 01.02 Open Seasons
- 01.03 Harvest Allocation
- 01.05 Quota Allocation – Guided Hunting
- 01.06 Limited Entry Hunting
- 01.10 Resident Hunter Priority
- 01.11 Commercial Hunting Interests
- 04.01.3 Control of Species
- 13.01 Goal of Wildlife Management

Ministry Procedure Manual, Volume 4, Section 7

Subsections:

- 01.01.1 Allowable Harvest
- 01.02 Open Seasons
- 01.03.1 Harvest Allocation
- 01.05.1 Quota
- 01.05.2 Administrative Guidelines
- 01.06.1 Limited Entry Hunting
- 01.07.1 Big Game Harvest Management
- 04.01.3 Protecting Species at Risk From Other Species

PREPARED BY		AUTHORIZATION	
NAME Bighorn Sheep Working Group	NAME Dan Peterson	SIGNATURE 	
POSITION Forests, Lands and Nat. Res. Op.	POSITION Director, Fish & Wildlife		DATE EFFECTIVE November 27, 2014



VOLUME	SECTION	SUBSECTION	PAGE
4	7	01.07.5	2 of 9
SUBJECT			
Bighorn Sheep Harvest Management			

Purpose:

To establish a sound and transparent approach for developing management objectives and harvest regulations for Bighorn Sheep province-wide.

Definitions:

“allocation period” –the five year period to which an allocation share applies, as defined in the Harvest Allocation Procedure.

“annual allowable harvest” (AAH) – the number of Bighorn Sheep that are allowed to be killed by resident hunters and guided hunters each year.

“big game stock assessment” – the process of collecting, analyzing and reporting demographic information for the purpose of determining the effects of harvesting on big game populations.

“full curl ram” – means full curl bighorn ram mountain sheep as defined in the *Wildlife Act* Hunting Regulation (B.C. Reg. 190/84).

“mature ram” – means mature bighorn ram mountain sheep as defined in the *Wildlife Act* Hunting Regulation (B.C. Reg. 190/84).

“population” – a biological unit or a discrete group of potentially interbreeding individuals in a given locality, and includes all ages and gender classes. Distinct populations of Bighorn Sheep can be surmised within individual mountain blocks or groups of mountain blocks where regular exchange is known or suspected and can be considered to be relatively discrete.

“population management unit” (PMU) – the spatial scale at which a given big game population will be managed for hunting.

“regional section head” (RSH) – a section head responsible for the management of fish and wildlife within a region, Ministry of Forests, Lands and Natural Resource Operations.

“sightability correction factor” – a quantitative coefficient which is applied to a population survey to account for visibility or sightability bias of the observers.

“three quarter curl ram” – means three quarter curl ram mountain sheep as defined in the *Wildlife Act* Limited Entry Hunting Regulation (B.C. Reg. 134/93).

“visibility bias” – a failure to observe all animals during aerial or ground surveys.

DATE EFFECTIVE	REVISION NO.
November 27, 2014	



VOLUME	SECTION	SUBSECTION	PAGE
4	7	01.07.5	3 of 9
SUBJECT			
Bighorn Sheep Harvest Management			

Procedure:

1 Population Management Units

- 1.1 Bighorn Sheep should generally be managed at the population level.
- 1.2 As specified in the Big Game Harvest Management Procedure, Bighorn Sheep may be managed at smaller or larger spatial units, provided that the resulting units conform to the criteria outlined in the Big Game Harvest Management Procedure.
- 1.3 The RSH should consider, and where appropriate, make changes to the spatial units identified in 1.2 before the start of each new allocation period.

2 Management Objectives

- 2.1 Management objectives should be defined for each Bighorn Sheep PMU, and should take into consideration the big game management objectives described in the Big Game Harvest Management Procedure.
- 2.2 Unless contrary management objectives have been identified, hunted Bighorn Sheep populations should be managed to avoid population declines and to maintain sufficient mature rams in the population to ensure older rams fulfill their social and biological roles (e.g. do most of the breeding, maintain traditional range utilization and subdue excessive activity by younger rams during the rut)¹.
- 2.3 Where feasible, management objectives should take other values such as wildlife viewing into consideration.

3 Harvest Strategy

3.1 Population Assessment

- 3.1.1 The appropriate Resource Information Standards Committee (RISC) standards should be used when performing inventories of Bighorn Sheep populations.
- 3.1.2 Population estimates based on direct counts should be adjusted upwards to account for visibility bias using a sightability correction factor. The appropriate RISC standards should be considered when establishing sightability correction factors.

¹ Geist, V. 1971. Mountain sheep: a study in behaviour and evolution. Univ. Chicago Press, Chicago, Ill. 383 p.

DATE EFFECTIVE	REVISION NO.
November 27, 2014	



VOLUME	SECTION	SUBSECTION	PAGE
4	7	01.07.5	4 of 9
SUBJECT			
Bighorn Sheep Harvest Management			

3.2 Harvest Management Rules

- 3.2.1 Bighorn Sheep populations with less than 75 observed sheep should not be hunted, unless required to meet management objectives².
- 3.2.2 The AAH for rams for each population should typically be calculated by applying a harvest rate of not more than 3% to the total population estimate³.
- 3.2.3 When setting the harvest rate for each Bighorn Sheep population, consideration should be given to:
- management objectives determined in section 2;
 - variations in recruitment rates;
 - rates of harvest by First Nations for food, social or ceremonial purposes;
 - rates of non-hunting human caused mortalities (e.g. road/rail kills);
 - rates of illegal harvest; and
 - survey data on sex/age composition. In such cases, the AAH for rams may be up to 8% to 10% of the estimated number of rams⁴.
- 3.2.4 Where sufficient population-specific demographic information exists, a big game stock assessment that utilizes a population-specific population model should be performed to determine the appropriate AAH that will enable the population management objectives to be achieved. Harvest rates should be approved by the Wildlife Manager in cases where the big game stock assessment indicates that harvest rates higher than 3% may be used to achieve population management objectives.
- 3.2.5 The RSH should consider recommending a reduced harvest rate for California Bighorn Sheep populations and the Spences Bridge population of introduced Rocky Mountain Bighorn Sheep where:
- the mean age of rams in the licensed harvest is less than 6 years of age⁵; or

² 2010. Montana Bighorn Sheep Conservation Strategy, Montana Fish, Wildlife & Parks, Helena, MT (pages 39-40).

³ Rominger, E. 2008. Ram Harvest Strategies for Western States and Provinces—2007. Biennial Symposium of the Northern Wild Sheep and Goat Council 16: 92-98.

⁴ 1993. Management Plan for Bighorn Sheep in Alberta. Wildlife Planning Series Number 6. Alberta Environmental Protection, Fish and Wildlife Services.

DATE EFFECTIVE	REVISION NO.
November 27, 2011	



VOLUME	SECTION	SUBSECTION	PAGE
4	7	01.07.5	5 of 9
SUBJECT			
Bighorn Sheep Harvest Management			

- b. an analysis of data suggests the mean age of harvested rams is likely to decline below 6 years of age within the current allocation period or next 3 years; or
 - c. a particular population is shared between regions and another jurisdiction and the overall harvest rate must be adjusted to account for a differential distribution of sheep throughout their range.
- 3.2.6 The RSH should consider recommending a reduced harvest rate for Rocky Mountain Bighorn Sheep populations where:
- a. the mean age of rams in the licensed harvest is less than 7 years of age⁵; or
 - b. an analysis of data indicates the mean age of harvested rams is likely to decline below 7 years of age within the next 3 years; or
 - c. a particular population is shared between regions and another jurisdiction and the overall harvest rate must be adjusted to account for a differential distribution of sheep throughout their range.
- 3.2.7 The RSH should consider recommending closing a harvest season where any one of the following criteria are met:
- a. < 75 mountain sheep have been observed in a population over three consecutive surveys; or
 - b. the population or components of the populations (e.g. mature rams) have declined below population objectives, and population viability remains at risk even after corrective management actions have been implemented.
- 3.2.8 The RSH should consider recommending opening a harvest season on a population that was previously closed to harvest if the population has, as determined during late winter⁶ for 3 successive surveys:
- a. ≥ 75 observed mountain sheep; and
 - b. ≥ 30 rams:100 ewes; and
 - c. ≥ 30 lambs:100 ewes.

⁵ Hengeveld, P.E. and M. Festa-Bianchet. 2011. Harvest Regulations and Artificial Selection on Horn Size in Male Bighorn Sheep. *Journal of Wildlife Management* 75: 189-197.

⁶ 2010. Montana Bighorn Sheep Conservation Strategy, Montana Fish, Wildlife & Parks, Helena, MT (pages 39-40).

DATE EFFECTIVE	REVISION NO.
November 27, 2014	



VOLUME	SECTION	SUBSECTION	PAGE
4	7	01.07.5	6 of 9
SUBJECT			
Bighorn Sheep Harvest Management			

- 3.2.9 Lamb and/or ewe harvest seasons should be considered where it is deemed necessary to maintain population health, to aid in the reduction of agriculture-related conflicts, to reduce potential for disease outbreaks, and where such seasons are consistent with the management objectives of the population.
- 3.2.10 For allocated PMUs where there is insufficient information to estimate the size of the Bighorn Sheep population, the AAH may be estimated from the historical average annual harvest of Bighorn Sheep by licensed hunters, providing all available evidence suggests that the historic harvest has been sustainable.
- 3.2.11 It is recommended that an AAH be established for unallocated PMUs.

3.3 Hunting Regulations

- 3.3.1 Bighorn Sheep harvest seasons should be regulated using a combination of the season type and seasons bounds outlined in Table 1 of Appendix A.
- 3.3.2 Numbers of Limited Entry Hunting (LEH) authorizations and guide outfitters' quotas should be set in accordance with the Harvest Allocation Procedure, Limited Entry Hunting Procedure, Quota Procedure, and Administrative Guidelines Procedure.
- 3.3.3 Success rates used to determine the number of LEH authorizations should reflect the most recent three years that were open to Bighorn Sheep hunting. Success rates should be determined for each individual LEH hunt.
- 3.3.4 Despite section 3.3.3, LEH success rates should be limited to a minimum of 10%. Other minimum success rates may be applied where approved by the Wildlife Manager. Limited Entry Hunting areas with consistently low success rates should be reviewed and other regulatory options considered for implementation.
- 3.3.5 Before proposing regulation changes so that populations will meet the performance measures of management objectives (e.g. avoid population declines), staff should examine lines of evidence as described in Appendix B to determine if those performance measures are not being met, and report that information to the Wildlife Manager.

4 Bag Limits

- 4.1 Normally, provincial and regional bag limits should be no more than one ram and one ewe or lamb Bighorn Sheep per hunter per year.

5 Regulation Review

DATE EFFECTIVE	REVISION NO.
November 27, 2011	



PROCEDURE MANUAL

VOLUME	SECTION	SUBSECTION	PAGE
4	7	01.07.5	7 of 9
SUBJECT			
Bighorn Sheep Harvest Management			

- 5.1 Regulations should be reviewed, and the results of any regulation changes monitored, according to Appendix B and the procedure outlined in the Big Game Harvest Management Procedure.

DATE EFFECTIVE	REVISION NO.
November 27, 2014	



VOLUME	SECTION	SUBSECTION	PAGE
4	7	01.07.5	8 of 9
SUBJECT			
Bighorn Sheep Harvest Management			

Appendix A: Recommended Hunting Season Structure for Bighorn Sheep

Table 1. Season bounds (minimum/maximum season dates) for Bighorn Sheep harvest seasons.

Class	Season Type	Season Bounds
Full Curl Ram, or Mature Ram	GOS	Sep 10 – Oct 25
		Aug 15 – Sep 30⁷
Full Curl Ram, Three Quarter Curl Ram, or Ram Only	LEH	Aug 25 – Nov 30
Ewe or Lamb	LEH	Oct 1 – Nov 30

GOS = General Open Season
LEH = Limited Entry Hunt

⁷ Only in Region 7A and 7B.

DATE EFFECTIVE	REVISION NO.
November 27, 2014	



VOLUME	SECTION	SUBSECTION	PAGE
4	7	01.07.5	9 of 9
SUBJECT			
Bighorn Sheep Harvest Management			

Appendix B: Assessing and Monitoring Performance Measures of Management Objectives

Prior to Proposing a Regulation Change:

Population management units for Bighorn Sheep should have one or more performance measures that are used to determine if management objectives are being met (e.g. avoid population declines). It is important to note that these performance measures are meant to be used as general guidance and should not be used as a precise threshold for immediate initiation of a regulation change. This is because of the general problems associated with assessing populations (e.g. unfavourable weather conditions or observer bias when conducting aerial surveys).

It is recommended that multiple lines of evidence be examined that could indicate performance measures are not being met. These include:

- a) successive population surveys (i.e. repeat surveys over a year or number of years);
- b) a big game stock assessment (analysis of population and hunter harvest information); and
- c) observational information from a variety of sources.

The spatial area to be used to assess a management concern will normally be the PMU (e.g. the population). There may be circumstances where the performance measure is not being met in a portion of a PMU. In these situations, options should be examined for adjusting harvest regimes in the affected area only so as not to reduce hunting opportunities throughout the entire PMU. Where this occurs, the management focus should be recovery within the affected area, so as to restore consistent regulations throughout the PMU.

Monitoring the Regulation Change:

To evaluate if the regulation change has had the desired population effect (e.g. recovery above management threshold limits), a big game stock assessment should be conducted 3-5 years after the regulation change has been implemented in order to provide adequate time for the desired change in the population to occur. Normally the stock assessment would include a minimum of one population survey in addition to the analysis of hunter harvest information.

DATE EFFECTIVE	REVISION NO.
November 27, 2014	

