

**SOILS AND LANDSCAPES  
ASSOCIATED WITH  
SILVER SAGEBRUSH AND SAGE GROUSE**

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## INTRODUCTION

At the time of agricultural development the sage grouse (*Centrocercus urophasianus*) was reported throughout the Dry Mixed Grass Ecoregion (Soil Correlation Area 1, the Brown soil zone of southeastern Alberta). The habitat in Canada occupied by sage grouse has suffered a 66 to 92% decline over the past 30 years (Aldridge 2001). The sage grouse population in Alberta is now confined to a region of native range south of the Cypress Hills, where it is isolated from the main population centered in Wyoming and Colorado.

Silver sagebrush (*Artemisia cana*) is a very important plant species, in that it provides cover for sage grouse breeding and nesting. Silver sagebrush is also important for winter browse for the Pronghorn antelope (*Antilocarpa americana*). Silver sagebrush is considered to be an increaser species, meaning that it tends to increase in cover and height with grazing pressure on grasses and forbs. Sage grouse need at least a 5% cover of silver sagebrush for nesting and brooding (Aldridge 2001).













LandWise Inc. was contracted by Alberta Public Lands to evaluate known locations of silver sagebrush. Major goals of the study were:

- 1) to characterize typical soils and landscapes where silver sagebrush occur, using available soil survey information and the authors' knowledge;
- 2) to assign an AGRASID (Agricultural Region of Alberta Soil Information Database, Brierley et al. 2001) soil landscape model to each location of silver sagebrush identified by Alberta Public Lands and Alberta Environment,
- 3) to assess the density distribution of silver sagebrush in relation to soil landscape models, and
- 4) to develop predictive mapping tools to assist in sage grouse management strategies.

## METHODS

Alberta Public Lands provided a database of known occurrences of silver sagebrush, including legal location, examiner, shrub height, sagebrush density distribution class, parent material, soil order and/or subgroup, soil series, AGRASID soil landscape model, slope class, aspect, and range site code (Appendix 1). The density distribution classes are shown and described in Table 1. The soils and/or AGRASID information was incomplete, and LandWise Inc. provided the AGRASID soil landscape model and other additions and edits for each sagebrush location, for density distribution classes 3 through 12. Classes 1 and 2 were not evaluated due to the scarcity of sagebrush in these classes (Table 1). Public Lands personnel of Lethbridge and Medicine Hat, including Barry Adams, Bruce Cairns, Terry Hood, Dennis Milner, Darlene Moisey and Ken Pitcher, also provided input to LandWise Inc. on specific localities with significant sagebrush cover.

**Table 1. Density distribution classes for plant species**  
(a descriptive method used by Alberta Public Lands to communicate the amount and pattern of the area covered by a plant species).

Class	Description of abundance in polygon	Distribution
1	Rare	
2	A few sporadically occurring individual plants	
3	A single patch	
4	Several sporadically occurring plants	
5	A few patches	
6	Several well spaced patches	
7	Continuous uniform occurrences of well spaced plants	
8	Continuous occurrence of plants with a few gaps in the distribution	
9	Continuous dense occurrence of plants	
10	A single patch plus a few sporadically occurring plants	
11	A single patch plus several sporadically occurring plants	
12	A few patches plus several sporadically occurring plants	

The Natural Resources Service of Alberta Environment provided northing and easting coordinates for the 33 known active and inactive sage grouse leks in southern Alberta. Cameron Aldridge<sup>1</sup> (personal communication) provided LandWise with information on which 10 of the 33 sites are active, and with the approximate year of abandonment for inactive sites. LandWise Inc. plotted these coordinates on 1:50,000 NTS maps. Aerial photography (1:60,000 scale) and AGRASID Version 3.0 (1:100,000 scale) were then used to determine the AGRASID soil landscape model for each lek location. For locations within the County of Forty Mile, the County of Forty Mile 1:50,000 Soil Survey (McNeil et al. 1994) was used to identify the specific soil map unit, and to confirm the AGRASID soil landscape model. One site was covered by the 1:20,000 Onefour and Sage Creek Soil Survey<sup>2</sup>, and the appropriate soil landscape model was identified.

Once the AGRASID SLMs containing active or inactive sage grouse leks were identified, SLMs containing the same soil series and that occur on similar landscapes were also identified. SLMs containing inactive sage grouse leks were split into two types: those

<sup>1</sup> C.L. Aldridge, Ph.D. Candidate, Dept. of Biological Sciences, University of Alberta, March 2001.

<sup>2</sup> Conducted by Ron McNeil, Contract Pedology Services Ltd., completed in March 1992 for Agriculture and AgriFood Canada.

that occur on the overflow range-site type, and those that have a lower probability of containing suitable habitat due to soil or landscape limitations.

Alberta Public Lands staff also provided descriptions of four plant communities in which silver sagebrush is an important species (Appendix 3). These communities occur in the Dry Mixed Grass and Mixed Grass Ecoregions, in both open shrubland and native grasslands. The four plant communities are:

- 1) silver sagebrush, needle and thread, and sand grass;
- 2) silver sagebrush, needle and thread, and blue grama grass;
- 3) silver sagebrush and western wheatgrass; and
- 4) silver sagebrush and northern wheatgrass.

LandWise Inc. reviewed this information, and modifications to refine and enhance the descriptions are suggested in Appendix 3.

## **RESULTS AND DISCUSSION**

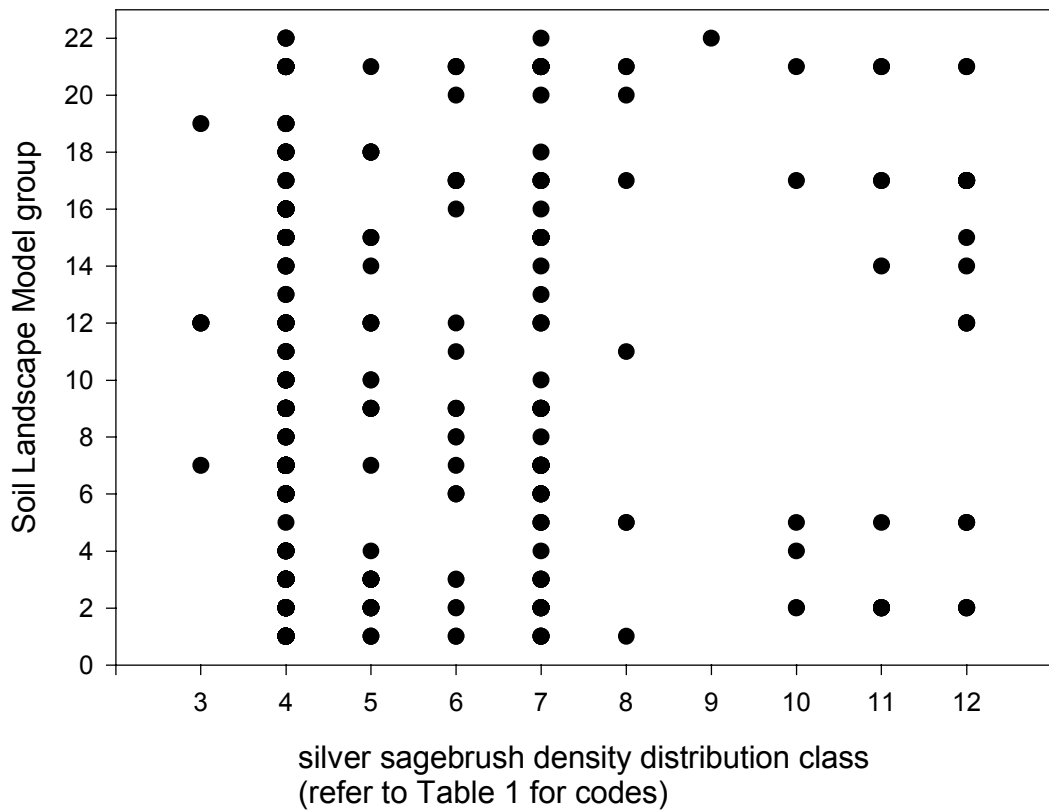
### **Identification of SLMs for silver sagebrush locations provided by Alberta Public Lands**

AGRASID SLMs for each known occurrence of silver sagebrush were identified as closely as possible (Appendix I). SLMs containing silver sagebrush were then divided into 22 groupings, based on similarities in soil order (Chernozemic, Solonchic or Regosolic), parent material (till, bedrock, alluvium, lacustrine) or range site (sandy, sand, choppy sand hills, loamy) categories. Results indicated there was no relationship between silver sagebrush density distribution classes and Soil Landscape Model groups (Fig. 1).

The lack of correlation between silver sagebrush occurrence and SLM groupings may be due to inadequate identification of legal locations for the silver sagebrush database. Numerous locations were listed as multiple quarter sections, and in some cases the quarter section was not identified. This hindered the identification of SLM in cases where several soil landscape models were present in one section or quarter section. It is also possible that different field examiners identified sagebrush density class differently than others, in cases where correlation exercises with other field examiners were insufficient.

### **Characterization of SLMs for Sage Grouse Lek Locations Provided by Alberta Environment**

The southeastern corner of Alberta contains a much higher proportion of SLMs appropriate for sagebrush cover that is adequate for sage grouse habitat. All of the active and inactive lek locations noted in Alberta occur on the south and southwest side of the Cypress Hills. Additional inactive leks occur elsewhere in SCA 1, based on local testimony, but they have been inactive for at least 50 years, before Alberta Environment started documentation.



**Legend for Soil Landscape Model groups**

- |  |   |
|--|---|
| 1: Chernozem, loamy                        | 12: Chernozem and Solonetz, till over bedrock |
| 2: Chernozem, till                         | 13: Dark Brown Chernozem and Solonetz, misc.  |
| 3: Dark Brown Chernozem, till              | 14: Solonetz, till over bedrock               |
| 4: Chernozem on till over bedrock          | 15: Solonetz, till                            |
| 5: Chernozem on alluvial fans              | 16: Solonetz, loamy                           |
| 6: Chernozem, loamy and sandy              | 17: Solonetz, alluvial fan                    |
| 7: Chernozem, sandy                        | 18: Solonetz and Regosol, fans and bedrock    |
| 8: Chernozem, sandy and sands              | 19: Solonetz, lacustrine                      |
| 9: Chernozem, sands                        | 20: Regosol, fluvial                          |
| 10: Chernozem, sands and choppy sand hills | 21: Thin breaks                               |
| 11: Chernozem and Solonetz, loamy          | 22: Gravel and shallow to gravel              |

Note: All SLM groups are in the Brown soil zone except groups 3 and 13.

Fig. 1. Soil Landscape Model group vs. silver sagebrush density distribution class.

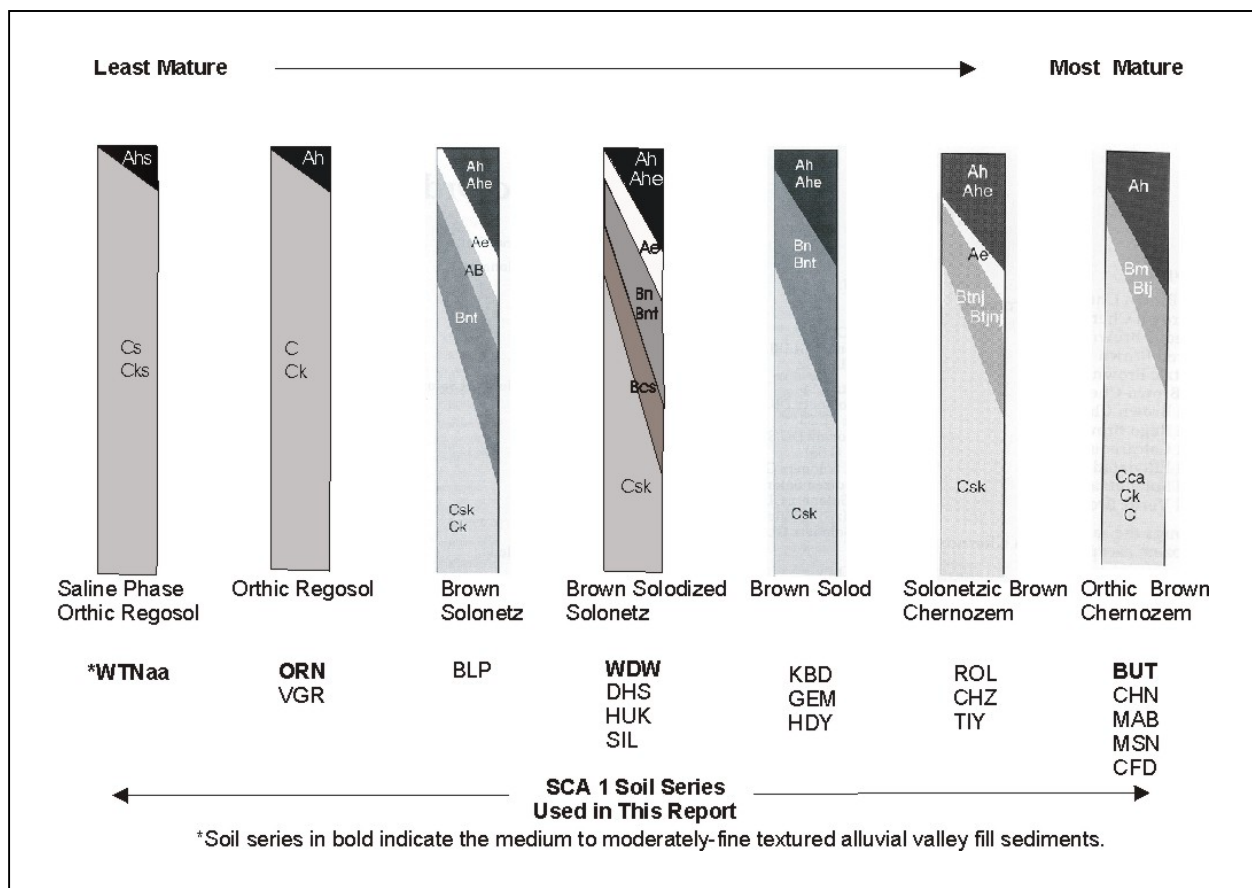
The AGRASID soil landscape model (SLM) was identified for each of the 33 known active and inactive sage grouse leks in southern Alberta (Table 2).

**Table 2. Status and SLMs for known sage grouse leks in Alberta. (Status and year of abandonment provided by C. L. Aldridge, personal communication<sup>1</sup>)**

LEK #	Active or (Inactive Since)	Township, Range, Meridian	AGRASID Version 3.0 1:1 000 000 Soil Landscape Model	1:50 000 County of Forty Mile Soil Survey	Onefour - Sage Creek 1:20,000 Soil Survey
67-2/24	Active	3-6-W4	BUWD11/I3I	ORWD3/2-3a	-
68-10/11	Active	4-6-W4	BUT14/I3I	ORWD3/2-3a	-
68-9	Active	5-6-W4	ORWD3/I3I	ORWD3/2-3a	-
68-16	Active	4-4-W4	ORWD3/I3I	-	-
68-22	Active	1-2-W4	BUWD18/U1h	-	-
80-30	Active	3-2-W4	WDW13/SC2	-	-
83-31 a)	Active	5-6-W4	WTNaa3/U1I	WTN3/2	-
83-31 b)	Active	5-6-W4	WTNaa3/U1I	WTN3/2	-
83-31 c)	Active	5-6-W4	WTNaa3/U1I	WTN3/2	-
99-34	Active	5-5-W4	WDW3/I3I	ORWD3/2-3a	-
67-1	(1979)	5-6-W4	BUWD5/I3I	WDW5/2-3a	-
67-3	(1994)	1-2-W4	ORWD19/I3h	-	-
67-4	(1994)	1-2-W4	BUWD18/U1h	-	-
67-5	(1987)	6-3-W4	GNN14/I3I	-	-
68-12	(1980)	3-6-W4	WDW1/I3I	WDW5/2-3a	-
68-13	(1994)	4-4-W4	ORN7/I3I	ORWD3/2-3a	-
68-14	(1985)	4-5-W4	GERO6/I3I	DHRO1/3	-
68-15	(1976-94)	2-5-W4	BUT14/I3I	-	-
68-17	(1994)	4-4-W4	BUT14/I3I	-	-
68-18	(1975)	3-4-W4	BUT14/I3I	-	-
68-19	(1977-97)	2-4-W4	PHN17/R2I	-	-
68-20	(1976)	3-3-W4	BUWD4/SC2	-	-
68-21	(1975-94)	2-3-W4	HDRO1/U1h	-	-
68-23	(1968-94)	3-1-W4	WDW13/SC2	-	-
68-6/7	(1977)	5-6-W4	ORWD3/I3I	ORWD3/2-3a	-
68-8	(1983)	5-6-W4	ORWD3/I3I	ORWD3/2-3a	-
75-25	(1985-95)	5-1-W4	ZUN7/SC2	-	-
75-26	(1997)	2-3-W4	ORWD19/I3I(h)	-	ORWD3/2-3a
76-27	(1987-94)	5-5-W4	WDW3/I3I	WDW5/2-3a	-
76-28	(1995)	4-7-W4	ORWD3/I3I	ORWD3/2-3a	-
79-29	(1979)	6-1-W4	CGW19/I3I	-	-
95-32	(1997)	3-1-W4	HDRO1/I3Ic	-	-
95-33	(1998)	5-5-W4	HDRO1/U1h	ORWD3/2-3a	-

SLMs that contain active and inactive sage grouse leks, and SLMs that are similar to SLMs containing sage grouse leks (potential habitat), are listed in Appendix 2. The following generalizations can be made from the SLMs listed in Appendix 2.

**Occurrence on the overflow range site type.** All active and the majority of inactive sage grouse leks occur on the overflow range site type (Wroe et al. 1988), which receives more water and sediment than typical for the climate, due to episodic runoff events. The lek locations occur mainly on alluvial fans or aprons (I31), and often occupy broad level concave valley settings (U11). The valleys range from broad poorly-defined swales to glacial meltwater channels (SC2) (Table 2). The dominant soil series that contain active or inactive leks on alluvial valley fill sediments include Bunton (BUT), Wardlow (WDW), Orion (ORN), and Weston (WTNaa) (Table 2, Appendix 2). These four soil series range from Orthic Regosol, saline phase (WTNaa) as the least developed, to Orthic Brown Chernozem (BUT) as the most developed, on valley fill sediments. This continuum of soil profile development is shown in Fig. 2, and includes schematics of required soil horizons (SCWG 1998), and also shows other soil series that are discussed in this report.



**Figure 2. Example of a common soil profile development sequence representative of valleys or basins in SCA1. (Adapted from SCWG 1998).**

Two inactive leks (67-5 and 79-29 in Table 2) are located in SCA 2 (the Dark Brown Highlands of the Cypress Hills in the Mixed Grass Ecoregion), also on overflow range sites and valley fill parent material. These leks occur on SLMs dominated by the Craigower (CGW) and Glenbanner (GNN) soil series. The occurrence of inactive sage grouse leks in the cooler moister climate of SCA 2 is in contrast to the more typical occurrence of active and inactive leks in the semi-arid climate of SCA 1.

The tendency for sage grouse leks to occur on the overflow range site type is probably related to the additional moisture, nutrient enrichment, and occasional sedimentation brought in by extreme runoff events. Sediments may provide nutrient enrichment beneficial to forbs and sagebrush. Sediments may also decrease the growth and viability of grasses, and thus contribute to an increase in sagebrush cover.

Creek drainage basins and their valleys that contain active or inactive leks include seven active leks that flow into the internally-drained Pakowki basin: South and North Manyberries, Irrigation, Fourways, Ketchum, Erickson, Hooper, and Canal Creeks. The internally-drained Pakowki basin contains 170 km<sup>2</sup> of valley fill sediments (McNeil 1996). An additional six creek drainage basins contain active or inactive leks (three active): Grant, Middle, Lodge, Bare, Sage, and Cripple Creeks.

Sediments carried by flood events in all of the creeks listed above are rich in sodium sulphate salts derived from the marine Bearpaw shale, or from till or other surficial sediments related to the Bearpaw shale. The internally drained nature of the Pakowki basin also may promote sagebrush. Salts are concentrated by the evaporating water, promoting long-term sodic and saline conditions at mesic sites in the basin. This tends to reduce grass cover, and ultimately promotes sagebrush cover.

Silver sagebrush most commonly occurs with western wheatgrass in the overflow range site type, at a cover greater than 5% (Appendix 3).

**Occurrence on non-overflow sites.** Inactive leks also occur on soils and landscapes in SCA 1 that have a lesser or negligible contribution from overflow waters. These include the soil series Gem (GEM), Ronalaine (ROL), and Pinhorn (PHN) (Appendix 2), which range from lacustrine veneer over glacial till, to thick till, to thin till over nonmarine softrock. Silver sagebrush in these locations typically occurs with needle and thread and blue grama grass, and can range from 5 to 35% cover (Appendix 3).

Some inactive leks also occur on Solonchic soils developed on glacial till (Halliday, HDY, and Hemaruka, HUK) or thin till over marine softrock (Steveville, SIL). Plant communities on HDY and HUK soil series are characterized by northern wheatgrass and a 7 to 27% cover of silver sagebrush.

**Potential habitat.** SLMs containing the same soil series and occurring on similar landscapes as SLMs with active or inactive leks (called “potential habitat” SLMs) were also identified. Although the overflow and non-overflow range site types described

above contain some of these “potential habitat” SLMs, the following locations have adequate sagebrush cover, but do not contain active or inactive leks.

General locations that have adequate sagebrush cover but do not contain documented leks include: 1) drainages of the Milk, Lost, South Saskatchewan, Red Deer, Bow, Oldman, and Little Bow Rivers, 2) the areas around Tide and Louisiana Lakes, and 3) drainages to creeks including Peigan, Seven Persons, Lost, and Ross Creeks, and 4) the areas of Walsh Flats, Bryant Coulee and Red Rock Coulee. The lack of sage grouse leks in these drainage basins may reflect the lack of large blocks of native prairie. <sup>1</sup>Aldridge (personal communication) stated that a successful brood requires a 500 ha area with sufficient forbs and sagebrush for their diet, and sagebrush cover for nesting and brooding.

In addition, silver sagebrush also occurs with needle and thread and sand grass on sandy, sand and choppy sand hills range sites, with cover commonly ranging from 5 to 20%. Examples of this type of sagebrush occurrence include native prairie blocks near Hays, Hilda, Pakowki Sandhills, and on CFB Suffield.

**Area calculations.** AGRASID Version 3.0 was used to calculate the area of SCA 1 covered by SLMs containing active and/or inactive sage grouse leks. SLMs containing inactive leks that occurred on non-overflow range-site types were categorized as “less desirable habitat”. The calculations were also completed for a subset area immediately south of the Cypress Hills, covering Townships 1 through 7 and Ranges 1 through 7 west of the fourth meridian. Detailed results are contained in Appendix 2, and a summary of results is presented in Table 3.

**Table 3. Summary of the area covered by SLMs that contain active or inactive leks, or contain similar soil and landscape characteristics.**

Habitat Type	SCA 1		Subset Area, Tp. 1-7, Rg. 1-7, W4			
	ha	%	SCA 1		SCA 2	
	ha	%	ha	%	ha	%
Active leks (all on overflow types)	18,692	0.41	17,232	3.67	0	0
Inactive leks; overflow types	4,169	0.09	4,169	0.89	4,236	0.90
Inactive, less desirable habitat	52,787	1.15	17,228	3.66	0	0
Potential habitat, no leks	428,225	9.30	73,681	15.67	3,081	0.66
Sum of area with relevant SLMs	503,874	10.94	112,310	23.89	7,317	1.56
Total area	4,606,685		296,636		173,454	

All of the documented active and inactive leks on the overflow range-site type occur in the subset area of Townships 1 to 7 and Ranges 1 or 7. SLMs containing active leks cover 3.67% of the subset area, compared with only 0.41% of SCA 1 (Table 3). Two main factors probably account for the concentration of sage grouse in the subset area (the southeastern corner of the province).

- 1) Less than 10% of the subset area is cultivated, compared with over 80% of SCA 1 as a whole. Since sage grouse require at least 500 ha of suitable habitat per brood, cultivation reduces their chances for success.
- 2) The overflow range-site type is much more common in the subset area, due to the greater elevation relief afforded by the area from the Cypress Hills to the Pakowki Basin and/or Wildhorse Basin.

## **DATA GAPS AND RECOMMENDATIONS**

**Refinement of the silver sagebrush density distribution file.** The most likely soil landscape models were provided for each location in the silver sagebrush density distribution file provided by Alberta Public Lands. However, the SLMs showed no correlation to silver sagebrush density (Fig. 1). Improved precision for legal land locations contained in the silver sagebrush density distribution file may improve the relationship. It is recommended that Alberta Public Lands provide a thorough review and update of legal land locations in the silver sagebrush density distribution file. Specific locations could be plotted by examiners on 1:50,000 maps, and easting and northing coordinates could then be added. Alternatively, GPS coordinates could be identified. The review should include assignment of degrees of confidence for specific entries, and inferences as to probable reasons for observed silver sagebrush density at each site.

**Use of the Native Prairie Baseline to refine area calculations.** The analysis of areas covered by silver sagebrush at a cover adequate or marginal for sage grouse leks, which was conducted during the current investigation, assumed that all the SLMs containing sage grouse leks were in native prairie. However, SCA 1 is dominated by cultivated agriculture, and also includes significant areas of non-native pasture. At least 80% of SCA 1 is non-native, compared with less than 10% of the subset area (Townships 1-7, Ranges 1-7). Therefore, SLM hectares that are assumed to be suitable for silver sagebrush (Appendix 2) will be reduced in area and overall percentage, particularly for SCA 1. It is therefore recommended that the current investigation be supplemented with information from the native prairie baseline survey, so that the area covered by SLMs suitable for sage grouse leks can be determined with a higher degree of accuracy.

**Determination of the role of episodic runoff events.** Data collected by the current investigation suggest overflow and sedimentation caused by episodic flood events are important for the maintenance or increase of silver sagebrush, and for the maintenance of active sage grouse leks. The means by which overflow and sedimentation promote silver sagebrush is poorly understood and requires research. For example, is silver sagebrush maintained/increased by disturbance caused by episodic runoff, or are over-grazing and/or drought stress mainly responsible? What role does the re-deposition of sodic and saline materials play in contributing to the silver sagebrush - sage grouse ecosystem? Does episodic flooding also promote forbs that are desirable to the sage grouse? What is the role of minimum habitat size and shape? For example, are valleys with sagebrush

less conducive to sustaining successful broods? These questions could be assessed by academic research.

**Evaluation of historic and current water management.** Data collected by the current investigation indicate the importance of episodic runoff events for the maintenance of active sage grouse leks. Therefore, each creek drainage basin containing active and inactive leks should be evaluated to document potential impediments to surface water flow, such as dams on creeks, or dugouts in swales leading to creeks. In addition to potential drainage impediments, some creek systems may be actively down-cutting, thus causing overflow to occur less frequently. The evaluation should be combined with an analysis of present-day and historic aerial photographs, to compare the degree and intensity of water management structures in the 1960s with those of today. The evaluations should focus on the subset area of Townships 1 to 7, Ranges 1 to 7, or a portion of it. The film and solar angle technology recommended in Fent (1999) could also be used to assist with silver sagebrush community identification on future aerial photography coverage of this area.

**Evaluate the role of climate change.** Active sage grouse leks are far fewer in number today than in the past. Cultivation of native prairie has undoubtedly played an important role in the destruction of sage grouse leks. However, the role of Holocene climatic variation is very poorly understood. Research from South Dakota indicates that for the period from about 2500 to 850 years before present, global temperatures were higher, and there was greater precipitation and runoff. This caused greater erosion of badland escarpments, and resulted in greater transport of sediments to basinal areas (White and Hannis 1985). Soils in the active and inactive leks in southeastern Alberta are dominated by soils that are relatively immature. This indicates they may have been deposited by a higher degree of erosion and transport during a similar warmer and wetter period.

The investigation of Holocene climatic variation should start with a thorough literature review. The review should focus on the Palliser Triangle and the Northern Great Plains of the U.S.A. The literature review should then be applied to the Cypress Hills and Pakowki Basin region, in order to target research needs. Additional research could be conducted in the evaporative basins using tools including paleosols, palynology, phytoliths, and paleolimnology. Research agencies that could be involved in this effort include the Geological Survey of Canada (Don Lemmon and Rudy Klaasen), Alberta Geological Survey (Mark Fenton), Cypress Hills Provincial Park (Keith Bocking), the University of Lethbridge (Rene Barendregt), and the University of Calgary (Robert Vance). An improved understanding of Holocene climate variation will be useful for the development of appropriate land management strategies in southeastern Alberta.

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Appendix 1. SLMs for each silver sagebrush location. (Locations and density distribution classes provided by Alberta Public Lands.

Twp	Rg	Sec.	Qtr.	Density D class	Lease	Examiner	Elevation	Aspect	Parent Material	SLM from AGRASID	SLM group description	SLM group number	Soil subgroup	Soil complex	Soil series	Texture or complex	Slope or complex	Macro landform	Local landform	Landform element	Range site	Range condition %	RC class	Vigor	Estimated production
6	5	33	4	12	MAYER	OC			GF-M	CGW16/131	sz fan	17		CGW-GNN		SICL-CL-SCL	3	Valleys	Inclined			0	-P		
1	3	5	0	12	ONE FOUR	AR	898	NE	M	MSN1/U1h	ch till	2	O.B		MSN	SL-CL	3-4	Uplands	Rolling		Lo	75	+G	G	200
1	3	5	2	12	ONE FOUR	AR	897	E	M	MSN4/13hd	ch till	2	O.B		MSN	SL-CL	3-5	Uplands	Rolling		Lo	76.3	+E	G	250
1	6	7	3	12	PINHORN	AR	1016	NW	GL	WDW5/131	sz fan	17	B.SS		WDW	L_C/CL	3-4	Valleys	13-25	Lower slope	BIO	62.4	G	E	125
1	6	7	1	12	PINHORN	AR	1028	SE	GL	WDW13/R21	sz fan	17	B.SS		WDW	L_C/CL	5	Hills	Rolling	Mid slope	Lo	90.6	E	E	325
1	3	7	2	12	ONE FOUR	AR	914	E-SE	M	MSN4/13hd	ch till	2	O.B		MSN	SL-CL	5-6	Hills	Ridged	Crest	Lo	85.7	E	G	175
1	7	11	4	12	PINHORN	AR	1022	SE	M	PHS12/H51	ch sz till/br	12		SIL/PHN		L_C/CL	3	Midlands	12-13	Mid slope	Lo	63.7	G	G	200
1	7	11	2	12	PINHORN	AR	1031	S-SW	M	ROS11/R21	ch sz till/br	12		SIL/ROL		L_C/CL		Midlands	Undulating		BIO	55.3	-G	G	125
1	7	10	8	12	PINHORN	AR	1033	N	M	PHS12/H51	ch sz till/br	12		SIL/PHN		L_C/CL	4-5	Midlands	13-20		Lo	57.8	-G	F	150
1	7	10	1	12	PINHORN	AR		NW	M	ROS11/R21	ch sz till/br	12		SIL/ROL		L_C/CL	3-5	Uplands	13-20		Lo	62.3	G	G	200
1	3	8	1	12	ONE FOUR	AR	893		M	MSN1/U1h	ch till	2	O.B		MSN	CL-C	2-3	Uplands	12-23		Lo	67.6	+G	G	200
1	7	3	2	12	PINHORN	AR	1034	SW	GL	WDW19/U1h?	sz fan	17	B.SS		WDW	L_C	4	Valleys	Inclined		Lo	69.8	+G	G	200
1	7	2	1	12	PINHORN	AR			M	SIL6/R21	sz till/br	14	B.SS		SIL	L_C/CL	3	Midlands	Rolling	Mid slope	BIO	71.1	+G	G	175
1	3	8	4	12	ONE FOUR	AR	889		M-GL	GEHU13/U1h	sz till	15	O.B		HUK/GEM/TK	SL-CL	2-3		14-25		Lo	68.15	+G	G	175
1	6	5	4	12	PINHORN	AR	1000	SW	GL	WDW13/R21	sz fan	17	B.SS		WDW	L_C/CL	2-3	Midlands	Plain	Level	BIO	55.4	-G	F	85
1	4	2	6	12	ONE FOUR	AR	911	SW	U	ZUN1/14h	thin break	21	O.R		ZUN		6	Uplands	13-20		Tb	71.5	+G	G	100
1	4	12	2	12	ONE FOUR	AR	871	E-SE	R-GL	BUKM1/13lc	ch fan	5	O.B		BUT/CMR	BUKM1/13lc	3	Valleys	13-16-25		Lo	58	-G	G	150
1	4	1	4	12	ONE FOUR	AR	877	SW	R-GL	BUKM1/13lc	ch fan	5	O.B		BUT/CMR	BUKM1/13lc	3-4	Hills	13-20-25	Mid slope	Lo	62.95	G	G	175
1	6	6	2	12	PINHORN	AR	1030	SW	GL	WDW13/R21	sz fan	17	B.SS		WDW	L_C/CL	3	Valleys	16-25		BIO	74.35	+G	F	175
1	6	6	1	12	PINHORN	AR	1016	SE	GL	WDW13/R21	sz fan	17	B.SS		WDW	L_C/CL	3	Midlands	Undulating		BIO	63.7	G	G	150
1	6	5	2	12	PINHORN	AR	1020	S	GL	WDW13/R21	sz fan	17	B.SS		WDW	L_C/CL	2-3	Midlands	Undulating		BIO	75.5	-E	G	100
1	4	16	1	12	ONE FOUR	AR	863	NE	U	ZUN1/14h	thin break	21	O.R		ZUN		3-5	Valleys	Inclined	Lower slope	Tb	23.75	+P	F	100
1	4	7	4	12	ONE FOUR	AR	874	SE	R-GL	BUKM1/13lc	ch fan	5	O.B		BUT/CMR	BUKM1/13lc	3-4	Valleys	13-25		Lo	41.2	+F	F	125
1	4	12	7	12	ONE FOUR	AR	913	SW	M	MSN4/13hd	ch till	2	O.B		MSN	SL-CL	5-6	Hills	13-20	Upper slope	Tb	77.5	-E	G	150
1	6	5	3	11	PINHORN	AR	1020	SE	GL	WDW13/R21	sz fan	17	B.SS		WDW	L_C/CL	3-5	Hills	Rolling	Upper slope	Lo	89.1	-E	G	275
1	3	7	2	11	ONE FOUR	AR			M	MSN4/13hd	ch till	2	O.B		MSN	SL-CL	5	Uplands		Mid slope	Lo	86.8	E	G	350
1	7	12	3	11	PINHORN	AR	1029	SE	M	SIL6/R21	sz till/br	14	B.SS		SIL	L_C/CL	5	Hills	13-20	Mid slope	Lo	42	+F	F	150
1	4	21	2	11	ONE FOUR	AR	891		U	ZUN1/14h	thin break	21	O.R		ZUN		1-5		Hunmocky		Tb	69.3	+G	G	150
1	6	6	3	11	PINHORN	AR	1036	NW	GL	WDW13/R21	sz fan	17	B.SS		WDW	L_C/CL	5	Hills	Rolling		BIO	86.8	E	G	175
1	3	6	1	11	ONE FOUR	AR	903	SW	M	MSN4/13hd	ch till	2	O.B		MSN	SL-CL	3-4	Hills	Undulating	Mid slope	Lo	79.1	-E	G	250
1	4	12	1	11	ONE FOUR	AR	915	E-SE	M	MSN4/13hd	ch till	2	O.B		MSN	SL-CL	3-5	Hills	Rolling		Lo	88.1	E	G	225
1	4	11	4	11	ONE FOUR	AR	892	SE	R-GL	BUKM1/13lc	ch fan	5	O.B		BUT/CMR	BUKM1/13lc	5	Hills	Ridged	Crest	Tb	69.3	+G	G	150
1	4	11	3	11	ONE FOUR	AR	921	S-SW	M	MSN4/R2m	ch till	2	O.B		MSN	SL-CL	3-5	Hills	Ridged	Upper slope	Tb	73.3	+G	F	150
1	3	6	4	11	ONE FOUR	AR	886	S	M	MSN4/13hd	ch till	2	O.B		MSN	SL-CL	3-5	Uplands	Rolling		Lo	78.4	-E	G	250
1	3	7	1	11	ONE FOUR	AR	897	SW	M	MSN4/13hd	ch till	2	O.B		MSN	SL-CL	3	Uplands	13-25		Lo	78.8	-E	G	200
1	4	3	4	11	ONE FOUR	AR	883	E-NE	U	ZUN1/14h	thin break	21	O.R		ZUN		3-5	Valleys	Inclined	Upper slope	Lo	49.55	+F	G	150
1	3	7	3	11	ONE FOUR	AR	900	NE	M	MSN1/U1h	ch till	2	O.B		MSN	CL-C	2-3		Undulating		Lo	70.6	+G	G	200
1	3	7	4	11	ONE FOUR	AR	899	E	M	MSN1/U1h	ch till	2	O.B		MSN	CL-C	2-3	Uplands	Undulating		BIO	72.45	+G	G	175
1	4	12	3	10	ONE FOUR	AR	910	SE	M	MSN8/R2m	ch till	2	O.B		MSN	SL-CL	2	Valleys		Level depression	Lo	78.7	-E	G	800
1	4	20	4	10	ONE FOUR	AR	910		M	MSN1/U1h	ch till	2	O.B		MSN	CL-C	3	Uplands	12-23		Lo	68.6	+G	G	225
1	4	1	1	10	ONE FOUR	AR	901	NE	R-GL	BUKM1/13lc	ch fan	5	O.B		BUT/CMR	BUKM1/13lc	5	Hills	13-25	Mid slope	Lo	85.2	E	E	300
1	6	8	2	10	PINHORN	AR	1010	E-NE	M	MSPH17/R21	ch till/br	4	O.B		MSN/PHN/CMB	L_C/CL	3-4			Lo	79.45	-E	G	200	
1	7	3	3	10	PINHORN	AR	1055	S	U	ZUN1/13m	thin break	21	O.R		ZUN	L_C	5-6	Hills	13-20	Mid slope	Lo	78.6	-E	G	200
1	7	12	2	10	PINHORN	AR	1031	NW	GL	WDW5/131	sz fan	17	B.SS		WDW	L_C/CL	4-5	Hills	13-20		BIO	60.8	G	G	150
11	13	35	3	9	HAYS WEST	KET			GF	PURAS/131	gr	22	O.R	RAM/PUN		L		Lowlands	Plain	Terrace	Li	78	-E		
3	3	32	2	8	SAGE CREEK	AR			GF-GL	BUWD4/SC2	ch sz lo	11		BUT/WDW		SiL/SiCL	2	Valleys	14-16-25	Terrace	Cy	31.55	-F		
1	4	2	3	8	ONE FOUR	AR	846		U	ZUN1/14h	thin break	21	O.R		ZUN		2		Terrace		Cy	66	G	G	100
7	5	4	1	8	MAYER	OC & DM			GF	CGW16/131	sz fan	17		DBSS-ODB		SICL-CL-SCL	2-3					0	-P		
8	8	33	1	8	BROWER	OC			L	BUT4/U1h	ch fan	5	B.SZ	ORN/WDW		SIL-SiC	2				Cy	0	-P		
21	10	7	8	8	DINOSAUR PARK	OC			F	VGR1/U1h	rg fl	20	O.R		VGR	L	2				Sy	35.04	F		
11	13	16	7	8	HAYS WEST	KET		S	F	EXPI/131	ch fan	5	O.R		EXP	SL-L	3	Valleys	Plain	Terrace	Li	69.5	+G		
3	3	10	3	8	SAGE CREEK	AR			U	ZUN16/14h	thin break	21	O.R		ZUN		1	Valleys	Plain	Level depression	Cy	65.3	G		
13	11	27	1	8	HAYS EAST	H.B		N	M	CHN7/U1h	ch lo sy	1	O.B	O.B-B.SS		L	4	Uplands	Hilly	Mid slope	BIO/Lo	85	E		
12	14	16	4	7	VAUXHALL	CAT			F	BVCH1/U1h	ch lo sy	6	O.B	BVL/CHN		LS/SL	3	Uplands	Plain	Level depression	Sy	0	+P		
3	5	12	1	7	SAGE CREEK	AR		SW		PHS12/R2m	ch sz till/br	12		PHN/SIL		SIL	3-5	Uplands	Rolling	Upper slope	BIO	67.7	-G		
3	4	4	2	7	SAGE CREEK	AR			GF	BUT14/131	ch fan	5		BUT		SIL	2	Valleys	Plain		Ov	30.5	-F		
4	3	6	1	7	SAGE CREEK	AR			U	ZUN1/13h	thin break	21	O.R		ZUN		5	Uplands	Ridged		Tb	61.85	G		
1	4	3	2	7	ONE FOUR	AR	848	SW	U	ZUN1/14h	thin break	21	O.R		ZUN		7-8	Valleys	Steep slopes	Mid slope	Tb	60.45	G	E	150
3	3	31	3	7	SAGE CREEK	AR		NE	M	HDRO5/13mc	sz till	15		HDY/ROL		CL	4	Uplands		Mid slope</					

Appendix 1. SLMs for each silver sagebrush location. (Locations and density distribution classes provided by Alberta Public Lands.

Twp	Rg	Sec.	Qtr.	Density D class	Lease	Examiner	Elevation	Aspect	Parent Material	SLM from AGRASID description	SLM group number	Soil subgroup	Soil complex	Soil series	Texture or complex	Slope or complex	Macro landform	Local landform	Landform element	Range site	Range condition %	RC class	Vigor	Estimated production	
3	2	30	1	7	SAGE CREEK	AR		S	M	HDKT5/H51	sz till	15	HDY/KTM		SICL	2	Uplands	13-25	Upper slope	Lo	27.5	-F			
3	2	18	4	7	SAGE CREEK	DM & MS				HURO2/R21	sz till	15	HUK/ROL		SICL	3	Uplands	Undulating	Level depression	BIO	60.2	G			
3	2	7	4	7	SAGE CREEK	DM & MS			M	HURO1/R21	sz till	15	HUK/ROL		SICL	3	Uplands	Undulating	Mid slope	BIO	61.1	G			
1	3	33	3	7	SAGE CREEK	AR			M	MSN7/U1h	ch till	2		MSN	SIL	1	Midlands	14-16		Lo	61.65	G			
1	3	27	2	7	SAGE CREEK	AR		E	M	MSN7/U1h	ch till	2	O.B	MSN	SIL	2	Midlands	13-25		Lo	65.5	G			
29	14	27	4	7	COLE - GRAZED	DM			GL	BKZG7/L1	dk brn	13	DB.SS	WES	SIL	1	Uplands	Rolling	Mid slope	BIO	60.99	G			
1	6	4	3	7	KENNEDY COULEE E.P.	KET		SE	L	MSPH17/R21	ch till/br	4	O.B-B.SS	WDW	L	2	Uplands	Lower slope	BIO	0	-P	G			
8	7	14	3	7	ED ROCK - EXCLOSURE	IS	991	SE	M	TTH7/U11	dk brn till	3	TTH-sz/MHR		L	4	Uplands	Undulating	Mid slope	BIO	81.1	-E			
6	4	12	8	7	LINTON KLEINKNECH	IS			GF	WSM4/I3m	dk brn till	3	O.DB-DB.SS	CGW	L-C/L	2	Uplands	Hilly		Lo	60.25	G			
3	3	35	2	7	GE CREEK - EXCLOSURE	DM			M	HDKT5/H51	sz till	15	B.SO	HDY	CL	3	Uplands		Terrace	BIO	60.71	G			
1	18	9	4	7	TWIN RIVER - GRAZED	DM	1242	W	GL	PUR14/H11	dk brn till	3	O.DB	LUP	L	3	Uplands	Veneer	Terrace	Lo	36.99	F			
1	1	4	2	7	WILDHORSE - CAGES	DM/IS	853	SW	GL	BVL14/U1h	ch sy	7	SZ.B	CHZ	L	1	Uplands	Hummocky	Terrace	Lo	52	-G			
1	1	4	2	7	WILDHORSE - EXCLOSURE	DM	853	SW	GL	BVL14/u1h	ch sy	7	SZ.B	CHZ	L	1	Uplands	Hummocky	Terrace	Lo	61.94	G			
7	5	4	1	7	MAYER	OC & DM			GF	CGW16/I31	sz fan	17	O.DB-SZ		SICL-CL-SCL	4				Lo	0	-P			
12	15	33	1	7	VAUXHALL	CAT			L/M	KBWD16/U1h	sz lo	16	KBD/WDW		SL_C/L	1-3	Uplands	Plain		Lo	0	-P			
7	5	4	1	7	MAYER	OC & DM			GF	CGW16/I31	sz fan	17	DB.SS-O.DB		SICL-CL-SCL	2-3				Lo	0	-P			
7	5	2	6	7	MAYER	DM			M	WSM14/H1h	dk brn till	3	O.DB		SICL-CL-SCL	5-6	Uplands	Rolling		Lo	0	-P			
7	5	2	5	7	MAYER	DM			M	WSM14/H1h	dk brn till	3	O.DB	ODB/Eroded		SICL-CL-SCL	5-6	Uplands	Rolling		Lo	0	-P		
21	10	7	5	7	DINOSAUR PARK	OC			F	VGR1/U1h	rg fl	20	O.R		SL-L	3				Sy	44	+F			
3	3	25	4	7	SAGE CREEK	AR		NE	M	HDKT5/H51	sz till	15	HDY/KTM		SICL	3	Uplands	Undulating		SL	15.5	P			
6	5	27	3	7	HEIDENGER	DM			GF	CGW16/I31	sz fan	17	DB.SS-O.DB		SICL-CL-SCL	2-3				Lo	0	-P			
3	3	24	2	7	SAGE CREEK	DM & MS			M	HURO1/R21	sz till	15	HUK/ROL		SICL	3	Uplands	Undulating	Level depression	BIO	60.7	G			
8	8	27	1	7	BROWER	OC			F	BUT4/U1h	ch fan	5	O.B	BUT	L	2				Lo	0	-P			
8	8	24	8	7	BROWER	DM			L	CFD7/U1h	ch lo	1	O.B		L	2				Sb	0	-P			
7	8	26	3	7	KRAFT	DM			M	MAB10/H11	ch till	2	O.B	MAB	CL	4				Lo	0	-P			
7	7	20	7	7	SUNDERLAND	DM			M	MAB10/H11	ch till	2	O.B	MAB	CL	4				Lo	74.2	+G			
7	7	19	8	7	SUNDERLAND	DM			L/M	MAB10/H11	ch till	2	O.B	MAB/CFD	L-CL	2				Lo	48.4	+F			
7	7	19	3	7	SUNDERLAND	DM			F	SZUN1/SC2	thin break	21	O.B		SL	2				Sb	29.25	-F			
7	7	17	2	7	SUNDERLAND	DM			M	MAB10/H11	ch till	2	O.B	MAB/CFD	CL	3				Lo	66.96	+G			
13	11	35	2	7	HAYS EAST	H.B		SW	M	TAB5/H11	ch lo sy	6	O.B	TAB	L	3	Uplands	Rolling	Level depression	Lo	67.5	+G			
12	13	24	3	7	HAYS WEST	KET			M	ANOS/H1m	ch sy	7	O.B	ANO	L	2	Uplands			Lo	65.5	G			
13	11	34	6	7	HAYS EAST	H.B		SW	F	TAB5/H11	ch lo sy	6	O.B	TAB	L	2	Uplands	Plain	Level depression	Lo	77.5	-E			
13	11	34	3	7	HAYS EAST	H.B			F	CFMA1/U1h	ch till	2	O.B	MAB/CFD	L	3	Uplands	Plain	Level depression	Lo	72	+G			
13	11	33	5	7	HAYS EAST	H.B			M	TAB5/H11	ch lo sy	6	SZ.B	TAB	L	3	Uplands	Rolling	Level depression	Lo	84.5	E			
13	11	33	4	7	HAYS EAST	H.B			F	TAB5/H11	ch lo sy	6	O.B	TAB	L	2	Uplands	Plain	Level depression	Lo	72	+G			
13	11	33	1	7	HAYS EAST	H.B		S	F	TAB5/H11	ch lo sy	6	O.B	TAB	L	2	Uplands	Plain	Level depression	Lo	77.5	-E			
12	13	16	3	7	HAYS WEST	KET		W	F	CVD1/U1h	ch sa	9	O.B	CVD	SL	3	Uplands	Plain	Level depression	Sy	74.5	+G			
12	11	20	4	7	HAYS EAST	CT		S	F	CHN6/U1h	ch lo	1	O.B	BVL/CVD	L	4	Midlands	Hummocky		Lo	64	G			
13	11	9	3	7	HAYS EAST	CT		N	F	CHN6/U1h	ch lo	1	O.B	BVL/CHN	FSL	3	Midlands	Plain	Level depression	Sy	77	-E			
13	15	14	2	7	VAUXHALL	CAT			F	BVL1/U1h	ch sy	7	O.B	BVL	SL	2-3	Uplands	Plain	Level depression	Lo	0	-P			
13	11	8	2	7	HAYS EAST	CT		E	F	CHN6/U1h	ch lo	1	O.B	CHN	FSL	3	Midlands	Plain		Sy	68.5	+G			
12	13	34	1	7	HAYS WEST	KET			F	ANOS/H1m	ch sy	7	O.B	ANO	FSL	4	Uplands	Undulating		Sy	79	-E			
12	13	34	1	7	HAYS WEST	KET		S	F	ANOS/H1m	ch sy	7	O.B	ANO	FSL	3	Uplands	Plain		Sy	79.5	-E			
12	13	27	4	7	HAYS WEST	HB			M	ANOS/H1m	ch sy	7	O.B	ANO	L	3	Uplands	Plain	Level depression	Sy	73.5	+G			
12	13	27	3	7	HAYS WEST	KET		N	M	ANOS/H1m	ch sy	7	O.B	ANO	L	3	Uplands	Plain	Level depression	Sy	82.5	-E			
12	13	27	1	7	HAYS WEST	KET		NW	M	ANOS/H1m	ch sy	7	O.B	ANO	L	3	Uplands			Lo	84.5	E			
12	13	2	6	7	HAYS WEST	KET			E	PURAS/I31	gr	22	O.R	RAM/PUN	Sil	3	Uplands			Li	55	-G			
12	13	23	2	7	HAYS WEST	KET			F	CVD1/U1h	ch sa	9	O.B	CVD	LS	6	Uplands	Rolling		Sy	66.5	+G			
12	13	22	3	7	HAYS WEST	KET			M	CVD1/U1h	ch sa	9	O.B	CVD	L	3	Uplands	Rolling		Lo	64	G		P	
12	12	19	3	7	HAYS WEST	KET			F	CVD1/U1h	ch sa	9	O.B	CVD	FSL	3	Uplands	Plain	Level depression	Sy	51.5	-G			
12	13	16	2	7	HAYS WEST	KET		E	E	CVD1/U1h	ch sa	9	O.B	CVD	LS	3	Uplands	Plain	Level depression	Sa	71	+G			
12	13	14	2	7	HAYS WEST	KET			FE	CVD1/U1h	ch sa	9	O.B	CVD	LS	3	Uplands	Plain	Level depression	Sy	59.5	G			
12	13	12	4	7	HAYS WEST	KET			F	CVD1/U1h	ch sa	9	O.B	CVD	LS	3	Uplands			Sy	58.5	G			
12	13	9	1	7	HAYS WEST	KET		E	FE	CVD6/U1h	ch sa	9	O.B	CVD	LS	4	Uplands	Rolling	Level depression	Sy	59.5	G			
12	12	7	1	7	HAYS WEST	KET		S	F	ZUN1/I4h	thin break	21	O.HR		SIL	3	Valleys	Hilly	Terrace	Li	69.5	+G			
12	12	19	4	7	HAYS WEST	MS			E	CVD1/U1h	ch sa	9	O.B	CVD	LS	6	Uplands	Rolling		CS	73	+G			
3	3	10	1	7	SAGE CREEK	KET			M	MAB7/U1h	ch till	2	O.B	MAB	SICL	3	Uplands	Hilly	Crest	Lo	61.3	G			
12	12	19	2	7	HAYS WEST	KET			E	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	L	8	Valleys	Steep slopes	Crest	CS	73.5	+G			
11	13	34	3	7	HAYS WEST	KET			E	BVCV4/H11	ch sa sy	8	O.B	CVD/PLS	LS	6	Uplands	Hummocky	Upper slope	Sa	57.5	-G			
11	13	27	4	7	HAYS WEST	KET		E	M	CVPL1/H11	ch sa	9	R.B		L	8	Valleys	Steep slopes		Tb	71	+G			
1	6	21	4	7	MRNA	KET			M	SIL6/R21	sz till/br	14	O.B	B.SZ-B.SS	SIL	3-5	Uplands	Hummocky	Mid slope		0	-P	F		
13	15	5	1	6	VAUXHALL	CAT			L/M	KBWD16/U1h	sz lo	16	O.B	KBD/WDW	SL/L_C	3	Uplands	Plain	Level depression		0	-P			
21	11	2	3	6	DINOSAUR PARK	BA		S	M	VGR1/U1h	rg fl	20	O.B	VGR	L	3	Uplands	Terrace		BdL	54.97	-G			
6	5	27	5	6	HEIDENGER	OC			R	ZUN1/I4h	thin break	21	Eroded		VARIABLE	>5	Midlands	Hilly	Mid slope		0	-P			
1	7	10	3	6	PINHORN	AR			M	PHS12/H51	ch sz till/br	12	O.B	SIL/PHN	L_C/CL	1-2	Lowlands		Level	BIO	68.05	+G	G	100	
11	13	30	4	6	HAYS WEST	KET			F	BVCV4/H11	ch sa sy	8	O.B	BVL/CVD	S	3	Uplands	Hummocky	Mid slope	SL	67.5	+G			
13	11	28	4	6	HAYS EAST	H.B		N	F	CHN7/U1h	ch lo	1	O.B	CHN	L	4	Uplands	Hilly	Upper slope	Lo	79	-E			
1	6	7	2	6	PINHORN	AR	1018	SW	GL	WDW5/I31	sz fan	17	B.SS	WDW	L/C	2-3	Valleys	13-14		BIO	78.6	-E	G	125	
1	6	5	3	6	PINHORN	AR	1010	SW	GL	WDW13/R21	sz fan	17	B.SS	WDW	L_C/CL	2-3	Valleys	14-25		BIO	70.5	+G	F	85	
1	4	10	5	6	ONE FOUR	AR	865		U	ZUN1/I4h	thin break	21	O.B	ZUN	SL	3			13-25	Cy	62.1	G	G	100	
13	11	28	4	6	HAYS EAST	H.B		S	F	CHN7/U1h	ch lo	1	O.B	CHN	L	2	Uplands	Plain	Level depression	Lo	74	+G			
6	5	27	5	6	HEIDENGER	OC			GF	CGW16/I31	sz fan	17	GNN/CGW		SICL-CL-SCL	3	Lowlands	Plain	Level		0	-P			

Appendix 1. SLMs for each silver sagebrush location. (Locations and density distribution classes provided by Alberta Public Lands.

Twp	Rg	Sec.	Qtr.	Density D class	Lease	Examiner	Elevation	Aspect	Parent Material	SLM from AGRASID	SLM group description	SLM group number	Soil subgroup	Soil complex	Soil series	Texture or complex	Slope or complex	Macro landform	Local landform	Landform element	Range site	Range condition %	RC class	Vigor	Estimated production
1	2	30	3	6	SAGE CREEK	AR			GF	GPY15/U1h	ch sz lo	11	B.SS	GPY15	SL	3	Valleys	Plain	Level depression	Lo	44	+F			
13	11	36	1	6	HAYS EAST	CT		W	F	CFMA1/H11	ch till	2	O.B	MAB/CFD	L	4	Midlands	Hummocky		Lo	59	-G			
13	11	27	7	6	HAYS EAST	H.B		SW	F	TAB5/H11	ch lo sy	6	O.B		TAB	L	3	Uplands	Hilly	Mid slope	Lo	83	-E		
2	4	31	1	6	SAGE CREEK	AR			U	ZUN3/SC2	thin break	21	O.R	ZUN	L	1	Valleys	Plain	Level depression	Cy	64.6	-G			
15	16	32	3	6	VAUXHALL	CAT			L	BVL1/u1H	ch sy	7	O.R	BVL - ZUN	SL	03-Jun			Terrace	Tb	0	-P			
6	4	17	2	6	DONALD KLEINKNECH	OC		VAR	M	PMWS1/3h	dk brn till	3	O.DB	WSM	L	6	Uplands	Hummocky		Lo	41.3	+F			
12	13	25	4	6	HAYS WEST	KET			M	CV1/U1h	ch sa	9	O.B	CVD	L	6	Uplands	Rolling		Lo	71	+G			
13	11	35	4	6	HAYS EAST	CT			M	TAB5/H11	ch lo sy	6	O.B	TAB	L	4	Midlands	Rolling	Upper slope	Lo	61	-G			
6	4	18	4	6	DONALD KLEINKNECH	OC		VAR	M	TTH7/I31	dk brn till	3	O.DB	TTH	L	4	Uplands	Plain	Level depression	Lo	81.4	-E			
12	13	28	1	6	HAYS WEST	KET			M	CV1/U1h	ch sa	9	O.HG	CVD	FSL	3	Lowlands	Plain	Level depression	Lo	66.5	-G			
3	3	35	2	6	SAGE CREEK - GRAZE	IS				DHKB16/I31	sz fan	17	B.SS	PHS	L	3	Uplands			BIO	57.2	+G			
13	11	34	4	6	HAYS EAST	H.B		NE	M	CFMA1/U1h	ch till	2	O.B	MAB/CFD	L	3	Uplands	Rolling	Level depression	Lo	77.5	-E			
12	13	8	4	6	HAYS WEST	KET		E	F	CV1/U1h	ch sa	9	O.B	CVD	SL	3	Uplands			Sy	87.5	-E			
12	13	6	1	6	HAYS WEST	KET			F	BVCV4/H11	ch sa sy	8	O.B	BVL/CVD	SL	6	Uplands	Rolling	Upper slope	Sy	82	-E			
13	11	22	4	6	HAYS EAST	H.B		W	F	TAB5/H11	ch lo sy	6	O.B	TAB	L	3	Uplands	Plain	Level depression	Lo	64.5	-G			
12	14	32	4	5	VAUXHALL	CAT			L/M	ANO17/H11	ch sy	7	O.B	ANO	SL	3/4	Uplands	Rolling		Lo	0	-P			
3	3	7	4	5	SAGE CREEK	AR			M	MSN7/I3md	ch till	2	O.B	MSN	SICL	5	Uplands	19-20-25		Lo	70.8	+G			
1	7	3	3	5	PINHORN	AR		SE	M	ROS11/R21	ch sz till/br	12		B.SS-SZ.B	L_C/C.L	3	Valleys	Inclined		BIO	55.5	-G	F	100	
3	4	7	1	5	SAGE CREEK	AR		NW	GF/M	ORS116/R2md	sz rg fan & br	18		ORN/SIL	SIL	3-5	Uplands	Rolling	Upper slope	Cy	42.45	+F			
1	6	21	3	5	MRNA	KET			M	SIL6/R21	sz till/br	14		B.SZ-B.SS	SIL	3	Lowlands	Hummocky			0	-P			
2	3	17	1	5	SAGE CREEK	AR		S	GL/M	ORWD19/I3h	sz rg fan & br	18		ORN/WDW	SIL/SICL	3	Midlands	13-25	Mid slope	Cy	62.5	-G			
2	3	9	3	5	SAGE CREEK	AR		S	GL/M	ORWD19/I3h	sz rg fan & br	18		ORN/WDW	SIL/SICL	2	Midlands	13-25		Cy	81.3	-E			
11	14	29	4	5	VAUXHALL	KET			L	CHN1/U1h	ch lo	1	O.B	CHN	SL	3	Uplands	Plain		Lo	0	-P			
3	3	19	2	5	SAGE CREEK	AR		NE	M	ROS14/H11	ch sz till/br	12		ROL/SIL	SICL	3	Uplands	13-25	Upper slope	BIO	52.2	-G			
3	3	20	1	5	SAGE CREEK	AR			M	ROS14/H11	ch sz till/br	12		ROL/SIL	SICL	3	Uplands	13-25	Crest	Lo	41.5	+F			
3	4	10	2	5	SAGE CREEK	AR			GF/M	ORS116/R2md	sz rg fan & br	18		ORN/SIL	SIL/SIL	4	Uplands	13-25	Lower slope	Lo	27.85	-F			
4	3	5	2	5	SAGE CREEK	AR			M	MAB7/U1h	ch till	2	O.B	MAB	SICL	3	Uplands	20-25		Lo	75.5	-E			
2	2	18	3	5	SAGE CREEK	AR		SE	M	HDRO4/I3lc	sz till	15		HDY/ROL	SICL	3	Uplands	12-13	Upper slope	Lo	50	+F			
3	4	18	3	5	SAGE CREEK	AR		N	GF-GL	ORWD18/R21	sz rg fan & br	18		ORN/WDW	SIL/SICL	3	Midlands	13-25	Upper slope	BIO	50.05	-G			
12	13	11	2	5	HAYS WEST	KET			F	CV1/U1h	ch sa	9	O.B	CVD	LS	3	Uplands	Plain		Sy	77	-E			
3	4	12	1	5	SAGE CREEK	AR		SE	M	MSN7/I3md	ch till	2	O.B	MSN	SICL	3	Uplands	13-20-25		Lo	54.5	-G			
2	3	23	2	5	SAGE CREEK	AR		SE	U	ZUN3/SC2	thin break	21	O.R		L	2	Valleys	13-25		Cy	61.6	-G			
1	6	13	2	5	MRNA	KET			M-R	MSPH1/R21	ch till/br	4		MSN/PHN	L	4	Uplands	Hilly			0	-P			
2	4	31	4	5	SAGE CREEK	AR		S	M	ROL7/U1hc	ch till	2	SZ.B	ROL	SICL	1	Uplands	13-25	Upper slope	Lo	43.9	+F			
6	4	16	1	5	DONALD KLEINKNECH	OC			M	MCWS1/H1m	dk brn till	3	O.DB		L	4	Midlands	Hilly		Li	68.06	+G			
11	13	33	1	5	HAYS WEST	H.B			M	CVPL1/H11	ch sa	9	O.B	CVD/PLS	FSL	2	Uplands	Plain	Level depression	Lo	47.5	+F			
6	4	26	3	5	LINTON KLEINKNECH	IS			M	WSM4/I3m	dk brn till	3	O.DB	WSM	SIL	5	Uplands	Rolling		Lo	52.89	-G			
13	1	18	1	5	NY ISLAND LAKE - EX	IS	728	NE	GF	CV1/U1h	ch sa	9	O.B	BVL	CVD	L	3	Uplands	Undulating	Terrace	Sy	67.6	+G		
6	4	17	1	5	DONALD KLEINKNECH	IS		VAR	M	MCWS1/H1m	dk brn till	3	DB.SS	MCA	L	4	Uplands	Inclined		BIO	57.75	-G			
2	2	6	3	5	SAGE CREEK	AR			S	HDRO1/H11	sz till	15		HDY/ROL	SICL	4	Midlands	13-20-25		Lo	69.25	+G			
13	11	36	3	5	HAYS EAST	KET		SE	M	CFMA1/H11	ch till	2	O.B	MAB/CFD	L	5	Uplands			Lo	70.5	+G			
17	9	33	4	5	AINY HILLS - EXCLOS	IS	779	SW	M	FMRO7/H11	ch till	2	SZ.B	ROL	L	5	Uplands	Hummocky	Terrace	Lo	74.53	+G			
1	3	35	4	5	SAGE CREEK	AR			S	ROL7/U1h	ch till	2	SZ.B	ROL	SICL	2	Midlands	13-25	Upper slope	BIO	72.5	+G			
12	13	13	2	5	HAYS WEST	S			E	CV1/U1h	ch sa	9	O.B	CVD	LS	3	Uplands	Plain		CS	87	-E			
12	12	20	4	5	HAYS WEST	S			E	CV1/U1h	ch sa	9	O.B	CVD	LS	3	Uplands	Rolling	Level depression	CS	68.5	+G			
1	6	1	5	5	MRNA	KET			M	PHS11/R21	ch sz till/br	12		PHN/SIL	L	3-4	Uplands	19-20			0	-P			
6	5	30	1	5	LINTON KLEINKNECH	IS			M	TTH14/H11	dk brn till	3	O.DB	TTH	L	4	Uplands			Lo	35	-F			
1	3	31	1	5	SAGE CREEK	AR		SW	GL/M	GERO5/U1h	sz till	15		GEM/ROL	SIL/SICL	3	Midlands	13-14-25		BIO	68.55	+G			
6	4	11	2	5	LINTON KLEINKNECH	IS			M	MCWS1/H1m	dk brn till	3		SIL	L	5	Uplands	Rolling	Terrace	Li	44	+F			
6	4	17	8	5	DONALD KLEINKNECH	IS		VAR	M	MCWS1/H1m	dk brn till	3	O.DB		L	4	Uplands			Li	72.6	+G			
6	4	18	6	5	LINTON KLEINKNECH	OC		VAR	M	TTH7/I3h	dk brn till	3			L	4	Midlands	Hilly		Tb	68.92	+G			
13	11	32	5	5	HAYS EAST	KET			M	CFD7/U1h	ch lo	1	SZ.B	CFD	L	3	Uplands			Lo	64.5	-G			
12	12	17	4	5	HAYS WEST	F			F	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	S	1	Uplands	Hummocky	Mid slope	Sy	76	-E			
2	10	20	4	5	ADEN - EXCLOSURE	IS	907		M	CFMS1/U1h	ch till	2	O.B	CFD	L	1	Uplands	Terraced	Terrace	Lo	78.27	-E			
12	13	10	1	5	HAYS WEST	KET			F	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	FSL	3	Uplands	Plain		Sy	66	-G			
6	4	30	8	5	DONALD KLEINKNECH	DM		VAR	M	TTH7/H11	dk brn till	3	O.DB	TTH	L	4	Uplands	Hummocky		Lo	84.48	-E			
6	4	7	0	5	LINTON KLEINKNECH	OC			M	TTH7/I3h	dk brn till	3	O.DB	TTH	L	5	Uplands			Lo	78.8	-E			
1	6	1	5	5	MRNA	KET			M	PHS11/R21	ch sz till/br	12		PHN/SIL	L	3-4	Uplands	19-20			0	-P			
17	9	33	4	5	RAINY HILLS - GRAZE	DM	779	SW	M	FMRO7/H11	ch till	2	SZ.B	ROL	L	5	Uplands	Hummocky	Terrace	Lo	65.67	-G			
13	11	17	4	5	HAYS EAST	CT			M	CFD1/U1h	ch lo	1	O.B		L		Uplands			Lo	52	-G			
6	4	26	1	5	LINTON KLEINKNECH	OC		VAR	M	PMWS1/i3h-d	dk brn till	3			L	4	Uplands			BdL	62.49	-G			
6	4	7	6	5	LINTON KLEINKNECH	IS & DM		VAR	M	TTH7/I3h	dk brn till	3	O.DB	TTH	SIL	5	Uplands			Lo	63.45	-G			
11	13	30	1	4	HAYS WEST	KET		N	F	BVCV4/H11	ch sa sy	8	O.B	BVL/CVD	SL	3	Uplands	Plain		Sy	70	+G			
12	12	19	2	4	HAYS WEST	F			F	CV1/U1h	ch sa	9	O.B	CVD	FSL	3	Uplands	Plain	Level depression	Sy	68.5	+G			
12	12	18	3	4	HAYS WEST	E			F	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	L	3	Uplands	Hummocky		CS	74.5	+G			
12	12	18	1	4	HAYS WEST	H.B			FE	CV1/U1h	ch sa	9	O.B	CVD	LS	2	Uplands	Plain	Level depression	Sy	72	+G			
12	12	7	4	4	HAYS WEST	F			F	CV1/U1h	ch sa	9	O.B	CVD	LS	2	Uplands	Plain	Level depression	Sy	385	+E			
15	16	15	2	4	VAUXHALL	CAT			Lvb/M	CFCH1/U1h	ch lo	1		CFD/CHN	L	3/2	Uplands	Plain	Level	Lo	0	-P			
12	12	17	3	4	HAYS WEST	H.B			E	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	L	3	Uplands	Plain	Level depression	CS	81	-E			
12	12	20	3	4	HAYS WEST	H.B			E	CV1/U1h	ch sa	9	O.B	CVD	LS	4	Uplands	Hummocky	Level depression	CS	82.5	-E			
12	12	17	1	4	HAYS WEST	F			F	CV1/U1h	ch sa	9	O.B	CVD	LS	3	Uplands	Plain		Sy	74	+G			
12	12	16	2	4	HAYS WEST	H.B			F	ZUN1/4h	thin break	21	O.HR		SIL	3	Uplands	Rolling	Upper slope	Li	63	-G			

Appendix 1. SLMs for each silver sagebrush location. (Locations and density distribution classes provided by Alberta Public Lands.

Twp	Rg	Sec.	Qtr.	Density D class	Lease	Examiner	Elevation	Aspect	Parent Material	SLM from AGRASID	SLM group description	SLM group number	Soil subgroup	Soil complex	Soil series	Texture or complex	Slope or complex	Macro landform	Local landform	Landform element	Range site	Range condition %	RC class	Vigor	Estimated production
12	12	8	3	4	HAYS WEST					ZUN1/4h	thin break	21	R.B		L		Valleys	Hilly	Crest	Tb	55.5	-G			
12	12	7	3	4	HAYS WEST	HB			FE	CVDI/U1h	ch sa	9	O.B		LS	2	Uplands	Plain	Level depression	Sy	75.5	-E			
12	12	20	1	4	HAYS WEST	H.B			E	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	FSL	4	Uplands	Plain	Level depression	CS	78.5	-E			
12	13	4	4	4	HAYS WEST	H.B			M	BVCV4/H11	ch sa sy	8	O.B	BVL/CVD	FSL	3	Uplands	Plain	Level depression	Lo	85.5	E			
12	12	20	2	4	HAYS WEST				F	CVVS1/D11	ch sy CS	10	O.B	CVD/VST	FSL	3	Uplands	Plain		Sy	71	+G			
12	13	5	6	4	HAYS WEST	KET		S	F	CVDI/U1h	ch sa	9	O.B		FSL	3	Uplands	Plain		Sy	77	-E			
11	13	29	4	4	HAYS WEST	H.B			FE	CVPL1/H11	ch sa	9	O.B	CVD/PLS	FSL	2	Uplands	Plain	Level depression	Sy	70	+G			
12	13	6	1	4	HAYS WEST	KET		S	F	BVCH13/U1h	ch lo sy	6	O.B	BVL/CHN	FSL	3	Uplands	Plain	Level depression	Sy	81.5	-E			
12	12	7	3	4	HAYS WEST	H.B			F	CVDI/U1h	ch sa	9	O.B		LS	2	Uplands	Plain	Level depression	Sy	81.5	-E			
12	13	8	3	4	HAYS WEST	H.B			FE	CVDI/U1h	ch sa	9	O.B		LS	3	Uplands	Plain	Level depression	Sy	94.5	+E			
12	12	21	2	4	HAYS WEST	H.B		E		ZUN1/4h	thin break	21	R.B		L	8	Uplands	Hilly		Tb	83	-E			
12	13	8	5	4	HAYS WEST	H.B			F	CVDI/U1h	ch sa	9	O.B	CVD	LS	3	Uplands	Undulating	Level depression		89	E			
12	13	9	1	4	HAYS WEST	H.B			FE	CVV6/U1h	ch sa	9	O.B	CVD	LS	2	Uplands	Plain	Level depression	Sa	58.5	G			
12	12	29	1	4	HAYS WEST				F	ANOS/U1h	ch sy	7	O.B	ANO	SL	3	Uplands	Plain	Level depression	Sy	74	+G			
12	13	9	2	4	HAYS WEST	HB			M	CVDI/U1h	ch sa	9	O.B	CVD	FSL	3	Uplands	Plain	Level depression	Lo	74.5	+G			
12	12	29	3	4	HAYS WEST	H.B			F	ANOS/U1h	ch sy	7	O.B	ANO	FSL	2	Uplands	Plain	Level depression	Sy	65	G			
12	13	10	4	4	HAYS WEST	H.B			E	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	LS	4	Uplands	Rolling	Level depression	CS	75.5	-E			
11	13	35	3	4	HAYS WEST	KET			F	PURAS/131	gr	22	O.R	RAM/PUN	SIL		Lowlands	Plain	Terrace	Li	78	-E			
12	13	11	3	4	HAYS WEST	KET			E	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	LS	7	Uplands	Hummocky		CS	79.5	-E			
12	13	12	4	4	HAYS WEST	H.B			FE	CVDI/U1h	ch sa	9	O.B	CVD	LS	2	Uplands	Plain	Level depression	Sy	69.5	+G			
12	12	30	5	4	HAYS WEST	HB			M	BVL1/U1h	ch sy	7	O.B	BVL	L	4	Uplands	Undulating	Level depression	Lo	70	+G			
12	13	13	1	4	HAYS WEST	H.B			E	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	LS		Uplands	Rolling	Level depression	CS	82.5	-E			
12	12	30	3	4	HAYS WEST	H.B			M	BVL1/U1h	ch sy	7	O.B	BVL	L		Uplands	Rolling	Crest	Lo	61.5	G			
12	13	13	4	4	HAYS WEST				E	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	LS	5	Uplands	Ridged		CS	75.5	-E			
12	13	14	1	4	HAYS WEST	H.B			E	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	LS		Uplands	Plain	Level depression	CS	86.1	E			
12	12	31	1	4	HAYS WEST	H.B			F	ANOS/U1h	ch sy	7	O.B	ANO	FSL	3	Uplands	Undulating	Level depression	Sy	62	G			
12	13	15	2	4	HAYS WEST	H.B			FE	CVDI/U1h	ch sa	9	O.B	CVD	LS	2	Uplands	Plain	Level depression	Sy	87.5	E			
12	13	15	3	4	HAYS WEST	H.B			FE	CVDI/U1h	ch sa	9	O.B	CVD	LS		Uplands	Plain	Level depression	Sy	59.5	G			
11	13	33	4	4	HAYS WEST	H.B			M	BVCV4/H11	ch sa sy	8	O.B	FSL	4	Uplands	Plain	Level depression	Sy	59.5	G				
11	13	33	4	4	HAYS WEST	H.B			FE	BVCV4/H11	ch sa sy	8	O.B	BVL/CVD	FSL	2	Uplands	Plain	Level depression	Sy	57	-G			
11	13	28	2	4	HAYS WEST	KET		S	F	CVPL1/H11	ch sa	9	O.B	CVD/PLS	SL	3	Uplands	Plain	Level depression	Sy	76	-E			
12	13	16	4	4	HAYS WEST	H.B			F	CVDI/U1h	ch sa	9	O.B	CVD	FSL	2	Uplands	Plain	Level depression	Sy	75	+G			
11	13	34	4	4	HAYS WEST	H.B			FE	CVDI/U1h	ch sa	9	O.B	CVD	FSL	2	Uplands	Plain	Level depression	Sy	54.5	-G			
11	13	27	1	4	HAYS WEST	H.B			F	CVPL1/H11	ch sa	9	O.R	CVD/PLS	L	3	Lowlands	Plain	Terrace	Li	59.5	G			
12	12	32	6	4	HAYS WEST	H.B			F	ANOS/U1h	ch sy	7	O.B	ANO	FSL	2	Uplands	Plain	Level depression	Sy	76	-E			
12	13	2	2	4	HAYS WEST	KET			F	PURAS/131	gr	22	O.B	RAM/PUN	LS	2	Uplands	Plain	Level depression	Sy	59.5	G			
12	13	21	2	4	HAYS WEST	KET		SW	F	BVL7/U1h	ch sy	7	O.B	BVL	SL	3	Uplands	Plain	Level depression	Sy	76.5	-E			
12	13	22	2	4	HAYS WEST	H.B			FE	CVDI/U1h	ch sa	9	O.B	CVD	FSL	2	Uplands	Undulating	Level depression	Sy	60.5	G			
11	13	32	1	4	HAYS WEST	H.B			FE	CVPL1/H11	ch sa	9	O.B	CVD/PLS	FSL	3	Uplands	Plain	Level depression	Sy	70.5	+G			
12	13	4	2	4	HAYS WEST	H.B			M	BVCV4/H11	ch sa sy	8	O.B	BVL/CVD	FSL	2	Uplands	Plain	Level depression	Lo	80.5	-E			
12	13	22	6	4	HAYS WEST	H.B			FE	CVDI/U1h	ch sa	9	O.B	CVD	FSL	3	Uplands	Plain	Level depression	Sy	62.5	G			
12	13	23	1	4	HAYS WEST	KET			E	CVVS1/D11	ch sa CS	10	O.B	CVD/VST	LS	6	Uplands	Rolling		CS	70	+G			
15	16	4	4	4	VAUXHALL	CAT			L	KBWD2/U1h	sz lo	16	B.S.O		SIL_SIC	3				BIO	0	-P	G		
12	13	23	3	4	HAYS WEST	KET			M	ANOS/H1m	ch sy	7	O.B	ANO	L	6	Uplands	Rolling	Upper slope	Lo	79	-E			
12	13	4	4	4	HAYS WEST	H.B			E	CVDI/U1h	ch sa	9	O.B	CVD	LS	2	Uplands	Plain		Sa	73	+G			
12	13	25	2	4	HAYS WEST	H.B			M	ANOS/H1m	ch sy	7	O.B	ANO	L	5	Uplands	Rolling	Upper slope	Lo	72	+G			
12	13	25	3	4	HAYS WEST	H.B			F	ANOS/H1m	ch sy	7	O.B	ANO	FSL	3	Uplands	Undulating	Level depression	Sy	81	-E			
11	13	21	4	4	HAYS WEST	H.B			FE	EXP1/131	ch fan	5	O.B	EXP	FSL	2	Lowlands	Plain	Terrace	Li	78	-E			
12	13	26	1	4	HAYS WEST	KET			M	ANOS/H1m	ch sy	7	O.B	ANO	L	6	Uplands	Hummocky	Upper slope	Lo	84	E			
12	13	26	3	4	HAYS WEST	H.B			M	ANOS/H1m	ch sy	7	O.B	ANO	L	4	Uplands	Rolling	Level depression	Lo	65.5	G			
15	16	3	4	4	VAUXHALL	CAT			Lvb/M	CFCH1/U1h	ch lo	1	O.B	CFD/CHN	SL/SL_C	3/4	Uplands	Hilly		Lo	0	-P			
12	13	27	2	4	HAYS WEST	KET		N	M	CVDI/U1h	ch sa	9	O.B	CVD	L	4	Uplands	Undulating		Lo	65.5	G			
12	13	7	1	4	HAYS WEST	H.B			FE	BVCV13/U1h	ch sa sy	8	O.B	BVL/CHN	LS	2	Uplands	Plain	Level depression	Sy	65.5	G			
15	16	2	2	4	VAUXHALL	CAT			Lvb/M	CFCH1/U1h	ch lo	1	O.B	CFD/CHN	L_CL	3/4	Uplands	Plain		Lo	0	-P			
11	13	20	1	4	HAYS WEST	H.B			F	PURAS/131	gr	22	O.B	PUN/RAM	SL	2	Lowlands	Plain	Terrace	Sy	86	E			
11	13	29	3	4	HAYS WEST	H.B			FE	CVPL1/H11	ch sa	9	O.B	CVD/PLS	FSL	5	Uplands	Plain		Sy	90.5	E			
13	16	12	1	4	VAUXHALL	KET			M	CFCH6/U1h	ch lo	1	O.B	CFD/CHN	L_CL	3/4				Lo	0	-P			
12	13	35	1	4	HAYS WEST	H.B			M	ANOS/H1m	ch sy	7	O.B	ANO	L		Uplands	Rolling	Level depression	Lo	83	-E			
12	13	36	1	4	HAYS WEST	H.B			M	ANOS/U1h	ch sy	7	O.B	ANO	L	3	Uplands	Rolling	Level depression	Lo	74.5	+G			
12	13	36	4	4	HAYS WEST	H.B			M	CFDI/U1h	ch lo	1	O.B	CFD	L	3	Uplands	Plain	Level depression	Lo	69	+G			
6	4	6	2	4	CLINTON KLEINKNECHT	OC		VAR	M	TTH7/13h	dk bm till	3	O.DB		L	5	Uplands	Hummocky		Lo	44.48	+F			
13	11	7	3	4	HAYS EAST	H.B			F	CFDI/U1h	ch lo	1	O.B	CFD	L	2	Uplands	Rolling	Level depression	Lo	74.5	+G			
13	11	7	6	4	HAYS EAST	CT			M	BVCF1/U1h	ch lo sy	6	O.B	BVL?	L	3	Uplands	Plain	Level depression	Lo	70.5	+G			
11	13	19	4	4	HAYS WEST	KET		S	F	ZUN1/3h	thin break	21	R.B		L	8	Valleys	Rolling	Upper slope	Tb	67	+G			
13	16	1	4	4	VAUXHALL	KET			F	CFCH6/U1h	ch lo	1	O.B	CFD/CHN	SL	3/2	Uplands	Plain	Level depression	Lo	0	-P			
13	11	8	3	4	HAYS EAST	H.B		E	F	CHN6/U1h	ch lo	1	O.B	BVL/CHN	FSL	3	Uplands	Plain	Level depression	Sy	64	G			
13	11	8	4	4	HAYS EAST	CT		E	F	CHN6/U1h	ch lo	1	O.B	BVL/CHN	L	3	Midlands	Plain		Lo	57.5	-G			
13	15	12	4	4	VAUXHALL	CAT			F	ANO17/H1lr	ch sy	7	O.B	ANO	SL	3	Uplands	Plain	Level	Lo	0	-P			
13	11	9	7	4	HAYS EAST	CT			F	CFDI/au1h	ch lo	1	O.B	CFD	L	3	Midlands	Plain	Level depression	Lo	76.5	-E			
11	13	28	3	4	HAYS WEST	KET			F	CVPL1/H11	ch sa	9	O.B	CVD/PLS	SL	4	Uplands	Hummocky		Sy	74	+G			
13	11	12	4	4	HAYS EAST	CT		W	M	MARO2/H11	ch till	2	O.B	ROL/MAB	L	5				Lo	67	+G			
13	11	15	3	4	HAYS EAST	H.B		E	F	CHN6/U1h	ch lo	1	O.B	CHN	L	2	Uplands	Plain	Level depression	Lo	65.5	G			

Appendix 1. SLMs for each silver sagebrush location. (Locations and density distribution classes provided by Alberta Public Lands.

Twp	Rg	Sec.	Qtr.	Density D class	Lease	Examiner	Elevation	Aspect	Parent Material	SLM from AGRASID	SLM group description	SLM group number	Soil subgroup	Soil complex	Soil series	Texture or complex	Slope or complex	Macro landform	Local landform	Landform element	Range site	Range condition %	RC class	Vigor	Estimated production	
13	11	15	5	4	HAYS EAST	H.B			M	TAB5/H11	ch lo sy	6	O.B	TAB	L	4	Uplands	Rolling	Mid slope	Lo	59	G				
13	11	16	2	4	HAYS EAST	H.B			F	CHN6/U1h	ch lo	1	O.B		CHN	L	3	Uplands	Plain	Level depression	Lo	54.5	-G			
13	11	16	4	4	HAYS EAST	H.B			F	CHN6/U1h	ch lo	1	O.B		CHN	L	3	Uplands	Rolling	Level depression	Lo	57	-G			
13	11	17	1	4	HAYS EAST	H.B		E-NE	F	CHN6/U1h	ch lo	1	O.B	BVL/CHN		L	3	Uplands	Plain	Level depression	Lo	60	-G			
11	13	33	1	4	HAYS WEST	H.B			FE	CVPL1/H11	ch sa	9	O.B	CVD/PLS		FSL		Uplands	Plain	Level depression	Sy	57.5	-G			
13	11	18	1	4	HAYS EAST	H.B			F	CFD1/U1h	ch lo	1	O.B		CFD	L	3	Uplands	Plain	Level depression	Lo	33	F			
13	15	12	3	4	VAUXHALL	KET			L	RRWD19/U1h	sz lo	16	B.SS	RRD/WDW		SIL/SIL_SCL	2-3	Uplands	Plain	Level	Lo	0	-P			
13	11	20	4	4	HAYS EAST	CT			F	KBT11/U1h	sz lo	16	B.SS	KBD/T1Y		L		Midlands	Plain		BIO	69	+G			
13	11	22	2	4	HAYS EAST	H.B			F	CHN6/U1h	ch lo	1	O.B		CHN	L	2	Uplands	Rolling	Level depression	Lo	60	G			
11	13	19	4	4	HAYS WEST	KET			F	BVCV4/H11	ch sa sy	8	O.B	BVL/CVD		SL		Uplands	Hummocky		Lo	82	-E			
13	11	23	5	4	HAYS EAST	H.B		N	M	MARO2/H11	ch till	2	O.B	ROL/MAB		L	4	Uplands	Hilly	Crest	Lo	69.5	+G			
13	11	25	3	4	HAYS EAST	KET			F	CFMA1/H11	ch till	2	O.B	MAB/CFD		L		Uplands			Lo	54.5	-G			
13	11	27	1	4	HAYS EAST	H.B			F	CHN7/U1h	ch lo	1	O.B		CHN	L	3	Uplands	Plain	Level depression	Lo	66	G			
13	15	12	3	4	VAUXHALL	KET			L	RRWD19/U1h	sz lo	16	B.SS	RRD/WDW		SIL_SCL	3	Uplands	Plain	Level depression	BIO	0	-P			
1	6	15	1	4	MRNA	KET			M	PHS11/R21	ch sz till/br	12	B.SS	PHN/SIL		L	1-2	Uplands			Lo	0	-P			
13	11	28	3	4	HAYS EAST	KET			F	CHN6/U1h	ch lo	1	O.B	BVL/CHN		L		Uplands			Lo	64.5	G			
1	6	2	8	4	MRNA	KET		SW	M	MSPH1/R21	ch till/br	4	B.SS	MSN/PHN		L	1-3	Uplands	Plain	Level	Lo	0	-P			
1	6	1	6	4	MRNA	KET			M	PHS11/R21	ch sz till/br	12	B.SS	PHN/SIL		L	1-3	Uplands	14-25		Lo	0	-P	G		
13	11	32	1	4	HAYS EAST	KET			F	CFD7/U1h	ch lo	1	O.B	TAB		L	3	Midlands			Lo	70.5	+G			
13	11	32	2	4	HAYS EAST	CT		W	M	CFD7/U1h	ch lo	1	SZ.B	CFD?		L	4	Midlands	Rolling		Lo	72.5	+G			
13	11	32	4	4	HAYS EAST	KET			M	CFD7/U1h	ch lo	1	B.SS	MAB/CFD?		L	3	Uplands			Lo	66.5	+G			
12	13	16	1	4	HAYS WEST	H.B			FE	CVD1/U1h	ch sa	9	O.B	CVD		LS	3	Uplands			Sy	62.5	G			
13	15	12	1	4	VAUXHALL	KET			Fv/Mu	ANO17/H11r	ch sy	7	O.B	O.B/B.SO		SL/SCL_SCL	2-3	Uplands	Plain	Level	Lo	0	-P			
13	15	12	1	4	VAUXHALL	KET			Lvb/M	RRWD19/U1h	sz lo	16	O.B	RRD/WDW		SL_SCL	1-2	Lowlands	Plain	Level	BIO	0	-P			
13	15	11	1	4	VAUXHALL	CAT			F	RRWD19/U1h	sz lo	16	O.B	RRD/WDW?		SL	3	Uplands	Plain	Level	Lo	0	-P			
13	15	11	1	4	VAUXHALL	KET			Lvb/M	RRWD19/U1h	sz lo	16	O.B	RRD/WDW		SL/SCL_SCL	2-3	Uplands	Plain	Level	Lo	0	-P			
1	6	21	4	4	MRNA	KET			M	SIL6/R21	sz till/br	14	B.SS		SIL	L	4	Uplands	Hummocky	Mid slope	BIO	0	-P			
13	15	5	3	4	VAUXHALL	PS			L	ANO5/U1h	ch sy	7	O.B	O.B/B.SO		SL/SCL_SCL	3	Uplands	Plain	Terrace	Lo	0	-P			
13	11	35	1	4	HAYS EAST	CT		N-S	M	TAB5/H11	ch lo sy	6	O.B	TAB?		L	5	Midlands	Rolling	Upper slope	Lo	51	-G			
13	15	4	4	4	VAUXHALL	CAT			F	BVL13/U1h	ch sy	7	O.B	BVL		SL	2-3	Uplands	Plain	Level depression	Lo	0	-P			
13	11	35	2	4	HAYS EAST	KET			M	TAB5/H11	ch lo sy	6	O.B	TAB		L	4	Uplands			Lo	62	G			
13	11	35	3	4	HAYS EAST	CT			F	TAB5/H11	ch lo sy	6	O.B	TAB		FSL	3	Midlands	Plain		Lo	58	-G			
1	6	2	3	4	MRNA	KET			M	PHS11/R21	ch sz till/br	12	B.SS	PHN/SIL		L		Uplands	Plain	Level depression	Lo	0	-P			
13	11	35	4	4	HAYS EAST	KET			F	TAB5/H11	ch lo sy	6	O.B	TAB		FSL	3	Uplands			Lo	63	G			
15	16	29	1	4	VAUXHALL	KET			Fv/M	BVL1/U1h	ch sy	7	O.B	BVL		LS/gSL	3/4	Uplands			Lo	0	-P			
12	13	21	1	4	HAYS WEST	H.B			FE	BVL7/U1h	ch sy	7	O.B	BVL		FSL	2	Uplands	Plain	Level depression	Sy	84.5	E			
13	13	1	1	4	HAYS WEST	H.B			M	CFD1/U1h	ch lo	1	O.B	CFD		L	2	Uplands	Plain	Level depression	Lo	69	+G			
13	13	1	2	4	HAYS WEST	KET			M	CFD1/U1h	ch lo	1	O.B	CFD		L	4	Uplands	Plain	Level depression	Lo	75	+G			
7	7	16	2	4	SUNDERLAND	DM			M	MAB14/H11m	ch till	2	O.B	MAB		CL	5	Uplands			Lo	67.38	+G			
15	16	28	3	4	VAUXHALL	KET			F	BVL1/U1h	ch sy	7	O.B	BVL		SL_SCL/SL	4	Uplands			Lo	0	-P			
7	7	17	1	4	SUNDERLAND	DM			M	MAB14/H11m	ch till	2	O.B	MAB		CL	4	Uplands			Lo	68.4	+G			
13	15	4	3	4	VAUXHALL	CAT			Lvb/M	KBWD16/U1h	sz lo	16	O.B	KBD/WDW		BVL/SCL	2-3	Uplands	Plain	Level depression	BIO	0	-P			
12	13	22	4	4	HAYS WEST	H.B			M	BVL7/U1h	ch sy	7	O.B	BVL		L	4	Uplands	Plain	Level depression	Lo	59.5	G			
13	15	3	2	4	VAUXHALL	KET			F	KBWD16/U1h	sz lo	16	O.B	KBD/WDW		SIL/SCL_SCL	2-3	Uplands	Plain	Level depression	Lo	0	-P			
13	15	3	1	4	VAUXHALL	CAT			Lvb/M	KBWD16/U1h	sz lo	16	O.B	KBD/WDW		SIL/SCL_SCL	2-3	Uplands	Plain	Level depression	Lo	0	-P			
13	15	2	3	4	VAUXHALL	CAT			L	RRWD19/U1h	sz lo	16	B.SS	RRD/WDW		SL	2	Uplands	Plain	Level	Lo	0	-P			
19	10	29	8	4	TIDE LAKE	DM			M	ROS14/H11e	ch sz till/br	12	O.B		BVL	L	1	Uplands			Lo	62.9	G	G		
13	15	2	2	4	VAUXHALL	KET			Fvb/M	BVL17/U1h	ch sy	7	O.B	O.B/B.SS		SL/SCL_SCL	2-3	Uplands	Plain	Level	Lo	0	-P			
12	14	9	3	4	VAUXHALL	KET			F/M/L/M	BVCH1/U1h	ch lo sy	6	O.B	BVL/CHN		SL/CL		Uplands			Lo	0	-P			
12	14	13	3	4	VAUXHALL	KET			M/R	HDRO1/H51	sz till	15	O.B	HDY/ROL?		L_CL	6/5	Uplands	10-20		BdL	0	-P			
12	14	18	2	4	VAUXHALL	KET			F/M/L/M	BVCH1/U1h	ch lo sy	6	O.B	BVL/CHN		SL/CL	3/2	Uplands			Sy	0	-P			
12	14	17	1	4	VAUXHALL	KET			F/M/L/M	BVCH1/U1h	ch lo sy	6	O.B	BVL/CHN		SL/CL	3/2	Uplands			Sy	0	-P			
12	14	17	4	4	VAUXHALL	CAT			L	BVCH1/U1h	ch lo sy	6	O.B	BVL/CHN		SL/CL	3	Uplands			Lo	0	-P			
13	15	1	4	4	VAUXHALL	KET			Lvb/M	RRWD19/U1h	sz lo	16	O.B	RRD/WDW?		SL	1-3	Uplands	Plain		Lo	0	-P			
13	14	55	3	4	VAUXHALL	KET			F	BVL1/U1h	ch sy	7	O.B	BVL		SL	3-4	Uplands	Plain	Level	Lo	0	-P			
12	14	15	2	4	VAUXHALL	KET			F/M/L/M	BVCH1/U1h	ch lo sy	6	O.B	BVL/CHN		SL/CL	3/2	Uplands			Lo	0	-P			
13	14	18	2	4	VAUXHALL	KET			M	ANO17/H11r	ch sy	7	O.B	ANO		SL_SCL	3-5	Uplands	Plain	Mid slope	Lo	0	-P			
12	14	8	1	4	VAUXHALL	CET			FL	BVCH1/U1h	ch lo sy	6	O.B			S		Uplands			Lo	0	-P			
1	2	31	3	4	SAGE CREEK	AR		SW	M	ROL7/U1h	ch till	2	SZ.B	ROL		SiCL	3	Midlands	13-25	Upper slope	BIO	41.4	+F			
8	8	34	2	4	BROWER	OC			F	MAB10/H11	ch till	2	O.B	MAB		LS	4	Uplands			Sa	0	-P			
8	8	34	3	4	BROWER	DM			M	MAB10/H11	ch till	2	O.B	MAB/CFD		CL	3	Uplands			Lo	0	-P			
1	4	16	1	4	SAGE CREEK	AR			M	HDHU16/U1h	sz break	15	O.B	HDY/HUK		SiCL	1	Midlands	Undulating	Upper slope	BIO	74.9	+G			
1	4	16	4	4	ONE FOUR	AR	894	NE	U	ZUN1/14h	thin break	21	O.R	ZUN		SL	5	Uplands	Rolling		Lo	68.7	+G	G	175	
12	14	8	2	4	VAUXHALL	KET			F	BVCH1/U1h	ch lo sy	6	O.B	BVL/CHN		SL/LS	1	Uplands	16-20		Sy	0	-P			
12	14	7	4	4	VAUXHALL	CAT			F/M/L/M	BVCH1/U1h	ch lo sy	6	O.B	BVL/CHN		SL/CL		Uplands			Lo	0	-P			
12	14	24	3	4	VAUXHALL	PS			Fb/M	BVL1/U1h	ch sy	7	O.B	BVL		SL/SCL_SCL	3	Uplands	Plain	Level depression	Lo	0	-P			
1	6	13	2	4	MRNA	M/R			M/R	MSPH1/R21	ch till/br	4	O.B	MSN/PHN		L		Uplands	Hilly		Lo	0	-P	E		
12	14	7	1	4	VAUXHALL	KET			F	BVRI1/U1h	ch sy	7	O.B	BVL/R1R		SL/LS	3	Uplands			Sy	0	-P			
12	14	25	2	4	VAUXHALL	PS			Fvb/M	BVL1/U1h	ch sy	7	O.B	BVL		SL/CL	3	Uplands	Plain	Level depression	Lo	0	-P			
12	14	26	4	4	VAUXHALL	CAT			Fv/M	ANO	ch sy	7	O.B	ANO		SL/SCL_SCL	3	Uplands			Sy	0	-P			
12	14	27	2	4	VAUXHALL	CAT			Fv/M	ANO5/U1h	ch sy	7	O.B	ANO		SL/CL	3	Uplands			Lo	0	-P			
1	4	10	4	4	ONE FOUR	AR	904	E	M	MSN4/R2m	ch till	2	O.B	MSN		SL_CL	3-5	Uplands			Lo	31.1	-F	P	125	

Appendix 1. SLMs for each silver sagebrush location. (Locations and density distribution classes provided by Alberta Public Lands.

Twp	Rg	Sec.	Qtr.	Density D class	Lease	Examiner	Elevation	Aspect	Parent Material	SLM from AGRASID	SLM group description	SLM group number	Soil subgroup	Soil complex	Soil series	Texture or complex	Slope or complex	Macro landform	Local landform	Landform element	Range site	Range condition %	RC class	Vigor	Estimated production		
12	14	6	2	4	VAUXHALL	KET			L	BVRI1/U1h	ch sy	7	O.B	BVL/RIR	SL	3					Lo	0	-P				
13	14	17	1	4	VAUXHALL	KET			Fvb/M	ANO17/H1lr	ch sy	7	O.B		ANO	SL/SIL	2-3	Uplands	Plain	Level	Lo	0	-P				
13	14	17	1	4	VAUXHALL	CAT		S	Fvb/M	ANO17/H1lr	ch sy	7			ANO	SL/SL_SCL	3	Uplands	Plain		Lo	0	-P				
12	14	30	3	4	VAUXHALL	CAT			M	TKI5/U1h	ch lo	1				L	3/2	Uplands	Rolling		BIO	0	-P				
6	5	27	6	4	HEIDENGER	DM			GF-M	CGW16/13l	sz fan	17				SICL-CL-SCL	3	Uplands	20-25			0	-P				
12	14	31	4	4	VAUXHALL	CAT			Fvb/M	ANO17/H1lr	ch sy	7				ANO?	SL_C/C	2/1				Lo	0	-P			
13	14	16	1	4	VAUXHALL	CAT			Fvb/M	BVL1/U1h	ch sy	7	O.B		BVL	BVL1/U1h	2-3	Uplands	Plain	Level	Lo	0	-P				
12	14	33	4	4	VAUXHALL	KET			Fvb/M	BVL1/U1h	ch sy	7		O.B	BVL	SL/SL_SCL	3	Uplands	Plain	Level	Lo	0	-P				
6	5	34	2	4	MAYER	OC			GF	CGW16/13l	sz fan	17				O.DB-DB.SS	SICL-CL-SCL	3				0	-P				
6	5	36	3	4	MAYER	DM			M	WSM10/H1m	dk bm till	3				O.DB-SZ.GL	SICL-CL-SCL	5		12-19		0	-P				
12	14	35	3	4	VAUXHALL	KET			Fvb/M	ANOS/U1h	ch sy	7	O.B		ANO	SL_C/C	3	Uplands	Plain	Level	Lo	0	-P				
12	14	36	3	4	VAUXHALL	KET			Fvb/M	ANOS/H1l	ch sy	7				O.B	ANO	SL/SL_SCL	3-4	Uplands	Plain	Level	Lo	0	-P		
12	15	20	1	4	VAUXHALL	CAT			M	CHWD1/U1h	ch sz lo	11				CHZ/WDW	L_CL/C	2/3	Uplands	Plain	Level depression	Lo	0	-P			
7	4	7	4	4	MAYER	DM			M	WSM1/H1m	dk bm till	3	O.DB				SICL-CL-SCL	4-5				0	-P				
7	4	7	8	4	MAYER	DM			M	WSM4/R2m	dk bm till	3				O.DB-GL-SZ	SICL-CL-SCL	5				0	-P				
11	14	2	1	4	VAUXHALL	CAT			Lu	CHN1/U1h	ch lo	1	B.S		CHN	ISL	2-3	Uplands	Plain	Terrace	Lo	0	-P				
1	7	11	4	4	PINHORN	AR	1033	SW	M	SIL6/R2l	sz till/br	14	B.SS		SIL	L_C/CL	4	Uplands	20-25	Mid slope	Lo	70.45	+G	G	250		
1	3	7	1	4	ONE FOUR	AR	902	NE	M	MSN1/U1h	ch till	2	O.B		MSN	CL_C	2		Inclined		Lo	80.5	-E	G	200		
1	6	7	3	4	PINHORN	AR	1019	S	M	MSPH17/R2l	ch till/br	4	O.B	MSN/PHN/CMR		L_C	3	Uplands	13-20-25	Mid slope	Lo	62.4	+G	G	175		
7	5	1	8	4	MAYER	DM			M	WSM10/H1m	dk bm till	3				O.DB-SZ.GL	SICL-CL-SCL	5	Uplands	12-20-25		0	-P				
13	14	15	3	4	VAUXHALL	KET			M	CFD1/U1h	ch lo	1	O.B		CFD	L_CL	3/4	Uplands	Plain	Level	Lo	0	-P		F		
13	14	14	1	4	VAUXHALL	KET			M	CFD1/U1h	ch lo	1	O.B		CFD	L/SIL_CL	3	Uplands	Plain	Level	Lo	0	-P				
7	5	3	1	4	MAYER	DM			U	SUN1/4h	thin break	21				VARIABLE	>5	Hills		10-22		0	-P				
13	14	9	2	4	VAUXHALL	KET			L	BVL1/U1h	ch sy	7	O.B		BVL	SL/L	2-3	Uplands	Plain	Level	Lo	0	-P				
13	14	7	4	4	VAUXHALL	CAT			Fvb/M	ANO17/H1lr	ch sy	7	O.B		ANO	SL/SL_SCL	3-4	Uplands	Rolling		Lo	0	-P				
13	14	7	3	4	VAUXHALL	CAT			Fvb/M	ANO17/H1lr	ch sy	7		O.B	ANO	SL/SL_SCL	2-3	Uplands	Plain	Level	Lo	0	-P				
19	16	16	4	4	ACHDA	MS & MB			M	ROL10/U1h	ch till	2	SZ.B	CCL/HDY/HUK		L	3	Uplands	Undulating	Level depression	BIO	77.4	-E				
7	5	33	3	4	MAYER	OC			M	WSM14/H1md	dk bm till	3				VARIABLE	>5	Hills				0	-P				
13	14	6	2	4	VAUXHALL	KET			Fvb/M	ANO17/H1lr	ch sy	7		O.B	ANO	SL/SL_SCL	2-3	Uplands	Plain	Level	Lo	0	-P				
1	1	4	2	4	WILDHORSE - GRAZED	IS	853	SW	GF	BVL14/U1h	ch sy	7	SZ.B		CHZ	L	1	Uplands	Hummocky	Terrace	Lo	52.15	-G				
13	14	5	4	4	VAUXHALL	KET		E	Fvb/M	ANO17/H1lr	ch sy	7		O.B	ANO	SL/SL_SCL	3	Uplands	16-20		Lo	0	-P				
8	3	6	2	4	CYPRESS HILLS	OC&MS			F	DMDP5/14h	dk brn	13	O.DB	DMS/DPT		L.S-/SL		Hills		Mid slope	Lo	60.3	+G	G	1500		
13	14	5	3	4	VAUXHALL	KET			Fvb/M	ANO17/H1lr	ch sy	7		O.B	ANO	L/SL_SCL	2-3	Uplands	Plain	Level	Lo	0	-P				
2	4	16	4	4	ONE FOUR - EXCLOSURE	DM	937	E	M	ORWD16/13l	sz rg fan & br	18	B.SZ		CHZ	L	3	Uplands	Undulating	Terrace	Lo	61.92	+G				
2	4	16	4	4	ONE FOUR - GRAZED	IS	937	E	M	ORWD16/13l	sz rg fan & br	18	B.SS		WDW	L	3	Uplands	Undulating	Terrace	Lo	57.39	-G				
11	14	20	4	4	VAUXHALL	KET			L	CHN1/U1h	ch lo	1	O.B		CHN	ISL		Uplands	Plain	Terrace	Lo	0	-P				
3	5	24	2	4	SAGE CREEK	AR		E	GF	ORWD18/R2l	sz rg fan & br	18		ORN/WDW		SIL/SICL	3	Uplands	Rolling	Upper slope	Li	58.75	+G				
3	5	13	4	4	SAGE CREEK	AR		NW	GF	ORWD18/R2l	sz rg fan & br	18		ORN/WDW		SIL/SICL	3-5	Uplands	13-20	Upper slope	Li	73.05	+G				
12	15	24	2	4	VAUXHALL	CAT			L	ROS11/H5l	ch sz till/br	12	B.SO		ROL/SIL?	L_CL	3-6	Uplands	Hilly		Lo	0	-P	E			
3	2	32	2	4	RESSDAY - EXCLOSURE	IS	968	S	M	HDRO1/H5l	sz till	15	B.SO		HDY	L	2	Uplands	Hummocky	Terrace	BIO	60.26	+G				
3	2	32	2	4	RESSDAY - GRAZED	DM	968	S	M	ROS14/13bc	ch sz till/br	12	B.SS		SIL	CL_C	2	Uplands	Hummocky	Terrace	BIO	73.1	+G				
13	14	4	3	4	VAUXHALL	KET			L	BVL1/U1h	ch sy	7	O.B		BVL	SL/L					Lo	0	-P				
12	15	24	2	4	VAUXHALL	CAT			M	ROS11/H5l	ch sz till/br	12	O.B	ROL/SIL?		L_CL	4/3	Hills			Lo	0	-P	E			
3	4	15	4	4	SAGE CREEK	AR			M	ROL/SIL	ch sz till/br	12		ROL/SIL		SICL	4	Uplands	Rolling	Upper slope	Lo	64.2	+G				
3	4	15	4	4	SAGE CREEK	AR			M/R	PHS11/R2mc	ch sz till/br	12		PHN/SIL		SIL/SICL	3	Uplands	13-25	Upper slope	Lo	31.3	-F				
3	18	7	4	4	ACA-C	AR		S	M	PUR2/H1m	dk bm till	3	O.DB	RPM		L	6	Hills	Hummocky		Lo	0	-P	G			
3	4	13	3	4	SAGE CREEK	AR			M	ROS12/H5l	ch sz till/br	12		ROL/SIL		SICL	3	Uplands	13-20-25	Upper slope	Lo	50	+F				
3	4	10	1	4	SAGE CREEK	AR		N	M	MSN7/13md	ch till	2	O.B		MSN	SICL	5	Uplands	13-25		Lo	71.5	+G				
3	4	9	2	4	SAGE CREEK	AR		S	GF	ORS116/R2md	sz rg fan & br	18		ORN/SIL		SIL	4	Uplands	13-25	Mid slope	BIO	68.9	+G				
3	18	17	1	4	ACA-C	AR		SW	M	PUR2/H1m	dk bm till	3	O.DB	RDM/GL		L	5	Uplands	Hummocky		Lo	0	-P	G			
3	4	9	1	4	SAGE CREEK	AR		SE	GF/M	ORS116/R2md	sz rg fan & br	18		ORN/SIL		SL/SIL	3	Uplands	19-25		BIO	53.7	-G				
3	18	17	4	4	ACA-C	AR			M	PUR2/H1m	dk bm till	3	O.DB	RDM/GL		L	4	Uplands	Hummocky	Mid slope	Lo	0	-P	G			
3	18	17	4	4	ACA-C	AR			M	PUR2/H1m	dk bm till	3	O.DB	RDM/GL		L	4	Uplands	Hummocky	Crest	Lo	0	-P	G			
3	18	18	2	4	ACA-C	AR			M	PUR2/H1m	dk bm till	3	O.DB	RDM/GL		L	5	Uplands	Hummocky	Upper slope	Lo	0	-P	G			
12	15	28	2	4	VAUXHALL	CAT			Lv/M	CHWD1/U1h	ch sz lo	11		CHD/WDW		SIL_SICL/SIC	3	Uplands	Plain		Lo	0	-P				
3	4	3	1	4	SAGE CREEK	AR		N	M	MSN1/14md	ch till	2	O.B		MSN	SICL	3	Uplands	13-25	Upper slope	Lo	53.7	-G				
12	15	28	4	4	VAUXHALL	CAT & PS			Lv/M	CFD7/U1h	ch lo	1		O.B.B.SO	CFD	SIL/SL_SCL	2-3	Uplands	Plain	Level depression	BIO	0	-P				
12	15	29	2	4	VAUXHALL	CAT			Lv/M	CHWD1/U1h	ch sz lo	11		CHZ/WDW		L_SICL/SIC	3	Uplands	Rolling		Lo	0	-P				
3	18	29	5	4	ACA-M	AR		NW	M	PW11/13hd	dk bm till	3	O.DB	RDM/ER		L	4	Uplands	Hummocky	Mid slope	Lo	0	-P	G			
3	18	29	4	4	ACA-C	AR		N	M	PUR2/H1m	dk bm till	3	O.DB	RDM/ER		L	6	Hills	Hummocky	Mid slope	Lo	0	-P	G			
6	4	1	0	4	LINTON KLEINKNECH	DM		VAR	M	PMWS1/13h	dk bm till	3						Hills	Hilly	Mid slope	Li	86.1	-E				
6	4	2	0	4	LINTON KLEINKNECH	OC & DM			M	WSM14/R2m	dk bm till	3				SIL	5	Uplands	Rolling	Terrace	Li	65.7	-G				
6	4	3	5	4	LINTON KLEINKNECH	OC			M	MCWS1/H1m	dk bm till	3	DB.SS		MCA	L	4	Uplands	Inclined	Lower slope	BIO	58	-G				
6	4	6	1	4	LINTON KLEINKNECH	DM		VAR	M	TTH7/13h	dk bm till	3	O.DB		TTH	L	5	Uplands	Hummocky	Mid slope	Lo	54.6	-E				
1	7	11	2	4	PINHORN	AR	1047	W-NW	M	SIL6/R2l	sz till/br	14	B.SS		SIL	L_C/CL	3	Midlands	Undulating		BIO	83.25	-G	G	150		
11	14	27	2	4	VAUXHALL	CAT			L	CHN1/U1h	ch lo	1	O.B		CHN	ISL	2-3	Hills	Plain	Terrace	Lo	0	-P				
11	14	30	3	4	VAUXHALL	KET			Fvb/M	BVRI1/U1h	ch sy	7	O.B		BVL/RIR	L_CL/SL	3	Uplands	Plain		Lo	0	-P				
12	15	30	1	4	VAUXHALL	CAT			Lv/M	CFD7/U1h	ch lo	1		O.B.B.SO	CFD	SL_CL/C	3	Uplands	Plain	Level depression	Lo	0	-P				
3	3	30	2	4	SAGE CREEK	AR		S	M	ROS14/H1l	ch sz till/br	12		ROL/SIL		SICL	3	Uplands	Undulating	Crest	BIO	46.2	+F				
3	3	29	4	4	SAGE CREEK	AR		W	M	MAB7/U1h	ch till	2	O.B		MAB	SICL	3	Uplands	Undulating	Crest	Lo	32.5	-F				
3	3	28	3	4	SAGE CREEK	AR			M	MAB7/U1h	ch till	2	O.B		MAB	SICL	2										

Appendix 1. SLMs for each silver sagebrush location. (Locations and density distribution classes provided by Alberta Public Lands.)

Twp	Rg	Sec.	Qtr.	Density D class	Lease	Examiner	Elevation	Aspect	Parent Material	SLM from AGRASID	SLM group description	SLM group number	Soil subgroup	Soil complex	Soil series	Texture or complex	Slope or complex	Macro landform	Local landform	Landform element	Range site	Range condition %	RC class	Vigor	Estimated production	
6	4	6	2	4	LINTON KLEINKNECH	OC			M	TTH7/13h	dk brn till	3	O.DB		TTH	L	5		Hilly	Terrace	Lo	44.48	+F			
3	3	26	3	4	SAGE CREEK	DM,AR,AB &MS			M	HUR01/R2l	sz till	15		HUK/ROL	SiCL	3		Uplands	Undulating	Level depression	BIO	45.35	-F			
12	15	30	3	4	VAUXHALL	CAT			Lv/M	CFD7/U1h	ch lo	1		O.B/B.SO	CFD	SL_CL/C	3				Lo	0	-F			
11	14	31	1	4	VAUXHALL	KET			F	BVCH1/U1h	ch lo sy	6	O.B	BVL/CHN	SLSL	3	Uplands	16-20	Terrace	Sy	0	-P				
3	3	23	4	4	SAGE CREEK	AB			M	HUR01/R2l	sz till	15		HUK/ROL	SiCL	3	Uplands	Undulating	Level depression	BIO	72.5	+G				
6	4	12	1	4	LINTON KLEINKNECH	OC			M	WSM4/13m	dk brn till	3	O.DB		WSM	SIL	4		Rolling	Terrace	Lo	82.4	-E			
6	4	12	4	4	LINTON KLEINKNECH	IS & SN			M	WSM4/13m	dk brn till	3	O.DB		WSM	SIL	5				Lo	92.25	+E			
13	14	2	1	4	VAUXHALL	CAT			M	ANO5/H1l	ch sy	7	O.B		ANO	SL/SL_SCL	3	Uplands	Plain	Hills	Lo	0	-P			
6	4	13	7	4	DONALD KLEINKNECH	DM		VAR	M	PMWS1/13hd	dk brn till	3	DB.SS		CGW	SIL	2		Hills	Hummocky	SL	35.6	F			
6	4	13	8	4	DONALD KLEINKNECH	DM		VAR	M	PMWS1/13hd	dk brn till	3						Hills	Hummocky	Li	88.5	E				
6	4	16	1	4	DONALD KLEINKNECH	IS		VAR	M	MCWS1/H1m	dk brn till	3	O.DB			L				Lo	52.1	-G				
3	3	23	2	4	SAGE CREEK	AB			M	RO7/U1hc	ch till	2	SZ.B		ROL	SiCL	3	Uplands	Undulating	Level depression	Lo	53	-G			
6	4	16	4	4	DONALD KLEINKNECH	IS		VAR	M	MCWS1/H1m	dk brn till	3	O.DB			WSM	SIL	4			Lo	57.8	-G			
1	7	1	3	4	PINHORN	AR	1022	N	GL	WDW5/13l	sz fan	17	B.SS		WDW	L_C/CL	3-4	Midlands	13-25		BIO	68.8	+G	G	150	
3	3	22	3	4	SAGE CREEK	AB	1000		M	MAB7/U1h	ch till	2	O.B		MAB	SiCL	3	Uplands	Undulating	Level depression	Lo	46.5	+F			
12	14	5	1	4	VAUXHALL	CAT			F/M,L/M	BVCH1/U1h	ch lo sy	6	O.B	BVL/CHN	L_CL/SCL	3			Level		Lo	0	-P			
6	4	17	8	4	DONALD KLEINKNECH	OC		VAR	U	ZUN3/SC1h	thin break	21				L		Midlands	Steep slopes		Ov	51.65	-G			
1	7	1	2	4	PINHORN	AR		N	M	SIL6/R2l	sz till/br	14	B.SS		SIL	L_C/CL	5-6	Hills	13-20	Mid slope	Lo	68.2	+G	G	225	
3	3	15	4	4	SAGE CREEK	AB			M	MAB7/U1h	ch till	2	O.B		MAB	SiCL	3	Uplands	Undulating	Level depression	Lo	54.4	-G			
6	4	20	1	4	DONALD KLEINKNECH	DM		VAR	M	TTH10/H1m	dk brn till	3	O.DB		TTH	L	4	Uplands	Rolling	Mid slope	Lo	72.27	+G			
6	4	20	2	4	DONALD KLEINKNECH	DM		VAR	M	TTH10/H1m	dk brn till	3	O.DB		TTH	L	4	Uplands	Rolling	Mid slope	Lo	51.7	-G			
6	4	22	3	4	DONALD KLEINKNECH	DM		VAR	M	WSM1/H1m	dk brn till	3	O.DB			L		Midlands	Plain	Mid slope	Lo	89.8	E			
6	4	22	4	4	DONALD KLEINKNECH	DM		VAR	M	WSM1/H1m	dk brn till	3	O.DB		WSM	SIL	5	Midlands	Hummocky	Mid slope	Lo	79.51	-E			
6	4	23	7	4	DONALD KLEINKNECH	DM		VAR	M	PMWS1/13h	dk brn till	3				6		Hills	Hilly	Mid slope	Li	83.78	E			
6	4	24	1	4	DONALD KLEINKNECH	DM		VAR	GF	GNGC4/3c	dk brn	13				L		Midlands	Hummocky	Mid slope	Ov	38.17	F			
3	3	15	2	4	SAGE CREEK	AB			M	MAB7/U1h	ch till	2	O.B		MAB	SiCL	4	Midlands	Rolling	Upper slope	Lo	63.85	G			
12	15	32	3	4	VAUXHALL	CAT			Lv/Mu	CFD7/U1h	ch lo	1		O.B/B.SS	CFD	SiL/SL-SCL	3/2	Uplands	Rolling		Lo	0	-P			
3	3	10	2	4	SAGE CREEK	MS			M	MSN7/14md	ch till	2	O.B		MSN	SiCL	4	Uplands	Hilly	Upper slope	Lo	47.25	+F			
6	4	30	1	4	DONALD KLEINKNECH	DM		VAR	U	ZUN3/SC1h	thin break	21				L		Valleys	Steep slopes		Ov	43.2	+F			
6	4	30	5	4	DONALD KLEINKNECH	DM		VAR	M	WSM7/H1hd	dk brn till	3	O.DB		WSM	SIL	5	Uplands	Hummocky		Lo	69.5	+G			
6	4	30	6	4	DONALD KLEINKNECH	DM		VAR	M	TTH7/H1l	dk brn till	3	O.DB		TTH	L	4	Uplands	Hummocky		Lo	61.4	G			
3	3	10	1	4	SAGE CREEK	AB			M	MAB7/U1h	ch till	2	O.B		MAB	SiCL	3	Uplands	12-25	Level		Lo	46	+F		
6	4	36	1	4	LINTON KLEINKNECH	DM			M	WSM4/13m	dk brn till	3	O.DB		WSM	SIL	5	Uplands	Rolling		Lo	74.15	+G			
6	4	36	2	4	LINTON KLEINKNECH	DM			M	WSM4/13m	dk brn till	3	O.DB		WSM	SIL	5	Uplands	Hilly		Lo	74.2	+G			
6	5	30	1	4	LINTON KLEINKNECH	DM		VAR	M	WSM7/H1m	dk brn till	3						Uplands	Steep slopes		Tb	52.1	-G			
12	15	33	3	4	VAUXHALL	CT & PS			Lvb/M	KDWD16/U1h	sz lo	16		KBD/WDW	SiL-SiCL/SiC	2-3	Uplands	Plain	Level depression		Lo	0	-P			
3	3	8	1	4	SAGE CREEK	AB			M	MAB7/14md	ch till	2	O.B		MAB	SiCL	4	Uplands	Undulating	Level depression	Lo	62.2	G			
8	7	14	3	4	RED ROCK - GRAZED	DM	991	SE	M	TTH7/U1l	dk brn till	3		TTH-sz/MHR		L		Uplands	Undulating	Mid slope	BIO	68.77	+G			
1	6	7	4	4	PINHORN	AR	1024	W-NW	M	MSPH17/R2l	ch till/br	4	O.B	MSN/PHN/CMB	L_C/CL	5	Hills	Rolling	Mid slope	Lo	80.55	-E	G	200		
12	15	34	1	4	VAUXHALL	CAT & PS			Lvb/M	RRWD19/U1h	sz lo	16		RRD/WDW	SiL/SL-SCL	2-3	Uplands	Plain	Level depression	BIO	0	-P				
3	3	1	4	4	SAGE CREEK	DM			M	ROL7/U1hc	ch till	2	SZ.B		ROL	SiCL	3	Uplands	Plain	Terrace	Lo	57.75	-G			
17	2	16	4	4	SCHULER - EXCLOSUR	IS	800	SE	M	FMT4/H1l	ch till	2	O.B		FMT	L	3	Uplands	Hummocky	Terrace	Lo	64.9	G			
3	3	1	2	4	SAGE CREEK	AR		SW	M	ROL7/U1hc	ch till	2	SZ.B		ROL	SiCL	3	Uplands	Undulating		Lo	62	G			
3	3	1	2	4	SAGE CREEK	AB			M	MAB14/13md	ch till	2	O.B		MAB	SiCL	4	Midlands	Plain	Mid slope	Lo	60.4	G			
12	15	36	2	4	VAUXHALL	KET		W	M	RRWD16/U1h	sz lo	16		RRD/WDW	L_C	3	Uplands	Plain	Level		Lo	0	-P			
1	6	4	1	4	KENNEDY COULEE E.F.	KET		NE	L	MSPH17/R2l	ch till/br	4	B.SO		KBD	L	2	Uplands	Plain	Mid slope	Lo	0	-P	G		
3	2	6	1	4	SAGE CREEK	DM & MS			M	ROL7/U1h	ch till	2	SZ.B		ROL	SiCL	3	Uplands	Plain	Terrace	Lo	54.01	-G			
1	6	9	1	4	KENNEDY COULEE E.F.	KET			L	MSPH17/R2l	ch till/br	4	O.R		ORN	SIL	1		Lower slope		Lo	0	-P	G		
1	6	9	2	4	KENNEDY COULEE E.F.	KET		W	L	MSPH17/R2l	ch till/br	4	B.SO		GEM	L	3		Upper slope		Lo	0	-P	G		
18	10	7	6	4	TIDE LAKE	DM			GL	RMR19/U1h	lac	19	B.SO		RMR	SiCL	1				BIO	77.9	-E			
18	10	9	1	4	TIDE LAKE	DM			M	MAR07/HR2M	ch till	2				L	2				Lo	65.33	G			
18	10	9	5	4	TIDE LAKE	DM			M	HDRO4/U1h	sz till	15				SiCL	1				Lo	49.2	+F			
11	14	33	2	4	VAUXHALL	KET & CAT			L	CHN1/U1h	ch lo	1	O.B		CHN	SL	2	Uplands	Plain	Terrace	Lo	0	-P			
18	10	33	3	4	TIDE LAKE	DM			GL	PTRM19/U1L	lac	19				CL	1	Midlands	Plain	Terrace	BIO	64.7	-G			
2	4	33	3	4	SAGE CREEK	AR		SW	M	MSN7/14md	ch till	2	O.B		MSN	SiCL	4	Uplands	13-20-25	Upper slope	Lo	50.7	-G			
19	10	9	3	4	TIDE LAKE	DM			M	PTRM19/U1l	lac	19						Midlands	Plain	Level depression	SL	40	F			
19	10	9	4	4	TIDE LAKE	DM			GL	PTRM2/U1L	lac	19				CL	1	Midlands	Plain	Terrace	BIO	66.8	+G			
19	10	18	1	4	TIDE LAKE	OC & DM			GL	KBWD16/U1h	sz lo	16						Uplands	Hummocky	Mid slope	BIO	70.7	+G			
2	3	25	1	4	SAGE CREEK	AR		SE	M	HDRO1/U1h	sz till	15			HDY/ROL	SiCL	3	Uplands	13-20-25	Upper slope	Lo	51	-G			
19	10	28	2	4	TIDE LAKE	DM			M	BLOR3/U1n	sz rg fan & br	18									BIO	61.9	G			
1	3	32	3	4	SAGE CREEK	AR		SW	M	MSN7/U1h	ch till	2	O.B		MSN	SiCL	3	Midlands	13-14-25		Lo	51	-G			
2	4	32	3	4	SAGE CREEK	AR		NE	M	MSN7/14md	ch till	2	O.B		MSN	SiCL	3	Uplands	13-25	Upper slope	Lo	45	+F			
2	4	30	3	4	SAGE CREEK	AR			U	ZUN3/SC2	thin break	21	O.R		ZUN		3	Uplands	Undulating		Lo	37.5	F			
2	3	34	3	4	SAGE CREEK	DM			M	HDRO5/13lc	sz till	15			HDY/ROL	SiCL	3	Uplands	Rolling		BIO	78.55	-E			
1	6	7	4	4	PINHORN	AR	1015	SE	M	MSPH17/R2l	ch till/br	4	O.B	MSN/PHN/CMR	L_C/CL	5	Hills	19-20	Mid slope	Lo	87.1	E	G	250		
2	3	26	4	4	SAGE CREEK	AR			U	ZUN3/SC2	thin break	21	O.R		ZUN		2	Uplands	Undulating	Upper slope	Lo	35.5	F			
1	6	5	1	4	PINHORN	AR	1013	E	M	MSPH17/R2l	ch till/br	4	O.B	MSN/PHN/CMR	L_C/CL	3-5	Hills	Rolling	Mid slope	Lo	67.2	+G	G	275		
1	3	28	1	4	SAGE CREEK	AR			M	HDRO4/U1h	sz till	15			HDY/ROL	SiCL	3	Midlands	Undulating		BIO	65.05	G			
1	3	29	3	4	SAGE CREEK	AR		NE	M	MSN6/R2l	ch till	2	O.B		MSN	SiCL	4	Midlands	13-25		Lo	82.1	-E			
2	3	10	4	4	SAGE CREEK	AR		S	M	ROL7/U1h	ch till	2	SZ.B		ROL	SiCL	2	Midlands	13-25	Upper slope	Lo	61.5	G			
2	3	7	4	4	SAGE CREEK	AR		S	GL/M	GEHU16/13l	sz till	15		GEM/HUK	SiL/SiCL	3	Midlands	13-25		BIO	74.1	+G				
2	3																									

Appendix 1. SLMs for each silver sagebrush location. (Locations and density distribution classes provided by Alberta Public Lands.

Twp	Rg	Sec.	Qtr.	Density D class	Lease	Examiner	Elevation	Aspect	Parent Material	SLM from AGRASID	SLM group description	SLM group number	Soil subgroup	Soil complex	Soil series	Texture or complex	Slope or complex	Macro landform	Local landform	Landform element	Range site	Range condition %	RC class	Vigor	Estimated production
1	6	8	1	4	PINHORN	AR	1016	E	M	MSPH17/R21	ch till/br	4	O.B	MSN/PHN/CMR		L_C/CL	4-5	Midlands	13-25		Lo	79.6	-E	G	200
2	3	18	2	4	SAGE CREEK	AR			GL/M	GEHU16/I31	sz till	15		GEM/HUK		SiL/SICL	3	Midlands	13-25		Lo	79.4	-E		
2	3	1	1	4	SAGE CREEK	AR		S		ROL7/U1h	ch till	2	SZ.B		ROL	SICL	3	Midlands	13-25		Lo	52	-G		
2	3	4	3	4	SAGE CREEK	AR		SE	GF/M	GPRO4/U1h	ch sz lo	11		GPH/ROL		SL/SICL	2	Midlands	13-25	Upper slope	Lo	39.9	F		
2	2	30	2	4	SAGE CREEK	AR			M	HDRO1/U1h	sz till	15		HDY/ROL		SICL	3	Uplands	13-25	Upper slope	Lo	49.65	+F		
2	3	2	1	4	SAGE CREEK	AR		E	M	ROL7/U1h	ch till	2	SZ.B		ROL	SICL	2	Midlands	14-25		Lo	71	+G		
2	3	4	2	4	SAGE CREEK	AR		SE	M	HDHU16/U1h	sz till	15		HDY/HUK		SICL	2	Midlands	13-25	Upper slope	BIO	73.05	+G		
19	10	5	7	3	TIDE LAKE	AB & OC			L	GLWL1/L2	lac	19	R.G			SiC	2			Level depression	SL	25	+P		
19	10	28	1	3	TIDE LAKE	OC			M	ROSI1/H11	ch sz till/br	12				L	1				Lo	73.3	+G		
15	16	1	1	3	VAUXHALL	KET			F	BVL1/U1h	ch sy	7	R.B	BVL?		gSL	6/5					0	-P		
1	6	15	8	3	MRNA	KET			M	PHS11/R21	ch sz till/br	12		PHN/SIL		L	3	Uplands	Hummocky			0	-P		
2	3	28	3	3	SAGE CREEK	AR		E	M	ROSI1/I41	ch sz till/br	12		ROL/SIL		SICL	4	Uplands	13-20-25	Upper slope	Lo	54.6	-G		
1	4	3	1	3	ONE FOUR	AR	888	SE	M/R	PHS11/R21	ch sz till/br	12		SIL/PHN		SL_CL	3	Uplands	13-25		BIO	74.6	+G	G	150
15	16	20	3	2	VAUXHALL	CAT			F	ANBV1/U1h	ch sy	7	O.B	ANO/BVL		SL/LS	3/2		Undulating		Lo	0	-P		
2	3	8	1	2	SAGE CREEK	AR		SE	GL/M	GEHU16/I31	sz till	15		GEM/HUK		SiL/SICL	2	Midlands	13-25	Upper slope	BIO	70.5	+G		
2	3	9	4	2	SAGE CREEK	AR		SW	M	HDRO5/I3c	sz till	15		HDY/ROL		SICL	2	Midlands	13-25	Upper slope	Lo	36.95	F		
15	16	21	3	2	VAUXHALL	PS			F	ANBV1/U1h	ch sy	7	O.B	ANO/BVL		SL/LS	3/2	Uplands	Plain	Level	Lo	0	-P		
15	16	17	4	2	VAUXHALL	PS			M	MAR07/U1h	ch till	2		MAB/ROL		L/SL_CL	3/2	Uplands	Plain	Level	Lo	0	-P		
2	3	12	1	2	SAGE CREEK	AR		S	M	HDRO1/H11	sz till	15		HDY/ROL		SICL	3	Uplands	13-25	Upper slope	Lo	58.5	G		
2	3	20	4	2	SAGE CREEK	AR		SE	M	HDRO5/I31	sz till	15		HDY/ROL		SICL	3	Uplands	13-25	Upper slope	BIO	64.5	G		
2	3	15	2	2	SAGE CREEK	AR		SE	M	HDRO5/I3c	sz till	15		HDY/ROL		SICL	3	Midlands	13-25	Upper slope	BIO	61.8	G		
1	3	34	2	2	SAGE CREEK	AR			M	HDHU16/U1h	sz till	15		HDY/HUK		SICL	1	Midlands	Plain	Level depression	BIO	51.3	-G		
12	16	23	4	2	VAUXHALL	PS			M	HDRO1/H51	sz till	15		HDY/ROL		SL_CL/L_C	3	Uplands	Plain	Level depression	Lo	0	-P		
12	12	7	8	2	HAYS WEST				F	CVD1/U1h	ch sa	9	O.B		CVD	LS		Uplands	Plain	Terrace	Sy	81.5	-E		
8	8	34	4	2	BROWER	DM			M				O.B	MAB/CFD		CL	3				Lo	0	-P		
15	16	16	4	2	VAUXHALL	PS			Fvb/M	ANBV1/U1h	ch sy	7		ANO/BVL		SL_CL/L_C	3	Uplands	Plain	Level	Lo	0	-P		
2	3	19	2	2	SAGE CREEK	AR		SE	M	HDRO5/I3c	sz till	15		HDY/ROL		SICL	3	Uplands	13-25		BIO	60	G		
2	3	29	3	2	SAGE CREEK	AR			M	ROS12/R21	ch sz till/br	12		ROL/SIL		SICL	1-3	Uplands	12-23-25		Lo	61.5	G	G	1500
2	3	30	2	2	SAGE CREEK	AR		SE	M	HDRO5/I3c	sz till	15		HDY/ROL		SICL	3	Uplands	13-25		BIO	66.7	+G		
15	16	14	3	2	VAUXHALL	PS			Lvb/M	CFCH1/U1h	ch lo	1		CFD/CHN		LS/SL_SCL	4/3	Uplands	Plain	Level depression	Lo	0	-P		
8	8	27	4	2	BROWER	DM			M				O.B	MAB/CFD		CL	3				Lo	0	-P		
2	3	21	4	2	SAGE CREEK	AR		E	M	ROSI1/I41	ch sz till/br	12		ROL/SIL		SICL	3	Uplands		Upper slope	BIO	66.4	+G		
1	6	1	2	2	MRNA	KET			M	PHS11/R21	ch sz till/br	12		PHN/SIL		L	3	Uplands	19-20		Lo	0	-P	G	
8	8	24	7	2	BROWER	DM			M				O.B		MAB	CL	4				Lo	0	-P		
2	4	33	1	2	SAGE CREEK	AR			M/R	PHS12/R21	ch sz till/br	12		PHN/SIL		SiL	3	Uplands	13-25		Lo	48	+F		
8	8	23	1	2	BROWER	DM			M				O.B	MAB/CFD		CL	3				Lo	0	-P		
2	4	35	4	2	SAGE CREEK	AR		N	M	ROS12/R21	ch sz till/br	12		ROL/SIL		SICL	3	Uplands	13-25	Upper slope	Lo	53.5	-G		
2	4	36	1	2	SAGE CREEK	AR		NE	M	ROSI1/R21	ch sz till/br	12		ROL/SIL		SiCL	3	Uplands	13-20-25	Upper slope	Lo	44.5	+F		
12	16	25	2	2	VAUXHALL	PS			Lv/M	CFD7/U1h	ch lo	1		O.B.SS	CFD	SL_CL/C	3	Uplands	Plain	Level depression	Lo	0	-P		
12	16	23	1	2	VAUXHALL	PS			L				O.B	HDY/ROL?		SL	3	Uplands	Plain	Level depression	Lo	0	-P		
12	16	13	1	2	VAUXHALL	PS			GL	CFD1/U1h	ch lo	1		CFD/TIY	CFD	SiL/SIL_SCL	3/2	Uplands	Plain	Level	Lo	0	-P		
15	16	20	2	2	VAUXHALL	CAT			F	MAR07/U1h	ch till	2		MAB/ROL		L/SL_CL	3/2	Uplands	Plain	Level	Lo	0	-P		
15	16	12	3	2	VAUXHALL	PS			F	RAM1/I31	gr	22		RAM	RAM	SL		Uplands	Plain	Level	Lo	0	-P		
12	12	29	4	2	HAYS WEST				F	ANOS/U1h	ch sy	7	O.B		ANO	SL		Uplands	Plain	Level depression	Lo	78.5	-E		
12	12	31	3	2	HAYS WEST	HB		E	M	CFD1/U1h	ch lo	1	O.B	CFD	CFD	L	3	Uplands	Plain	Level depression	Lo	75	+G		
9	8	3	2	2	URRAY LAKE - GRAZ	DM	808		M				O.B	MAB	MAB	L	4	Uplands	Undulating	Terrace	Lo	78.27	-E		
9	8	3	2	2	URRAY LAKE - EXCLOS	IS	808	NW	M				O.B	MAB	MAB	L	4	Uplands	Undulating	Terrace	Lo	73.77	+G		
12	16	25	4	2	VAUXHALL	CAT & SCT			L	CFD7/U1h	ch lo	1		O.B.SS	CFD	SL/SIL_SCL	3	Uplands	Rolling		Lo	0	-P		
15	16	11	3	2	VAUXHALL	PS			Lvb/M	CFCH1/U1h	ch lo	1		CFD/CHN		SL/SL_C	3/4	Uplands	Plain	Level	Lo	0	-P		
15	16	10	4	2	VAUXHALL	PS			Lvb/M	CFCH1/U1h	ch lo	1		CFD/CHN		SL/SL_C	3/4	Uplands	Plain	Level	Lo	0	-P		
15	16	10	2	2	VAUXHALL	PS			M	CFCH1/U1h	ch lo	1		CFD/CHN		L_C	2/3	Uplands	Plain	Level	Lo	0	-P		
15	16	9	4	2	VAUXHALL	PS			M	KBWD2/U1h	sz lo	16		KBW/DW		L_C	2/3	Uplands	Plain	Level	Lo	0	-P		
6	4	24	7	2	DONALD KLEINKNECH	DM		VAR	M				O.DB		WSM	SiL	4	Uplands	Hummocky		Lo	79.18	-E		
15	16	8	3	2	VAUXHALL	PS			M	MAR07/U1h	ch till	2	O.B	MAB/ROL		gSL	3/2	Uplands	Plain	Level	Lo	0	-P		
12	15	32	1	2	VAUXHALL	PS			Lvb/M	KBWD16/U1h	sz lo	16		KBW/DW		SiL/SL_SCL	3/2	Uplands	Plain	Level	Lo	0	-P		
3	3	18	1	2	SAGE CREEK	AR		S	M	ROSI4/H11	ch sz till/br	12		ROL/SIL		SICL	5	Uplands	Inclined		Tb	53.05	-G		
1	6	21	3	2	MRNA	KET		S	M	SIL6/R21	sz till/br	14	SZ.B		SIL	L	3	Lowlands		Level depression	Lo	0	-P		
1	6	21	2	2	MRNA	KET			M/R	CMS14/R21	ch sz till/br	12	O.B	CMR/SIL		L	4	Uplands	Plain	Level depression	Lo	0	-P		
12	15	31	3	2	VAUXHALL	CAT			F	CFD7/U1h	ch lo	1	O.B		CFD	SL	3	Uplands	Plain	Level depression	Lo	0	-P		
12	13	17	2	2	HAYS WEST	KET			E	CVD1/U1h	ch sa	9	O.B		CVD	LS	3	Uplands	Plain	Level depression	Sa	74.5	+G		
12	13	17	3	2	HAYS WEST	KET		E	FE	CHN1/U1h	ch lo	1	O.B		CHN	FSL	4	Uplands	Undulating		Sy	89	E		
15	16	5	4	2	VAUXHALL	PS			L	CFCH7/U11	ch lo	1	O.B												

Appendix 1. SLMs for each silver sagebrush location. (Locations and density distribution classes provided by Alberta Public Lands.

Twp	Rg	Sec.	Qtr.	Density D class	Lease	Examiner	Elevation	Aspect	Parent Material	SLM from AGRASID	SLM group description	SLM group number	Soil subgroup	Soil complex	Soil series	Texture or complex	Slope or complex	Macro landform	Local landform	Landform element	Range site	Range condition %	RC class	Vigor	Estimated production
3	18	23	3	2	ACA-M	AR		NE	M				O.DB	O.DB/R.DB	L	6	Uplands	Inclined	Mid slope	Lo	0	-P	G		
3	4	1	1	2	SAGE CREEK	AR		NE	M	MSN7/4md	ch till	2	O.B		MSN	SL	3	Uplands	13-25	Lo	80	-E			
15	16	14	1	2	VAUXHALL	CAT			F	RAM1/3l	gr	22	O.B		RAM	SL_SIL	2	Hills	Rolling	Lo	0	-E	F		
3	18	23	2	2	ACA-M	AR			S				O.DB			L	4	Uplands	Hummocky	Mid slope	Lo	0	-P	G	1400
3	18	20	2	2	ACA-C	AR		SE	M				O.DB	O.DB/GL.DB		L	3	Uplands	Hummocky	Crest	Lo	0	-P	G	
3	4	5	1	2	SAGE CREEK	AR		S	GF/M/R	ORS116/R2md	sz rg fan & br	18		ORN/SIL		SIL/SICL	6	Hills	Steep slopes	Tb	67.55	+G			
1	6	1	6	2	MRNA	KET			M				B.SS			L	3	Uplands	Plain	Lo	0	-P			
3	18	17	3	2	ACA-C	AR			M				O.DB	O.DB/GL.DB		L	4	Uplands	Hummocky	Upper slope	Lo	0	-P	G	
3	18	14	5	2	ACA-M	AR			M				O.DB	O.DB/GL.DB		L	4	Uplands	Hummocky	Lo	0	-P	G	1300	
3	18	14	1	2	ACA-M	AR		W	M				O.DB	O.DB/GL.DB		L	3	Uplands	Hummocky	Crest	Lo	0	-P	G	1100
1	6	1	1	2	MRNA	KET			M	PHS11/R2l	ch sz till/br	12	O.B	PHN/SIL		L	2	Uplands	Plain	Level depression	Lo	0	-P	E	
15	16	32	2	2	VAUXHALL	PS			F	BVL1/U1h	ch sy	7	O.B		BVL	gSL	3/4	Uplands	Plain	Level	Lo	0	-P		
3	18	8	3	2	ACA-C	AR		E	M				O.DB	O.DB		L	5	Hills	Hummocky	Upper slope	Lo	0	-P	G	
3	4	15	2	2	SAGE CREEK	AR			R;M/R	PHS11/R2mc	ch sz till/br	12		PHN/SIL		SIL/SICL	5	Uplands	13-20-25	Lo	65	G			
3	18	7	2	2	ACA-C	AR		E	M				O.DB	O.DB/GL.DB		L	5	Uplands	Hummocky	Upper slope	Lo	0	-P	G	
3	18	7	1	2	ACA-C	AR			M				O.DB	O.DB/GL.DB		L	4	Uplands	Hummocky	Crest	Lo	0	-P	G	
13	11	8	2	2	HAYS EAST	CT			F				O.B		CHN	L	3	Uplands	Plain	Lo	66	G			
15	16	31	1	2	VAUXHALL	PS			F	BVCV1/U1h	ch sa sy	8	O.B	BVL/CVD		LS/S	3	Uplands	Plain	Level	Lo	0	-P		
2	12	4	3	2	TING ON STONE - GRA	DM	918	NE	F				O.B		RAM	L	1	Uplands	Veneer	SwG	67.01	+G			
2	10	20	4	2	ADEN - GRAZED	DM	907		F				O.B		CFD	L	1	Uplands	Terraced	Terrace	Lo	62.73	G		
13	11	10	3	2	HAYS EAST	CT			M				O.B	CFD?		L	5	Midlands	Plain	Lo	72.5	+G			
15	16	29	1	2	VAUXHALL	PS			F	ANBV1/U1h	ch sy	7	O.B	ANO/BVL		SL/L	3/2	Uplands	Plain	Level	Lo	0	-P		
12	15	24	1	2	VAUXHALL	PS			F				O.B	TIK?		L/SIL_CL	3	Uplands	Plain	Level	Lo	0	-P		
1	18	9	4	2	WIN RIVER - EXCLOSU	IS	1242	W	GL				O.DB		LUP	L	3	Uplands	Veneer	Terrace	Lo	36.44	F		
8	3	8	2	2	CYPRESS HILLS	DM			F	DMDP5/14h	dk brn	13	O.DB	DMS/DPT		L.S-S/L		Hills	Hummocky		Lo	46	+F	F	
7	5	5	1	2	MAYER	DM			M				O.DB-SZ			3					Lo	0	-P		
12	15	22	4	2	VAUXHALL	PS			Lv/M	CFD7/U1h	ch lo	1		O.DB/SZ	CFD	SIL/SIL_SCL	3/2	Uplands	Plain	Level	Lo	0	-P		
7	4	8	7	2	MAYER	DM			M				O.B	O.DB/Eroded		SIL-SL-SCL	5-6				Lo	0	-P		
12	15	21	3	2	VAUXHALL	PS			M	CHWD1/U1h	ch sz lo	11	CHZ/WDW	SZ/B/B.SS		L_CL/SIL_SCL	3	Uplands	Plain	Level	Lo	0	-P		
1	3	6	2	2	ONE FOUR	AR	903	W	U	ZUN1/4h	thin break	21			ZUN	SL	3-4	Uplands	Rolling	Upper slope	Lo	87.8	E	E	200
12	15	20	2	2	VAUXHALL	PS			Lbv/M	CHWD1/U1h	ch sz lo	11	CHZ/WDW	SZ/B/B.SS		L_CL/SIL_SCL	3	Uplands	Plain	Level depression	Lo	0	-P		
7	4	8	2	2	MAYER	DM			M				O.DB	O.DB/SZ		SIL-SL-SCL	4-5				Lo	0	-P		
7	4	7	2	2	MAYER	DM			M				O.DB	O.DB/Eroded soils		SIL-SL-SCL	5-6	Uplands	10-20-22	Mid slope	Lo	0	-P		
12	15	19	1	2	VAUXHALL	ps			M	HDRO1/H5l	sz till	15	HDY/ROL	SZ/B/B.SS		L_CL/SIL_SCL	3	Uplands	Plain	Level depression	Lo	0	-P		
7	4	7	1	2	MAYER	DM			M				O.DB	O.DB/SZ		SIL-SL-SCL	4-5	Uplands	16-20	Lo	0	-P			
6	5	36	4	2	MAYER	DM			M				O.DB	O.DB/SZ		SIL-SL-SCL	4	Uplands	16-20-25	Lo	0	-P			
1	3	7	3	2	ONE FOUR	AR	902	SW	M	MSN1/U1h	ch till	2	O.B		MSN	CL_C	3	Midlands	13-25	Lo	63	G	G	175	
6	5	34	2	2	MAYER	OC			R					Eroded		VARIABLE	>5	Midlands	Hilly	Mid slope	Lo	0	-P		
12	14	33	2	2	VAUXHALL	CAT			Fvb/M	ANO17/H1lr	ch sy	7	O.B/B.SO		ANO	SL/SL_SCL	3	Uplands	Plain	Level	Lo	0	-P		
15	16	27	2	2	VAUXHALL	PS			F	ZUN1/3h	thin break	21	O.R		ZUN	LS_S	2	Uplands	Plain	Level	Sy	0	-P		
6	5	32	4	2	MAYER	DM			M				O.DB-GL-SZ			SIL-SL-SCL	5	Uplands	Rolling		Lo	0	-P		
1	4	1	2	2	ONE FOUR	AR	872	N-NW	Lvb/M	BU1C1/3lc	ch fan	5	BUT/CMR			SL	3	Uplands	13-25	Lo	86.7	E	E	300	
12	14	31	4	2	VAUXHALL	PS			M	ANO17/H1r	ch sy	7		O.B/B.SS	ANO	SL/SL_SCL	3/2	Uplands	Plain	Level depression	Lo	0	-P		
12	14	31	1	2	VAUXHALL	PS			Fvb/M	ANO17/H1lr	ch sy	7		O.B/B.SO	ANO	SL/SL_SCL	3	Uplands	Plain	Level	Lo	0	-P		
1	4	2	4	2	ONE FOUR	AR	904	NE	M	MSN4/R2m	ch till	2	O.B		MSN	SL_CL	5-6	Hills	Hummocky	Tb	73	+G	E	150	
1	4	2	4	2	ONE FOUR	AR	893	NE	M	MSN4/R2m	ch till	2	O.B		MSN	SL_CL	3	Hills	13-25	Mid slope	Lo	88.25	E	E	350
12	14	30	3	2	VAUXHALL	PS			L				TIK?	O.B/B.SS		SL/L_CL	3	Uplands	Plain	Level	Lo	0	-P		
3	18	23	3	2	ACA-M	AR			M				O.DB			L	3	Uplands	Hummocky	Upper slope	Lo	0	-P	G	
1	4	3	2	2	ONE FOUR	AR	885	S	M/R	PHS11/R2l	ch sz till/br	12	SIL/PHN	B.SS/O.B		SL_CL	3	Uplands	Ridged	Upper slope	Lo	85.55	E	G	225
7	7	16	8	2	SUNDERLAND	DM			M				MAB/CFD			CL	3				Lo	61.3	G		
12	14	29	4	2	VAUXHALL	PS			L	ANO17/H1lr	ch sy	7		O.B/B.SS	ANO	SL/L_CL	3	Uplands	Plain	Level	Lo	0	-P		
12	14	29	1	2	VAUXHALL	CAT			L	BVCH1/U1h	ch lo sy	6	BVL/CHN	O.B/B.SS		SL/L_CL	3	Uplands	Plain	Level	Lo	0	-P		
1	4	7	1	2	ONE FOUR	AR	911		M	MSN4R2m	ch till	2	O.B		MSN	SL_CL	3	Uplands	Rolling	Upper slope	Lo	63.2	G		150
6	5	22	4	2	HEIDENGER	OC & DM			M				O.DB-Solomnetic			SIL-SL-SCL	4	Uplands	Plain	Level	Lo	0	-P		
12	14	28	3	2	VAUXHALL	PS			L	ANO17/H1lr	ch sy	7		O.B/B.SS	ANO	SL/L_CL	3/2	Uplands	Plain	Level depression	Lo	0	-P		
1	4	9	4	2	ONE FOUR	AR	870	S-SE	M	MSN10/R2ln	ch till	2	O.B		MSN	SL_CL	2	Uplands	14-25	Lo	66.4	+G		150	
6	5	22	4	2	HEIDENGER	OC			R				Eroded			VARIABLE	>5				Lo	0	-P		
15	16	27	2	2	VAUXHALL	CAT & KMT			F	ZUN1/3h	thin break	21	O.R		ZUN	LS_S	2	Uplands	Steep slopes	Terrace	Sy	0	-P		
6	5	22	3	2	HEIDENGER	DM			M				O.DB	O.DB/Eroded		SIL-SL-SCL	5-6	Uplands	Rolling		Lo	0	-P		
12	14	27	1	2	VAUXHALL				F/M;L/M	BVCH1/U1h	ch lo sy	6	BVL/CHN			SL/L_CL	3	Uplands	Plain	Level depression	Lo	0	-P		
3	18	35	4	2	LUTZ	DM			M				O.DB			L	6				Lo	50.4	-G		
3	18	35	3	2	LUTZ	DM			M				O.DB			L	6				Lo	43.07	+F		
1	6	21	3	2	MRNA	KET			M	SIL6/R2l	sz till/br	14		B.SZ-B.SS	SIL	L	3	Lowlands	Hummocky		Lo	0	-P		
1	6	1	6	2	MRNA	KET			M	PHS11/R2l	ch sz till/br	12	PHN/SIL			L	1-3		14-25		Lo	0	-P		
7	7	18	8	2	SUNDERLAND	DM			L				TIK/PTA			SIC	3				Cy	69.8	+G		
8	8	36	7	2	BROWER	DM			L				CFD/GEM			SI	3				Lo	0	-P		
12	14	20	4	2	VAUXHALL	PS			L	BVCH1/U1h	ch lo sy	6	BVL/CHN	O.B/B.SS		SL/L_CL	3	Uplands	Plain	Level	Lo	0	-P		
8	8	35	8	2	BROWER	dm			M				MAB/CFD			CL	4				Lo	0	-P		
12	14	19	3	2	VAUXHALL	CAT			L				TIK?	O.B/B.SS		SL/L_CL	3	Uplands	Rolling	Level	Lo	0	-P		
12	14	18	4	2	VAUXHALL	PS			L	BVCH1/U1h	ch lo sy	6	BVL/CHN			L	3	Uplands	Plain	Level depression	Lo	0	-P		
12	16	24	1	2	VAUXHALL	CAT			M	HDRO1/H5l	sz till	15	HDY/ROL	B.SO/B.SS		SL_CL/C	3	Uplands	16-20	Lo	0	-P			
7	8	25	8	2	KRAFT	DM			L				TIK/PTA			SIC	2				Cy	0	-P		

Appendix 1. SLMs for each silver sagebrush location. (Locations and density distribution classes provided by Alberta Public Lands.)

Twp	Rg	Sec.	Qtr.	Density D class	Lease	Examiner	Elevation	Aspect	Parent Material	SLM from AGRASID	SLM group description	SLM group number	Soil subgroup	Soil complex	Soil series	Texture or complex	Slope or complex	Macro landform	Local landform	Landform element	Range site	Range condition %	RC class	Vigor	Estimated production
7	8	26	4	2	KRAFT	DM			M				O.B		MAB	CL	4				Lo	0	-P		
15	16	27	2	2	VAUXHALL	PS			F	ZUN1/3h	thin break	21	O.R		ZUN	LS_S	2	Uplands	Plain	Level	Sy	0	-P		
12	16	24	3	2	VAUXHALL	CAT			L	CFD7/U1h	ch lo	1	O.B		CFD	SL_CL	3	Uplands	Hilly		Lo	0	-P		
25	4	13	4	2	SHBACHER - EXCLOSU	AB/LC		N-NE	M				O.B		MAB		2	Uplands	Rolling	Mid slope	Lo	81.99	-E		
15	16	23	3	2	VAUXHALL	CAT			F				O.R	RAM?		LS_S	2	Uplands	Plain	Terrace	Sy	0	-P		
11	14	30	2	2	VAUXHALL	KET			Fb/M	BVR1/U1h	ch sy	7	O.B	BVL/RIR		L_CL/SL	3	Uplands	Plain	Terrace		0	-P		
39	7	3	1	2	RIBSTONE	HL & AR			L				DB.SZ			C	1-3	Valleys	Plain	Level depression		0	-P		900
1	6	6	4	2	PINHORN	AR	1026	E-NE	M	MSPH17/R2I	ch till/br	4	O.B	MSN/PHN/CMR		L_C/CL	3-5	Hills	Rolling	Upper slope	Lo	97.7	+E	E	400
1	7	10	2	2	PINHORN	AR	1066	SE	M	PHS12/H2I	ch sz till/br	12	O.B	SIL/PHN		L_C/CL	4	Hills	Rolling	Mid slope	Lo	74.15	+G	G	300
15	16	27	2	2	VAUXHALL	CAT & KMT			F	ZUN1/3h	thin break	21	O.R		ZUN	LS_S	2	Uplands	Steep slopes	Terrace	Sy	0	-P		
1	6	8	4	2	PINHORN	AR	1048	S-SW	M	MSPH17/R2I	ch till/br	4	O.B	SIL/PHN		L_C/CL	3	Uplands	Rolling	Mid slope	Lo	87.05	E	G	300
21	11	10	1	2	DINOSAUR PARK	BA		S	C	VGR1/U1h	rg fl	20	O.R		VGR	SL	7				Sy	48.13	+F		
1	6	8	3	2	PINHORN	AR	1017	S-SW	M	MSPH17/R2I	ch till/br	4	O.B	MSN/PHN/CMR		L_C/CL	3	Uplands	Undulating		Lo	68.2	+G	G	175
2	3	27	2	2	SAGE CREEK	AR			M	HDR05/I3I	sz till	15	O.B	HDY/ROL		SiCL	3	Uplands	13-25	Upper slope	BIO	69	+G		
15	16	21	4	2	VAUXHALL	CAT			F	BVL1/U1h	ch sy	7	O.B	BVL		SL/LS	3/2	Uplands	Plain	Level	Lo	0	-P		
1	7	3	1	2	PINHORN	AR	1057	S	M	ROS11/R2I	ch sz till/br	12	O.B	SIL/ROL		L_C/CL	3-4	Hills	Rolling		Lo	50.6	-G	G	200
1	7	2	8	2	PINHORN	AR	1033	E-SE	M	SIL6/R2I	sz till/br	14	B.SS		SIL	L_C/CL	3	Midlands	13-25	Mid slope	Lo	80.85	-E	G	300
1	7	3	4	2	PINHORN	AR	1117		M	ROS11/R2I	ch sz till/br	12	O.B	SIL/ROL		L_C/CL	3-4	Uplands	Rolling		BIO	78.3	-E	G	
15	16	22	1	2	VAUXHALL	PS			F	ANBV1/U1h	ch sy	7	O.B	ANO/BVL		SL/LS	3/2	Uplands	Plain	Level	Lo	0	-P		
12	15	22	2	1	VAUXHALL	CAT			L				O.B	ROL/SIG		SIL_SICL	2	Uplands	Rolling	Level depression	BIO	0	-P		
1	6	21	3	1	MRNA	KET			M	CMS14/R2I	ch sz till/br	12	O.B	CMR/SIL		L	4	Uplands	Plain	Level depression	Lo	0	-P		
1	4	7	2	1	ONE FOUR	AR	859	S-SW	M	MSN4/R2m	ch till	2	O.B		MSN	SL_CL	3	Uplands	Rolling	Upper slope	Lo	88.1	E	E	300
15	16	5	6	1	VAUXHALL	CAT			L	CFCH7/U1h	ch lo	1	O.B	CFD/CHN		SIL_SICL	2/3				Lo	0	-P		
6	4	6	2	1	CLINTON KLEINKNECH	OC			M				O.DB		TTH	L	5		Hilly	Terrace	Lo	44.48	+F		
1	4	15	4	1	ONE FOUR	AR	907	E-NE	M	MSN4/R2m	ch till	2	O.B		MSN	CL_C	3-4				Lo	82.2	-E	E	275
1	4	15	3	1	ONE FOUR	AR	910	E	M	MSN8/R2m	ch till	2	O.B		MSN	SL_CL	2	Uplands	Undulating		Lo	45.8	+F	G	150
12	14	23	1	1	VAUXHALL	CAT			F	CFD1/U1h	ch lo	1	O.B	CFD		LS/SL	3/2	Uplands	Plain	Level		0	-P		
6	4	6	2	1	CLINTON KLEINKNECH	OC		VAR	M				O.DB		TTH	L	5	Uplands	Hummocky		Lo	44.48	+F		
8	8	24	6	1	BROWER	DM			L				O.B	CFD/GEM		SiCL	3				Lo	0	-P		
8	8	34	1	1	BROWER	DM			M				O.B	MAB/CFD		CL	3				Lo	0	-P		
6	4	6	2	1	CLINTON KLEINKNECH	OC&IS			M				O.DB		TTH	L	5	Midlands	Hilly	Terrace	Lo	44.48	+F		
2	6	18	3	1	PINHORN - GRAZED	IS	991	NE	GF				O.B	BVL		L	4	Uplands	Terraced	Terrace	Lo	80.19	-E		
7	8	36	1	1	KRAFT	DM			L				O.B	TIK/PTA		SIC	2				Cy	0	-P		
1	6	21	2	2	MRNA	KET			M/R	CMS14/R2I	ch sz till/br	12	O.B	CMR/SIL		L	4					0	-P		
18	10	15	3		TIDE LAKE	AB/OC			M	HDHU16/U1h	sz till	15					1				BIO	32	-F		
12	13	17	4		HAYS WEST	KET		VAR	F	CHN1/U1h	ch lo	1	O.HG		CHN	SL	3	Uplands	Plain	Level depression	Sb	48	+F		
3	3	21	4		SAGE CREEK	DM & MS			U	ZUN1/3h	thin break	21	O.R	ZUN			5	Uplands	Hilly	Mid slope	Tb	67.42	+G		
16	5	18	3		SUFFIELD			E	M	FMT4/H1I	ch till	2	O.B	FMT	MEDIUM		5		Hummocky			0	-P		
16	6	7	2		SUFFIELD			NW	FE	CVD1/H1I	ch sa	9	O.B	CVD	V.COARSE		4					0	-P		
17	4	25	1		SUFFIELD					ZUN1/4hd	thin break	21		ZUN								0	-P		
6	4	11	0		CLINTON KLEINKNECH	IS & SM		VAR	M	WSM4/I3m	dk brn till	3	O.DB		WSM		4	Hills	Hilly	Mid slope	Lo	75.8	-E		
7	4	8	1		MAYER	OC			M/R	WSM4/H1h	dk brn till	3		Eroded		VARIABLE	>5					0	-P		
12	14	24	4		VAUXHALL	PS			L	BVL1/U1h	ch sy	7	PS	O.B/B.SS	BVL	SL/SIL	3	Uplands	Plain	Level	Lo	0	-P		
11	14	19	3		VAUXHALL	KET			Fb/M	BVR1/U1h	ch sy	7	O.B	BVL/RIR		L_CL/SL	3	Uplands	Plain	Terrace		0	-P		
8	8	33	7		OVALYN RANCHES	TH			F	BUT4/U1h	ch fan	5	O.B	BUT	FSL		2				Sb	0	-P		
7	4	8	1		MAYER	OC			GL	WSM1/H1m	dk brn till	3	O.DB	O.DB/DB.SS		SiCL-CL-SCL	3-4			Level depression		0	-P		
20	3	6	4		SUFFIELD				Fb/M	CVD5/H1m	ch sa	9	O.B	CVD	V.COARSE		5					0	-P		

## Appendix 2. Soil Landscape Models that contain active or inactive sage grouse leks, or have similar soil and landscape characteristics.

### Legend:

<b>orange:</b>	SLMs that contain active sage grouse leks.
<b>yellow:</b>	SLMs that contain inactive sage grouse leks; overflow range-site type.
<b>green:</b>	SLMs that contain inactive leks; less desirable habitat.
<b>white:</b>	SLMs that contain potential habitat, but do not contain active or inactive leks.

SCA 1				Townships 1 to 7, Ranges 1 to 7				
SLM	number of polygons of SLM in SCA 1	hectares	Percentage of SCA 1 covered by SLM	SLM	number of polygons	hectares	% of subset SCA area covered by SLM	
BUT1/I3l	19	9155.31	0.20	BUT11/I3l	1	974.69	1	0.21
BUT1/I3lc	1	1160.84	0.03	BUT11/U1h	1	364.38	1	0.08
BUT1/I3lr	1	80.13	0.00	BUT13/U1h	1	210.95	1	0.04
BUT1/I3mc	2	544.94	0.01	<b>BUT14/I3l</b>	<b>2</b>	<b>2517.50</b>	<b>1</b>	<b>0.54</b>
BUT1/U1h	1	1199.40	0.03	BUT15/I3l	1	177.17	1	0.04
BUT10/I3l	1	733.64	0.02	BUT15/U1l	2	5826.48	1	1.24
BUT10/SC1l	1	413.96	0.01	BUT18/U1h	1	127.39	1	0.03
BUT11/I3l	1	974.69	0.02	BUT7/I3l	2	825.69	1	0.18
BUT11/I3md	1	235.94	0.01	BUWD1/I3h	1	1676.90	1	0.36
BUT11/L3r	3	472.39	0.01	<b>BUWD11/I3l</b>	<b>1</b>	<b>2570.56</b>	<b>1</b>	<b>0.55</b>
BUT11/U1h	2	2812.20	0.06	<b>BUWD18/U1h</b>	<b>1</b>	<b>1713.94</b>	<b>1</b>	<b>0.36</b>
BUT13/L1	1	1083.24	0.02	BUWD4/I4l	1	422.47	1	0.09
BUT13/SC1h	1	2360.94	0.05	<b>BUWD4/SC2</b>	<b>1</b>	<b>808.98</b>	<b>1</b>	<b>0.17</b>
BUT13/SC2	2	9558.42	0.21	<b>BUWD5/I3l</b>	<b>1</b>	<b>317.52</b>	<b>1</b>	<b>0.07</b>
BUT13/U1h	1	210.95	0.00	GERO5/U1h	1	622.85	1	0.13
<b>BUT14/I3l</b>	<b>2</b>	<b>2517.50</b>	<b>0.05</b>	<b>GERO6/I3l</b>	<b>1</b>	<b>789.94</b>	<b>1</b>	<b>0.17</b>
BUT14/SC4	1	181.11	0.00	HDRO1/H1l	5	3680.63	1	0.78
BUT15/I3l	1	177.17	0.00	HDRO1/H5l	4	2359.14	1	0.50
BUT15/U1l	2	5826.48	0.13	HDRO1/I3l	1	1020.11	1	0.22
BUT17/I3l	4	3809.63	0.08	<b>HDRO1/I3lc</b>	<b>5</b>	<b>3897.28</b>	<b>1</b>	<b>0.83</b>
BUT18/U1h	1	127.39	0.00	HDRO1/I3m	1	131.11	1	0.03
BUT2/I3l	2	2447.28	0.05	HDRO1/I3mc	1	2111.84	1	0.45
BUT2/U1h	1	447.15	0.01	HDRO1/R2l	6	2747.92	1	0.58
BUT3/U1h	1	1143.54	0.02	<b>HDRO1/U1h</b>	<b>13</b>	<b>9708.95</b>	<b>1</b>	<b>2.07</b>
BUT4/I3l	10	6253.29	0.14	HDRO2/H5l	2	818.40	1	0.17
BUT5/U1h	1	1089.16	0.02	HDRO2/I3l	1	587.17	1	0.12
BUT5/U1l	1	88.45	0.00	HDRO2/R2l	1	486.65	1	0.10
BUT6/I1l	1	508.44	0.01	HDRO4/H5l	1	5382.32	1	1.14
BUT6/I3l	3	620.31	0.01	HDRO4/I3lc	2	1652.54	1	0.35
BUT7/I1l	1	719.14	0.02	HDRO4/I3md	1	919.26	1	0.20
BUT7/I3l	5	1821.72	0.04	HDRO4/U1h	1	935.95	1	0.20
BUWD1/I3h	1	1676.90	0.04	HDRO5/I3lc	3	2892.49	1	0.62
<b>BUWD11/I3l</b>	<b>1</b>	<b>2570.56</b>	<b>0.06</b>	HDRO5/I3mc	2	1286.09	1	0.27
<b>BUWD18/U1h</b>	<b>1</b>	<b>1713.94</b>	<b>0.04</b>	HDRO5/R2l	2	1470.85	1	0.31
BUWD4/I4l	1	422.47	0.01	HDRO5/U1h	1	1810.42	1	0.39
<b>BUWD4/SC2</b>	<b>1</b>	<b>808.98</b>	<b>0.02</b>	HDRO8/H5l	1	1825.20	1	0.39

## Appendix 2. Soil Landscape Models that contain active or inactive sage grouse leks, or have similar soil and landscape characteristics.

### Legend:

<b>orange:</b>	SLMs that contain active sage grouse leks.
<b>yellow:</b>	SLMs that contain inactive sage grouse leks; overflow range-site type.
<b>green:</b>	SLMs that contain inactive leks; less desirable habitat.
<b>white:</b>	SLMs that contain potential habitat, but do not contain active or inactive leks.

SCA 1				Townships 1 to 7, Ranges 1 to 7			
SLM	number of polygons of SLM in SCA 1	hectares	Percentage of SCA 1 covered by SLM	SLM	number of polygons	hectares	% of subset SCA area covered by SLM
BUWD5/I3l	1	317.52	0.01	ORN19/U1h	1	427.07	0.09
GERO1/U1h	1	764.65	0.02	ORN7/I3l	1	487.76	0.10
GERO2/U1h	1	614.99	0.01	ORWD16/I3l	1	562.70	0.12
GERO5/U1h	2	1647.70	0.04	ORWD18/R2l	1	1194.02	0.25
GERO6/I3l	1	789.94	0.02	ORWD19/I3h	2	2250.27	0.48
HDRO1/H1l	24	20149.63	0.44	ORWD19/U1h	1	893.94	0.19
HDRO1/H1c	1	451.57	0.01	QRWD3/I3l	4	4350.21	0.93
HDRO1/H1r	1	722.65	0.02	ORWD3/U1h	1	471.27	0.10
HDRO1/H1m	4	1797.74	0.04	PHN1/R2l	3	4805.24	1.02
HDRO1/H5l	11	7373.13	0.16	PHN17/H5l	1	320.45	0.07
HDRO1/HR2m	1	657.86	0.01	PHN17/R2l	4	2585.29	0.55
HDRO1/I3l	1	1020.11	0.02	PHN17/R2m	1	211.22	0.04
HDRO1/I3lc	5	3897.28	0.08	PHN6/R2l	1	71.49	0.02
HDRO1/I3m	1	131.11	0.00	PHN7/R2l	3	2435.43	0.52
HDRO1/I3mc	1	2111.84	0.05	WDW1/I3l	1	304.79	0.06
HDRO1/R2h	1	429.79	0.01	WDW13/R2l	1	655.22	0.14
HDRO1/R2l	7	2966.20	0.06	WDW13/SC2	1	2795.75	0.59
HDRO1/R2m	2	927.71	0.02	WDW16/U1h	1	259.28	0.06
HDRO1/U1h	32	44865.82	0.97	WDW18/U1l	1	270.61	0.06
HDRO1/U1hr	2	2638.49	0.06	WDW19/I3l	2	1400.19	0.30
HDRO1/U1l	1	1319.28	0.03	WDW19/U1h	2	961.33	0.20
HDRO12/H1md	1	1086.22	0.02	WDW2/I3l	1	207.34	0.04
HDRO13/H5l	1	197.37	0.00	WDW3/I3l	2	2733.49	0.58
HDRO13/I1l	1	1043.23	0.02	WDW5/I3l	1	416.38	0.09
HDRO13/SC1l	1	439.07	0.01	WDW5/U1h	1	298.39	0.06
HDRO2/H1l	5	2004.53	0.04	WDW6/I3l	1	213.30	0.05
HDRO2/H1ln	1	99.16	0.00	WDW6/U1h	1	296.21	0.06
HDRO2/H1lr	1	1534.14	0.03	WTNaa3/L1	1	248.28	0.05
HDRO2/H1m	2	1508.31	0.03	WTNaa3/L1n	1	1191.81	0.25
HDRO2/H5l	3	1092.14	0.02	WTNaa3/U1l	2	550.17	0.12
HDRO2/H5m	1	1746.11	0.04	ZUN1/I3m	1	147.96	0.03
HDRO2/HR2m	1	464.15	0.01	ZUN1/I4hd	1	5019.29	1.07
HDRO2/I3l	1	587.17	0.01	ZUN1/SC1h	1	1099.60	0.23
HDRO2/R2l	1	486.65	0.01	ZUN1/SC2	2	1869.49	0.40
HDRO2/SC4	1	738.66	0.02	ZUN1/SC4	1	111.03	0.02
HDRO2/U1h	5	5887.97	0.13	ZUN16/I4h	1	445.84	0.09

## Appendix 2. Soil Landscape Models that contain active or inactive sage grouse leks, or have similar soil and landscape characteristics.

### Legend:

<b>orange:</b>	SLMs that contain active sage grouse leks.
<b>yellow:</b>	SLMs that contain inactive sage grouse leks; overflow range-site type.
<b>green:</b>	SLMs that contain inactive leks; less desirable habitat.
<b>white:</b>	SLMs that contain potential habitat, but do not contain active or inactive leks.

SCA 1				Townships 1 to 7, Ranges 1 to 7			
SLM	number of polygons of SLM in SCA 1	hectares	Percentage of SCA 1 covered by SLM	SLM	number of polygons	hectares	% of subset SCA area covered by SLM
HDRO4/H1lc	1	578.01	0.01	ZUN3/SC2	2	3829.52	1 0.81
HDRO4/H5I	1	5382.32	0.12	ZUN7/SC1I	1	246.43	1 0.05
HDRO4/HR2m	1	2407.53	0.05	CGW13/I3I	1	267.96	2 0.06
HDRO4/I3I	1	391.59	0.01	CGW13/SC2	1	887.80	2 0.19
HDRO4/I3lc	2	1652.54	0.04	CGW16/I3I	3	1487.34	2 0.32
HDRO4/I3md	1	919.26	0.02	CGW19/I3I	1	426.08	2 0.09
HDRO4/U1h	2	1958.25	0.04	GNN14/I3I	1	3809.87	2 0.81
HDRO4/U1he	1	423.90	0.01	GNN7/I3I	1	437.55	2 0.09
HDRO5/H5I	1	210.41	0.00				
HDRO5/I3lc	3	2892.49	0.06	<b>Total</b>	<b>136</b>	<b>119,626</b>	<b>25.45</b>
HDRO5/I3mc	2	1286.09	0.03	<b>Total Subset area</b>		<b>470,090</b>	
HDRO5/R2I	3	2436.37	0.05				
HDRO5/U1h	1	1810.42	0.04				
HDRO8/H1I	4	6764.03	0.15				
HDRO8/H1m	1	1975.24	0.04				
HDRO8/H5I	1	1825.20	0.04				
HDRO8/SC3	1	404.98	0.01				
HDRO8/SC4	1	223.37	0.00				
HDRR1/H1I	1	109.19	0.00				
ORN19/U1h	1	427.07	0.01				
ORN19/U1I	1	1241.17	0.03				
ORN7/I3I	1	487.76	0.01				
ORWD1/I1I	1	201.54	0.00				
ORWD16/I3I	1	562.70	0.01				
ORWD18/R2I	1	1194.02	0.03				
ORWD19/I3h	2	2250.27	0.05				
ORWD19/U1h	1	893.94	0.02				
ORWD2/U1In	1	258.27	0.01				
ORWD3/I3I	5	5810.83	0.13				
ORWD3/U1h	1	471.27	0.01				
PHN1/R2I	3	4805.24	0.10				
PHN17/H5I	1	320.45	0.01				
PHN17/R2I	4	2585.29	0.06				
PHN17/R2m	1	211.22	0.00				
PHN6/R2I	1	71.49	0.00				
PHN7/R2I	3	2435.43	0.05				

## Appendix 2. Soil Landscape Models that contain active or inactive sage grouse leks, or have similar soil and landscape characteristics.

### Legend:

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<b>white:</b>	SLMs that contain potential habitat, but do not contain active or inactive leks.

SCA 1				Townships 1 to 7, Ranges 1 to 7			
SLM	number of polygons of SLM in SCA 1	hectares	Percentage of SCA 1 covered by SLM	SLM	number of polygons	hectares	% of subset SCA area covered by SLM
WDW1/H1I	1	490.44	0.01				
WDW1/I3I	1	304.79	0.01				
WDW1/U1h	3	2114.90	0.05				
WDW1/U1I	3	1846.84	0.04				
WDW13/R2I	1	655.22	0.01				
WDW13/SC2	1	2795.75	0.06				
WDW13/U1h	1	306.73	0.01				
WDW13/U1I	1	394.20	0.01				
WDW16/I3I	1	234.93	0.01				
WDW16/SC1I	2	385.10	0.01				
WDW16/U1h	4	1149.46	0.02				
WDW16/U1he	1	75.40	0.00				
WDW16/U1I	4	2515.15	0.05				
WDW16/U1e	1	460.47	0.01				
WDW18/L2	1	169.38	0.00				
WDW18/U1I	1	270.61	0.01				
WDW19/I3I	2	1400.19	0.03				
WDW19/SC1h	1	983.73	0.02				
WDW19/U1h	2	961.33	0.02				
WDW2/I3I	1	207.34	0.00				
WDW3/I3I	2	2733.49	0.06				
WDW3/L2	1	184.84	0.00				
WDW3/U1h	1	128.34	0.00				
WDW3/U1I	2	3904.29	0.08				
WDW5/I3I	1	416.38	0.01				
WDW5/U1h	1	298.39	0.01				
WDW6/I3I	1	213.30	0.00				
WDW6/U1h	1	296.21	0.01				
WTNaa1/U1I	3	1667.13	0.04				
WTNaa19/FP1	1	417.70	0.01				
WTNaa2/U1I	1	713.43	0.02				
WTNaa3/L1	1	248.28	0.01				
WTNaa3/L1n	1	1191.81	0.03				
WTNaa3/L2	1	455.35	0.01				
WTNaa3/U1I	2	550.17	0.01				
ZUN1/DL	14	8138.93	0.18				

## Appendix 2. Soil Landscape Models that contain active or inactive sage grouse leks, or have similar soil and landscape characteristics.

### Legend:

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<b>green:</b>	SLMs that contain inactive leks; less desirable habitat.
<b>white:</b>	SLMs that contain potential habitat, but do not contain active or inactive leks.

SCA 1				Townships 1 to 7, Ranges 1 to 7			
SLM	number of polygons of SLM in SCA 1	hectares	Percentage of SCA 1 covered by SLM	SLM	number of polygons	hectares	% of subset SCA area covered by SLM
ZUN1/I3h	68	49314.65	1.07				
ZUN1/I3hd	2	971.99	0.02				
ZUN1/I3m	3	682.46	0.01				
ZUN1/I4h	46	61420.94	1.33				
ZUN1/I4hd	5	19964.87	0.43				
ZUN1/I4m	2	898.45	0.02				
ZUN1/I4mr	1	725.90	0.02				
ZUN1/I5	1	5593.12	0.12				
ZUN1/SC1h	14	8008.07	0.17				
ZUN1/SC1l	3	948.74	0.02				
ZUN1/SC2	13	12662.80	0.27				
ZUN1/SC3	5	1671.02	0.04				
ZUN1/SC3r	1	456.02	0.01				
ZUN1/SC4	1	111.03	0.00				
ZUN1/U1hn	2	422.85	0.01				
ZUN10/SC1l	1	325.36	0.01				
ZUN13/SC1h	1	631.67	0.01				
ZUN14/SC1hd	1	608.93	0.01				
ZUN16/I3h	11	15560.63	0.34				
ZUN16/I3hd	2	1069.01	0.02				
ZUN16/I3md	1	367.68	0.01				
ZUN16/I4h	7	4028.13	0.09				
ZUN16/I4hd	1	10247.40	0.22				
ZUN16/SC4	1	350.76	0.01				
ZUN19/SC1h	1	1694.70	0.04				
ZUN19/SC1l	1	672.02	0.01				
ZUN2/SC1l	1	147.38	0.00				
ZUN2/SC2	1	316.18	0.01				
ZUN3/SC1h	12	5968.13	0.13				
ZUN3/SC1l	2	844.41	0.02				
ZUN3/SC2	4	4692.36	0.10				
ZUN3/SC3	1	194.70	0.00				
ZUN4/I3h	2	817.59	0.02				
ZUN4/I4h	3	661.82	0.01				
ZUN4/I4hd	1	2275.17	0.05				
ZUN4/SC1h	4	5172.58	0.11				

## Appendix 2. Soil Landscape Models that contain active or inactive sage grouse leks, or have similar soil and landscape characteristics.

### Legend:

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<b>green:</b>	SLMs that contain inactive leks; less desirable habitat.
<b>white:</b>	SLMs that contain potential habitat, but do not contain active or inactive leks.

SCA 1				Townships 1 to 7, Ranges 1 to 7			
SLM	number of polygons of SLM in SCA 1	hectares	Percentage of SCA 1 covered by SLM	SLM	number of polygons	hectares	% of subset SCA area covered by SLM
ZUN4/SC1hd	1	116.84	0.00				
ZUN4/SC2	3	2343.34	0.05				
ZUN4/SC3	2	2094.81	0.05				
ZUN7/SC11	2	534.44	0.01				
ZUN7/SC2	1	648.21	0.01				
<b>Total SLM area</b>	<b>567</b>	<b>503,874</b>	<b>10.94</b>	<b>Total SLM area, SCA1</b>	<b>136</b>	<b>112,310</b>	<b>23.89</b>
<b>Total Hectares in SCA 1</b>		<b>4,606,865</b>		<b>Total Subset area</b>		<b>470,090</b>	
<b>Summary Calculations for SCA 1:</b>				<b>Summary Calculations for SCA 1 in the Subset Area</b>			
<b>SLMs with active leks in SCA 1</b>		<b>18,692.25</b>	<b>0.41</b>	<b>SLMs with active leks in Tp 1-7, Rg 1-7</b>		<b>17,231.63</b>	<b>3.67</b>
<b>Inactive lek SLMs in SCA1;</b> <b>overflow range site type</b>		<b>4,169.31</b>	<b>0.09</b>	<b>Inactive lek SLMs in Tp 1-7, Rg 1-7;</b> <b>overflow range site type</b>		<b>4,169.31</b>	<b>0.89</b>
<b>SLMs with Inactive leks in SCA 1;</b> <b>less desirable habitat</b>		<b>52,786.54</b>	<b>1.15</b>	<b>SLMs with Inactive leks in Tp 1-7, Rg 1-7;</b> <b>less desirable habitat</b>		<b>17,227.89</b>	<b>3.66</b>
<b>Potential habitat SLMs, not containing</b> <b>active or inactive leks, in SCA 1</b>		<b>428,225.57</b>	<b>9.30</b>	<b>Potential habitat SLMs, not containing</b> <b>active or inactive leks, in Tp 1-7, Rg. 1-7</b>		<b>73,680.933</b>	<b>15.67</b>

**Appendix 3. Description of Alberta plant communities in which silver sagebrush is an important species.**

	<b>AVERAGE</b>	<b>MINIMUM</b>	<b>MAXIMUM</b>	<b>CONSTANCY</b>	<b>countif</b>
ACHIMIL	0.05	0.00	0.20	30	3
AGROALB	0.55	0.00	4.00	20	2
AGRODAS	0.15	0.00	1.50	10	1
AGROPEC	0.25	0.00	2.50	10	1
<b>AGROSMI</b>	<b>21.34</b>	<b>3.00</b>	<b>55.50</b>	<b>100</b>	<b>10</b>
ALLITEX	0.05	0.00	0.20	30	3
ANTENN	0.59	0.00	2.40	40	4
<b>ARTECAN</b>	<b>7.51</b>	<b>5.00</b>	<b>11.00</b>	<b>100</b>	<b>10</b>
ARTEFRI	7.03	0.50	10.00	100	10
ASTEERI	0.40	0.00	3.00	20	2
ATRINUT	1.68	0.00	9.00	50	5
BOUTGRA	7.00	0.00	24.50	80	8
CALAMON	0.35	0.00	1.50	40	4
CAREX	1.23	0.00	2.50	80	8
CHRYNAU	1.20	0.00	9.00	20	2
COMAPAL	0.03	0.00	0.30	10	1
DISTSTR	0.25	0.00	2.50	10	1
ERIGCAE	0.52	0.00	3.00	30	3
EUROLAN	2.00	0.00	8.50	50	5
GLAUMAR	0.05	0.00	0.50	10	1
GUTISAR	0.75	0.00	4.00	40	4
HETEVIL	0.45	0.00	4.50	10	1
HYMERIC	0.30	0.00	3.00	10	1
KOELMAC	11.83	0.50	22.00	100	10
LOMATI	0.03	0.00	0.30	10	1
MUHLCUS	0.60	0.00	3.00	30	3
OPUNPOL	2.43	0.00	8.00	50	5
PHLOHOO	1.48	0.00	6.50	50	5
PLANPAT	0.10	0.00	0.50	50	5
POA	0.35	0.00	3.50	10	1
POASAND	18.47	0.00	28.50	90	9
POLYGO	0.01	0.00	0.05	10	1
POTEHIP	0.10	0.00	1.00	10	1
SPHACOC	0.22	0.00	0.75	50	5
STIPCOM	6.64	0.00	25.00	80	8
STIPVIR	0.45	0.00	2.50	20	2
TRAGDUB	0.05	0.00	0.50	10	1
VICIAME	0.01	0.00	0.05	10	1

**Appendix 3. Description of Alberta plant communities in which silver sagebrush is an important species.**

**PLANT COMMUNITY**

Plant Community Name  
 Latin Description  
 Natural Sub-Region  
 Community Type  
 Number of Samples  
 Narrative

SilverSagebrush / Western Wheat Grass Type  
 Artemisia cana / Agropyron smithii Type  
 Dry Mixed Grass  
 Native Grassland  
 10

This is a late seral to PNC community associated with solonchic soils, mostly in the dry-mixed grass. Solonchic soils normally range from brown solonchic and orthic regosols to brown solods and are developed on glacial fluvial and glacial lacustrine parent material with sodium enrichment. Textures are generally silt loams and silt clay loams. This type is generally found in lower in the landscape than the Silver Sagebrush / Northern Wheat Grass Type but higher than the riparian Silver Sagebrush/Western Wheatgrass type described by Thompson and Hansen 2001. The riparian type has a higher canopy cover of Silver Sagebrush, averaging about 40% while this type has about 7 to 8% cover with a lesser average canopy height as well. The last sentence is unclear, and should be re-worded.

Elevation  
 Suggested Grazing Capacity  
 Grazing Capacity Comment  
 Grazing Succession

0.15 to 0.2 AU/MS/ACRE  
 Late seral to PNC

**ENVIRONMENTAL VARIABLES**

Drainage  
 Slope  
 Aspect  
 Soil Sub-Group  
 Soil Series  
 Range Site Category  
 Soil Correlation Area

Generally well drained  
 Generally level to very gentle slopes  
 Variable

Orthic Regosol, Brown and Dark Brown Solodized Solonchic, Brown and Dark Brown Solod, Brown and Dark Brown Solonchic Chernozem  
 WDW, GEM, DHS, KBD, HUK, HDY, SIL, ORN, KTM, ROL, CHZ, BUT, HKR, FST, NUT, HND, ZUN  
 Blowout, Overflow, Limy, Saline Lowland, Thin breaks  
 1 and 4

Appendix 3. Description of Alberta plant communities in which silver sagebrush is an important species.

	Ave.	Minimum	Maximum	Constancy	countif
ACHIMIL	0.07	0.00	2.50	7	4
AGRODAS	1.27	0.00	9.00	40	23
AGROPEC	0.03	0.00	1.50	2	1
AGROPY	0.16	0.00	6.50	5	3
AGROSCA	0.00	0.00	0.05	2	1
AGROSMI	2.63	0.00	27.00	53	30
ALLITEX	0.01	0.00	0.53	2	1
ANDRSEP	0.02	0.00	0.53	5	3
ANTENN	0.07	0.00	3.30	5	3
ANTEPAR	0.14	0.00	7.50	4	2
<b>ARTECAN</b>	<b>8.77</b>	<b>5.00</b>	<b>33.20</b>	<b>100</b>	<b>57</b>
ARTEFRI	6.23	0.00	18.73	84	48
ARTELUD	0.03	0.00	1.50	2	1
ASTRMIS	0.02	0.00	1.00	2	1
ASTRPEC	0.08	0.00	4.50	2	1
ATRINUT	0.10	0.00	3.33	4	2
<b>BOUTGRA</b>	<b>13.58</b>	<b>2.67</b>	<b>40.00</b>	<b>100</b>	<b>57</b>
CALALON	1.90	0.00	16.50	28	16
CALAMON	0.52	0.00	5.33	35	20
CAMPROT	0.01	0.00	0.60	2	1
CAREFIL	0.06	0.00	3.33	2	1
CARESTE	0.08	0.00	3.33	4	2
CAREX	5.34	0.00	23.93	91	52
CERAARV	0.02	0.00	1.33	2	1
CHENOP	0.04	0.00	1.73	7	4
CIRSFO	0.04	0.00	2.00	2	1
COMAPAL	0.02	0.00	1.30	4	2
COMAUMB	0.01	0.00	0.53	4	2
CORYVIV	0.08	0.00	2.00	12	7
ERIGCAE	0.10	0.00	5.00	5	3
ERYSASP	0.02	0.00	1.00	2	1
ERYSINC	0.00	0.00	0.20	2	1
EUROLAN	0.08	0.00	3.50	4	2
FESTOVI	0.01	0.00	0.50	2	1
GAURCO	0.16	0.00	5.87	5	3
GUTISAR	0.04	0.00	2.50	2	1
HETEVIL	0.80	0.00	8.00	26	15
KOELMAC	11.34	0.00	28.33	93	53
LAPPOCC	0.00	0.00	0.07	2	1
LEPIDEN	0.02	0.00	0.67	7	4
LEPIDI	0.02	0.00	1.00	4	2
LIATPUN	0.02	0.00	1.00	2	1
LITHINC	0.00	0.00	0.17	2	1
LYGOJUN	0.09	0.00	2.40	11	6
OPUNPOL	1.32	0.00	11.50	25	14
PAROSES	0.01	0.00	0.50	2	1
PHLOHOO	0.87	0.00	8.67	28	16
PLANPAT	0.05	0.00	1.27	9	5
POA	0.00	0.00	0.03	2	1
POACOMP	0.03	0.00	1.50	2	1
POAJUNC	0.04	0.00	2.00	2	1
POASAND	0.70	0.00	10.50	33	19
POTEHIP	0.00	0.00	0.05	2	1
POTEPAR	0.02	0.00	1.00	2	1
POTEPEN	0.01	0.00	0.17	4	2
PSORLAN	0.40	0.00	7.00	11	6
ROSAARK	0.05	0.00	2.00	4	2
SELADEN	0.10	0.00	5.57	2	1
SOLIMIS	0.01	0.00	0.30	4	2
SPHACOC	1.20	0.00	10.00	40	23
<b>STIPCOM</b>	<b>35.26</b>	<b>18.00</b>	<b>62.00</b>	<b>100</b>	<b>57</b>
TARAOFF	0.07	0.00	1.00	14	8
THERRHO	0.37	0.00	7.00	12	7
TRAGDUB	0.11	0.00	3.00	12	7
VICIAME	0.12	0.00	0.20	26	15
VICISPA	0.23	0.00	5.50	19	11
ZIGAVEN	0.00	0.00	0.20	2	1

**Appendix 3. Description of Alberta plant communities in which silver sagebrush is an important species.**

**PLANT COMMUNITY**

Plant Community Name	Silver Sagebrush / Needle and Thread Grass - Blue Gramma Grass Type
Latin Description	Artemisia cana / Stipa comata - Bouteloua gracilis Type
Natural Sub-Region	Dry Mixed Grass
Community Type	Native Grassland
Number of Samples	57
Narrative	This is a late seral to PNC community type on Loamy and Sandy range sites in the dry mixed grass prairie and soil correlation area 1. Soils are mostly Orthic Brown Chernozems that are well to rapidly drained, loam and sandy loam textured soils. This type is found on mostly very gentle slopes and heavier textured soils than the Silver Sagebrush / Needle and Thread Grass - Sand Grass type on coarse sand verging to choppy sandhill topography.
Elevation	0.20 to 0.25 AUMS/AC
Suggested Grazing Capacity	Grazing pressure will reduce the canopy of Silver Sagebrush and Blue grama grass.
Grazing Capacity Comment	This statement may not be correct.
Grazing Succession	Late seral to PNC

**ENVIRONMENTAL VARIABLES**

Drainage	Generally well to rapidly drained
Slope	Generally very gentle to nearly level slope
Aspect	Variable
Soil Sub-Group	Orthic Dark Brown Chernozem, Orthic Regosol, Brown Solodized Solonetzic, Cumulic Regosol, Rego Brown Chernozem, Orthic Humic Regosol, Solonetzic Brown Chernozem
Soil Series	On medium and moderately coarse-textured soils, including BVL, CVD, CFD, RAM, CHN, FMT, MAB, ROL, PUN, ZUN, EXP, ANO, HUK, GEM, TIK, MSN, RRD, WDW, LYB, CHZ, VST and ATP belong in type with sand grass.
Range Site Category	mostly on Loamy and Sandy
Soil Correlation Area	1

**Appendix 3. Description of Alberta plant communities in which silver sagebrush is an important species.**

	<b>Average</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Constancy</b>	<b>countif</b>
AGRODAS	<b>0.82</b>	<b>0.00</b>	<b>5.83</b>	<b>44</b>	<b>8</b>
AGROSMI	1.62	0.00	5.83	78	14
ANDRSEP	0.01	0.00	0.17	11	2
<b>ARTECAN</b>	<b>10.75</b>	<b>6.00</b>	<b>20.83</b>	<b>100</b>	<b>18</b>
ARTEFRI	3.36	0.00	9.50	89	16
BOUTGRA	6.33	0.17	11.00	100	18
<b>CALALON</b>	<b>18.85</b>	<b>0.00</b>	<b>41.33</b>	<b>89</b>	<b>16</b>
CALAMON	0.09	0.00	1.00	28	5
CARESTE	1.25	0.00	12.83	28	5
CAREX	2.20	0.00	8.87	56	10
CERAARV	0.17	0.00	2.00	11	2
CHENPRA	0.53	0.00	2.33	39	7
CIRSARV	1.37	0.00	14.67	17	3
COMAUMB	0.02	0.00	0.37	6	1
CORYVIV	0.01	0.00	0.17	6	1
CRYPFEN	0.10	0.00	1.57	17	3
DESCSOP	0.25	0.00	2.00	17	3
ERIGCAN	0.01	0.00	0.17	6	1
ERYSASP	0.18	0.00	2.00	11	2
HELICOU	0.03	0.00	0.33	11	2
HETEVIL	1.99	0.00	6.17	67	12
KOELMAC	3.91	0.00	15.00	83	15
LAPPOCC	0.23	0.00	2.17	11	2
LEPIDEN	0.02	0.00	0.20	11	2
LEPIDI	1.19	0.00	8.83	56	10
LIATPUN	0.17	0.00	1.00	17	3
LITHINC	0.06	0.00	1.00	11	2
LYGOJUN	0.56	0.00	3.50	39	7
OENONUT	0.06	0.00	1.00	6	1
OPUNPOL	6.54	0.00	17.50	72	13
PLANPAT	0.84	0.00	11.83	33	6
POASAND	0.07	0.00	1.00	17	3
PSORLAN	6.06	0.00	20.33	89	16
ROSAARK	1.86	0.00	11.17	39	7
ROSAWOO	0.99	0.00	14.87	11	2
SALSKAL	0.04	0.00	0.33	17	3
SPHACOC	0.02	0.00	0.17	11	2
<b>STIPCOM</b>	<b>27.24</b>	<b>14.50</b>	<b>41.67</b>	<b>100</b>	<b>18</b>
STIPVIR	0.06	0.00	1.00	6	1
SYMPOCC	0.18	0.00	3.17	6	1
TARAOFF	0.03	0.00	0.50	6	1
TRAGDUB	0.01	0.00	0.17	6	1
VICISPA	0.16	0.00	1.17	22	4

### Appendix 3. Description of Alberta plant communities in which silver sagebrush is an important species.

#### PLANT COMMUNITY

Plant Community Name  
 Latin Description  
 Natural Sub-Region  
 Community Type  
 Number of Samples  
 Narrative

Silver Sagebrush / Needle and Thread Grass - Sand Grass Type  
 Artemisia cana / Stipa comata - Calamovilfa longifolia Type  
 Dry Mixed Grass  
 Open Shrubland  
 18

This is a late-seral to PNC community type associated with Sands, Sandy and Choppy Sandhill range sites in the dry-mixed grass prairie and soil correlation area 1. Soils are rapidly drained and developed on fluvial and eolian parent material. This community type is related to the Silver Sagebrush/Needle and Thread - Bluegrama community type that occurs on heavier textured soils, which are considered Loamy range sites.

Elevation  
 Suggested Grazing Capacity  
 Grazing Capacity Comment  
 Grazing Succession

0.20 to 0.25 AUM/AC  
 Late seral to PNC

#### ENVIRONMENTAL VARIABLES

Drainage  
 Slope  
 Aspect  
 Soil Sub-Group  
 Soil Series  
 Range Site Category  
 Soil Correlation Area

Rapidly drained  
 Very gentle to strong slope  
 Variable

Orthic Brown Chernozem, Rego Brown Chernozem, and Orthic Regosol  
 Cavendish (CVD), Antelope (ATP), Vendistat (VST) and (PLS)

Sa, CS, Sy  
 1

### Appendix 3. Description of Alberta plant communities in which silver sagebrush is an important species.

Code	Description
A	Forested stands dominated by deciduous tree species; tree cover > 10%; decid. species > 70%
C	Forested stands dominated by coniferous tree species; tree cover > 10%; conif. species > 70%
M	Forested stands mixed with decid. and conif. tree species; tree cover > 10%; stand composition can vary between 40 and 60% of each species
SO	Open Shrublands - upland sites; woody perennials < 6m; shrub cover between 10 and 50%
SC	Closed Shrublands - upland sites; woody perennials <6m; shrub cover > 60%
WT	Treed wetlands - wetland sites; dominated by conif. species; trees > 6m; tree cover > 10%
WS	Shrub-dominated wetlands; dominated by decid. shrubs; shrubs > 6m; shrub cover > 10%
WG	Grass or grass-like wetlands; dominated by grasses, sedges, rushes..; shrub cover <10%; tree cover < 10%
R	Lotic Riparian areas ( use WT, WS, or WG for lentic sites )
G	Native Grasslands; dominated by grasses and forbs on well drained upland sites; tree cover <10%; shrub cover <10%
CL	Cleared lands supporting annual or perennial crops
NV	Non-vegetated area