MULTISAR: A Multi-Species Conservation Strategy for Species at Risk in the Grassland Natural Region of Alberta, 2019–2020 Report



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Executive Summary

MULTISAR (multiple species at risk) is a program focused on multi-species conservation at the landscape level that promotes stewardship through voluntary participation of landholders on both Crown and private lands. MULTISAR defines species at risk as those with a provincial general status of *At Risk, May Be At Risk* or *Sensitive*. The program is a collaborative effort among landholders, the Alberta Conservation Association, Alberta Environment and Parks, the Prairie Conservation Forum, Cows and Fish, Canadian Cattlemen's Association, Alberta Beef Producers, the Canadian Round Table for Sustainable Beef and Environment and Climate Change Canada.

The habitat conservation program includes the development of detailed habitat conservation strategies (HCSs) in the Milk River and South Saskatchewan watersheds of southern Alberta, as well as the more compact species at risk conservation plans (SARC plans) and habitat management plans (HMPs) delivered throughout the Grassland Natural Region.

In 2019–2020, a new HCS was developed on eight ranches totalling approximately 63 100 acres. MULTISAR also completed one HMP on 810 acres of land within our priority areas. Several habitat enhancement projects were developed to improve the habitat of key wildlife species on HCS and HMP properties. These included planting native grass plugs, building wildlife-friendly fencing, installing ferruginous hawk (*Buteo regalis*) poles, protecting trees, providing portable fencing units, fencing off wetlands and dugouts and providing alternate water sources.

No SARC plans or beneficial management plan assessments were delivered this year as no landholders were contacted or referred to MULTISAR.

The education, outreach and awareness program was achieved primarily by MULTISAR staff giving presentations and demonstration tours to landholders, wildlife and conservation groups, college students and the general public. MULTISAR partnered with the Canadian Cattlemen's Association to manage a booth during the Calgary Stampede that was potentially viewed by over 100 000 people. Communication material produced included one issue of MULTISAR's *Grassland Gazette* newsletter. In total, MULTISAR interacted with more than 4000 people (and an additional 100 000 people at the Calgary Stampede) through close to 160 contacts with individuals/groups including landholders, the general public, academia, industry, media, government and non-governmental organizations and other sectors.

Under the research and monitoring program, MULTISAR continued implementing its monitoring and evaluation protocol to assess the directionality of habitat improvements and management changes and the effectiveness of its HCSs. A subsample of range and riparian sites and wildlife points was revisited on three MULTISAR HCS ranches (52 375), five years after their initial assessment, to determine whether management recommendations had been implemented and to monitor their effects on species at risk habitat. Roughly 25 habitat enhancement projects on participating HCS ranches were monitored in 2019 to determine whether enhancements were achieving their objectives.

MULTISAR continues to compile wildlife observation and vegetation assessment data that it has been accumulating since its first HCS. In 2020, MULTISAR will also continue to focus on determining inferences between species at risk occurrences and habitat metrics.

MULTISAR will strive to promote beneficial management practices recommendations to improve and maximize habitat quality for species at risk.

Disclaimer

The views and opinions expressed in this report are those of the author and do not necessarily represent the policies or positions of Alberta Environment and Parks, the Alberta Fish and Wildlife Stewardship Branch, or the Alberta Government.

Introduction

Grasslands have evolved over thousands of years, yet over the last century we've managed to lose roughly 80% of the native grasslands in Canada (Bailey *et al.* 2010). It is, therefore, no surprise that grasslands are home to some of the most endangered and unique species in Canada. The MULTISAR program was established in 2002 to help maintain and improve habitat for these unique species by collaborating with landholders and increasing awareness of species at risk.

MULTISAR (multiple species at risk) is a program focused on multi-species conservation at the landscape level that promotes stewardship through voluntary participation of landholders on both Crown and private lands. MULTISAR defines species at risk as those with a provincial general status of *At Risk, May Be At Risk* or *Sensitive*. The program is a collaborative effort among landholders, the Alberta Conservation Association (ACA), Alberta Environment and Parks (AEP) and the Prairie Conservation Forum (PCF). The primary goals of MULTISAR are to implement collaborative strategies to manage multiple species on a defined working landscape and to assist with the implementation of these strategies. These are built as landholder-specific habitat conservation strategies (HCSs), leading to the implementation of habitat enhancement activities that benefit both the farm/ranch operation and wildlife. Through these HCS relationships, MULTISAR has implemented 216 habitat enhancement projects on ~514 593 acres of land.

MULTISAR consists of three primary components:

Habitat conservation strategies, which are detailed plans developed with landholders that can be used as a tool for the management of their land.

An education, outreach and awareness program, which involves developing beneficial management practices (BMPs) for various species, publishing the annual *Grassland Gazette*, developing and delivering presentations for the public, and completing species at risk conservation (SARC) plans, which are a condensed form of HCSs and completed for landholders outside the priority landscape of the Milk River watershed and portions of the South Saskatchewan River watershed. New in 2018 was the development of habitat management plans (HMPs) for properties within the priority areas to allow additional engagement with producers with less time commitment than required for the more detailed HCSs. These plans focus on wildlife habitat, and assess specific attributes such as litter and cover (Robel pole measurements) along with detailed wildlife surveys. They provide producers with a higher level of detail than SARC plans, but lack the time-intensive range information collection that one would have with an HCS.

Research, monitoring and evaluation, which involves the monitoring of habitat enhancements every one to two years and evaluation of the detailed plans (HCSs) every five years to determine whether they are having the desired effect or are in need of adjustments.

The MULTISAR program is guided by the 2015–2020 business plan. The MULTISAR mission, vision and goals are as follows:

<u>Mission</u>: To develop and implement the MULTISAR process which directs conservation of multiple species (including species at risk) and their habitat within the Grassland Natural Region of Alberta.

<u>Vision</u>: Habitat for multiple species of wildlife, including species at risk, will be maintained or enhanced in the grasslands of Alberta through an integrated and collaborative process that contributes to the values of Albertans and the wellbeing and sustainability of the ranching community.

Program Area Goals:

Habitat Conservation Program:

Goal: Incorporating the values of all partners to deliver an integrated program that provides for the conservation of wildlife (species at risk) and their habitat.

Education, Outreach and Awareness:

Goal: To create awareness about the needs and habitat requirements of wildlife (focusing on species at risk) and the management practices that aid in their conservation and the sustainability of rangelands in the Grassland Natural Region.

Research and Monitoring Program:

Goal: To increase our knowledge of species at risk and their habitat using data collected though the MULTISAR process.

Education, Outreach and Awareness

MULTISAR continued to deliver its education, outreach and awareness program as time and resources permitted. Activities included everything from field training events, to presentations to school, college, community and landholder groups and at conferences, to attendance at events with the MULTISAR display. Direct communication with landholders is ongoing, as is communication with other organizations and government agencies.

Landholder Awareness

At Home on the Range, *Grassland Gazette* and Other Informational Publications

In total, 1407 copies of MULTISAR's flagship booklet, *At Home on the Range: Living with Alberta's Prairie Species at Risk* (Saunders *et al.* 2016), was distributed to landholder cooperators, mailed out to county and municipal district offices, provided to non-profit organizations for distribution, and given to interested members of the public at events such as the Calgary Stampede. The 14th issue of MULTISAR's newsletter, the *Grassland Gazette*, was produced in December 2019 and sent to 523 MULTISAR contacts, including programparticipating landholders. Approximately 7600 MULTISAR fact sheets and species at risk information cards were handed out.

Southern Alberta Grazing School for Women

The 16th annual Southern Alberta Grazing School for Women was held on July 16 and 17, 2019 in Milk River, Alberta, with 50 women in attendance. The two-day event included topics such as linking riparian health to management, local plant identification, range health and post-fire management. MULTISAR has been one of the organizing partners of this event since 2011. The MULTISAR display was set up and two presentations were given by MULTISAR—one on species at risk and ranching, and one on stocking rates.

Southern Alberta Youth Range Days

Southern Alberta Youth Range Days was held from July 23 to 25, 2019 in Aden, Alberta. MULTISAR is one of the organizing partners of this event and had staff in attendance to help deliver presentations. The agenda included range plant identification and quiz, a ranch management challenge, riparian management techniques, a species at risk game and shorthorned lizard (*Phrynosoma hernandesi*) searches. There were 50 participants in attendance. Attendees came from various backgrounds, including farm and ranch, acreage and town.

Presentations/Training to Landholder Groups

MULTISAR had numerous conversations and meetings with individual landholders and landholder groups (over 90) about topics such as species at risk, wildlife-friendly fencing, hawk poles, water management, native grass restoration, herbicides for invasive weeds, habitat assessments and the MULTISAR process. Forty-three of those conversations were in-person meetings, with the remaining conversations done either through email or by phone.

Educational Presentations

MULTISAR was involved in youth and post-secondary education activities on four occasions, reaching approximately 2300 individuals. Table 1 summarizes these activities.

Date	Event	Location	Туре	Attendance
April 10–11, 2019	Aggie Days	Lethbridge, AB	MULTISAR display	2200 youths, ranging from pre-k to grade 9, and supervising adults
July 23–25, 2019	Youth Range Days	Aden, AB	Presentations about species at risk, short- horned lizards, range health and plant ID; ranch plan workshop	50 (youths and parents)
September 17, 2019	Lethbridge College Field Trip	Milk River, AB	Presentation about landholder collaboration and species at risk	25 college students
November 18, 2019	Lethbridge College, Wildlife Society student chapter	Lethbridge, AB	Presentation on MULTISAR and ferruginous hawks (<i>Buteo</i> <i>regalis</i>)	27 college students

Table 1. Summary of MULTISAR activities associated with youth and post-secondary education.

Public Outreach

Presentations, Demonstration Tours and Displays

In addition to MULTISAR's involvement with landholders, youth and post-secondary students, MULTISAR delivers presentations and tours to other groups working on the landscape (such as non-governmental organizations [NGOs], not-for-profit organizations, and government agencies), and participates in their events. At public events, MULTISAR will give presentations and take its interactive species at risk and grassland display. In 2019–2020, MULTISAR gave live presentations and set up the display for the public on 11 occasions. Presentations and tours were also given to individuals and groups to inform them about MULTISAR and its processes. Taking the MULTISAR display and giving presentations to the public allowed MULTISAR to directly reach over 600 individuals and created direct and indirect exposure for at least 100 500 people who visited the Calgary Stampede Cattle Trail and other events such as the Medicine Hat Sportsman Day. At the Calgary Stampede, MULTISAR, as well as various other environmental organizations working towards engaging people in grasslands-related issues, was invited by the Canadian Cattlemen's Association to set up displays. Table 2 summarizes MULTISAR's public outreach activities.

Date	Event	Location	Туре	Attendance
April 26, 2019	Saskatchewan Prairie Conservation Action Plan webinar series	Online presentation	Presentation about developing predictive models of occurrence for grassland birds in Alberta Available online at: <u>https://youtu.be/0HAw4G8wyqU</u>	104 attendees plus 50+ views online.
May 23, 2019Nature Conservancy of Canada Nature Talks: Why Grasslands MatterLethbridge, ABPresentation MULTISAR		Presentations about MULTISAR; MULTISAR display	100 attendees	
June 5, 2019	AltaLink Green Day event	Calgary, AB	MULTISAR display	40 attendees

Table 2	Summary o	of 2019–2020	public outreach	activities by	/ MULTISAR
	Summary		public outleach	activities b	

July 4–13, 2019	Calgary Stampede; Canadian Cattlemen's Association	Calgary, AB	MULTISAR display	Over 100 000 visitors from around the world
July 16– 17, 2019	Southern Alberta Grazing School for Women	Milk River, AB	Presentations about ranching with species at risk and stocking rates; MULTISAR display	50 attendees
November 1, 2019	Society for Range Management conference	Olds, AB	Presentation about MULTISAR	40 attendees
November 19, 2019	Grassland Market symposium	Calgary, AB	Presentation about MULTISAR	100 attendees
November 21, 2019	Walk on the Wild Side	Picture Butte, AB	Presentation about ferruginous hawk and osprey (<i>Pandion haliaetus</i>) poles	12 attendees
January 18, 2020	Ladies Livestock Lessons	Cremona, AB	Presentation about MULTISAR and habitat improvements	150 attendees
January 25, 2020	Medicine Hat Sportsman Day	Medicine Hat, AB	MULTISAR display	500 attendees
February 13, 2020	Alberta Institute of Agrologists Lunch and Learn	Lethbridge, AB	Presentation about MULTISAR	50 attendees

Website and Social Media

The MULTISAR website (<u>www.multisar.ca</u>) continues to be the key portal where information about the program, BMPs for species at risk, as well as related documents, news events and

producer stories can be accessed. It continues to get direct feeds from both the MULTISAR Twitter and Facebook accounts, which provide current news. The number of original tweets/Facebook posts from this past year was 45.

Media and Other Publications

In addition to the MULTISAR newsletter, the *Grassland Gazette*, that was produced and sent to over 523 contacts, MULTISAR had a paper published in the journal *Rangelands* in August 2019 titled *Listen, Learn, Liaise: Taking the Species out of Species-at-Risk Through Engagement* (Jones *et al.* 2019). Also, Deer Creek Livestock Co., a partner with MULTISAR, was given the 2020 Environmental Stewardship Award from Alberta Beef Producers. The video featuring Deer Creek Livestock Co. highlights how landholders and MULTISAR can work together to achieve habitat and wildlife goals. The video and write-up can be seen here: https://www.albertabeef.org/producers/environmental-stewardship-award.

Contacts, Extension and Outreach

Through the course of any fiscal year, MULTISAR staff interacts on a daily basis with landholders and other individuals, representative of a broad spectrum of sectors. Between April 1, 2019 and March 31, 2020, 159 contacts were made with over 4000 people, plus over 100 000 people that visited the Calgary Stampede Cattle Trail and either stopped to talk with staff or walked by and saw the MULTISAR display. These contacts include organizations and agencies with which MULTISAR regularly collaborates; these discussions and meetings included approximately 48 people. Table 3 shows a breakdown of the different individuals/groups that MULTISAR reached out to, as well as how many people were involved with MULTISAR in some way because of the interaction with these contacts.

Contact Type	# Contacts	# People Reached
Landholder	79	138
Landholder Group	13	92
Government	15	85
NGO	24	472
Academic (individual researchers)	3	8

Т	able	3.	MULT	ISAR	contacts	for	2019-2020.
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School	3	104
Individual (non-landholder)	3	2 (+ over 100 000 at the Calgary Stampede)
Industry	3	45
Media	2	Unknown
Company	4	4
Consultant	0	0
Contractor	1	523
Other (MULTISAR handouts at events and Prairie Conservation and Endangered Species Conference)	9	2855
Total:	159	104 328

Habitat Conservation Strategies

Conservation efforts to maintain and enhance wildlife habitat and rangelands for both species at risk and cattle production are the primary objectives of MULTISAR and habitat conservation strategies. The majority of the province's remaining native prairie is found in the Grassland Natural Region (GNR), where over 70% of Alberta's species at risk can be found. Most of these native habitats still exist thanks to livestock production. Efforts to maintain and enhance wildlife habitat for species at risk and rangeland sustainability can be achieved through a voluntary and collaborative approach with landholders and leaseholders. An HCS team works together to balance the needs for healthy rangelands and quality fish and wildlife habitats through grazing recommendations and habitat improvement projects. Each strategy is a result of detailed range, wildlife and riparian inventories and assessments, from which management goals and objectives can be made.

HCS Process

The foundation of an HCS is its team members. Landholders, as well as both government and non-government agencies, make up the team and include members from AEP, ACA, PCF and any other organizations that are stakeholders in the property.

Management objectives and strategies for the implementation of conservation efforts are developed by the entire MULTISAR HCS team and address wildlife, habitat, range, riparian and land management objectives identified for a particular landbase. Management and habitat enhancement recommendations are based largely on the recovery and conservation management actions for species identified as a priority on the land and from MULTISAR's BMP document (Rangeland Conservation Service Ltd. 2016).

For a complete and detailed description of the entire HCS process, refer to MULTISAR's 2010–2011 progress report (Rumbolt *et al.* 2011). Information regarding the detailed survey methodologies used in HCSs can be found in MULTISAR's 2011–2012 progress report (MULTISAR 2012).

HCS Achievements for the Fiscal Year 2019–2020

To date, MULTISAR has completed 55 HCSs on 514 593 acres of land within the Milk River and South Saskatchewan watersheds (Table 4). In 2019, MULTISAR completed HCSs for eight new properties in southern Alberta, totalling 63 100 acres. Work on these properties included detailed wildlife, range and riparian inventories.

Year*	# Landholder Participants	Acres Surveyed
2004	1	62 050
2005	1	159
2006	2^	32 868
2007	3	85 712
2008	2	7680
2009	3	38 630
2010	5	4720
2011	5	17 878
2012	3	13 140
2013	1	7859
2014	2	43 250
2015	2	8553
2016	5	9837
2017	7	62 973
2018	5	56 184
2019	8	63 100
Total	55	514 593+

Table 4. Habitat conservation strategy participant summary.

*HCSs were counted in the year in which fieldwork was initiated; however, some surveys continued for more than one year.

^ In 2006, MULTISAR absorbed the Western Blue Flag Program (previously overseen by ACA) and its eight participating landholders. These properties did not have an HCS completed and therefore they are not included in this total.

+This number includes those smaller-sized properties originally assessed as an HCS but which are now a part of the HMP process.

To date, 23 HCSs, which have been implemented for at least five years, have been reassessed (Table 5). Furthermore, six HCSs have been reassessed for a second time. These reassessments entailed a resurvey of a subsample of the original range, riparian and wildlife inventories. More details on these reassessments can be found in the *Habitat Conservation Strategy Evaluation and Monitoring Program* section.

Year of HCS Reassessment	MULTISAR Participant	Size of Property (acres)
2011	1	62 050
2012	1	28 797
2013	3	49 012
2014	3	44 777
2015	4	10 111
2016	6	67 801
2017	2	43 068
2018	6	62 151
2019	3	52 375
Total	23*	420 142

Table 5. Habitat conservation strategy reassessment summary.

*This number excludes the most recent reassessment for MP_1 in 2016; MP_4 in 2017; MP_7, MP_8 and MP_9 in 2018; and MP_6 in 2019.

Wildlife

To date, approximately 80 190 wildlife observations have been submitted to the Fish and Wildlife Management Information System (FWMIS) since 2004, including 8603 in 2019. Sixty-two different species at risk were recorded on HCS properties in 2019. Table 6 summarizes the species at risk observed on all HCS properties assessed (or reassessed) during the 2019 field season.

Species	General Status ¹	Legislative Status	# of Observations	Feature	Significance
Birds					
Alder flycatcher (<i>Empidonax</i> alnorum)	Sensitive	none	6		
American kestrel (<i>Falco sparverius</i>)	Sensitive	none	11		
American white pelican (<i>Pelecanus</i> <i>erythrorhynchos</i>)	Sensitive	none	36		
Baird's sparrow (<i>Ammodramus</i> bairdii)	Sensitive	Special Concern ²	339		
Bald eagle (<i>Haliaeetus</i> <i>leucocephalus</i>)	Sensitive	none	6		
Baltimore oriole (<i>lcterus galbula</i>)	Sensitive	none	33		
Bank swallow (<i>Riparia riparia</i>)	Sensitive	Threatened ²	182	3 colonies	
Barn swallow (<i>Hirundo rustica</i>)	Sensitive	Threatened ²	32		
Barred owl (<i>Strix</i> <i>varia</i>)	Sensitive	Special Concern ³	5		
Black-backed woodpecker (<i>Picoides arcticus</i>)	Sensitive	none	1		

 Table 6. Species at risk recorded on HCS properties during the 2019 field season.

Black-crowned night- heron (<i>Nycticorax</i> <i>nycticorax</i>)	Sensitive	none	1		
Black-necked stilt (<i>Himantopus</i> <i>mexicanus</i>)	Sensitive	none	18		
Black-throated green warbler (<i>Dendroica virens</i>)	Sensitive	Special Concern ³	3		
Black tern (<i>Chlidonias niger</i>)	Sensitive	none	12		
Bobolink (<i>Dolichonyx</i> oryzivorus)	Sensitive	Threatened ²	47		
Brewer's sparrow (<i>Spizella breweri</i>)	Sensitive	none	28		
Burrowing owl (<i>Athene cunicularia</i>)	At Risk	Endangered ^{2,3}	1	1 active burrow; 1 old burrow	
Chestnut-collared longspur (<i>Calcarius ornatus</i>)	Sensitive	Threatened ²	1,580	7 nests	
Common nighthawk (Chordeiles minor)	Sensitive	Threatened ²	26	1 nest	
Common yellowthroat (<i>Geothlypis trichas</i>)	Sensitive	none	85		
Eastern kingbird (<i>Tyrannus tyrannus</i>)	Sensitive	none	174		
Eastern phoebe (<i>Sayornis phoebe</i>)	Sensitive	none	3		

Ferruginous hawk (<i>Buteo regalis</i>)	At Risk	Endangered ³ Threatened ²	65	16 nests	
Forster's tern (<i>Sterna forsteri</i>)	Sensitive	none	5		
Grasshopper sparrow (<i>Ammodramus</i> savannarum)	Sensitive	none	116		
Great blue heron (<i>Ardea herodias</i>)	Sensitive	none	9		
Great gray owl (<i>Strix</i> nebulosa)	Sensitive	none	5		
Least flycatcher (<i>Empidonax</i> <i>minimus</i>)	Sensitive	none	87		
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Sensitive	Threatened ²	8		
Long-billed curlew (<i>Numenius</i> americanus)	Sensitive	Special Concern ²	137		
McCown's longspur (<i>Rhynchophanes</i> <i>mccownii</i>)	May Be At Risk	Threatened ²	104		
Olive-sided flycatcher (<i>Contopus</i> <i>cooperi</i>)	May Be At Risk	Threatened ²	1		
Osprey (Pandion haliaetus)	Sensitive	none	2		
Pied-billed grebe (<i>Podilymbus</i> <i>podiceps</i>)	Sensitive	none	2		

Prairie falcon (<i>Falco mexicanus</i>)	Sensitive	Special Concern ²	22	4 nests	
Sandhill crane (Grus canadensis)	Sensitive	none	11		
Sharp-tailed grouse (<i>Tympanuchus</i> <i>phasianellus</i>)	Sensitive	none	348	14 leks; 1 nest	
Short-eared owl (<i>Asio flammeus</i>)	May Be At Risk	Special Concern ²	1		
Sora (<i>Porzana</i> carolina)	Sensitive	none	6		
Sprague's pipit (<i>Anthus spragueii</i>)	Sensitive	Threatened ²	380	1 nest	
Upland sandpiper (<i>Bartramia</i> <i>longicauda</i>)	Sensitive	none	28		
Western tanager (<i>Piranga ludoviciana</i>)	Sensitive	none	1		
Western wood- pewee (<i>Contopus</i> <i>sordidulus</i>)	Sensitive	none	80		
White-faced ibis (<i>Plegadis chihi</i>)	Sensitive	none	5		
Herpetofauna					
Bullsnake (<i>Pituophis</i> catenifer sayi)	Sensitive	none	8	1 hiber- naculum	
Northern leopard frog (<i>Lithobates</i> <i>pipiens</i>)	At Risk	Threatened ³ Special Concern ²	67	5 breeding sites	

Plains garter snake (<i>Thamnophis radix</i>)	Sensitive	none	5		
Prairie rattlesnake (<i>Crotalus viridis</i>)	Sensitive	Special Concern ²	42	4 hiber- nacula	
Short-horned lizard (<i>Phrynosoma</i> <i>hernandesi</i>)	At Risk	Endangered ^{2,3}	11		
Mammals					
American badger (<i>Taxidea taxus</i>)	Sensitive	Special Concern ²	14	8 burrows	
Bobcat (Lynx rufus)	Sensitive	none	1	tracks	
Grizzly bear (<i>Ursus</i> arctos)	At Risk	Threatened ³ Special Concern ²	9		
Hoary bat (<i>Lasiurus cinereus</i>)	Sensitive	none	22		Recorded acoustically
Little brown myotis (<i>Myotis lucifugus</i>)	May Be At Risk	Endangered ²	21		Recorded acoustically
Long-tailed weasel (<i>Mustela frenata</i>)	May Be At Risk	none	1	scat	
Pronghorn (<i>Antilocapra</i> <i>americana</i>)	Sensitive	none	282		
Eastern red bat (<i>Lasiurus borealis</i>)	Sensitive	none	4		Recorded acoustically
Silver-haired bat (<i>Lasionycteris</i> <i>noctivagans</i>)	Sensitive	none	20		Recorded acoustically

Swift fox (<i>Vulpes velox</i>)	At Risk	Endangered ³ Threatened ²	1	
Western small- footed myotis (<i>Myotis ciliolabrum</i>)	Sensitive	Special Concern ³	3	Recorded acoustically

¹General status in Alberta (AEP 2015a), ²legislative status under Canada's *Species at Risk Act* (Government of Canada [GOC] 2018), ³legislative status under Alberta's *Wildlife Act* (Government of Alberta [GOA] 2016) or designation as *Special Concern* by the Minister.

Range

The HCS properties assessed (and reassessed) across southern Alberta in 2019 displayed a wide range of diversity in the plant communities and range health found. MULTISAR conducted 322 detailed range transects (vegetation inventories), 343 range health assessments, 67 tame pasture assessments, 51 forest health assessments and 683 visual reconnaissance plots during the 2019 field season (Table 7). During these inventories, nine species of rare plants and no rare plant communities were observed on the properties, as listed in Table 7. This table does not include a summary of range work for MP_56 because this range was assessed separately by the landholder in previous years.

Property	Acres	Sites Assessed*	# of Plant Communities Assessed	Rare Plants
MP_6	44 082	138 range healthassessments17 tame pastureassessments	48	None
MP_26	7834	30 range health assessments 3 tame pasture assessments	19	None
MP_27	459	7 range health assessments	5	None

Table 7. Summary of range work completed on HCS properties during the 2019 field season.

MP_48	40 111	 197 detailed transects 104 range health assessments 8 tame pasture assessments 61 visual reconnaissance plots 	87	Bottlebrush squirrel-tail (<i>Elymus elymoides</i>) Cock's-comb cryptantha (<i>Cryptantha celosiodes</i>) Mojave sea-blite (<i>Suaeda moquinii</i>) Spiny milkvetch (<i>Astragalus kentrophyta</i>) Watson's goosefoot (<i>Chenopodium watsonii</i>)
MP_49	5530	 30 detailed transects 33 range health assessments 19 tame pasture assessments 351 visual reconnaissance plots 9 forest health assessments 	43	None
MP_50	7777	 30 detailed transects 18 range health assessments 15 tame pasture assessments 36 forest health assessments 249 visual reconnaissance plots 	92	Limber pine (<i>Pinus flexilis</i>)
MP_51	2081	45 detailed transects5 range health assessments2 visual reconnaissance plots	34	None

MP_52	1214	2 detailed transects	27	Limber pine
		assessments		tridentata)
		5 tame pasture assessments		Shrubby beardtongue (Penstemon fruticosus)
		18 visual reconnaissance plots		
		6 forest health assessments		
MP_53	480	7 detailed transects 2 visual reconnaissance plots	9	None
MP_54	407	11 detailed transects	10	Fringed loosestrife (<i>Lysimachia ciliata</i>) Limber pine

Riparian

The Alberta Riparian Habitat Management Society—Cows and Fish completed 22 riparian health assessments in the South Saskatchewan River watershed, as part of its partnership with MULTISAR. In addition, 28 riparian health assessments were completed within the South Saskatchewan watershed by private contractors and five riparian health assessments were completed within the Milk River watershed by MULTISAR.

Wildlife and Range Health Inferences

Compiling the data gathered from the wildlife, range and riparian health assessments on each property allows MULTISAR to make inferences regarding the range and riparian health of a site and the corresponding wildlife and habitat features observed. Using this information, management plans were created for each property, incorporating BMPs for each management unit that promote sustainable ranching and habitat for species at risk.

Implementation of HCS Habitat Enhancements

MULTISAR completed seven new habitat enhancements within the Milk River watershed in 2019 and early 2020, and continued work on a native reseed project at the Silver Sage Conservation Site that was initiated in previous years. This native reseed project includes the continued
restoration of 1300 acres back to native grass through spraying for kochia (*Kochia* spp.), Canada thistle (*Cirsium arvense*) and other weeds. Habitat enhancement projects included: installation of almost 5 km of new wildlife-friendly fencing to improve movement of pronghorn and to prevent cattle from accessing riparian areas; purchase of a portable fencing unit to be used around dugouts, coulees and wetlands to improve habitat for amphibians, game birds and waterfowl; installation of three hawk poles to assist with the recovery of the *Endangered* ferruginous hawk and to help control Richardson's ground squirrels (*Urocitellus richardsonil*); purchase of a portable watering unit to improve dugout conditions; and purchase of shrub plugs for one property, which are to be planted during the spring of 2020 and will create additional habitat for species at risk and other wildlife.

Within the South Saskatchewan watershed, 13 habitat enhancements have been implemented in 2019 and early 2020 as part of HCSs. Habitat enhancement projects included: purchase of three portable electric fence units to assist landholders with grazing management, excluding cattle from sensitive areas and promoting grazing in areas that cattle tend to avoid; purchase of bio-control for leafy spurge (*Euphorbia esula*), a perennial noxious weed that can lower carrying capacity of pastures since cattle refuse to graze areas that are infested; purchase of materials for two wildlife-friendly fencing projects; purchase of three portable watering units to provide fresh water for cattle and to deter cattle loafing, as well as to keep cattle out of one wetland that contains a population of *Threatened* northern leopard frogs; purchase of two tire troughs to entice cattle away from a natural spring by offering easy access to cleaner water, which can improve weight gain and offset foot rot occurrences; and purchase of balsam poplar (*Populus balsamifera*) stakes for one property, which are to be planted along with willow (*Salix* spp.) stakes from the surrounding area during the spring of 2020 and will create additional habitat for species at risk and other wildlife around an existing wetland area.

MULTISAR West projects are situated within the South Saskatchewan River watershed, and focus is placed on properties in the Parkland and Rocky Mountain natural regions of southwest Alberta. In 2019, MULTISAR West implemented five new habitat enhancements to reduce pressure on riparian habitat. In collaboration with a landholder situated on the west side of the Porcupine Hills, an old horse corral where livestock previously have had direct access to a creek for over 100 years was removed and materials and supplies for a new corral upslope were provided. The riparian area was rehabilitated by planting over 2000 shrubs along this tributary to the Oldman River that supports westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) and bull trout (*Salvelinus confluentus*). In collaboration with two landholders, two natural springs were developed as alternative watering sites for cattle and a portable watering unit was supplied to reduce pressure on riparian habitat.

In total, 216 on-the-ground enhancement projects have been completed by MULTISAR HCS participants since 2005 (Figure 1).

Habitat enhancement projects continue to be monitored through MULTISAR's monitoring and evaluation protocol to ensure that the enhancements are having the desired positive effect on specific habitats and wildlife. The *Habitat Conservation Strategy Evaluation and Monitoring Program* section provides more detail on MULTISAR's monitoring and evaluation process and the positive results that are being seen on the landscape as a result of these enhancement projects.



Figure 1. Habitat enhancement projects completed in the Milk River and South Saskatchewan watersheds, by category, since 2005.

HCS Summary

Over the last 18 years, MULTISAR has become increasingly more recognized and its HCS work has grown tremendously throughout the South Saskatchewan and Milk River watersheds. MULTISAR has developed plans for approximately 514 593 acres of land, of which a large portion is interconnected, allowing for landscape planning as well as with single property initiatives. MULTISAR will continue to make efforts to increase the landbase worked on within priority areas and seek to "connect" additional properties adjacent to participating HCS landholders. MULTISAR has provided and will continue to provide open communication, information and awareness, and team-based wildlife habitat planning, and will continue to build long-term relationships with landholders, government, NGOs and industry.

Habitat Management Plans

In 2018–2019, MULTISAR created another extension program to further influence rangeland management and benefit prairie wildlife habitats. Habitat management plans (HMPs) were introduced in 2018 as an extension of the HCSs, to focus solely on proposed habitat improvements at a given ranch and to continue collecting some wildlife and habitat data. Like SARC plans, HMPs are a more condensed version of an HCS applied at the ranch level but involving detailed wildlife surveys and simplified wildlife habitat assessments to document species at risk and habitat indicators, respectively. HMPs were implemented on new MULTISAR properties less than 4000 acres in size, and on HCS properties that are already on their second or greater reassessment. These plans will be delivered throughout the Milk River and South Saskatchewan watersheds.

HMP Process

Detailed wildlife inventories, including multi-species point count surveys, were completed following protocols outlined in Rumbolt *et al.* (2011). At each multi-species point count survey location, a Robel pole measurement and litter weight estimate were also taken following protocols by Robel *et al.* (1970) and Willoughby (2007), respectively, to gain some insight on wildlife habitat for a particular landbase.

Similar to the HCS process, HMP teams develop management objectives and strategies for the implementation of new habitat enhancement projects and the monitoring of ongoing habitat enhancements based on current wildlife, range and riparian data. Management and habitat enhancement recommendations for new HMP properties are based largely on the recovery and conservation management actions for species identified as a priority on the landbase and from MULTISAR's BMP document (Rangeland Conservation Service Ltd. 2016).

HMP Achievements for the Fiscal Year 2019–2020

To date, MULTISAR has completed three HMPs on 5459 acres of land within the Milk River and South Saskatchewan watersheds (Table 8). In 2019, MULTISAR completed an HMP for one new property and included detailed wildlife and simplified range health techniques.

Year	MULTISAR Participant	Acres Surveyed
2018	MP_8*	3479

Table 8. Habitat management plan participant summary.

2018	MP_47	1170
2019	MP_55	810
Total	3	5459

*This HCS property was incorporated into the HMP process, which entailed a resurvey of a subsample of the original riparian and wildlife inventories, and the collection of new range data at point count survey locations.

Wildlife

To date, approximately 758 wildlife observations collected on HMP properties have been submitted to FWMIS. Fourteen different species at risk were recorded on HMP properties in 2019. Table 9 summarizes the species at risk observed on all HMP properties assessed (or reassessed) during the 2019 field season.

Table 9.	Species a	at risk	recorded	on HMP	properties	during the	e 2019 field	season.
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Species	General Status ¹	Legislative Status	# of Observations	Feature	Significance
Birds					
Alder flycatcher	Sensitive	N/A	1		
Baltimore oriole	Sensitive	N/A	3		
Bank swallow	Sensitive	Threatened ²	1		
Barn swallow	Sensitive	Threatened ²	1		
Bobolink	Sensitive	Threatened ²	1		
Eastern kingbird	Sensitive	N/A	2		
Great blue heron	Sensitive	N/A	1		

Least flycatcher	Sensitive	N/A	13	
Sora	Sensitive	N/A	1	
Western wood- pewee	Sensitive	N/A	7	
Mammals				
Hoary bat	Sensitive	N/A	4	Recorded acoustically
Little brown myotis	May Be At Risk	Endangered ²	7	Recorded acoustically
Eastern red bat	Sensitive	N/A	2	Recorded acoustically
Silver- haired bat	Sensitive	N/A	5	Recorded acoustically

¹General status in Alberta (AEP 2015a), ²legislative status under Canada's Species at Risk Act (GOC 2018).

Range

The HMP property assessed in southern Alberta in 2019 displayed a wide range of diversity in plant communities and habitat attributes (litter weight, standing biomass [Robel pole measurements]). Three Robel pole readings and litter weight estimates were made at each HMP survey location, which translated into a total of 39 Robel pole readings and litter weight estimates during the 2019 field season (Table 10). During these assessments, rare plants were not observed on the property.

Table 10.	Summarv	of range w	ork complete	d on HMP	properties	during the	2019 field sease	on
	Garminary	or runge n			properties	during the		JI I.

Property	Acres	# of Robel Pole Readings	# of Litter Weight Estimates	Rare Plants
MP_55	810	39	39	None

Riparian

No riparian assessments were completed in the Milk River or South Saskatchewan River watersheds for HMP properties during 2019.

Wildlife and Range Health Inferences

Compiling the data gathered from the wildlife, range and riparian health assessments on each property allows MULTISAR to make inferences regarding the range and riparian health of a site and the corresponding wildlife and habitat features observed. Using this information, management plans were created for each property, incorporating BMPs for each management unit that promote sustainable ranching and habitat for species at risk.

Implementation of HMP Habitat Enhancements

MULTISAR did not complete any new habitat enhancements across the Milk River and South Saskatchewan watersheds in 2019 and early 2020. Two on-the-ground enhancement projects have been completed by MULTISAR HMP participants since 2018: one portable watering site and one upland watering site.

Habitat enhancement projects continue to be monitored through MULTISAR's monitoring and evaluation protocol to ensure that the enhancements are having the desired positive effect on specific habitats and wildlife. The *Habitat Conservation Strategy Evaluation and Monitoring Program* section provides more detail on MULTISAR's monitoring and evaluation process and the positive results that are being seen on the landscape as a result of these enhancement projects.

HMP Summary

Over the last 18 years, MULTISAR has become increasingly more recognized and its HCS work has grown tremendously throughout the South Saskatchewan and Milk River watersheds. MULTISAR has developed HMPs for approximately 5459 acres of land. These condensed assessments allow biologists to engage with more landholders sooner than would be possible if only HCSs were available, as only a limited number of detailed HCSs can be completed in a year. HMPs are a viable alternative that still allow for wildlife assessments and basic habitat surveys (litter weight and Robel pole measurements) coupled with funding for enhancements. MULTISAR has provided and will continue to provide open communication, information and awareness, and team-based wildlife habitat planning, and will continue to build long-term relationships with landholders, government, NGOs and industry.

Species at Risk Conservation Plans

SARC plans were introduced in 2007 as an extension of the HCSs program. They are a more condensed version of HCSs applied at the ranch level and delivered throughout the entire GNR and the adjacent Rocky Mountain and Parkland natural regions. In 2019–2020, MULTISAR continued the use of this extension program to influence rangeland management and benefit prairie wildlife habitats.

Over the years, MULTISAR staff have been approached by several landholders who wanted to complete specific habitat improvements on their properties (e.g., installation of hawk nesting poles, water developments), but were not interested in having their entire property assessed through a traditional SARC plan. They were focused on one aspect of their operation or one species or group of species and wanted species-specific or habitat-specific management tools to use on their properties. For this reason, MULTISAR developed BMP-specific assessments in 2012–2013 that focused solely on proposed habitat improvements or on the habitat requirement of species of interest.

SARC Plan/BMP Assessment Process

MULTISAR's SARC plan process is divided into six steps: 1) identification of priority lands,
2) landholder contact, 3) preliminary background research, 4) on-site habitat assessment,
5) SARC plan development and delivery, and 6) follow up. For a complete account of the SARC plan process, please refer to the 2010–2011 MULTISAR progress report (Rumbolt *et al.* 2011).

BMP assessments follow the same process as the SARC plans, except for step one. These assessments are normally completed in response to a landholder's request as opposed to the active solicitation involved with SARC plans.

Achievements

Since the inception of the SARC plan program in 2007, 82 assessments have been completed throughout the GNR, covering a total area of 156 254 acres. No assessment requests from landholders or referrals were made in 2019; therefore, no SARC plans were completed in 2019–2020.

This was the seventh year in which BMP-specific assessments were to be completed. Two BMP assessments (on a combined 1440 acres) were completed this year for landholders who wanted to install hawk nesting platforms, with interest in providing suitable nesting areas for ferruginous hawks and controlling Richardson's ground squirrels on their property in an ecologically

responsible manner. One BMP assessment was completed near the hamlet of Monarch, while the other assessment was conducted in the area of Drumheller. Since beginning these assessments in 2012, MULTISAR has completed 22 BMP assessments for a total of 58 152 acres.

Several habitat improvements have been developed as demonstration sites on SARC plan cooperator properties throughout the years and are periodically monitored to ensure that they are achieving their objectives. Habitat improvements include nesting platforms erected for ferruginous hawks, several wetland and riparian fencing projects, shelterbelt fencing, and portable watering unit development.

Discussion

SARC plans were initially popular with landholders when they were introduced in 2007. This was because the first "wave" of SARC plans was completed for people who were somewhat aware of the MULTISAR program and/or familiar with the MULTISAR staff. These established relationships led to many willing participants in the SARC plan program.

As a result of reduced funding, MULTISAR lost its Education and Outreach Coordinator in 2010. This position was key to promoting SARC plans and aided in ultimately engaging participants in the program. The following few years saw the number of SARC plans slowly begin to taper off despite various attempts at garnering interest in the program (presentations, mail-outs, etc.). Figure 2 summarizes the number of participating SARC plan landholders and properties per year over the 13 years of the program.

In 2013, an evaluation of the SARC plan program was completed. The results of this evaluation indicated that landholders who actively sought out MULTISAR and requested a SARC plan were interested in the information that MULTISAR provided and in making management changes to benefit wildlife habitat. Conversely, landholders who were first approached by MULTISAR were often not as interested in the information provided and were not as likely to engage in implementing management changes that would benefit species at risk. Therefore, it was decided that SARC plans would target those landholders who approached (or were referred to) MULTISAR and requested a plan. This scenario gives MULTISAR the best "bang for its buck", as time and resources can be focused on properties and landholders where implementation of plans is most likely.





This past year was the third consecutive year in which no SARC plans were completed, as no landholders were contacted or were referred to MULTISAR to have an assessment completed. The initial contact or knowledge of the program is typically from interactions of MULTISAR staff with landholders or other conservation organizations during various conferences, training days, tradeshows, etc.

SARC Plan Summary

SARC plans are ever evolving and are still seen as an important way for MULTISAR to reach out to a large number of landholders throughout the GNR and increase awareness of species at risk BMPs. Without an Education and Outreach Coordinator, MULTISAR will continue to provide SARC plans and BMP assessments on a responsive basis and promote them at various landholder events.

Habitat Conservation Strategy Evaluation and Monitoring Program

The year 2019–2020 marks the tenth year of MULTISAR's evaluation and monitoring program. The process of monitoring and evaluating occurs on two levels: reassessment of HCSs and monitoring of completed enhancements on properties that have an HCS. The following sections will provide a summary of MULTISAR's evaluation and monitoring accomplishments for the year.

Evaluation of the HCS component of the MULTISAR Program

An evaluation of each HCS completed for MULTISAR is scheduled to occur five years after the HCS implementation. The focus of this assessment is to measure the effectiveness of the HCS plans and recommendations in influencing habitat management decisions, improving/maintaining habitat for species at risk, and refining the landholders' perceptions of species at risk and their associated habitats. In 2019–2020, MULTISAR evaluated four properties (for three landholders) that had HCSs in place (referenced in this report with code names MP_3, MP_6, MP_26 and MP_27).

Evaluation of the HCS Process

During HCS evaluations, the following is completed:

- 1. A subsample of the initial range health and riparian health assessments and wildlife point counts are reassessed and/or resurveyed.
- The reassessment of the health of native and tame pastures is evaluated by completing range health reassessments at original assessment locations, ensuring that at least one transect is completed in each management unit of the HCS property and is, usually, associated with a wildlife point count.
 - Assessed range health is scrutinized against the HCS's desired habitat conditions within management units or areas within a management unit (i.e., maintain range health within ± 10%, increase range health by > 10%, or decrease range health by > 10%).
 - To facilitate comparison of results between assessments of different years, all scoring needs to be on the same ranking scale. To accomplish this, and in particular for noxious weeds (because ranks can change between years), scores are adjusted

in the current assessment year to reflect the ranking from the baseline year. As an example, in 2008 downy brome (*Bromus tectorum*) was not on the noxious weed list and did not change the range health scoring unless it caused a change in the plant community. By 2009, downy brome was listed and could affect more of the range health scoring results.

- 3. Riparian health is reassessed at original polygon locations. A subsample is selected if funding constraints exist.
- 4. Wildlife surveys are completed at specific locations (multi-species point counts and species-specific surveys). In order to make comparisons, surveys should mirror baseline methodologies as much as possible. The subsample amount varies based on property size.
 - If the property is small (5000 acres or less), approximately half of the original 100-m or 200-m point counts are completed. If the property is larger than 5000 acres, at most 100 point counts are completed using 100-m and 200-m point counts with a focus on the 100-m counts.
 - When selecting point counts to reassess, every pasture/management area should have at least one point count completed within it. Point count boundaries falling completely within Grassland Vegetation Inventory (GVI) polygons (i.e., having similar landscape features in terms of vegetation cover and human development) are singled out first for reassessment and the following conditions are applied:
 - At least one wildlife point count falls within the same GVI polygon as a range health reassessment location.
 - If possible, point count boundaries should not span more than one GVI polygon.
 - If baseline point count surveys only completed 200-m point counts (prior to GVI's inception), emulate this unless the above criteria are not met. If 200-m point counts do not fit within GVI polygons, complete 100-m point counts or select a different point count location to survey.
- 5. A landholder questionnaire is completed to document perspectives on the HCS process and its recommendations and their views on species at risk.
- 6. Data collected during the monitoring of completed enhancements recommended in the HCS are reviewed and/or analyzed.

7. Achievement of MULTISAR's HCS goals is measured based on the following: desired range and riparian health has been established, target wildlife species are present on the site, some of the recommendations in the HCS are being implemented, enhancements are having the desired effects, and MULTISAR is increasing awareness and knowledge about species at risk and is found to be beneficial to the ranching community.

HCS Evaluation Statistical Methods

Range

We used standard range health monitoring protocols to determine range health trends. Please refer to MULTISAR (2014), sections 5.2–5.2.2.2 for an explanation of the methodologies for evaluating this part of the HCS process.

The differences between the range health scores from baseline year and reassessment were calculated. Thereafter, the mean differences between the range health scores were looked at to see whether they were different from the following: $\pm 10\%$ for areas where the objective was to maintain range health, >10% for areas where the objective was to increase range health, and a decrease of more than 10% for areas where the objective was to decrease range health. This was accomplished by applying a paired t-test with the baseline and current health results within the statistical software JMP[®] (SAS Institute Inc. 2018). Values are reported as the mean (\bar{x}) \pm its standard deviation (SD). The null hypothesis was rejected if significance (P-value) was less than 0.05. In addition, since MP_3 and MP_6 have had a second reassessment, an analysis of variance (ANOVA) was used to determine whether the range health means across the three years were different and a Tukey test was used to depict differences among years. The ANOVA uses an F-test to determine whether the variability between yearly range health means is larger than the variability within each year's range health scores.

<u>Riparian</u>

Riparian inventories and health assessments help to identify problems and land-use issues along waterbodies. The information collected during a riparian assessment is intended to help promote riparian functions such as water storage, forage production and habitat for wildlife. The results of the assessment offer suggestions for landscape management to the landholder. In 2019, riparian health assessments were completed for two HCS reassessment properties (MP_3 and MP_6). Where possible, using the JMP[®] software, an ANOVA test was applied to determine whether the variability between yearly riparian health scores was larger than the variability within each year and a Tukey test was used to depict the differences among years.

Wildlife

Using the JMP[®] software, a paired t-test was applied to the wildlife data, comparing species richness and species diversity per multi-species point count with values reported as $\bar{x} \pm SD$. A significance of 0.05 was used to interpret the results. At MP_3 and MP_6 certain point counts have been assessed during three separate years. An ANOVA was used for these properties to determine whether the variability between each year's mean was larger than the variability within each year's species richness and diversity values. On properties where more than two assessments have been completed, a Tukey test was added to assess differences among years.

HCS Evaluation Results for 2019

Range Health Trend

MP_3

Across all 26 native and tame sites revisited at MP_3, overall range health increased slightly from the baseline year to 2019, but there was no significant difference in mean range health between years (p = 0.17, F = 1.79) (Figure 3). Encouragingly, since 2014, there has been an increase in range health by category, from 49.95% in the "high healthy" and "healthy" to 65.4% in these same categories in 2019 (Table 11). In both 2014 and 2019, only one site was determined to be "unhealthy".

The goal at ten native and three tame sites was to maintain range health from the 2014 scores. Their range health mean differences in 2019 were +4.8% (native) and +7% (tame), which meet the goal to stay within ten percent of original scores (native: p = 0.07, t = 2.03; tame: p = 0.28, t = 1.48). Tame areas having goals to increase health by greater than ten percent (n = 9) increased by an average of +12.2%, which meets the goals set in 2014 (p = 0.0015, t = 4.7). Native areas with goals to increase health (n = 4) did slightly, with a mean increase of +3.5, although there was no significant difference between years (p = 0.66, t = 0.49).



Figure 3. Least squared mean and 95% confidence limits for range health (percentage) trend for MP_3 on native and tame plots assessed from baseline year to current year (n = 26). The same letter ("a") above indicates no significant difference based on Tukey test results.

Table 11. MF	2 assessed	range	health	categories.
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Category	2006	2014	2019
High Healthy (86–100%)	23.1%	3.9%	38.5%
Healthy (75–85%)	23.1%	46.1%	26.9%
High Healthy with Problems (61–74%)	26.9%	23.1%	19.2%
Low Healthy with Problems (50–60%)	15.4%	23.1%	11.5%
Unhealthy (<50%)	11.5%	3.9%	3.9%

One hundred and twenty-eight native and tame range sites were reassessed on MP_6 in 2019. Baseline assessments at these sites were conducted in 2008, and the first reassessment was conducted in 2014. Range health has changed very little over the three assessments, and means did not vary between years (p = 0.07, F = 2.62) (Figure 4). Since 2014, there has been a decrease in range health by category, from 67.2% in the "high healthy" and "healthy" to 50% in these same categories in 2019 (Table 12). There has been a shift since 2014 from categories of higher health to ones with health problems, with 28.9% in 2014 to 46.1% in 2019. Numbers of "unhealthy" sites did not change in 2019. The goal at eighty native sites was to maintain range health relative to 2014 scores. Their range health mean difference in 2019 was -8.5%, which meets the goal to stay within ten percent of original scores, although mean range health was statistically different among years (p < 0.0001, t = -5.9). The goal at thirty-one native areas was to increase in health, which they did, by an average of 8.4%, nearly meeting goals set in 2014 (p = 0.008, t = 3.7). Seventeen tame pasture range health reassessments were completed, with scores increasing slightly from 74.1% ± 14.8 in 2008 to 80.7% ±12.0 in 2014 to 78.9% ± 12.9 in 2019, with trends showing non-significant changes in means across years (p = 0.33, F = 1.10).



Figure 4. Least squared mean and 95% confidence limits for range health (percentage) trend for MP_6 on native plots assessed from baseline year to current year (n = 111). The same letter ("a") above indicates no significant difference based on Tukey test results.

Category	2008	2014	2019
High Healthy (86–100%)	28.1%	46.1%	23.4%
Healthy (75–85%)	34.4%	21.1%	26.6%
High Healthy with Problems (61–74%)	15.6%	21.9%	31.3%
Low Healthy with Problems (50-60%)	13.3%	7.0%	14.8%
Unhealthy (<50%)	8.6%	3.9%	3.9%

Thirty-one native range points and two tame areas that were originally assessed in 2013 were reassessed in 2019. The overall health at all sites remained constant from 82.1% \pm 12.3 in 2013 to 82.3% \pm 12.1 in 2019 (p = 0.91, t = -0.12). There has been a slight shift in range health classification from "healthy" to "high healthy", and no sites were considered "unhealthy" in 2019 (Table 13).

Category	2013	2019
High Healthy (86–100%)	48.5%	54.5%
Healthy (75–85%)	36.4%	30.3%
High Healthy with Problems (61–74%)	12.1%	12.1%
Low Healthy with Problems (50–60%)	0%	3.0%
Unhealthy (<50%)	3.0%	0%

 Table 13. Percent of points within each range health category for MP_26.

The goal at 29 sites was to maintain range health relative to 2013 scores. Their range health mean difference in 2019 was -1.03%, which meets the goal to stay within ten percent of original scores (p = 0.62, t = -0.50). The 2013 goal at four areas was to increase range health, and they almost met the average 10% increase in range health with a mean increase of 9.5%.

MP_27

MP_27 was originally assessed in 2014, when seven range health assessments were performed in native grasslands. The overall health at sites changed from $65\% \pm 15.6$ in 2014 to $78.1\% \pm 6.8$ in 2019 (p = 0.03, t = 2.73). The goal for four areas in 2014 was to increase range health, and on average these sites increased significantly in health by 22.8% (p < 0.01, t = 15.84). The goal for three areas in 2014 to maintain range health was met, with range health remaining constant with average scores of 80% in 2014 and 80.3% in 2019 (p = 0.94, t = 0.09).

When looking at the range health from a health category classification, we find a large shift out of "unhealthy" and "low healthy with problems" in 2014 to higher health categories in 2019 (Table 14).

Category	2014	2019
High Healthy (86–100%)	0%	28.6%
Healthy (75–85%)	42.8%	42.8%
High Healthy with Problems (61–74%)	14.3%	28.6%
Low Healthy with Problems (50–60%)	28.6%	0%
Unhealthy (<50%)	14.3%	0%

Table 14. Percent of points within each range health category for MP_27.

Riparian Assessments

In 2019, two HCS reassessment properties, MP_3 and MP_6, had riparian health assessments completed using Cows and Fish assessment protocols (Cows and Fish 2017). For MP_3, overall riparian health increased slightly since 2014 for two of the three sites visited. One lotic site fell in the "healthy" category and one in the "healthy, but with problems" category, and the lentic site was classified as "unhealthy" (Table 15). Upon arrival at the lentic site, it was observed that the wetland had dried up since 2014 and that upland grass species had become established on the exposed soil, suggesting that this area was no longer covered by water for most of the growing season. Since this area does not appear to be functioning as a wetland, it is not discussed further in this section. One of the lotic systems increased in health by 4% and the other remained unchanged. The improvement seen was driven by a better score for preferred tree and shrub establishment, as it appears that hawthorn (*Crataegus* spp.) coverage increased, and choke cherry (*Prunus virginiana*) is now present at the site. Both sites are well vegetated and seem to have received minimal grazing pressure by livestock in recent years. Both sites scored well in terms of physical alterations (i.e., trailing, pugging/hummocking), especially compared to the 2006 scores.

For MP_6, overall riparian health has not changed very much since 2014 for the two sites revisited. The lotic site fell in the "healthy, but with problems" category and the lentic site was classified as "unhealthy" (Table 15). Both sites have acceptable levels of vegetative cover, predominately grasses and forbs. Much of the grass cover is provided by tame grasses such as foxtail barley (*Hordeum jubatum*), Kentucky bluegrass (*Poa pratensis*) and quack grass (*Elytrigia repens*). Overall, a combination of beaver (*Castor canadensis*) and cattle impacts has reduced riparian health; however, there are many desirable plant species still present and great potential for improvement with management changes.

Property	Inventory	Baseline Year	Reassessment #1	2018 Reassessment	Trend
MP_3	Lentic	26% Unhealthy	75% Healthy, but with Problems	9% Unhealthy	Area no longer functioning as a wetland.
	Lotic	61% Healthy, but with Problems	74% Healthy, but with Problems	74% Healthy, but with Problems	Health is stable
	Lotic	69% Healthy, but with Problems	81% Healthy	85% Healthy	Health has improved
MP_6	Lotic	72% Healthy, but with Problems	61% Healthy, but with Problems	60% Healthy, but with Problems	No change
	Lentic	65% Healthy, but with Problems	38% Unhealthy	35% Unhealthy	

 Table 15. Riparian health assessments, including riparian health scores, for reassessed HCS properties.

Wildlife Assessments

A subset of baseline year wildlife surveys was repeated in 2019 for properties MP_3, MP_6, MP_26 and MP_27. For this reporting, the focus will be on multi-species point count surveys, with comparisons of species richness and species diversity for grassland birds between the baseline and reassessment years. We also look at the top ten species recorded during each year.

MP_3

Eighteen point counts were completed on MP_3 in 2019 and were compared with wildlife information from previous assessments. Grassland bird species richness decreased slightly, from 3.4 ± 1.0 (2014), to 3.3 ± 1.6 (p = 0.35, t = -0.40). There was also no significant difference in grassland bird species diversity from 2014 (1.0 ± 0.4) to 2019 1.0 ± 0.5 (p = 0.43, t = -0.18). Analysis comparing all three assessment years to each other could not be completed as survey methods were different from baseline year to second reassessment year.

Richardson's ground squirrel was the most recorded species in 2019 but was not among the top five most abundant species in 2014 (+457% increase, Table 16). Savannah sparrow (*Passerculus sandwichensis*) and common yellowthroat also increased in abundance in 2019, whereas clay-colored sparrow (*Spizella pallida*), vesper sparrow (*Pooecetes gramineus*) and western meadowlark (*Sturnella neglecta*) all declined. In 2019, sharp-tailed grouse, Brewer's blackbird (*Euphagus cyanocephalus*), horned lark (*Eremophila alpestris*) and Canada goose (*Branta canadensis*) all fell from the top 10 species recorded and were replaced by American goldfinch (*Spinus tristis*), willet (*Tringa semipalmata*), yellow warbler (*Setophaga petechia*), brown-headed cowbird (*Molothrus ater*), grasshopper sparrow and white-tailed deer (*Odocoileus virginianus*).

2014		2019	
Species	Total	Species	Total
Clay-colored sparrow	24	Richardson's ground squirrel	39
Sharp-tailed grouse	21	Clay-colored sparrow	21
Western meadowlark	18	Savannah sparrow	19
Vesper sparrow	18	Western meadowlark	14
Savannah sparrow	17	Common yellowthroat	14
Common yellowthroat	8	American goldfinch	5
Richardson's ground squirrel	7	Willet	4
Brewer's blackbird	6	Vesper sparrow	3
Canada goose	4	Yellow warbler	3
Horned lark	2	Brown-headed cowbird Grasshopper sparrow White-tailed deer	2

Table 16. Most abundant species from MP_3 HCS point count data for reassessment years.

Eighty-six 100-m multi-species point counts were conducted at MP_6 in 2019 and compared with wildlife information from previous assessments. Grassland bird species richness decreased significantly from 2014, from 3.3 ± 1.3 to 2.67 ± 1.2 (p < 0.01, t = -3.18). However, there was no significant difference in grassland bird species diversity from 2014 (0.91 ± 0.51) to 2019 (0.79 ± 0.40) (p = 0.07, t = 1.85). Analysis comparing all three assessment years to each other could not be completed as survey methods were different from baseline year to second reassessment year.

Richardson's ground squirrel and chestnut-collared longspur were the two most frequently recorded species at MP_6 in 2019 (Table 17). Ground squirrels increased by 92% since 2014, while chestnut-collared longspurs decreased by 46%. There were also large decreases in horned lark (-39%) and McCown's longspur (-49%) numbers in 2019. Declines in Sprague's pipit (-97%) and Baird's sparrow numbers (-25%) took them out of the top 10 most abundant species in 2019. Two grassland bird species that exhibited large increases in 2019 were western meadowlark (+171%) and the savannah sparrow (+118%).

2014		2019			
Species	Total	Species	Total		
Chestnut-collared longspur	319	Richardson's ground squirrel	486		
Richardson's ground squirrel	253	Chestnut-collared longspur	172		
Horned lark	153	Horned lark	93		
McCown's longspur	73	Savannah sparrow	72		
Vesper sparrow	36	Western meadowlark	38		
Savannah sparrow	33	McCown's longspur	37		
Sprague's pipit	29	Clay-colored sparrow	30		
Baird's sparrow	16	Vesper sparrow	29		
Grasshopper sparrow	15	Common yellowthroat	18		
Western meadowlark	14	Grasshopper sparrow	17		

 Table 17. Most abundant species from point count data for reassessment years on MP_6 property.

Thirty-five point counts were completed on MP_26 in 2019 and were compared to 2014 wildlife data. Species richness decreased slightly from 4.3 ± 1.5 (2014) to 4.2 ± 1.6 (2019), although this difference was not significant (p = 0.68, t = -0.41). Species diversity was essentially unchanged from 1.3 ± 0.3 (2014) to 1.3 ± 0.4 (2019) and was determined to not be significant (p = 0.64, t = -0.48).

Cliff swallows (*Petrochelidon pyrrhonota*) and chestnut-collared longspurs were the two most frequently recorded species at MP_26 in 2019 (Table 18), with chestnut-collared longspurs decreasing by 24% from 2014. There were also decreases in the numbers of savannah sparrows (-66%) and horned larks (-21%) in 2019. There were increases in Sprague's pipits from 4 to 8 recorded (+100%), clay-colored sparrows (+150%) and Baird's sparrows (+83%).

Baseline Year		Reassessment Year			
Species	Total	Species	Total		
Savannah sparrow	60	Cliff swallow	486		
Chestnut-collared longspur	58	Chestnut-collared longspur	172		
Horned lark	37	Horned lark	93		
Richardson's ground squirrel	30	Baird's sparrow	72		
Cliff swallow	15	Clay-colored sparrow	38		
Baird's sparrow	12	Savannah sparrow	37		
Western meadowlark	10	Western meadowlark	30		
Vesper sparrow	9	Richardson's ground squirrel	29		
Clay-colored sparrow	8	Brewer's blackbird	18		
Brewer's blackbird	4	Sprague's pipit	17		
Sprague's pipit	4	Vesper sparrow	8		

 Table 18. Most abundant species from point count data for reassessment years on MP_26 property.

Eight point counts were completed on MP_27 in 2019 and were compared to 2014 wildlife data. Grassland bird species richness increased slightly from 4.3 ± 1.0 (2014) to 5.0 ± 0.9 (2019), although this difference was not significant (p = 0.20, t = 1.43). Species diversity of grassland birds also saw a small increase from 1.3 ± 0.2 (2014) to 1.4 ± 0.2 (2019) but was not significant (p = 0.54, t = 0.65).

Within the top species recorded at point counts, similar numbers of savannah sparrow, Sprague's pipit and western meadowlark were found, all with slight increases (Table 19). Clay-colored sparrows (+5) and Baird's sparrows (+10) saw larger increases in numbers from 2014 to 2019. No horned larks or chestnut-collared longspurs were observed in 2019, but bobolinks and grasshopper sparrows were two new species that were recorded in 2019.

Baseline Year		Reassessment Year			
Species	Total	Species	Total		
Boreal chorus frog (<i>Pseudacris maculata</i>)	101	Savannah sparrow	20		
Savannah sparrow	18	Bobolink	13		
Sprague's pipit	5	Baird's sparrow	11		
Western meadowlark	5	Clay-colored sparrow	7		
Blue-winged teal (Spatula discors)	4	Western meadowlark	7		
Chestnut-collared longspur	4	Sprague's pipit	6		
Mallard (Anas platyrhynchos)	4	Grasshopper sparrow	1		
Northern shoveler (<i>Spatula clypeata</i>)	3	Wilson's snipe (<i>Gallinago delicata</i>)	1		
Clay-colored sparrow/gadwall (<i>Mareca strepera</i>)/horned lark	2				

 Table 19. Most abundant species from point count data for reassessment years on MP_27 property.

Based on changes in abundance over time from all four reassessment properties combined, grassland bird species diversity and richness are declining on three of the four properties, but the difference is only significant for one property.

Questionnaires

As of January 2020, 19 new MULTISAR program participant initial questionnaires have been compiled (initiated in 2017), as well as 15 reassessment questionnaires from landholders that have had their HCSs reassessed (initiated in 2011–2012). The reassessment questionnaire consists of open-ended questions with an opportunity to answer many of the questions with multiple responses, opinions and suggestions (Appendix A).

Prior to working with MULTISAR, most of the participants could name a species at risk and could explain why a species could be at risk. Many participants had reservations about species at risk because of their impressions of the federal government's authority regarding these species. All participants believed that their land was or used to be valuable for species at risk habitat and 80% (12/15) believed that species at risk could be beneficial to their ranching operation. By working with the MULTISAR program, 9 of the 15 new participants hoped to receive aid and information in land and range management and 5 landholders wanted more information on wildlife and habitat management.

Overall, the results of the reassessment questionnaire were very positive. The landholders continue to value the friendly and collaborative work that MULTISAR has provided and they appreciate MULTISAR's multi-partner, multi-species and grassroots approach.

After having worked with MULTISAR, most participants have increased their appreciation for species at risk and view them more as an asset than a liability (Figures 5-6). Many of the landholders found that the HCS process helped them learn something about their property as well as empowering them with useful tools for their operation (Figure 7). Others responded that they did not think that change was needed at this time. All but one participant was sure that having an HCS provided the landholder with a tool acknowledging their good range management practices and the provision of habitat to protect species at risk.

On every questionnaire except for one, it was noted that participants increased their knowledge of range management principles and most were prepared to make some changes. When asked what each landholder thought was most beneficial to having an HCS completed on their land they appreciated knowing more about their land and appreciated the report as a tool for assistance with management decision making (Figure 8). All participants were willing to complete projects that would help benefit their cattle operations as well as wildlife and have agreed to work voluntarily with MULTISAR for another five years.



Figure 5. Landholder responses to question #3 of the MULTISAR reassessment questionnaire, 2011–2019.



Figure 6. Landholder responses to question #3a of the MULTISAR reassessment questionnaire, 2011–2019.



Figure 7. Landholder responses to question #7a of the MULTISAR reassessment questionnaire, 2011–2019.



Figure 8. Landholder responses to question #15 of the MULTISAR reassessment questionnaire, 2011–2019.

HCS Reassessment Concluding Remarks

Continuing to strive for a varied landscape will benefit both the livestock producer's operation and wild species' habitat. For the four HCS properties that had range, riparian and wildlife data reassessed and analyzed, most of the range and riparian goals were being met and health scores have either been maintained or were improving at the desired level. Even with the amount of habitat that is being maintained on the landscape, overall declines for most species at risk continue to be an ongoing concern. Sprague's pipit, Baird's sparrow and Brewer's sparrow were the only species at risk that exhibited stable or increasing abundance over time at some point count locations on reassessment properties in 2019. With many factors at play, including habitat type (soil type, plant communities, etc.), climatic conditions and range management, goals may vary between assessment years. In the forthcoming years, based on knowledge acquired through the HCS re-evaluation process, modifications may be made to recommendations and desired outcomes for each property. Adjustments may also be made to allow for improved assessments and monitoring for each HCS.

Monitoring Habitat Enhancements on HCS Participant Properties

Enhancement activities are monitored periodically to determine whether project goals and objectives are being accomplished; this monitoring can help aid in the evaluation process (Margoluis and Salafsky 1998). Problems identified and corrective actions applied during monitoring can help direct future enhancements and/or monitoring protocols. However, determining the success of an enhancement can be a complex question because the habitat manipulation (enhancement) can cause a range of effects, and some observed changes may not be linked to the manipulation (Fletcher *et al.* 2007). Roughly 31 enhancements, which were implemented on several different properties as a result of HCS recommendations, were monitored in 2019. The following is a summary of the key findings for this year.

Restoration Projects

Conversion of cropland back to native grasses can benefit a suite of native wildlife species. Monitoring of enhancement projects that involve native grass restoration has been completed every year for several consecutive years. For detailed objectives and desired measures of success for MULTISAR restoration projects see Downey *et al.* (2011; Section 5.3.1). In total, six restoration sites at two MULTISAR properties were monitored in 2019. Two restoration sites on MP_2 (RP_01 and RP_02), originally implemented in 2010 and 2017 respectively, were monitored for wildlife only. Reseeding on MP_18 has occurred over several years from 2011 to 2018. MP_18 is broken down into four sites for the purpose of this report (RP_01, RP_02, RP_03) and RP_04). Native restoration takes many years to accomplish; therefore, continuing to monitor these areas will be necessary to determine trends for these sites.

RP_01 on MP_2 was reseeded in 2010, but there have been many issues with seed establishment and weeds such as downy brome. Wildlife species observed have been varied, but desirable species like Sprague's pipit are appearing with greater regularity in the last 2 years (Figure 9). The species richness at point count locations on RP_01 in 2019 was five, with seven other species observed incidentally on the property. The species detected were grasshopper sparrow, American kestrel, western meadowlark, Richardson's ground squirrel, Sprague's pipit, brown-headed cowbird, California gull (*Larus californicus*), horned lark, long-billed curlew, savannah sparrow, Swainson's hawk (*Buteo swainsoni*) and vesper sparrow. RP_02 was not surveyed for wildlife in 2019 but will be monitored in 2020.



Figure 9. Abundance for specific grassland bird species on reseeded field in MP_02 RP_01 (2011 was first year post reseed).

MP_18 RP_01 and RP_02 were reseeded in fall 2011 and spring 2012, respectively. Both reseeds have resulted in an increase in litter and range health (Table 20). RP_03, RP_04 and RP_05 were reseeded in 2016, 2017 and 2018 respectively. These reseeds are not fully established and, therefore, they had low range health, litter weight and total vegetation cover values in 2019 (Table 20). Some level of grazing has occurred post reseeding on RP_01, RP_02 and RP_03.

Table 20.	Range information	collected for	restoration	project MP	_18 RP_	_01-RP_	_05

Reseed Location	2012	2013	2014	2015	2016	2018	2019

Range Health Average (%)	40	36	37	46	60	75	68
Litter Average (lbs)	483	467	433	475	1620	683	798
Total Vegetative Cover Average (%)	60	86	93	91	N/A	94	90

RP_01 (three transects/range health assessments)

RP UZ (three transects/range health assessment	RP	02 ((three	transects/range	health	assessments
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Range Health Average (%)	42	37	43	72	71	76	84
Litter Average (lbs)	371	225	308	683	662	690	678
Total Vegetative Cover Average (%)	69	80	87	86	N/A	96	90

RP_03 (one transect/range health assessment)

Range Health Average (%)			51	42
Litter Average (lbs)			160	136
Total Vegetative Cover Average (%)			67	67

RP_04 (one transect/range health assessment)

Range Health Average (%)			19	36
Litter Average (lbs)			50	50
Total Vegetative Cover Average (%)			64	70

RP_05 (one transect/range health assessment)

Range Health Average (%)				13
Litter Average (lbs)				25
Total Vegetative Cover Average (%)				49

The wildlife component of the MP_18 reseeding project was determined by completing wildlife point counts at historical point count locations.

Figures 11–14 show the changes in abundance over time only for specific selected grassland bird species on the reseeded sites (RP_01-04). The graphs show total numbers of each of these species per reseed treatment location from years 2016-2019 (please see prior annual reports to see earlier data). Results compare only recorded point count information, omitting any incidental sightings.

Overall, nine species were recorded on MP_18 RP_01 in 2019, including notable species such as grasshopper sparrow, Baird's sparrow and Sprague's pipit. Pipits have increased from 1 recorded in 2018 to 10 in 2019 (Figure 10). Overall, twelve species were detected on MP_18 RP_02 in 2019, including Baird's sparrow, grasshopper sparrow, Sprague's pipit and the only chestnut-collared longspurs recorded during point counts on the property in 2018 and 2019 (Figure 11).

Overall, eight species were recorded on MP_18 RP_03 in 2019, notably Baird's sparrow (Figure 12). Similarly, eight species were recorded on RP_04 in 2019, with the highest abundance of horned larks on the property for 2019 (Figure 13).



Figure 10. Abundance for specific grassland bird species on reseeded fields in MP_18 RP_01 (fall 2011 reseed).



Figure 11. Abundance for specific grassland bird species on reseeded fields in MP_18 RP_02 (spring 2012 reseed).







Figure 13. Abundance for specific grassland bird species on reseeded fields in MP_18 RP_04 (2018 is first year post reseed).

Shrub/Forb/Grass Plantings

Shelterbelts and shrub planting can increase nesting habitat for a variety of wildlife species such as ferruginous hawks and loggerhead shrikes and increase forage/winter habitat for greater sagegrouse (*Centrocercus urophasianus*), sharp-tailed grouse and pronghorn. Plantings will be monitored yearly for the first five years (unless deemed to be thriving or not successful at all), to determine establishment and growth. See Downey *et al.* (2011; Section 5.3.2) for more detailed objectives and desired measures of success for shelterbelt and shrub planting.

Over the span of several years, MULTISAR has planted plugs for thorny buffaloberry (*Shepherdia argentea*), chokecherry (*Prunus virginiana*), silver sagebrush (*Artemisia cana*), American vetch (*Vicia americana*), golden bean (*Thermopsis rhombifolia*) and needle-and-thread grass (*Hesperostipa comata*). In addition, needle-and-thread grass and silver sagebrush seeds were spread on reseeded areas.

MP_6 had willow stakes planted at two different sites. These two areas will be monitored in 2020.

Artificial Nesting/Roosting Structures

Artificial structures are used by MULTISAR in areas that have the potential to support a species at risk without negatively affecting other species in the area. Artificial structures include raptor nest poles, bat boxes and burrowing owl burrows. Refer to Section 5.3.3 of Downey *et al.* (2011) for objectives and desired measures of success for all of MULTISAR's artificial structures.

Artificial nesting structures monitored in 2019 included 2 artificial burrowing owl tunnels and 11 nest poles installed for ferruginous hawks; areas surrounding designated nest poles are also surveyed for Richardson's ground squirrels as an indicator of prey availability. The burrowing owl tunnels remain unused since 2009 but are in suitable habitat. Seven of the eleven nest poles surveyed on five properties had ferruginous hawks on the nest during the 2019 breeding season, which suggests that the nest poles are having the desired effect. Ground squirrel surveys were conducted at five properties (Table 21).

Weed Control

Sites invaded by noxious and restricted weed species experience reduced range health, as the invading species quickly replace the native vegetation, reducing diversity and productivity. Refer to Section 5.3.5 of Downey *et al.* (2011) for objectives, desired measures of success, and monitoring time frames for weed control enhancement sites. Two sites were monitored in 2019—one for Dalmatian toadflax (*Linaria dalmatica*) and one for Canada thistle. Two new sites that received biocontrol (insects) for leafy spurge and Dalmatian toadflax will be monitored in 2020.

Watering Systems

In 2019, one property (MP_06) with an upland watering system and two properties (MP_29 and MP_17) with portable watering units were visited to document use (including taking photographs). Wildlife surveys were completed at MP_06, and four species were detected: western meadowlark, horned lark, vesper sparrow and Richardson's ground squirrel. On MP_29, three species were recorded at the enhancement site: western meadowlark, red-winged blackbird (*Agelaius phoeniceus*) and cliff swallow. Photo reference points were taken at the portable water units in two pastures for MP_17.

Tree and Shrub Protection

It is generally recommended that trees and shrubs which are experiencing heavy damage by cattle should have fences or corral panels placed around them to help prevent their gradual destruction. Trees, especially lone cottonwood (*Populus balsamifera*) trees, that can be used as nesting sites in pastures by ferruginous hawks should also be protected. Sites at which the landholder implements a tree- or shrub-protection enhancement will be monitored every two years, with photos taken to document the reduced impact of cattle on trees or shrubs. Wildlife species observed using the sites will also be documented. Trees in riparian areas must also be protected from excessive beaver damage. These trees are wrapped with stucco wire where possible.

Monitoring occurred at one location in 2019. Tree protection panels were inspected in July 2019 on MP_43. At the time of inspection, the tree contained an active ferruginous hawk nest (Figure 14).

Participant	2013	2014	2015	2016	2016	2019	2019
Implementation Year	Survey Efforts and Results	Is Desired Effect Occurring and what					
# of Poles							Evidence
MP_8	2.13 km ²	2.26 km ²	2.39 km ²	2.13 km ²	2.13 km ²	2.13 km ²	Yes
2012/2014 4 poles	288 RGSQ*	258 RGSQ	210 RGSQ	228 RGSQ	67 RGSQ	131 RGSQ	3 of 4 nest poles being used by ferruginous hawks
MP_6		1.90 km ²	1.51 km ²	-	-	1.90 km ²	Yes
2013 3 poles	N/A	138 RGSQ	142 RGSQ			124 RGSQ	2 of 3 nest poles being used by ferruginous hawks

Table 21. Richardson's ground squirrel transects and ferruginous hawk artificial nesting structure monitoring in 2019.
MP_25		2.50 km ²	Yes				
2013	N/A	32 RGSQ	59 RGSQ	43 RGSQ	113 RGSQ	51 RGSQ	Nest pole being used by ferruginous hawks
1 pole							
MP_26	2.13 km ²	2.39 km ²	2.39 km ²	2.26 km ²	-	2.01 km ²	Yes
2013 2 poles	71 RGSQ	84 RGSQ	177 RGSQ	95 RGSQ		79 RGSQ	1 of 2 nest poles being used by ferruginous hawks
MP_42	N/A	N/A	N/A	N/A	N/A	1.38 km ²	No
2018						11 RGSQ	Nest pole not being used
1 pole							

*RGSQ = Richardson's ground squirrel



Figure 14. Protected ferruginous hawk nesting site.

Future Direction for Monitoring

In 2020, MULTISAR will continue to monitor a sub-sample of enhancement projects to determine whether desired effects are occurring. Table 22 lists the proposed enhancement monitoring schedule.

able 22. Flathled monitoring of ermancement projects in 2020.			
Enhancement Type and Associated Items to Monitor		# of Site Participa	
Artificial Structures		20	
•	Nest po	bles	
	0	Incorporating 5 Richardson's ground squirrel transects	

 Table 22. Planned monitoring of enhancement projects in 2020.

s or Ints

Restoration Projects	8
Range health transects	
Wildlife point counts	
Shrub/Forb/Grass Plantings	3
Needle-and-thread grass plug sites (2)	
• Native seed: silver sagebrush (1)	
Weed Control	2
Biocontrol sites	
Portable Watering Sites	12
Phone calls to landholders to discuss location of use and success	
Upland Watering Sites	20
Wildlife point counts	
Range health transects	
Photos taken	
Photos taken Tree and Shrub Protection	7
Photos taken Tree and Shrub Protection Wildlife point count	7
 Photos taken Tree and Shrub Protection Wildlife point count Vegetation regrowth recorded 	7
 Photos taken Tree and Shrub Protection Wildlife point count Vegetation regrowth recorded Photos taken 	7
Photos taken Tree and Shrub Protection Wildlife point count Vegetation regrowth recorded Photos taken Riparian Protection	7 3

MULTISAR and the Conservation and Recovery of Alberta's Species at Risk

The MULTISAR program provides conservation of multiple species at risk (SAR), and associated fish and wildlife, within the Grassland Natural Region, Parkland Natural Region and Rocky Mountain Natural Region of Alberta. A key component of the MULTISAR program is to implement recovery actions for *Endangered* and *Threatened* species in these natural regions. To better understand how MULTISAR is addressing the recovery of species at risk, a review of existing provincial recovery plans was completed. This review included:

Burrowing owl (Alberta Environment and Sustainable Resource Development [AESRD] 2012a)

Ferruginous hawk (Alberta Ferruginous Hawk Recovery Team 2009)

Greater sage-grouse (AESRD 2013a)

Short-horned lizard (AESRD 2013b)

Swift fox (Alberta Swift Fox Recovery Team 2007)

Northern leopard frog (AESRD 2012b)

St. Mary's/Rocky Mountain sculpin (*Cottus bairdi*) (The Alberta Rocky Mountain Sculpin Recovery Team 2013)

Stonecat (Noturus flavus) (The Milk River Species at Risk Recovery Team 2014)

Western silvery minnow (*Hybognathus argyritis*) (The Milk River Fish Species at Risk Recovery Team 2008)

Soapweed (Yucca glauca) and yucca moth (Tegeticula yuccasella) (AESRD 2013c)

Small-flowered sand-verbena (*Tripterocalyx micranthus*) (Alberta Small-flowered Sand-verbena Recovery Team 2012)

Tiny cryptantha (Cryptantha minima) (Alberta Tiny Cryptantha Recovery Team 2012)

Westslope cutthroat trout (The Alberta Westslope Cutthroat Trout Recovery Team 2013)

Whitebark pine (*Pinus albicaulis*) (Alberta Whitebark and Limber Pine Recovery Team 2014a)

Limber pine (Alberta Whitebark and Limber Pine Recovery Team 2014b)

Western spiderwort (Tradescantia occidentalis) (AESRD 2013d)

Provincial conservation and management plans for Special Concern species were also reviewed:

Harlequin duck (*Histrionicus histrionicus*) (Alberta Sustainable Resource Development [ASRD] 2010)

Long-billed curlew (AEP 2017a)

Prairie falcon (AESRD 2012c)

Sprague's pipit (AEP 2017b)

Prairie rattlesnake (AEP 2016a)

Western small-footed myotis (AESRD 2012d)

Western blue flag (*Iris missouriensis*) (Canada Western Blue Flag Maintenance/Recovery Team 2002)

Great Plains toad (Anaxyrus cognatus) (AEP 2015b)

Long-toed salamander (Ambystoma macrodactylum) (AEP 2016b)

White-winged scoter (Melanitta fusca deglandi) (AESRD 2012e)

Hare-footed locoweed (Oxytropis lagopus var. conjugens) (AEP 2016c)

For each species, a review of the recovery and conservation management actions that have been or will be addressed by MULTISAR since the program's inception in 2002 was conducted. The following sections detail how MULTISAR addresses or intends to address these actions, as well as the associated measures of success.

Burrowing Owl

Recovery Strategy: Habitat Management and Protection

Determine BMPs and encourage stewardship using the best available knowledge to enhance the quality of burrowing owl habitat and increase burrowing owl densities.

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
1. Stewardship: promote habitat conservation programs to private landholders.	MULTISAR is a conservation program designed for landholders with SAR on their land.	55 HCSs, 3 HMPs, 82 SARC plans and 22 BMP assessments have been completed as of March 2020.
	MULTISAR works cooperatively with other non- governmental organizations to support private landholders.	MULTISAR has directly contacted over 300 landholders about the species.
2. Implementation of beneficial management practices.	Developed BMPs for the species in 2004. Implements BMPs in the Milk River Basin through the HCS program. Implements BMPs throughout the GNR through the SARC plan program.	Developed BMPs for the species which were adopted by Alberta's recovery team. Distributed burrowing animal BMP information via brochures and within reports to approximately 77 landholders throughout the GNR. Recommended burrowing owl BMPs on approximately 193 020 acres on HCS properties, 873 acres on HMP properties, and 16 500 acres on SARC plan properties.

Table 23. MULTISAR's contribution to the implementation of information and outreach actionsidentified in the burrowing owl recovery plan (AESRD 2012a).

 3. Management of fossorial mammals: encourage land managers to maintain management systems that sustain availability of fossorial animal burrows for burrowing owls. and 4. Manage control of fossorial mammals. 	Developed BMPs for keystone species. Monitored ground squirrel populations throughout the GNR and through the HCS program. Encourages landholders to provide habitat for keystone species through the HCS and SARC plan programs.	Provided management recommendations specifically for keystone species on 184 147 acres. MULTISAR team has helped influence landholders to maintain over 305 875 acres of native prairie habitat for use by keystone species. Created two artificial nest burrows for burrowing owls to compensate for the lack of keystone species in these areas.
		Distributed burrowing animal BMPs to approximately 77 landowners via brochures and within reports.

6. Enhance habitat quality: increase the area and enhance the quality of burrowing owl habitat through increasing habitat patch sizes and reducing habitat fragmentation.	The MULTISAR program promotes a mosaic of range regimes and grass heights through: a. MULTISAR BMPs b. HCSs c. HMPs d. SARC plans	55 HCSs have been completed as of March 2020. As of March 2020, MULTISAR has been active on 514 593 acres through the HCS program, 5459 acres through the HMP program, and 156 254 acres through the SARC plan program.
	e. education outreach and awareness program	193 020 acres have been conserved for burrowing owls through the HCS program, 2970 acres through the HMP
	The HCS program identifies key habitat for conservation of	program, and 16 500 acres through SARC plans.
	burrowing owls and other species at risk and develops an integrated plan balancing the needs of the species with the other land users, including the rancher.	Approximately 190 habitat improvements developed in burrowing owl range using incentives from other NGOs and existing government programs.
	Works on both private and public land.	Over 1400 acres have been
	Uses the concept of natural variation in range	burrowing owl range through 11 reseed projects.
	management. Promotes habitat connectivity.	Over 362 513 acres are currently being maintained as
	Promotes reseeding projects in marginal areas surrounded by native prairie.	native prairie habitats by MULTISAR.
	Incentives are provided to landholders as free assessments through the HCS, HMP and SARC plan programs and the implementation and cost sharing of habitat improvement projects for rangelands.	

7. Minimize impacts of industrial development.	Information on the effects of industrial developments is included in all HCSs, HMPs and SARC plans. Developed and updated an industrial guidelines brochure for landholders.	Over 333 landholders have been given information on minimizing the impact of industrial developments. Recommended setbacks and timing conditions match the GOA/Alberta Energy Regulator recommendations.
9. Integrated management planning: provide burrowing owl conservation input into land management planning processes.	Developed habitat model for the burrowing owl. Assisted in developing a user- friendly tool to identify areas of high priority for the burrowing owl.	Developed a habitat suitability index (HSI) model to identify habitat for the species on the landscape. Currently developing a GVI-based resource selection function (RSF) model.
		HSI tool available for use by all prairie region biologists and available for download by industry and the public on the AEP website.
		A multiple conservation value (MCV) model was created for 14 priority wildlife species, including the burrowing owl, using existing RSF and HSI models developed by MULTISAR, to enable prioritization of management activities in the GNR.

Recovery Strategy: Population Conservation and Management

Implementation of policies and programs that maintain or increase the burrowing owl population in Alberta.

 Table 24. MULTISAR's contribution to the implementation of the population conservation and management actions identified in the burrowing owl recovery plan (AESRD 2012a).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
 Reduce avian predation: implement BMPs to reduce mortality arising from avian predation. and Limit negative impacts of pesticides. 	Developed BMPs for the species in 2004, which discussed reducing perch locations for avian predators. BMPs also discussed burrowing owls' sensitivity to pesticides and the need to leave a 500-m setback distance around burrows when applying pesticides.	Distributed burrowing animal BMPs to 77 landholders throughout the GNR.
	Performed pre-development surveys prior to installation of hawk nesting platforms and erected fences to reduce conflicts between avian predators and burrowing owls.	

Recovery Strategy: Population Monitoring

Monitor populations of burrowing owls.

 Table 25. MULTISAR's contribution to the implementation of population monitoring actions identified in the burrowing owl recovery plan (AESRD 2012a).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
 Systematic monitoring: implement long-term systematic monitoring approach using trend blocks. and Monitor productivity: continue to record productivity in specific nesting areas and develop a consistent method to do so. 	Aids in the completion of trend block surveys. Developed an in-house monitoring system which includes revisiting known burrowing owl nesting locations on MULTISAR cooperators' properties.	Over 130 individual sightings entered into FWMIS by MULTISAR since 2002. MULTISAR has taken part in GOA trend surveys for burrowing owls since 2005.
 Public reporting and data management. and Refine database. 	All information collected through the HCS, HMP and SARC plan programs has been entered into FWMIS.	

Recovery Strategy: Information and Outreach

Increase support of the burrowing owl and prairie conservation through public education and awareness programs.

Table 26.	MULTISAR's contribution to the implementation of information and outreach actions	
	identified in the burrowing owl recovery plan (AESRD 2012a).	

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
 Public education opportunities: increase general public awareness of grassland conservation, the burrowing owl, and related prairie conservation issues. and Landholder awareness: make direct contact with landholders to explain the status of burrowing owls, BMPs, and potential mitigation measures. 	Provides management information to landholders through the HCS, HMP and SARC plan programs. Develops educational materials and presentations, including the <i>At Home on the Range</i> guide for living with Alberta's species at risk. Developed a youth education program with the Prairie Conservation Forum (PCF) and AEP. Delivers presentations to landholders, youth groups and the general public about grassland conservation and prairie conservation issues.	Distributed BMPs via brochures or within reports to 77 private landholders. Have distributed over 12 776 copies of the <i>At</i> <i>Home on the Range</i> guide. Held approximately 140 presentations/public meetings for private landholders, government agencies, watershed groups and school groups. Completed 55 HCSs, 3 HMPs, 82 SARC plans and 22 BMPs.
5. Incentives: inform landholders about existing incentive programs and conservation partnerships available to help conserve burrowing owls.	Incentives are provided to landholders in the form of free assessments through the HCS, HMP and SARC plan programs and the implementation and cost sharing of habitat improvement projects for rangelands. Informs landholders of incentive programs through the annual <i>Grassland Gazette</i> .	Approximately 187 habitat improvements developed in burrowing owl range through the MULTISAR program using incentives from other NGOs and existing government programs. Distributed 4052 copies of the <i>Grassland Gazette</i> to landholders in the GNR.

Recovery Strategy: Research

Work with AEP, Environment and Climate Change Canada, non-governmental organizations and universities to complete the following research actions provided in Table 27.

Table 27.	MULTISAR's contribution to the implementation of research actions identified in the
	burrowing owl recovery plan (AESRD 2012a).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
1a. Beneficial management practices: conduct research on different management techniques to improve habitat for burrowing owls and their prey and to increase owl densities.	HCS program identifies key habitat for conservation of burrowing owls and other species at risk and develops an integrated plan balancing the needs of the species with the other land users, including the rancher.	36 HCSs and 2 HMPs have been completed within burrowing owl range. Distributed over 75 burrowing animals BMPs via brochures or within reports.
and 1c. Fossorial mammals: encourage study of the relationships between burrowing owls and fossorial mammals. and	MULTISAR makes recommendations for all habitat types and not just specifically for potential nesting areas. These other habitat types include foraging areas for burrowing owls.	
1d. Prey management: manage habitat to maximize prey densities near burrowing owl nests.		

Recovery Strategy: Plan Management and Administration

 Table 28. MULTISAR's contribution to the implementation of plan management and administration actions identified in the burrowing owl recovery plan (AESRD 2012a).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
1. Coordinate research effort: research activities will need to be properly permitted and coordinated to maximize benefits from research and minimize disturbance to the population.	MULTISAR is a partnership between AEP, ACA and PCF and meets requirements of the federal Habitat Stewardship Program.	Maintained successful partnerships between agencies/organizations.
3. Data submission: survey data will be entered into FWMIS.	All information collected through the HCS, HMP and SARC plan programs has been entered into FWMIS.	Over 130 observations entered into FWMIS by MULTISAR since 2002.

Burrowing Owl Summary

The MULTISAR program goals and objectives are closely aligned to many of the key action items identified in the provincial burrowing owl recovery plan. MULTISAR is a valuable tool in achieving action objectives of the recovery plan; in particular, the objectives pertaining to landholder education, development of tools such as the burrowing owl BMPs, maintenance of native prairie habitat, retention of burrows and keystone species, and multi-species conservation on the prairie. The MULTISAR program should continue to be used as a key tool in delivering the objectives of the burrowing owl recovery plan.

Ferruginous Hawk

Recovery Strategy: Habitat Management

Table 29. MULTISAR's contribution to the implementation of habitat management actionsidentified in the ferruginous hawk recovery plan (Alberta Ferruginous Hawk Recovery
Team 2009).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
1.3 Habitat protection: provide information and education encouraging retention of trees for nest	Provides management information to landholders through the HCS, HMP and SARC plan programs.	180 728 acres are being managed for ferruginous hawks through the HCS program.
sites. and 1.4 Habitat development: erect nest platforms in suitable habitat where no conflicts with other SAR exist.	Maintains native habitat, including trees used for nesting. Developed Raptor BMP and Artificial Nest Platforms for Ferruginous Hawks brochures for landholder use.	Distributed 111 <i>Raptor BMP</i> and 353 <i>Artificial Nest</i> <i>Platforms for Ferruginous</i> <i>Hawks</i> brochures to landholders. 22 nest poles have been installed on MULTISAR
	Identifies sites where long- established nesting trees have fallen down or where suitable nesting habitat exists and assists in erecting artificial nest poles.	cooperators' land.
	Promotes the importance of ferruginous hawks to landholders, especially for pest control.	

1.6 Financial incentives to agricultural producers for providing SAR habitat.	Develops free HCS, HMP and SARC plans. Developed BMP-specific plans addressing the suitability of the habitat for ferruginous hawk nest poles. Installed free raptor nesting poles at key locations.	Completed 55 HCSs, 3 HMPs, 82 SARC plans and 22 BMP plans, all of which have highlighted the benefits of providing habitat for ferruginous hawks. Has erected 22 nest poles for ferruginous hawks.
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Recovery Strategy: Reduction of Human Disturbances

Table 30. MULTISAR's contribution to the implementation of the reduction of human disturbanceactions identified in the ferruginous hawk recovery plan (Alberta Ferruginous HawkRecovery Team 2009).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
2.1 Industrial land planning: provide information on current and historical nesting locations and use of <i>Sensitive</i> <i>Species Inventory</i> <i>Guidelines</i> (AESRD 2013e).	All information collected through the HCS, HMP and SARC plan programs has been entered into FWMIS. Developed <i>Industrial</i> <i>Guideline</i> brochure for SAR. HCSs, HMPs and SARC plans include industrial guidelines for ferruginous hawks.	Over 842 ferruginous hawk observations have been entered into FWMIS by MULTISAR since 2002. Distributed 96 <i>Industrial</i> <i>Guideline</i> brochures to landholders. MULTISAR has completed 55 HCSs, 3 HMPs, 82 SARC plans and 22 BMP plans, all of which have provided industrial guidelines for raptors, including ferruginous hawks.

Recovery Strategy: Reduction of Human-caused Mortality

Table 31. MULTISAR's contribution to the implementation of the reduction of human-causedmortality actions identified in the ferruginous hawk recovery plan (Alberta FerruginousHawk Recovery Team 2009).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
3.0 Information and education programs to discourage persecution of species at risk.	Promotes the importance of species at risk to landholders for pest control. Works with landholders to convey that species at risk, including the ferruginous hawk, are beneficial, as opposed to detrimental, to their operation. Develops educational material and presentations including a youth education presentation on raptors at risk and the <i>At Home on the</i> <i>Range</i> brochure for living with Alberta's species at risk.	Has contacted over 1924 landholders since 2002 and distributed over 12 776 copies of the <i>At Home on the Range</i> brochure. Completed 55 HCSs, 3 HMPs, 82 SARC plans and 14 BMP plans, all of which explain the benefits of raptors to landholders. Held 140 presentations/public meetings for private landholders, government agencies, watershed groups and school groups.

Recovery Strategy: Population Monitoring and Research

Table 32. MULTISAR's contribution to the implementation of population monitoring and researchactions identified in the ferruginous hawk recovery plan (Alberta Ferruginous HawkRecovery Team 2009).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
5.1 and 7.1 Population monitoring and inventories every five years.	Participates in the five-year ferruginous hawk population inventory and annual trend monitoring surveys. Records all ferruginous hawk sightings and nest locations and submits observations to FWMIS.	Completes approximately nine ferruginous hawk quadrants each year. In the 2010 provincial monitoring year, completed 28 ferruginous hawk quadrants and <i>The 2015 Ferruginous</i> <i>Hawk Inventory and</i> <i>Population Analysis</i> (Redman 2016). Over 842 ferruginous hawk observations have been entered into FWMIS by MULTISAR since 2002.
7.3 Monitoring of and research into prey (including annual ground squirrel trend surveys).	Monitored ground squirrel populations throughout the GNR.	Assisted in completing over 61 transects as part of the ground squirrel monitoring program.
7.5 Research on range management and ferruginous hawks.	Conducts range health assessments on grasslands through the HCS program.	Conducted range health assessments on 55 HCS properties covering an area of approximately 514 593 acres.

7.8 Monitoring of ferruginous hawk population health.	Participates in the five-year ferruginous hawk population inventory with AEP and annual trend monitoring surveys. Records all ferruginous hawk sightings and nest locations and submits observations to FWMIS.	Completes approximately nine ferruginous hawk quadrants annually since 2003. In the 2015 provincial monitoring year, completed 28 ferruginous hawk quadrants. Over 842 ferruginous hawk observations have been entered into FWMIS by MULTISAR since 2002.
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Recovery Strategy: Information and Outreach

Table 33. MULTISAR's contribution to the implementation of information and outreach actionsidentified in the ferruginous hawk recovery plan (Alberta Ferruginous Hawk Recovery
Team 2009).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
6.1 Increase awareness of ferruginous hawks and native prairie conservation and foster action through stewardship.	Developed and implemented species BMPs; produced BMP brochures for raptors, as well as a BMP brochure for the ferruginous hawk's main prey, the Richardson's ground squirrel. Provides BMPs to landholders through the HCS, HMP and SARC plan programs. Promotes the importance of species at risk to landholders for pest control. Works with landholders to convey that species at risk, including the ferruginous hawk, are beneficial, as opposed to detrimental, to their operation.	Has contacted over 1924 landholders since 2002 and distributed over 12 776 copies of the <i>At Home on the Range</i> guide. Has completed 55 HCSs, 3 HMPs, 82 SARC plans and 22 BMP plans, all of which explain the benefits of raptors to landholders. Held approximately 140 presentations/public meetings for private landholders, government agencies, watershed groups and school groups. Has distributed approximately 111 raptor, 60 ground squirrel and 75 burrowing animals BMP brochures to landholders.
	Develops educational material and presentations including a youth education presentation on raptors at risk, the <i>At Home on the</i> <i>Range</i> guide for living with Alberta's species at risk, and participated in the development of the <i>Artificial</i> <i>Nest Poles for Ferruginous</i> <i>Hawks</i> brochure.	

Ferruginous Hawk Summary

The MULTISAR program goals and objectives are closely aligned to many of the key action items identified in the ferruginous hawk recovery plan. MULTISAR is key for achieving objectives related to landholder education, influencing the maintenance of native prairie habitat, retention of nest sites and keystone species and multi-species conservation on the prairie. MULTISAR has also developed relationships with energy distribution companies to assist with erecting artificial nesting poles. The MULTISAR program should continue to be used as a key tool in delivering the objectives of the ferruginous hawk recovery plan.

Greater Sage-grouse

Recovery Strategy: Habitat Conservation and Management

Conserve and manage habitat for greater sage-grouse in order to satisfy life cycle requirements and support of a viable population within its remaining historical range.

2013a).		
Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
1.1 Conduct impact assessments of anthropogenic disturbance.	During HCS, HMP and SARC plan field surveys, all anthropogenic features are documented and information is forwarded to the provincial sage-grouse recovery biologist.	All features have been documented and site-specific information has been gathered since 2014.
1.3 Establish or maintain protective notations around known lek sites regardless of activity.	The HCS program encourages habitat protection in and around active and historical sage- grouse leks.	Three historical leks are present within MULTISAR cooperator properties.

Table 34. MULTISAR's contribution to the implementation of habitat conservation andmanagement actions identified in the greater sage-grouse recovery plan (AESRD2013a).

 1.11 Inform ranchers on recognizing key habitat types that support sage-grouse. and 1.12 Encourage landowners to collaborate with programs like MULTISAR. and 1.14 Identify sites where grazing disturbance is not optimal and encourage landholders to enhance plant community. and 1.15 Promote stocking rates and rotational grazing to improve sage-grouse habitat. 	Where sage-grouse habitat is present on HCS cooperators' lands, MULTISAR will make appropriate range management and industrial recommendations to benefit the species. Range health assessments are completed for all HCSs. Range and wildlife analyses are completed for each HCS and take into consideration sage-grouse within their range.	Eight HCSs have been completed that directly target management of habitat for sage-grouse. Range health assessments and vegetation inventories have been conducted through eight HCSs on over 133 252 acres in sage-grouse range, including 51 862 acres in sage-grouse critical habitat.
1.16 Through the MULTISAR program, provide incentives to landowners and lessees for appropriate land management.	Currently, MULTISAR is working on restoration projects to return cultivated lands back to native grasslands in sage-grouse range using local species that include silver sagebrush. Removed anthropogenic features that attract predators from sage-grouse critical habitat.	So far, 960 acres have been reclaimed in sage-grouse range, including 320 acres considered as critical habitat. Six old buildings and one shelterbelt were removed from three sites within critical habitat.

Recovery Strategy: Population Management and Enhancement

Table 35. MULTISAR's contribution to the implementation of population management and
enhancement actions identified in the greater sage-grouse recovery plan (AESRD
2013a).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
2.1 Continue annual counts at lek sites.	Continue to assist AEP during the annual lek census, when needed.	Historical leks are present within MULTISAR cooperator properties.
		MULTISAR has participated in the annual lek counts since 2005 and continues to assist AEP with lek counts as needed.
2.9 Provide support for appropriate projects such as marking fence lines with reflectors to prevent mortalities through collisions.	Installing fence markers within sage-grouse critical habitat.	Markers have been installed on 36 km of fences within sage-grouse critical habitat.

Recovery Strategy: Outreach and Information

 Table 36. MULTISAR's contribution to the implementation of outreach and information actions identified in the greater sage-grouse recovery plan (AESRD 2013a).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
 4.3 Distribute maps of sage-grouse habitat to producers to encourage them to steward these areas in order to benefit sage-grouse. and 4.4 Provide guidance to landholders on watering site developments, cross fencing and salt placement in sage-grouse habitat. 	Sage-grouse critical habitat maps and BMPs are provided to MULTISAR cooperators as part of HCSs. MULTISAR cost shares and/or provides direct funding/support for landholders for various habitat improvement projects in sage-grouse range. MULTISAR also consults with landholders to ensure that other enhancement projects within sage-grouse habitat do not negatively affect the species.	HCSs have been completed that directly target management of habitat for sage-grouse. Has provided funding/support for 12.8 km of wildlife-friendly cross fencing and three water developments with the goal of improving range and riparian health within sage-grouse habitat.

Recovery Strategy: Plan Management and Administration

Table 37. MULTISAR's contribution to the implementation of plan management andadministration actions identified in the greater sage-grouse recovery plan (AESRD2013a).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
5.3 Enter population data into the FWMIS database following each field season.	Records all sage-grouse sightings in FWMIS.	Over 50 sage-grouse observations have been entered into FWMIS by MULTISAR since 2002.

Greater Sage-grouse Summary

MULTISAR continues to play a role in the recovery of greater sage-grouse in Alberta. MULTISAR is involved in almost all actions within the recovery plan where Alberta Fish and Wildlife or Alberta

Public Lands is listed as the lead. This includes habitat and species monitoring, implementation of BMPs within critical habitat, and education. Starting in the summer of 2014, MULTISAR began gathering information on anthropogenic features within critical sage-grouse habitat and will assist with their removal if required. MULTISAR will continue to assist with the recovery of greater sage-grouse in Alberta.

Short-horned Lizard

Currently, there is not a recovery plan for short-horned lizards in Alberta. A draft plan is proposed to be released in the next several years. A recovery action summary has been developed based on recommendations from the Endangered Species Conservation Committee. Within this action summary, several recovery actions have been initiated and/or are ongoing.

Recovery Strategy: Population Conservation and Management

Table 38. MULTISAR's contribution to the implementation of population conservation and
management actions identified in the short-horned lizard recovery action summary for
2012–2013 (AESRD 2013b).

Actions as Identified in the Recovery Action Summary	MULTISAR's Contribution	Measure of Success
1.1 An initial population estimate has been completed with a more detailed estimate still required.	All lands with the potential of providing short-horned lizard habitat are identified and surveyed for each new HCS, HMP and SARC plan. MULTISAR conducts periodic surveys for short- horned lizards on properties where populations have been identified.	Species-specific surveys have been completed on 14 properties identified as having lizard habitat. MULTISAR has identified/confirmed five populations of short-horned lizards and have entered 80 sightings into FWMIS since 2002.
	MULTISAR contributes data to FWMIS through the HCS, HMP and SARC plan programs. MULTISAR assists AEP biologists with provincial lizard occupancy surveys when needed.	MULTISAR assisted AEP biologists search three historical lizard locations in 2015, and confirmed active lizard populations at those sites.

1.2 Upcoming monitoring for changes in habitat quality.	MULTISAR conducts monitoring of rangelands for all HCS properties every five years. MULTISAR provides BMPs to landholders within short- horned lizard habitat in order to appropriately manage rangelands within lizard habitat.	MULTISAR has conducted approximately nine HCS assessments and subsequent reassessments on properties with confirmed lizard populations and five HCS assessments and four reassessments on lands with identified suitable habitat. More than 13 reptile BMP fact sheets, 801 short-horned lizard fact cards and 453 <i>Reptiles of</i> <i>Alberta</i> booklets have been distributed to landholders and the public.
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Recovery Strategy: Habitat Conservation and Management

Table 39. MULTISAR's contribution to the implementation of habitat conservation andmanagement actions identified in the short-horned lizard recovery action summary for2012–2013 (AESRD 2013b).

Actions as Identified in the Recovery Action Summary	MULTISAR's Contribution	Measure of Success
2.2 An HSI model developed for short- horned lizards identifies areas likely to provide habitat for the species.	HSI models are used in order to locate potential habitat areas for short- horned lizards, which aids in targeting searches for this species. MULTISAR directly contributed to the development of habitat models for short-horned lizards.	Suitable short-horned lizard habitat has been identified on 14 properties that work directly with MULTISAR. One HSI and one RSF model were developed by MULTISAR for the species. To enable prioritization of management activities in the GNR, an MCV model was created for 14 priority wildlife species, including the short-horned lizard, using existing RSF and HSI models developed by MULTISAR.

Recovery Strategy: Information and Outreach

Table 40. MULTISAR's contribution to the implementation of information and outreach actionsidentified in the short-horned lizard recovery action summary for 2012–2013 (AESRD2013b).

Actions as Identified in the Recovery Action Summary	MULTISAR's Contribution	Measure of Success
3.1 Public education regarding short- horned lizards and their habitat requirements is promoted through prairie conservation organizations.	Developed reptile BMP brochure to give to landholders. MULTISAR completes HCSs, HMPs and SARC plans in short-horned lizard habitat and involves the landholder in developing stewardship approaches on their land.	Distributed over 34 reptile brochures to landholders whose land may contain short-horned lizard habitat. Has worked directly with 14 landholders within short- horned lizard habitat.

Short-horned Lizard Summary

MULTISAR has contributed to the recovery of the short-horned lizard in southern Alberta through several key actions pertaining to population and habitat conservation and management and public education. MULTISAR will continue to implement these actions to assist in the recovery of this species.

Swift Fox

Recovery Strategy: Enhance and Maintain Habitat

Enhance and maintain habitat for swift foxes to satisfy life cycle requirements.

Table 41. MULTISAR's contribution to the implementation of the enhancement and maintenance of habitat actions identified in the swift fox recovery plan (Alberta Swift Fox Recovery Team 2007).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
1.1 Place protections on all known current swift fox dens and eliminate disturbance of known den sites by 2009.	MULTISAR contributes data to FWMIS through the HCS, HMP and SARC plan programs.	Entered 6 den sites and 18 individual observations into FWMIS since 2002.
1.3 Increase habitat area protected by stewardship, providing for a sustainable ranching industry and high-quality habitat by 2011.	MULTISAR encourages voluntary stewardship, particularly within its HCS program.	The HCS program is currently working on over 222 900 acres in swift fox range.

Recovery Strategy: Communication of Information

Communicate information about swift foxes to land managers, industry, trappers, recreational users and other relevant parties in the areas for the purpose of fostering stewardship of the species and its habitat.

Table 42. MULTISAR's contribution to the implementation of communication of informationactions identified in the swift fox recovery plan (Alberta Swift Fox Recovery Team2007).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
4.1 Develop and	Developed burrowing animal	Over 12 776 At Home on the
disseminate an information	BMP brochure.	Range: Living with Alberta's
package for outreach and	Developed <i>At Home on the</i>	Prairie Species at Risk guides
education aimed at land	<i>Range: Living with Alberta's</i>	have been distributed.
managers, industry,	<i>Prairie Species At Risk</i>	75 burrowing animal BMPs
trappers and recreational	guide, which provides	distributed via brochures or
users by 2008.	information on the swift fox.	within reports.

4.2 Contact all relevant stakeholders to identify conservation and stewardship opportunities for swift foxes by 2009.	MULTISAR works with several ranchers within swift fox range and has conveyed the importance of the species.	MULTISAR has worked directly, through HCSs, with six landholders known to have swift foxes on their properties.
4.3 Integrate swift fox biology and conservation information, along with other SAR and prairie conservation information, into local and provincial school curricula by 2008.	Developed a youth education program for species at risk.	MULTISAR has completed more than 56 school presentations.
4.4 Disseminate information regarding Alberta SAR program, illustrating potential benefits of stewardship activities for landowners, by 2007.	MULTISAR is working to help landholders benefit from SAR. This is achieved through partnerships and education about sustainable ranching practices.	MULTISAR has directly contacted over 1924 landholders since 2002. Approximately 12 776 At Home on the Range: Living with Alberta's Prairie Species at Risk guides have been distributed to landholders and land managers.

Swift Fox Summary

MULTISAR is contributing to many of the action items listed in the swift fox recovery plan and has even been listed in the recovery plan under several actions as a means of achieving an objective. This is positive as it shows MULTISAR's ability to work as a tool for SAR in Alberta's GNR.

Northern Leopard Frog

Recovery Strategy: Population Conservation and Management

Table 43. MULTISAR's contribution to the implementation of population conservation andmanagement actions identified in the northern leopard frog recovery plan (AESRD2012b).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
1.2 Conduct surveys of all currently occupied sites a minimum of once every five years.	MULTISAR conducts northern leopard frog surveys of known breeding sites identified through HCSs, every five years MULTISAR participated in the 2005 northern leopard frog inventory.	MULTISAR has completed northern leopard frog inventories at over 38 sites.
1.3 Conduct targeted surveys each year to search for previously unknown frog populations.	All waterbodies with the potential to contain northern leopard frog habitat are identified and surveyed for the species during each new HCS. MULTISAR has inventoried key areas of the Milk River Basin for evidence of breeding, primarily through the HCS and SARC plan programs.	One new breeding population was found in the western foothills during 2015 and one new population was found in the Dry Mixedgrass Natural Subregion in 2017. Northern leopard frogs were identified at 4 of the 16 properties assessed from 2016–2018 through the HCS program.
1.7 Conduct reintroduction of eggs to augment populations.	Potential reintroduction sites are identified through MULTISAR's HCS, HMP and SARC plan programs.	Egg masses from a known northern leopard frog breeding site, identified through an HCS, were used to successfully introduce frogs to a wetland in southwestern Alberta.

Recovery Strategy: Habitat Conservation and Management

Table 44. MULTISAR's contribution to the implementation of habitat conservation and
management actions identified in the northern leopard frog recovery plan (AESRD
2012b).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
2.2 Make contact with landholders on private/leased land that supports northern leopard frog populations.	The MULTISAR education and outreach program provides landholders with information on northern leopard frogs, including the importance of maintaining habitat for the northern leopard frog, and what individual landholders can do to help SAR.	Developed and distributed 82 copies of MULTISAR's BMP brochure for wetland species to landholders in the GNR.
2.3 Implement direct management of sites to alleviate threats through cooperative agreements with landholders or other initiatives.	Developed BMPs for the species to provide to landholders. MULTISAR helps implement BMPs through the HCS, HMP and SARC plan programs. Signs agreements with HCS landholders to help ensure sound management of northern leopard frog habitat.	Eight creeks and their adjacent wetlands are being managed for northern leopard frogs through MULTISAR's HCS and SARC plan programs. Installed five portable watering systems, five off-stream watering units and a pipeline on cooperators' lands to help reduce impacts on creeks that support populations of northern leopard frogs.

Recovery Strategy: Information and Education

 Table 45. MULTISAR's contribution to the implementation of information and education actions identified in the northern leopard frog recovery plan (AESRD 2012b).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
3.4 Provide information on leopard frog-related topics to technical and non- technical audiences through presentations, signage and other mechanisms.	Developed and distributed wetland BMP brochures. Provided information through presentations, public meetings and school field trips.	Developed and distributed 82 copies of MULTISAR's BMP brochure for wetland species to landholders in the GNR. Developed and distributed over 1400 northern leopard frog fact cards to the public and 41 <i>Amphibians on My</i> <i>Land</i> brochures to landholders.
		Hosted/participated in 128 presentations/public meetings for private landholders, school groups, government agencies and watershed stewardship groups.
		Led three school group tours of a northern leopard frog reintroduction site.
		Developed interpretive signs about northern leopard frogs and set them up at a reintroduction site.
		Developed a page on the state of northern leopard frogs in the Milk River Basin in the <i>Milk</i> <i>River State of the Watershed</i> <i>Report 2008</i> (Milk River Watershed Council Canada 2008) and in the <i>Milk River</i> <i>Transboundary State of the</i> <i>Watershed Report, 2nd Edition</i> (Milk River Watershed Council Canada 2013).

Recovery Strategy: Research

 Table 46. MULTISAR's contribution to the implementation of research actions identified in the northern leopard frog recovery plan (AESRD 2012b).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
4.3 Cooperate with other research initiatives that will better manage northern leopard frogs in Alberta.	Member of the research and monitoring team of the Milk River Watershed Council Canada, which is looking at solutions to improve water quality in the basin. Developing habitat model to better target new areas that have high potential for the species.	MULTISAR has developed an RSF model based on the GVI biophysical database. An MCV model was created for 14 priority wildlife species, including the northern leopard frog, using existing RSF and HSI models developed by MULTISAR, to enable prioritization of management activities in the GNR.

Recovery Strategy: Plan Management and Administration

Table 47. MULTISAR's contribution to the implementation of plan management and
administration actions identified in the northern leopard frog recovery plan (AESRD
2012b).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
5.3 Enter population data into FWMIS following each field season.	All sightings documented during HCS and SARC plan fieldwork are entered into the FWMIS database.	Since 2002, MULTISAR has contributed 1501 northern leopard frog sightings to the FWMIS database.

Northern Leopard Frog Summary

MULTISAR has contributed to the recovery of the northern leopard frog through three key actions: monitoring, direct management of habitat, and education and awareness. MULTISAR plans to continue to assist in the recovery of this species through these actions.

Rocky Mountain Sculpin, Stonecat and Western Silvery Minnow

Education and Outreach

Table 48. MULTISAR's contribution to the implementation of education and outreach strategiesand actions identified in the recovery plans for Rocky Mountain sculpin (The AlbertaRocky Mountain Sculpin Recovery Team 2013), stonecat (The Milk River Fish Speciesat Risk Recovery Team 2014) and western silvery minnow (The Milk River FishSpecies at Risk Recovery Team 2008).

Strategies/Actions as Identified in the Recovery Plans	MULTISAR's Contribution	Measure of Success
E1., A17. and E1. Improve awareness of the species.	MULTISAR has and will continue to inform landholders bordering the Milk and North Milk rivers of the existence and importance of these three species. HCSs and SARC plans have been completed for landholders along the Milk and North Milk rivers.	Met with over 191 landholders in the Milk River area. Worked with 15 landholders through the SARC plan and HCS programs whose properties directly border the Milk and North Milk rivers. Completed (in 2013) the evaluation of an HCS (developed in 2008) and confirmed a population of the sculpin still present and healthy in one of the tributaries of the North Milk River.
E2., A19. and E2. Encourage stakeholder participation.	MULTISAR completes HCSs and SARC plans in the Milk River area and involves landholders in developing stewardship approaches on their land. MULTISAR works with other stakeholders such as Cows and Fish and the Milk River Watershed Council Canada.	12 HCSs and 3 SARC plans have been completed for landholders whose properties border the Milk and North Milk rivers. MULTISAR attends the Milk River Watershed Council Canada annual general meetings and sits on their research team.

E4., A22 and E4. Discourage species introduction.	MULTISAR has developed a wetland BMP brochure which explains the issues related to the introduction of non-native fish to waterbodies	Has distributed over 84 copies of the wetland BMP brochure to landholders.
	fish to waterbodies.	

Rocky Mountain Sculpin, Stonecat and Western Silvery Minnow Summary

The Rocky Mountain sculpin, stonecat and western silvery minnow recovery plans have similar recovery strategies, and MULTISAR plans to continue supporting these species' recovery teams through education and outreach initiatives, and possibly funding upcoming research projects/inventories. MULTISAR assisted in funding preliminary research on these fish species in 2002–2003 and 2005–2006. MULTISAR is also focused on voluntary stewardship initiatives and will continue to promote appropriate BMPs in the Milk River Basin to protect the rivers and fish within it.

Westslope Cutthroat Trout

Management and Regulation

Table 49.	MULTISAR's contribution to the implementation of management and regulation actions
	identified in the westslope cutthroat recovery plan (The Alberta Westslope Cutthroat
	Trout Recovery Team 2013).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
A27. Apply mitigation measures: range management planning.	MULTISAR completes HCSs, HMPs and SARC plans within the Oldman River drainage and involves the landholder in developing stewardship approaches on their land. This process includes, but is not limited to, establishing suitable stocking rates and grazing regimes to promote riparian ecosystem health.	MULTISAR has worked with seven landholders through the HCS program to maintain approximately 663 acres of riparian habitat in westslope cutthroat trout range.
Westslope Cutthroat Trout Summary

MULTISAR has contributed to the recovery of the westslope cutthroat trout through one key action: the application of mitigation measures, primarily through range management planning. MULTISAR will continue to promote voluntary stewardship initiatives and the implementation of appropriate BMPs in the Oldman River Drainage to protect the waters and aquatic species at risk within it.

Soapweed, Small-flowered Sand-verbena and Tiny Cryptantha

Population Conservation and Management/Plan Management and Administration

Table 50. MULTISAR's contribution to the implementation of population conservation and
management actions identified in the recovery plans for soapweed (AESRD 2013c),
small-flowered sand-verbena (Alberta Small-flowered Sand-verbena Recovery Team
[ASSRT] 2012) and tiny cryptantha (Alberta Tiny Cryptantha Recovery Team [ATCRT]
2012).

Actions as Identified in the Recovery Plans	MULTISAR's Contribution	Measure of Success
1.1, 1.2, 1.2 Survey and monitoring.6.2 Data storage.	Rare plant surveys are completed on those HCS properties where critical habitat of these three species is found.	Confirmed two locations of small-flowered sand-verbena and three locations of tiny cryptantha in the Milk River area. Populations were previously identified in the early 1900s; however, no further information was known until MULTISAR located them.
		Worked through the SARC plan and HCS programs with 15 landholders whose properties directly border the Milk and North Milk rivers.
		Documented and entered 122 observations into the Alberta Conservation Information Management System (ACIMS) database.

1.3 Invasive species inventories (ASSRT 2012; ATCRT 2012).	MULTISAR completes range health assessments for all HCSs and documents the presence and location of any invasive plants (i.e., weeds).	MULTISAR documents and enters all noxious and prohibited noxious weed observations on cooperating lands into the provincial Geographic Land Information Management Planning System (GLIMPS) and Ecological Information Systems (ECOSYS) databases.
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Habitat Conservation and Management

Table 51. MULTISAR's contribution to the implementation of habitat conservation and
management actions identified in the recovery plans for soapweed (AESRD 2013c),
small-flowered sand-verbena (ASSRT 2012) and tiny cryptantha (ATCRT 2012).

Actions as Identified in the Recovery Plans	MULTISAR's Contribution	Measure of Success
 2.2 (AESRD 2013c) and 2.10 (ASSRT 2012; ATCRT 2012) Development of grazing BMPs. 2.11 (ASSRT 2012; ATCRT 2012) Implementation of grazing BMPs. 	Range health assessments are completed for all HCSs. MULTISAR develops grazing BMPs that will benefit rare plants and other species at risk while taking into account landholders' needs. MULTISAR works collaboratively with landholders to implement BMPs.	Worked through the HCS and SARC plan programs with 15 landholders who have critical habitat identified on their properties.

Information and Education

Table 52. MULTISAR's contribution to the implementation of information and education actions identified in the recovery plans for soapweed (AESRD 2013c), small-flowered sand-verbena (ASSRT 2012) and tiny cryptantha (ATCRT 2012).

Actions as Identified in the Recovery Plans	MULTISAR's Contribution	Measure of Success
3.2 (ASSRT 2012; ATCRT 2012) Information distribution.	MULTISAR has and will continue to inform private landholders within the critical habitat areas of these three species and their importance. HCSs and SARC plans have been completed for landholders in those critical habitat areas.	Met with over 191 landholders in the Milk River area. Worked with 15 landholders through the SARC plan and HCS programs who have critical habitat or are adjacent to known critical areas.

Soapweed, Small-flowered Sand-verbena and Tiny Cryptantha Summary

MULTISAR has contributed to the recovery of soapweed, small-flowered sand-verbena and tiny cryptantha through several key actions related to population monitoring, habitat conservation and landholder engagement. The MULTISAR program will continue to participate in recovery actions by documenting species occurrences on cooperating lands and developing/promoting BMPs as a key tool in conserving habitat for these species.

Western Spiderwort

Population Conservation and Management

Table 53. MULTISAR's contribution to the implementation of population conservation and
management actions identified in the western spiderwort recovery plan (AESRD
2013d).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
1.3. Survey for invasive species in habitat containing and/or adjacent to western spiderwort and implement control measures as needed.	MULTISAR completes range health assessments for all HCSs and documents the presence and location of any invasive plants (i.e., weeds). MULTISAR has developed, provided and assisted landholders in implementing BMPs for controlling the spread of invasive plants.	MULTISAR has worked with three landowners within areas of suitable habitat for the western spiderwort. Over 24 invasive plant BMP fact sheets have been distributed to landholders in the GNR.

Habitat Conservation and Management

Table 54. MULTISAR's contribution to the implementation of habitat conservation and
management actions identified in the western spiderwort recovery plan (AESRD
2013d).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
2.4 and 2.6 Provide landholders within western spiderwort range/habitat with range management plans and BMPs to incorporate the management of western spiderwort within their operations.	Range health assessments are completed for all HCSs. MULTISAR develops grazing BMPs that will benefit rare plants and other species at risk while taking into account landholders' needs. MULTISAR works collaboratively with landholders to implement BMPs.	Approximately 65 855 acres within suitable western spiderwort habitat have been included in the development of HCS and HMP plans.

Plan Management and Administration

Table 55. MULTISAR's contribution to the implementation of plan management andadministration actions identified in the western spiderwort recovery plan (AESRD2013d).

Actions as Identified in the Recovery Plan	MULTISAR's Contribution	Measure of Success
7.2 Data will be submitted to the ACIMS database.	MULTISAR has and will continue to enter rare plant observations into the ACIMS database, including western spiderwort.	MULTISAR documents and enters all rare plant observations into the ACIMS database, including western spiderwort, on cooperating lands.

Western Spiderwort Summary

MULTISAR has contributed to the recovery of the western spiderwort through three key actions: inventory and monitoring of invasive species, assisting landholders in implementing BMPs for the species as part of the HCS program, and submitting observations to the ACIMS database. MULTISAR will continue to assist in the recovery of western spiderwort by continuing the HCS program and the recovery actions associated with it in areas of suitable habitat for the species.

Harlequin Duck

Table 56. MULTISAR's contribution to the implementation of management actions identified inthe harlequin duck conservation management plan (ASRD 2010).

Actions as Identified in the Management Plan	MULTISAR's Contribution	Measure of Success
3.1 Inventory and monitoring.	MULTISAR contributes to the spring and late summer harlequin duck surveys in the Oldman/Livingstone drainages and the Castle/Carbondale drainages, when needed.	Involved in harlequin duck trend surveys since 2002. Documented and entered 222 observations into the FWMIS database.

Harlequin Duck Summary

MULTISAR has contributed to the recovery of the harlequin duck through one key action: inventory and monitoring. MULTISAR plans to continue to assist the recovery team and the recovery efforts of this species through participation in annual spring and late summer surveys in harlequin duck priority areas when needed.

Long-billed Curlew

Table 57. MULTISAR's contribution to the implementation of management actions identified in the long-billed curlew conservation management plan (AEP 2017a).

Actions as Identified in the Management Plan	MULTISAR's Contribution	Measure of Success
3.1 Inventory and monitoring.	Inventories areas of suitable habitat through its HCS, HMP and SARC plan programs. Records all observations and enters information into FWMIS.	Surveyed approximately 514 593 acres through the HCS program and 5459 acres through the HMP program since 2002. Participated in the annual provincial monitoring survey from 2002–2007. Participated in the international census in 2004–2005. Has entered over 577 observations into FWMIS.
3.2 Habitat management.	Provides information for landholders and implements BMPs through the HCS, HMP and SARC plan programs. Developed BMP brochure for grassland birds. Reseeding marginal cropland to native grassland. Developed and updated an HSI model and assisted in developing a user-friendly search tool to identify areas of high priority for the long-billed curlew.	MULTISAR has worked to conserve approximately 514 593 acres through the HCS program, 156 254 acres through the SARC plan program, and 5459 acres through the HMP program. MULTISAR and its cooperators have maintained over 321 653 acres of native prairie habitat for use by grassland birds. Has distributed over 108 BMP brochures for grassland birds to landholders. Has reseeded 1400 acres of marginal cropland back to native grassland.

3.4 Education and communication.	Developed BMP brochure for grassland birds for landholder use.	Has distributed over 108 BMP brochures for grassland birds to landholders.
	Provides information for landholders through the HCS, HMP and SARC plan programs.	Has completed 55 HCSs, 3 HMPs and 82 SARC plans, all of which have recommended
	Provides information through public and school presentations.	maintaining native grasslands for grassland birds.
	Developed the brochure At Home on the Range: Living with Alberta's Species at Risk that discusses the habitat needs of	Held approximately 140 presentations/public meetings for private landholders, government agencies and school groups.
	the long-billed curlew and grassland birds in general.	Distributed approximately 12 776 copies of the <i>At Home on the Range</i> guide within the GNR.

Long-billed Curlew Summary

MULTISAR has contributed to the recovery of the long-billed curlew through three key actions: inventories, the maintenance of habitat, and education and communication with the public. MULTISAR plans to continue to assist the recovery team and the recovery efforts for this species through the delivery of the MULTISAR program in priority areas that include the long-billed curlew.

Prairie Falcon

Table 58. MULTISAR's contribution to the implementation of management actions identified inthe prairie falcon conservation management plan (AESRD 2012c).

Actions as Identified in the Management Plan	MULTISAR's Contribution	Measure of Success
3.1 Inventory and monitoring	All prairie falcon observations are documented and entered into the FWMIS database.	Submitted more than 102 sightings and 61 nesting locations to the FWMIS database.

 3.2 Habitat management: 2. Maintain healthy rangelands with the understanding that a mosaic of grazing disturbances will benefit a variety of species. and 3. Limit the use of chemical ground squirrel control agents. 	MULTISAR is a multi-species management program that encourages appropriate management of habitat for over 17 species at risk, including the prairie falcon, through HCSs, HMPs and SARC plans. Promotes the importance of species at risk to landholders for pest control. Developed habitat models for the species to assist with identifying suitable habitat and focus habitat conservation efforts.	MULTISAR has worked to conserve approximately 514 593 acres through the HCS program, 156 254 acres through the SARC plan program, and 5459 acres through the HMP program. MULTISAR team has helped maintain over 321 653 acres of native prairie habitat for use by grassland birds. Over 56 ground squirrel BMPs have been distributed. Developed an HSI model based on the PCF's Native Prairie Vegetation Inventory. Developed a more robust RSF model based on the GVI. An MCV model was created for 14 priority wildlife species, including the prairie falcon, using existing RSF and HSI models developed by MULTISAR, to enable prioritization of management activities in the
		GNR.
3.3 Education and communication.	Developed and distributed raptor BMP fact sheet. Developed the brochure At Home on the Range: Living with Alberta's Species at Risk, which discusses the habitat needs of the prairie falcon and raptors in general.	More than 111 raptor BMP fact sheets have been distributed to landholders throughout the GNR. Distributed approximately 12 776 copies of the <i>At Home on the</i> <i>Range</i> guide within the GNR.

Prairie Falcon Summary

The MULTISAR program goals and objectives are closely aligned to many of the key action items identified in the prairie falcon conservation management plan. MULTISAR is a valuable tool in achieving action objectives of the plan; in particular, the objectives pertaining to inventory, maintenance of native prairie habitat, promotion of appropriate grazing practices, and multi-

species conservation on the prairies. The MULTISAR program should continue to be used as a key tool in delivering the objectives of the prairie falcon conservation management plan.

Sprague's Pipit

Table 59. MULTISAR's contribution to the implementation of management actions identified inthe Sprague's pipit conservation management plan (AEP 2017b).

Actions as Identified in the Management Plan	MULTISAR's Contribution	Measure of Success
3.1 Inventory and monitoring.	All Sprague's pipit observations are documented and entered into the FWMIS database.	Submitted more than 2050 sightings to the FWMIS database.
3.2 Habitat management.	MULTISAR is a multi-species management program that encourages appropriate management of habitat for over 17 species at risk, including the Sprague's pipit, through HCSs, HMPs and SARC plans. Currently working on restoration projects to return cultivated lands back to native grasslands.	MULTISAR has worked to conserve approximately 514 593 acres through the HCS program, 156 254 acres through the SARC plan program, and 5459 acres through the HMP program. MULTISAR team has helped maintain over 321 653 acres of native prairie habitat for use by grassland birds.
	Developed habitat models for the species to assist with identifying suitable habitat and focus habitat conservation efforts.	Developed an HSI model based on the PCF's Native Prairie Vegetation Inventory. Developed a more robust RSF model based on the GVI. An MCV model was created for 14
		the Sprague's pipit, using existing RSF and HSI models developed by MULTISAR, to enable prioritization of management activities in the GNR.

3.2.1 Timing and setback recommendations.	Developed and distributed an industrial guidelines fact sheet. Fact sheet was updated in 2010– 2011.	More than 96 industrial guidelines fact sheets have been distributed.
3.3 Education and communication.	Developed and distributed grassland bird BMP fact sheet.	More than 108 grassland bird BMP fact sheets have been distributed to landholders throughout the GNR.

Sprague's Pipit Summary

The MULTISAR program goals and objectives are closely aligned to many of the key action items identified in the Sprague's pipit conservation management plan. MULTISAR is a valuable tool in achieving action objectives of the plan; in particular, the objectives pertaining to inventory, maintenance of native prairie habitat, promotion of appropriate grazing practices, and multi-species conservation on the prairie. The MULTISAR program should continue to be used as a key tool in delivering the objectives of the Sprague's pipit conservation management plan.

Prairie Rattlesnake

Table 60. MULTISAR's contribution to the implementation of management actions identified in the prairie rattlesnake conservation management plan (AEP 2016a).

Actions as Identified in the Management Plan	MULTISAR's Contribution	Measure of Success
3.1 Inventory and monitoring.	All prairie rattlesnake and hibernaculum observations are documented and entered into the FWMIS database.	Submitted 3119 sightings to the FWMIS database.
3.2 Education and communication.	Developed and distributed a reptiles BMP fact sheet.	More than 13 reptile BMP fact sheets and 453 <i>Reptiles of Alberta</i> booklets have been distributed to landholders and the public.

Prairie Rattlesnake Summary

The MULTISAR program goals and objectives are closely aligned to many of the key action items identified in the prairie rattlesnake conservation management plan. MULTISAR is a valuable tool in achieving the action objectives of the plan; particularly with objectives pertaining to inventory, education and communication, and promotion of best management practices for landholders within prairie rattlesnake habitat. The MULTISAR program should continue to be used as a key tool in delivering the objectives of the prairie rattlesnake conservation management plan.

Great Plains Toad

Table 61.	MULTISAR's contribution to the implementation of management actions identified in
	the Great Plains toad conservation management plan (AEP 2015b).

Actions as Identified in the Management Plan	MULTISAR's Contribution	Measure of Success
3.1 Inventory, monitoring and assessment.	All Great Plains toad observations are documented and entered into the FWMIS database.	Over 36 targeted surveys for amphibians have been conducted in Great Plains toad range as part of HCS and HMP programming since 2002. MULTISAR has submitted 847 Great Plains toad observations to

3.2 Habitat protection and research.	MULTISAR has developed wetland and grazing management BMPs for amphibians, including Great Plains toad.	Developed and distributed over 90 copies of MULTISAR's BMP brochure for wetland species to landholders in the GNR.
	MULTISAR completes HCSs, HMPs and SARC plans in areas of suitable Great Plains toad habitat and involves landholders in developing stewardship approaches to protect this and other species on their land.	Four HCS plans and one HMP plan have been completed that directly target management of habitat for Great Plains toad.
		MULTISAR has worked to conserve over 308 601 acres of native grassland and 11 390 acres of riparian habitat within Great Plains toad range.
		64 upland/off-site watering projects, 24 willow plantings and 8 riparian protection projects have been completed to improve riparian ecosystem health in the GNR.
3.3 Education and communication.	Developed BMP brochures for wetland species and native grassland for landholder use. Provides information to landholders through the HCS, HMP and SARC plan programs. Provides information through public and school presentations. Developed the brochure <i>At Home</i> <i>on the Range: Living with</i>	More than 137 wetland species, <i>Amphibians on My Land</i> and native grassland BMP fact sheets have been distributed to landholders throughout the GNR. Distributed approximately 12 776 copies of the <i>At Home on the</i> <i>Range</i> guide within the GNR.
	Alberta's Species at Risk, which discusses the habitat needs of the Great Plains toad and associated BMPs.	

Great Plains Toad Summary

MULTISAR has contributed to the conservation management of the Great Plains toad through three key actions: inventories; the development, maintenance and improvement of suitable habitat; and public education and communication. MULTISAR will continue to assist in management efforts for this species through the delivery of the MULTISAR program in priority areas that include the Great Plains toad.

Long-toed Salamander

Table 62. MULTISAR's contribution to the implementation of management actions identified in the long-toed salamander conservation management plan (AEP 2016b).

Actions as Identified in the Management Plan	MULTISAR's Contribution	Measure of Success
3.1 Inventory and monitoring.	MULTISAR surveys potential breeding ponds in areas of suitable habitat as part of the multi-species wildlife surveys conducted for HCS and HMP assessments. All long-toed salamander observations are entered into the FWMIS database.	MULTISAR has conducted two amphibian inventory surveys in long-toed salamander range.
3.2 Habitat management.	MULTISAR has developed and facilitated the implementation of several BMPs for wetland species on private lands as part of the HCS/HMP assessments conducted.	MULTISAR has worked to conserve approximately 225 acres of open water and riparian habitat within long-toed salamander range. 11 wetland/riparian BMPs have been recommended to landholders in long-toed salamander range.
3.3 Education and communication.	Developed BMP brochures for wetland species and native grassland for landholder use. Provides information for landholders through the HCS, HMP and SARC plan programs. Provides information through public and school presentations.	Developed and distributed 82 copies of MULTISAR's BMP brochure for wetland species to landholders in the GNR.

Long-toed Salamander Summary

MULTISAR has contributed to the management of the long-toed salamander in Alberta through key actions pertaining to population inventory and monitoring and terrestrial and aquatic habitat management. MULTISAR will continue to implement these actions in areas of suitable habitat to assist in the management of this species.

White-winged Scoter

Table 63.	MULTISAR's contribution to the implementation of management actions identified in
	the white-winged scoter conservation management plan (AESRD 2012e).

Actions as Identified in the Management Plan	MULTISAR's Contribution	Measure of Success
3.2 Habitat management.	MULTISAR has developed and facilitated the implementation of several BMPs for wetland species on private lands as part of the HCS/HMP assessments conducted.	MULTISAR has worked with landholders to conserve over 11 739 acres of open water and riparian habitat within the white- winged scoter's breeding range. 64 upland/off-site watering projects, 24 willow plantings and 8 riparian protection projects have been completed to improve riparian ecosystem health in the GNR.
3.4 Education and communication.	Developed BMP brochures for wetland species and native grassland for landholder use.	Developed and distributed 82 copies of MULTISAR's BMP brochure for wetland species to landholders in the GNR.

White-winged Scoter Summary

MULTISAR has contributed to the conservation management of the white-winged scoter through two key actions: habitat management and public education and communication. MULTISAR plans to continue to assist in the management of this species through the delivery of the MULTISAR program in priority areas that include the white-winged scoter.

Western Small-footed Myotis

Table 64. MULTISAR's contribution to the implementation of management actions identified in the western small-footed myotis conservation management plan (AESRD 2012d).

Actions as Identified in the Management Plan	MULTISAR's Contribution	Measure of Success
3.1 Education and communication.	Developed and distributed a bat BMP fact sheet. Provides information for landholders through the HCS, HMP and SARC plan programs.	Approximately 368 bat BMP fact sheets have been distributed to landholders throughout the GNR.
3.2 Monitoring and assessment.	All western small-footed myotis detections are documented and entered into the FWMIS database.	Submitted nine observations into the FWMIS database.
3.3 Habitat management.	MULTISAR completes HCSs, HMPs and SARC plans in western small-footed myotis habitat and involves landholders in developing stewardship approaches on their land. Assists landholders in implementing and monitoring BMPs (e.g., suitable stocking rates, cottonwood tree protection, riparian restoration) for the conservation of multiple species, including the western small-footed myotis, on their lands.	 30 HCSs and 1 HMP encompassing over 11 164 acres of riparian habitat have been completed within the range of the small-footed myotis. HCSs have been completed that directly target management of habitat for the western small-footed myotis. Over 21 cottonwood trees have been protected and monitored on cooperating lands. 64 upland/off-site watering projects, 24 willow plantings and 8 riparian protection projects have been completed to improve riparian ecosystem health in the GNR.

Western Small-footed Myotis Summary

The MULTISAR program goals and objectives are closely aligned to many of the key action items identified in the western small-footed myotis conservation management plan. MULTISAR is a valuable tool in achieving action objectives of the plan; particularly those objectives pertaining to education and communication, inventory/monitoring, and promotion of best management practices for landholders within western small-footed myotis habitat. The MULTISAR program should continue to be used as a key tool in delivering the objectives of the western small-footed myotis conservation management plan.

Hare-footed Locoweed

Actions as Identified in the Management Plan	MULTISAR's Contribution	Measure of Success
5.1 Inventory and monitoring.	Rare plant surveys are completed on those HCS properties where this species may be found. All species observations are submitted to the ACIMS database.	Conducted two rare plant surveys in areas of suitable habitat for the species. MULTISAR documents and enters all observations of rare plants on cooperating lands, including of hare-footed locoweed, into the ACIMS database.
5.2 Habitat management.	MULTISAR completes range health assessments for all HCSs and documents the presence and location of any invasive plants (i.e., weeds). Develops grazing BMPs that may benefit rare plants and other species at risk while taking into account landholders' needs. Works collaboratively with landholders to implement BMPs.	The HCS program is currently active on over 9094 acres of native prairie within the range of hare-footed locoweed.

Table 65. MULTISAR's contribution to the implementation of management actions identified in the hare-footed locoweed conservation management plan (AEP 2016c).

5.4 Information and outreach.	MULTISAR will continue to inform private landholders of the importance of this species in areas of suitable habitat.	Has worked directly with five landholders to complete HCS plans within the range of hare- footed locoweed.
	HCSs, HMPs and SARC plans have been completed for landholders within the species' range.	Distributed over 9526 copies of the <i>At Home on the Range</i> guide within the GNR.

Hare-footed Locoweed Summary

MULTISAR has contributed to the conservation management of the hare-footed locoweed through three key actions: inventories, habitat management and information and outreach. MULTISAR plans to continue to assist with management of this species through the delivery of the MULTISAR program in areas of suitable habitat for the hare-footed locoweed.

Whitebark and Limber Pine

Protection of Whitebark Pine Stands/Information and Outreach

Table 66. MULTISAR's contribution to the information and outreach recovery actions identified in
the recovery plans for whitebark pine (Alberta Whitebark and Limber Pine Recovery
Team 2014a) and limber pine (Alberta Whitebark and Limber Pine Recovery Team
2014b).

Actions as Identified in the Recovery Plans	MULTISAR's Contribution	Measure of Success
2.9 Coordinate with land managers to ensure that the protection of whitebark and limber pine is considered in land-use planning.	MULTISAR works collaboratively with landholders to implement BMPs.	Approximately 75 297 acres within the range of whitebark and limber pine have been included in the development of HCS plans.
5.1 Engage private landowners and disposition holders in identification and stewardship of whitebark and limber pine.	Encourages voluntary stewardship and provides information for landholders through its HCS, HMP and SARC plan programs.	Has worked with 15 landholders to conserve approximately 16 334 acres of forested habitat within the range of whitebark and limber pine.

Whitebark and Limber Pine Summary

MULTISAR has contributed to the recovery of whitebark pine and limber pine primarily through public/landholder education and outreach. MULTISAR plans to continue to assist the recovery team and the recovery efforts for this species through the delivery of the MULTISAR program within whitebark pine and limber pine range.

Western Blue Flag

From 2002 to 2005, the majority of the western blue flag inventory, stewardship and educational work was completed through the Western Blue Flag Project (overseen by ACA). In 2005, the Western Blue Flag Project merged with MULTISAR, and western blue flag was downgraded from *Threatened* to *Special Concern* provincially. MULTISAR currently monitors four watering improvements, three reseeding projects and three fencing changes completed as part of the Western Blue Flag Program. In 2009, MULTISAR funded the western blue flag five-year inventories, the results of which provided a population estimate of approximately 107 000 to 138 000 plants. MULTISAR conducted an HCS on two western blue flag properties in 2009 and one western blue flag property in 2010. A potentially new population was found (as seeds) on an existing HCS property in 2013. In 2016, MULTISAR conducted an HCS reassessment of one western blue flag property, during which the plant was confirmed to still be present.

Additional Species

MULTISAR is also involved with several other listed species occurring in Alberta's GNR and bordering Parkland and Rocky Mountain natural regions through the HCS, HMP and SARC plan programs. These species include the peregrine falcon (*Falco peregrinus*), yucca moth, trumpeter swan (*Cygnus buccinator*), Ord's kangaroo rat (*Dipodomys ordii*), slender mouse-ear-cress (*Halimolobos virgata*) and mountain plover (*Charadrius montanus*). These species or their suitable habitats have not been located on MULTISAR cooperator properties, primarily because they are found in only a few specific locations within the province. As these species and habitats are located on cooperator properties, MULTISAR will provide BMPs and/or incentives for their protection and maintenance.

Program Summary

The MULTISAR program has successfully assisted in the implementation of many recovery and conservation management actions for species at risk (including *Sensitive* species) in the Grassland Natural Region of Alberta. MULTISAR is an important tool in education and outreach initiatives, implementation of BMPs, and the development of habitat improvement projects and

monitoring of species at risk. Additionally, the multi-species approach of MULTISAR allows for the recovery/management actions for several species to be included in each habitat conservation strategy, species at risk conservation plan and habitat management plan, thus decreasing the cost of implementing these actions and possible conflicts between different species at risk and their recovery/management.

Continued cooperation between provincial and federal recovery teams, the AEP Species at Risk Program and MULTISAR is essential to ensure the timely implementation of the necessary recovery/management actions for several species at risk. To facilitate the process, recovery team leads for species occurring in the Grassland Natural Region should communicate with MULTISAR during plan development and identify what aspects of their plan could be achieved through MULTISAR or multi-species initiatives. Multi-species initiatives may not be suitable for the recovery/management of all species but should be used whenever possible.

MULTISAR will continue to be a key tool in the implementation of species at risk recovery plans and conservation management plans in the Grassland, Parkland and Rocky Mountain natural regions.

Future Direction

In 2020–2021, MULTISAR will continue to work collaboratively with its partners to achieve goals and objectives in three core program areas:

- 1. Habitat Conservation Program:
 - 1.1 Continue to seek interested landholders in priority species at risk areas.
 - 1.2 Complete six new HCSs (~33 730 acres) and four HMPs (~4100 acres). These will include detailed vegetation and wildlife inventories, and range and riparian health assessments to identify habitats, priority species and the ecological condition of the rangeland and riparian areas.
 - 1.3 For those species at risk detected during inventories, use MULTISAR as a tool to implement recovery and conservation management actions identified in provincial and national recovery plans and provincial conservation management plans.
 - 1.4 Secure habitat for species at risk through signed stewardship commitment agreements with landholders.
 - 1.5 Assist landholders, based on priority, that have had an HSC or HMP completed, in implementing habitat enhancement recommendations outlined in their HCS or HMP.
 - 1.6 Complete new SARC plans or beneficial management plan assessments upon request and continue to seek interested landholders, conduct pre-assessment interviews and research, carry out rapid assessments and deliver final reports to landholders.
- 2. Education, Outreach and Awareness Program:
 - 2.1 When opportunities with watershed or other conservation groups, or the public, present themselves, promote the MULTISAR message and distribute relevant information to target audiences.
 - 2.2 Deliver two to five formal presentations to interest groups according to demand.
 - 2.3 Assemble information and images, write and distribute one issue of the *Grassland Gazette* (MULTISAR's newsletter).
 - 2.4 Update and reprint MULTISAR brochures and fact sheets on species at risk and BMPs, as needed.

- 2.5 Regularly update MULTISAR's website and Facebook and Twitter accounts and ensure that posted information is relevant and accurate.
- 2.6 Continue membership and maintain active participation in the Canadian Roundtable for Sustainable Beef.
- 2.7 Continue collaboration with the Canadian Cattlemen's Association on the environmental display along the Cattle Trail during the Calgary Stampede.
- 3. Research, Monitoring and Data Management Program:
 - 3.1 Assist AEP in conducting sharp-tailed grouse monitoring on leks in southeastern Alberta.
 - 3.2 Participate in the five-year monitoring of ferruginous hawks throughout their range in collaboration with AEP.
 - 3.3 Conduct five Richardson's ground squirrel surveys in vicinity of installed ferruginous hawk nest platforms.
 - 3.4 Assist AEP in conducting surveys for loggerhead shrike on one or two routes in southern Alberta.
 - 3.5 Monitor the Great Plains toad and the plains spadefoot (*Spea bombifrons*) on up to 10 road transects (routes for the Researching Amphibian Numbers in Alberta program), if temperatures and precipitation allow, for evidence of emergence and reproduction.
 - 3.6 Continue to assess the relationships among wildlife species occurrences, wildlife species diversity, relative abundance, plant community type and metrics of range health.
 - 3.7 Evaluate one property (~40 000 acres), originally assessed in 2014, to measure how effective the HCS plan was at influencing habitat management, habitat value for species at risk and the landholders' perceptions of species at risk.
 - 3.8 Monitor 75 (of approximately 218) habitat enhancement projects implemented within MULTISAR's program area since 2005.
 - 3.9 Submit all wildlife observation data collected to FWMIS annually.
 - 3.10 Continue to analyze MULTISAR's point count and range health data to examine habitat requirements of specific grassland bird species in the Mixedgrass, Dry Mixedgrass and Foothills Fescue natural subregions of Alberta.
 - 3.11 Submit all range health assessment data on Crown lands to the provincial GLIMPS database on an annual basis.

Literature Cited

Alberta Environment and Parks. 2015a. The general status of Alberta wild species 2015. URL: <u>https://extranet.gov.ab.ca/env/wild-species-status/default.aspx</u>. [Accessed 19 February 2020].

Alberta Environment and Parks. 2015b. Great Plains toad management plan 2015–2020. Alberta Environment and Parks, Species at Risk Conservation Plan No. 11. Edmonton, AB. 8 pp.

Alberta Environment and Parks. 2016a. Prairie rattlesnake conservation management plan 2016–2021. Alberta Environment and Parks, Species at Risk Conservation Management Plan No. 12. Edmonton, AB. 10 pp.

Alberta Environment and Parks. 2016b. Long-toed salamander conservation management plan. Alberta Environment and Parks, Species at Risk Conservation Management Plan No. 1. Edmonton, AB. 12 pp.

Alberta Environment and Parks. 2016c. Hare-footed locoweed conservation management plan. Alberta Environment and Parks, Species at Risk Conservation Management Plan No. 13. Edmonton, AB. 30 pp.

Alberta Environment and Parks. 2017a. Long-billed curlew conservation management plan. Alberta Environment and Parks, Species at Risk Conservation Management Plan No. 3. Edmonton, AB. 7 pp.

Alberta Environment and Parks 2017b. Sprague's pipit conservation management plan. Alberta Environment and Parks, Species at Risk Conservation Management Plan No. 2. Edmonton, AB. 11 pp.

Alberta Environment and Sustainable Resource Development. 2012a. Alberta burrowing owl recovery plan 2012–2017. Alberta Environment and Sustainable Resource Development, Alberta Recovery Plan No. 21. Edmonton AB. 27 pp.

Alberta Environment and Sustainable Resource Development. 2012b. Alberta northern leopard frog recovery plan 2010–2015. Alberta Environment and Sustainable Resource Development, Alberta Species at Risk Recovery Plan No. 20. Edmonton, AB. 34 pp.

Alberta Environment and Sustainable Resource Development. 2012c. Prairie falcon conservation management plan 2012–2017. Alberta Environment and Sustainable Resource Development, Species at Risk Conservation Management Plan No. 9. Edmonton, AB. 13 pp.

Alberta Environment and Sustainable Resource Development. 2012d. Western small-footed bat conservation management plan 2012–2017. Alberta Environment and Sustainable Resource Development, Species at Risk Conservation Management Plan No. 6. Edmonton, AB. 6 pp.

Alberta Environment and Sustainable Resource Development. 2012e. White-winged scoter conservation management plan. Alberta Environment and Sustainable Resource Development, Species at Risk Conservation Management Plan No. 7. Edmonton, AB. 11 pp.

Alberta Environment and Sustainable Resource Development. 2013a. Alberta greater sagegrouse recovery plan 2013–2018. Alberta Environment and Sustainable Resource Development, Alberta Species At Risk Recovery Plan No. 30. Edmonton, AB. 46 pp.

Alberta Environment and Sustainable Resource Development. 2013b. Species at risk 2012–13 recovery action summary: short-horned lizard. Alberta Environment and Sustainable Resource Development. Edmonton, AB. 2 pp.

Alberta Environment and Sustainable Resource Development. 2013c. Alberta soapweed and yucca moth recovery plan, 2012–2022. Alberta Environment and Sustainable Resource Development, Alberta Species At Risk Recovery Plan No. 25. Edmonton, AB. 23 pp.

Alberta Environment and Sustainable Resource Development. 2013d. Alberta western spiderwort recovery plan 2012–2022. Alberta Environment and Sustainable Resource Development, Alberta Species at Risk Recovery Plan No. 26. Edmonton, AB. 23 pp.

Alberta Environment and Sustainable Resource Development. 2013e. Sensitive species inventory guidelines. Alberta Environment and Sustainable Resource Development, Government of Alberta. Edmonton, AB. 128 pp.

Alberta Ferruginous Hawk Recovery Team. 2009. Ferruginous hawk recovery plan 2009–2014. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Recovery Plan No. 17. Edmonton, AB. 44 pp.

Alberta Small-flowered Sand-verbena Recovery Team. 2012. Alberta small-flowered sandverbena recovery plan 2012–2017. Alberta Environment and Sustainable Resource Development, Alberta Species at Risk Recovery Plan No. 24. Edmonton, AB. 27 pp.

Alberta Sustainable Resource Development. 2010. Harlequin duck conservation management plan 2010–2015. Alberta Sustainable Resource Development, Species at Risk Conservation Management Plan No. 4. Edmonton, AB. 17 pp.

Alberta Swift Fox Recovery Team. 2007. Alberta swift fox recovery plan 2006–2011. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Recovery Plan No. 14. Edmonton, AB. 23 pp.

Alberta Tiny Cryptantha Recovery Team. 2012. Alberta tiny cryptantha recovery plan 2012–2017. Alberta Environment and Sustainable Resource Development, Alberta Species at Risk Recovery Plan No. 23. Edmonton, AB. 25 pp.

Alberta Whitebark and Limber Pine Recovery Team. 2014a. Alberta whitebark pine recovery plan 2013–2018. Alberta Environment and Sustainable Resource Development, Alberta Species At Risk Recovery Plan No. 34. Edmonton, AB. 63 pp.

Alberta Whitebark and Limber Pine Recovery Team. 2014b. Alberta limber pine recovery plan 2014–2019. Alberta Environment and Sustainable Resource Development, Alberta Species at Risk Recovery Plan No. 35. Edmonton, AB. 61 pp.

Bailey A., D. McCartney and M. Schellenberg. 2010. Management of Canadian prairie rangeland. Agriculture and Agri-Food Canada, Government of Canada. Swift Current, SK. 58 pp.

Canada Western Blue Flag Maintenance/Recovery Team. 2002. Maintenance and recovery plan for western blue flag *(Iris missouriensis)* in Canada. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Recovery Plan No. 1. Edmonton, AB. 18 pp.

Cows and Fish. 2017. Health assessment and inventory forms. URL: https://cowsandfish.org/health-assessment-and-inventory-forms/ [Accessed 19 February 2020].

Downey, B.A., P.F. Jones and C.A. Koenig. 2011. MULTISAR evaluation and monitoring protocol. Pages 32–47 in Rumbolt, K.S., F. Blouin, B.A. Downey, B.L. Downey, C.A. Koenig, D.J. Jarina, P.F. Jones, J.P. Landry-DeBoer and E.R. Wesley. MULTISAR: a multi-species conservation strategy for species at risk 2010–2011 report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 141. Edmonton, AB. 84 pp.

Fletcher, R., A. Cilimburg and R. Hutto. 2007. Evaluating habitat restoration at O'Dell Creek using bird communities: 2006 report. Avian Science Center, University of Montana. Missoula, MT. 30 pp.

Government of Alberta. 2016. Species assessed by the conservation committee: Alberta species at risk. URL: <u>https://open.alberta.ca/publications/species-assessed-by-the-conservation-committee-alberta-species-at-risk</u>. [Accessed 19 February 2020].

Government of Canada. 2018. Species at risk public registry: species list. URL: <u>https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html</u>. [Accessed 19 February 2020].

Jones, P.F., B.A. Downey, B.L. Downey, K. Taylor, A.J. Miller and C. DeMaere. 2019. Listen, learn, liaise: taking the species out of species-at-risk through engagement. Rangelands 41(4): 169–177.

Margoluis, R., and N. Salafsky. 1998. Measures of success: designing, managing, and monitoring conservation and development projects. Island Press. Washington, D.C. 384 pp.

Milk River Watershed Council Canada. 2008. Milk River state of the watershed report 2008. Milk River Watershed Council Canada. Milk River, AB. 155 pp.

Milk River Watershed Council Canada. 2013. Milk River transboundary state of the watershed report, 2nd edition. Compiled by Palliser Environmental Services Ltd. and prepared for Milk River Watershed Council Canada (Alberta) in collaboration with the Milk River Watershed Alliance (Montana). Milk River, AB. 238 pp.

MULTISAR. 2012. MULTISAR: a multi-species conservation strategy for species at risk in the Grassland Natural Region of Alberta 2011–2012 report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 144. Edmonton, AB. 45 pp.

MULTISAR. 2014. MULTISAR: a multi-species conservation strategy for species at risk in the Grassland Natural Region of Alberta 2013–2014 report. Alberta Environment and Sustainable Resource Development, Alberta Species at Risk Report No. 152, Edmonton, AB. 60 pp. + appendix.

Rangeland Conservation Service Ltd. 2016. Beneficial management practices for the Milk River Basin and South Saskatchewan watersheds, Alberta (2016 update): a component of the multiple species at risk (MULTISAR) conservation strategy. Unpublished report prepared for MULTISAR. Airdrie, AB. 526 pp.

Redman, M. 2016. The 2015 ferruginous hawk inventory and population analysis. Alberta Environment and Parks, Operations Division. Alberta Species at Risk Report 155. Edmonton, AB. 22 pp.

Robel, R.J., J.N. Briggs, A.D. Dayton and L.C. Hulberts. 1970. Relationship between visual obstruction measurements and weight of grassland vegetation. Journal of Range Management 23: 295–297.

Rumbolt, K.S., F. Blouin, B.A. Downey, B.L. Downey, C.A. Koenig, D.J Jarina, P. F. Jones, J.P. Landry-DeBoer and E.R. Wesley. 2011. MULTISAR: a multi-species conservation strategy for species at risk 2010–2011 report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 141. Edmonton, AB. 84 pp.

SAS Institute Inc. 2018. JMP®, 2018 Version <14.3.0>. SAS Institute Inc., Cary, NC. 1989–2019.

Saunders, E., R. Quinlan, P. Jones, B. Adams and K. Pearson. 2016. At home on the range: living with Alberta's prairie species at risk (second edition). Alberta Conservation Association and Alberta Environment and Parks. Lethbridge, AB. 48 pp.

The Alberta Rocky Mountain Sculpin Recovery Team. 2013. Alberta rocky mountain sculpin recovery plan: 2012–2022. Alberta Environment and Sustainable Resource Development, Alberta Species at Risk Recovery Plan No. 27. Edmonton, AB. 61 pp.

The Alberta Westslope Cutthroat Trout Recovery Team. 2013. Alberta westslope cutthroat trout recovery plan: 2012–2017. Alberta Environment and Sustainable Resource Development, Alberta Species at Risk Recovery Plan No. 28. Edmonton, AB. 77 pp.

The Milk River Fish Species at Risk Recovery Team. 2008. Alberta western silvery minnow recovery plan 2008–2013. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Recovery Plan No. 16. Edmonton, AB. 54 pp.

The Milk River Fish Species at Risk Recovery Team. 2014. The Alberta stonecat recovery plan 2013–2023. Alberta Environment and Sustainable Resource Development, Alberta Species at Risk Recovery Plan No. 33. Edmonton, AB. 34 pp.

Willoughby, M.G. 2007. Range survey manual for Alberta rangelands version one. Rangeland Management Branch, Alberta Sustainable Resource Development. Edmonton, AB. 8 pp.

Appendices

Appendix A: Sample MULTISAR Landholder Reassessment Questionnaire

Evaluation of the MULTISAR Habitat Conservation Strategy (HCS)

Landholder: _____ Interviewer: _____ Date: _____

Questions:

Why did you become involved with MULTISAR?

Do you know what the MULTISAR program is about?

Before you started working with MULTISAR what did you think about species at risk?

And now?

Had you ever heard of any of the Beneficial Management Practices recommended in your HCS prior to working with MULTISAR?

a) Which ones?

b) Did you previously use any of the BMPs recommended or discussed by MULTISAR in your operation?

Do you prefer the multispecies approach versus a single species approach when working with a conservation group?

Do you prefer working with single organizations/agencies or one multi-partner group? a) Why?

Has your HCS influenced the way you manage your ranch?

In what way?

Do you feel that your land is important in providing habitat for SAR?

How has MULTISAR influenced your understanding of species at risk and their needs?

How has MULTISAR contributed to your understanding and knowledge of range management principals (range health, grazing intensity, etc.)?

How do you feel the completion of a MULTISAR HCS has contributed to your own knowledge of your ranch, range management and wildlife in your area?

Have you talked to others about MULTISAR?

Are MULTISAR staff easy to talk to, friendly, and communicate effectively when discussing the program?

How would you prefer to communicate with us?

What do you think is the most beneficial part of having an HCS completed for your ranch?

What is the biggest disadvantage to having a HCS completed on your ranch?

Overall, do you feel that MULTISAR has been a positive, neutral, or negative influence on the economy of your ranch?

What changes could be made to improve the HCS process?

Additional sections that you may have liked to see in the report?

Remove?

How is the length?

Time Commitments?

Cost?

Prior to MULTISAR were you nervous about species at risk and the potential impact there were going to have on your operations?

a) Why?

b) After MULTISAR...?

As a landholder do you feel comfortable having a HCS completed for your ranch that identifies your operations as effectively conserving species at risk habitat?

a). Do you feel that an HCS provides due diligence and acknowledged that good range management practices on your ranch have provided habitat to protect species at risk?

Are you interested in continuing to work with MULTISAR?

Appendix B: List of Abbreviations Used in MULTISAR Reports

Abbreviation	Expansion
ABP	Alberta Beef Producers
ACA	Alberta Conservation Association
ACIMS	Alberta Conservation Information Management System
AEP	Alberta Environment and Parks
CCA	Canadian Cattlemen's Association
CRSB	Canadian Roundtable for Sustainable Beef
BACI	Before-After-Control-Impact
ВМР	Beneficial Management Practice
FWMIS	Fish and Wildlife Management Information System
GNR	Grassland Natural Region
GVI	Grassland Vegetation Inventory
HCS	Habitat Conservation Strategy
НМР	Habitat Management Plan
HSP	Habitat Stewardship Program
MULTISAR	Multiple Species at Risk
PCF	Prairie Conservation Forum
RCS	Rangeland Conservation Service
SARC	Species at Risk Conservation
SARC Plan	Species at Risk Conservation Plan

SARPAL	Species at Risk Partnership on Agricultural Lands