

Alberta Tiny Cryptantha Recovery Plan 2012-2017



Alberta Species at Risk Recovery Plan No. 23

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PREFACE

Albertans are fortunate to share their province with a diverse variety of wild species. Populations of most species of plants and animals are healthy and secure. However, a small number of species are either naturally rare or are now imperiled because of human activities. Recovery plans establish a basis for cooperation among government, industry, conservation groups, landowners and other stakeholders to ensure these species and populations are restored or maintained for future generations.

Alberta's commitment to the *Accord for the Protection of Species at Risk* and to the *National Framework for the Conservation of Species at Risk*, combined with requirements established under Alberta's *Wildlife Act* and the federal *Species at Risk Act*, has resulted in the development of a provincial recovery program. The overall goal of the recovery program is to restore species identified as *Threatened* or *Endangered* to viable, naturally self-sustaining populations within Alberta. The policy document: *Alberta's Strategy for the Management of Species at Risk (2009-2014)* provides broader program context for recovery activities.

Alberta species at risk recovery plans are prepared under the supervision of the Species at Risk Program, Alberta Environment and Sustainable Resource Development. This often includes involvement of a recovery team composed of a variety of stakeholders including conservation organizations, industry, landowners, resource users, universities, government agencies and others. Membership is by invitation from the Director of Wildlife Management, and may include representation from the diversity of interests unique to each species and circumstance. Conservation and management of these species continues during preparation of the recovery plan.

The Director of Wildlife Management provides these plans as advice to the Minister responsible for fish and wildlife management. Alberta's Endangered Species Conservation Committee also reviews draft recovery plans, and provides recommendations to the Minister. Additional opportunities for review by the public may also be provided. Plans accepted and approved for implementation by the Minister are published as a government recovery plan. Approved plans are a summary of the Department's commitment to work with involved stakeholders to coordinate and implement conservation actions necessary to restore or maintain these species.

Recovery plans include three main sections: background information that highlights the species' biology, population trends, and threats; a recovery section that outlines goals, objectives, and strategies to address the threats; and an action plan that profiles priority actions required to maintain or restore the *Threatened* or *Endangered* species. Each approved recovery plan undergoes regular review, and progress of implementation is evaluated. Implementation of each recovery plan is subject to the availability of resources, from within and from outside government.

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The Species at Risk Program of Alberta Environment and Sustainable Resource Development (AESRD) provided funding for recovery team meetings and support for team members' travel to meetings.

Several team members donated their time and travel costs for the opportunity to participate in the recovery process. All team members spent considerable time and energy participating in the Alberta Recovery Planning Process for tiny cryptantha.

Todd Kemper (CWS; formally of the Parks Division, Alberta Tourism, Parks, and Protected Areas) completed a review of the known occurrences of tiny cryptantha in Alberta. Darcy Henderson (CWS) provided data collected on the Canadian Forces Base, Suffield. Alan Violette (AESRD) developed the range and location maps for the recovery team. Andrew Sommerville (AESRD) assisted with the occurrence data compilation and analysis.

EXECUTIVE SUMMARY

In December of 2007 the Minister of Environment and Sustainable Resource Development approved the listing of tiny cryptantha as *Threatened* in Alberta based on recommendations from the Endangered Species Conservation Committee. This designation was based on the small area of occupancy of tiny cryptantha in the province of Alberta, and the small and possibly declining provincial population of the species.

The tiny cryptantha in Alberta is highly susceptible to localized threats due to its limited occurrence in the province. Potential threats include sand dune stabilization, sand extraction, conversion of native grasslands, industrial and military activities, residential developments, recreational activities, and invasive species.

The goal of the recovery plan is to maintain the existing habitat and distribution of tiny cryptantha and to maintain a viable self-sustaining population of tiny cryptantha in Alberta. Strategies for recovery and maintenance of the species in Alberta must focus on the identified threats to the species and its habitat. Therefore the strategies to maintain and recover the tiny cryptantha are 1) Population Conservation and Management, 2) Habitat Conservation and Management, 3) Information and Outreach, 4) Research, 5) and identification of available resources. Detailed action items corresponding to each identified strategy were developed for 2012-2017 and are presented.

1.0 INTRODUCTION

1.1 Provincial and National Status

In October 2004, Alberta's Endangered Species Conservation Committee (ESCC) recommended that tiny cryptantha (*Cryptantha minima*) be listed as an *Endangered* species in Alberta. This recommendation was based on the small area of occupancy and extent of occurrence, declining population as a result of a reduction in habitat, and wide fluctuations in the number of plants. Additionally, the Alberta population is isolated from populations in the US. In December of 2007, the Minister of Environment and Sustainable Resource Development (AESRD) approved the listing of tiny cryptantha as *Endangered* in Alberta based on these recommendations.

The Initial Conservation Action Statement put forth by the ESCC, and approved by the Minister, specified that a recovery plan be developed in order to set goals, objectives, strategies, and management actions necessary to guide the recovery of the species over the subsequent 5 year period. The action statement also specified that management of the species should focus on identification and conservation of existing populations to prevent loss from managed activities rather than the creation of new habitat or species reintroduction.

Nationally, in April 1998, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated tiny cryptantha as *Endangered* in Canada. This listing was based on information suggesting small and highly localized populations. Additionally, the populations were disjunct and at risk because they occurred in disturbed areas (Smith 1998). This status was re-examined and confirmed in May 2000. Tiny cryptantha is a schedule 1 species under Canada's *Species at Risk Act*. A national recovery strategy for the species was completed in 2010.

1.2 Recovery Team

At the direction of the Minister of AESRD, the Alberta Tiny Cryptantha Recovery Team (herein called the team) was initiated in 2008 by the Director of Wildlife Management. Led by a species lead from AESRD, the primary responsibility of the team is to provide recommendations for recovery of tiny cryptantha, by outlining recovery strategies and actions in the Alberta Tiny Cryptantha Recovery Plan (hereafter referred to as the Plan). AESRD oversees implementation of the Plan by facilitating and encouraging involvement of appropriate and interested parties, including members of the team. The team Chair is responsible for updating the Plan and evaluating and reporting on the progress of recovery actions.

Membership of the recovery team attempts to include the best representation of parties likely to affect or be affected by recovery actions and currently consists of the following members; AESRD, Alberta Native Plant Council, City of Medicine Hat, Canadian Association of Petroleum Producers, Grasslands Naturalists and local members of the ranching community.

1.3 Technical Advisory Group

The technical advisory group reporting to the team is responsible for providing scientific information and advice to the team to aid in the decision making process. Experts on species biology and population ecology, habitat specialists, range agrologists, computer modeling and geographic information system specialists will be consulted on an as need basis to provide suitable information to the Recovery Team.

2.0 TINY CRYPTANTHA BIOLOGY

2.1 Species Description and Reproduction

Tiny cryptantha is a small annual vascular plant species in the Borage family (Boraginaceae). This annual herb is 2-20 cm tall when in flower with erect, branched, and bristly stems (Environment Canada 2006). Alternate spatula shaped leaves are present and gradually become smaller higher up the stem. Tiny tube shaped flowers (2.5-3 mm long) with white petals and yellow centers generally appear in May-June and produce small clusters of whitish nutlets with different shapes (heteromorphic) (Kershaw *et al.* 2001). Seed dispersal is likely limited to the immediate vicinity of the plant though seed may, rarely, be carried further.

Accustomed to limited moisture availability in the sandy soils, tiny cryptantha is well-adapted to respond to favorable moisture conditions; as such, population numbers fluctuate widely from year to year. Little is known about seed bank persistence for this species, although as an annual, its seeds would be expected to last long enough to provide a buffer against environmental variation. Dispersal of tiny cryptantha seeds may be limited. The majority of tiny cryptantha seed dispersal is likely passive, with seeds falling close to the parent plant.

2.2 Habitat

Tiny cryptantha occurs in the dry mixed grass prairie of southeastern Alberta, where it is mainly associated with river valleys (Figure 1). This species occurs in poorly developed sandy soils with varying amounts of depositional silt, within native prairie grasslands with 10-25% bare soil. Habitat is generally described as sandy to silty substrate on level to gently sloping valley bottom terraces, with additional occurrences on valley slopes and undulating to rolling sandy uplands (Wallis and Weshler 1988; ASRD 2004). Associated vegetation communities are dominated by needle-and-thread (*Stipa comata*) and blue grama (*Bouteloua gracilis*).

Tiny cryptantha appears to require some level of disturbance. Habitats that contain tiny cryptantha generally have occasional natural disturbances in the form of deposition, caused by the action of water (terraces in meander lobes), gravity (valley and upland slopes), wind (sandy, upland plains and dunes), and soil-disturbing animals that open up bare soil patches (ASRD 2004). Livestock grazing may help maintain populations, but the species is associated with native grassland and does not persist in frequently disturbed areas. Areas that have repeated

intense disturbances, such as cultivated fields or active sandbars, and areas with actively eroding slopes and cutbanks do not appear to support tiny cryptantha populations (ASRD 2004).

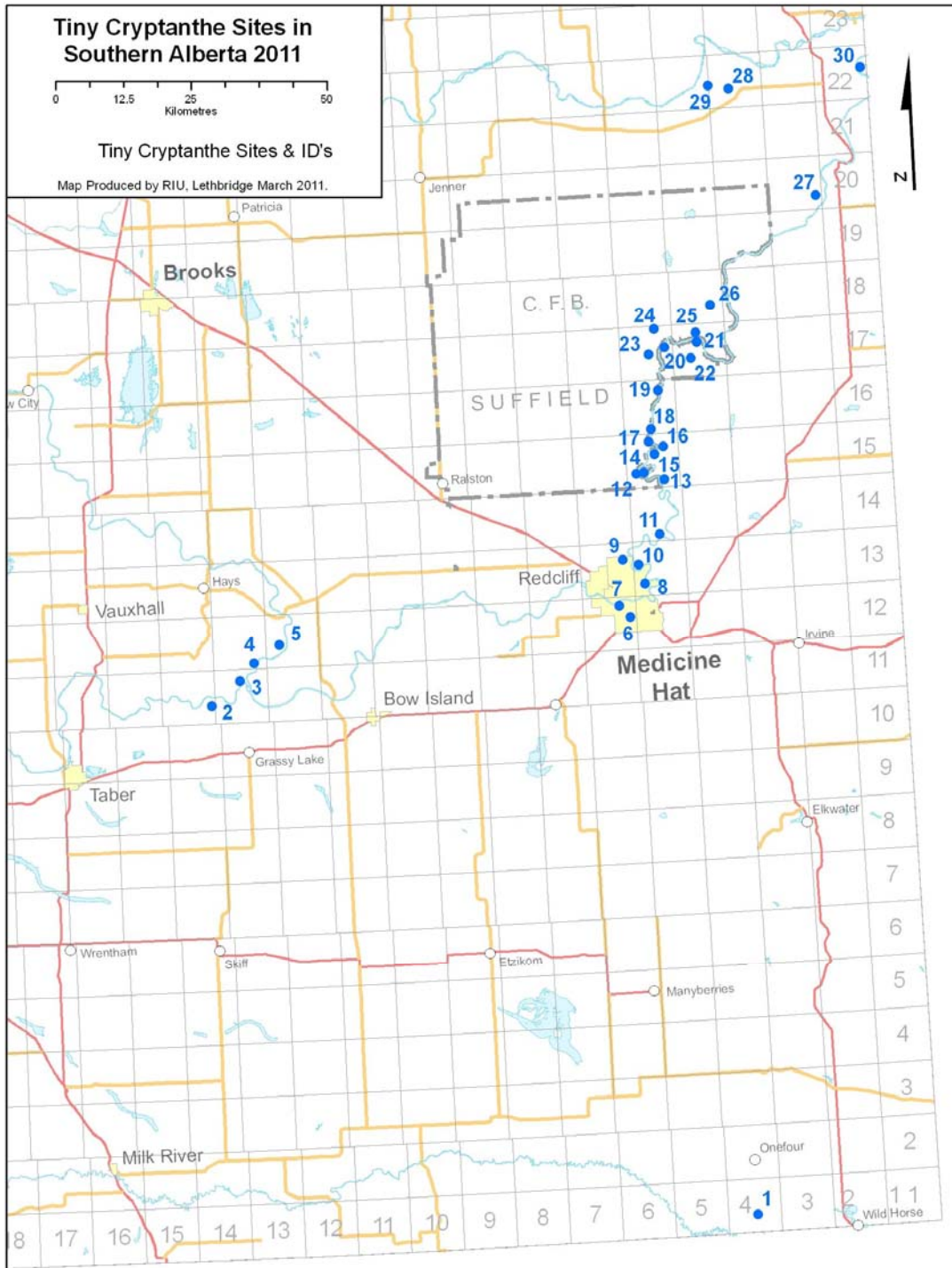


Figure 1. Locations of tiny cryptantha in Alberta. Refer to Table 1 for the population names corresponding to numbers indicated the map.

2.3 Population, Distribution and Trends

Populations appear to fluctuate widely from year to year, and survey effort has not been consistent. The species is more plentiful in wet years, and the relationship between moisture and reproductive output largely accounts for significant differences in population estimates from year to year. These factors make estimating population size and trends very difficult. There are insufficient historical and long-term data collected for this species to allow a rate of population decline to be determined (Environment Canada 2006). Recent survey efforts have also discovered previously unknown populations of tiny cryptantha in Alberta (C. Nemisky pers. comm). Ongoing monitoring will be required to assess the true size of these populations. The current state of knowledge of tiny cryptantha populations in Alberta is presented in Table 1.

Table 1. Location and population estimates for tiny cryptantha at all known locations within Alberta (ACIMS 2011)

Site No.	Name of location	Year first found	Highest population count (year)	Lowest population count (year)	No. of surveys
1	Onefour	2006	4018 (2006)	4018 (2006)	2
2	Oldman river - Grassy Lake	2004	500+ (2004)	0 (2007)	2
3	Oldman river - Hays	2007	300 (2007)	300 (2007)	1
4	Lower Bow 1	2002	2997 (2007)	0 (2003)	4
5	Lower Bow 2	2004	48 (2007)	3 (2004)	2
6	Medicine Hat- Seven Persons Coulee	2004	9 (2004)	9 (2004)	1
7	Medicine Hat - SW Block	2004	1085 (2004)	1 (2005)	2
8	Medicine Hat- Ranchlands	2004	35503 (2004)	35503 (2004)	1
9	Medicine Hat - Box Springs Rd	2004	60 (2004)	60 (2004)	1
10	South Sask S1	2004	450 (2004)	450 (2004)	1
11	South Sask S2	2004	2600+ (2004)	46 (2007)	2
12	Drowning Ford West side (Suffield)	1973	172174 (2004)	9 (2007)	5
13	Drowning Ford East Side1	1998	12335 (2003)	1 (1998)	5
14	Drowning Ford East Side2 (Brush Flats)	2003	17500 (2003)	80 (2004)	2
15	Drowning Ford East Side3	2003	12 (2003)	12 (2003)	1
16	Drowning Ford East Side4	2007	10 (2007)	10 (2007)	1
17	Drowning Ford East Side5	2003	7500 (2003)	0 (2006)	2
18	Drowning Ford East Side6	2003	37 (2003)	0 (2008)	2
19	Drowning Ford East Side7	2003	2 (2003)	0 (2006)	2
20	Koomati1	2003	1390 (2004)	1 (2003)	5
21	Koomati2	2005	55 (2005)	55 (2005)	1
22	Koomati3	2005	6 (2005)	6 (2005)	1
23	Nishomoto Flats1	2005	71922 (2005)	71922 (2005)	1
24	Nishomoto Flats2	2004	16011 (2004)	16011 (2004)	1
25	Suffield ()	1994	Unknown (1994)	Unknown (1994)	2
26	Suffield ()	2004	399 (2004)	399 (2004)	1
27	South Sask N1	2004	20 (2004)	0 (2007)	2
28	Bindloss1	2007	1260 (2007)	1210 (2010)	2
29	Bindloss2	2007	100 (2007)	100 (2007)	1
30	Empress	2004	500 (2004)	500 (2004)	1

3.0 POPULATION THREATS AND LIMITING FACTORS

The population of tiny cryptantha in Alberta is highly susceptible to localized threats because of its limited occurrence in the province (ESCC 2007).

The following subsections detail threats that may negatively impact the species. However, The team recognizes that while many of these threats have a negative impact, some threats may have a temporary positive impact (as described below) or limited impact on the species depending on the timing, duration, size, impact and location relative to the species. The following identifies all known potential threats to the species and its habitat at this time.

3.1 Dune Stabilization

Tiny cryptantha requires areas with disturbed sandy soil including sand dune habitat. Sand dune stabilization is the greatest threat to the survival of the species (Samson and Knopf 1994; Smith 1998; ASRD 2004). Processes that encourage dune stabilization include changes of fire regimes, changes in grazing regimes, and increased invasive species due to recreational and industrial activities. The primary contributing factor to sand dune stabilization is the encroachment of native and non-native vegetation into sandy areas.

3.2 Conversion of Native Habitats

Conversion of native prairie habitat (cultivation for annual cropland, tame pasture, etc.) results in direct loss of habitat for many prairie species including tiny cryptantha. Further conversion of native habitat within the range of the species in Alberta would lead to a loss of individual plants/populations, species seed banks, and habitat for the species.

Much of the range of tiny cryptantha is on public land under grazing disposition and as such, has a lower risk of conversion; however, there is no government policy or conditions placed on public land traded or sold. Additionally, some sites do occur on or near private lands, tax recovery lands, or lands administered by Special Areas.

3.3 Sand Extraction

Sand extraction can result in direct removal of plants from a population. Further, tiny cryptantha seeds can remain dormant in the soil for several years (ASRD 2004), waiting for favorable moisture conditions to germinate. Removal of sand for industrial activities directly impacts the species through loss of individuals, seedbank depletion, habitat loss and compaction of remaining soil.

3.4 Industrial Activities and Supporting Infrastructure

Industrial activities have the potential for both positive and negative impacts on the species. Increased activities on the landscape can provide disturbed areas suitable for seed germination and thus increase the amount of available habitat for the species (ASRD 2004; ASRD 2009).

However, the creation of suitable habitat may be a short-term effect which allows tiny cryptantha to expand into normally unsuitable areas and then eventually die off as the area returns to its former state (ASRD 2004).

Industrial activities may negatively impact the species through the introduction of invasive species, compaction of soils, habitat fragmentation, and destruction of individual plants. Timing, duration and frequency of industrial activities will determine the overall impact these activities have on the species (Henderson 2011).

3.5 Residential Development

Residential developments may result in extirpation of the species from the local area due to building of infrastructure and long-term habitat change. This occurred at one recently-located population near Medicine Hat.

3.6 Recreational Activities

Long-term or sustained recreational activities, including off-roading, can destroy plants and seed beds and introduce invasive species, which negatively impact the population. There are concerns over the high amount of recreational activities at a least one known tiny cryptantha habitat site in Alberta.

3.7 Military Activities

It is currently unclear how military activities at Canadian Forces Base (CFB) Suffield affect the tiny cryptantha (Environment Canada 2006). Road creation, maintenance and use of heavy machinery can negatively impact individual plants and the immediate area. However short duration activities may reactivate stabilized sand dunes and may suppress competition from other plant species. Long-term or sustained activities can destroy plants, seed beds and introduce invasive species, negatively impacting the population.

3.8 Invasive Species

Invasive species can stabilize sand dunes, compete with the species for resources, and decrease the amount of available habitat for the species (Eiswerth and Van Kooten 2002). Major land uses that may accelerate the introduction of invasive species include recreational activities, industrial activities, military activities, and feeding of cattle (ASRD 2004; Environment Canada 2006).

3.9 Incompatible Grazing

Tiny cryptantha appears to need habitat with low litter levels and a minimum of 10% bare soil for establishment (Environment Canada 2006). Grazing is an important management tool to maintain dune activity, and can positively and negatively affect the species. While overgrazing can severely damage the area and make it unsuitable for tiny cryptantha, underutilization of an area can also increase the likelihood of dune stabilization. A balance between the two is required to ensure that the species persists. Grazing timing is also important

as cattle may injure or ingest the species prior to seed production or dispersal, limiting the future seed bank required for the survival of the species. Well-managed rangeland that produces a heterogeneous pattern of utilization will likely allow for the persistence of this species.

3.10 Water management

Several populations of tiny cryptantha exist in close proximity to the South Saskatchewan, Red Deer, and Oldman rivers. Water management changes, including damming, flooding and alterations to flow could negatively affect the species and its habitat.

4.0 CRITICAL HABITAT

Critical habitat is a legal designation under Canada's *Species at Risk Act (SARA)*, and is defined as

“the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species critical habitat in the recovery strategy or action plan for the species” (Species at Risk Act 2002 s. 2).

The national recovery strategy described critical habitat for tiny cryptantha in August 2010 and Environment Canada posted this description on the *SARA* Registry (Environment Canada 2010). The provincial recovery team has no role in designating critical habitat, but the team and provincial government departments will be influenced by the designation and may need to alter land and habitat management to ensure effective protection.

The national recovery team must specify activities that may result in destruction of critical habitat. However, due to the *Natural Resource Transfers Act*, management responsibility for tiny cryptantha on private land or provincially-owned public land remains with the Government of Alberta. This requires that there be close federal-provincial collaboration. Absence of provincial effective protection of the critical habitat (to prevent destruction) could lead to pressure to enact an emergency order through *SARA*. This could lead to the federal government taking over the critical habitat protection role.

4.1 Destruction of Critical Habitat

The team has reviewed the activities identified in the national recovery plan as “likely result in the destruction of critical habitat”. An evaluation and some recommended interpretations are provided here.

1. Activities that destroy or negatively impact critical habitat for tiny cryptantha include anything that would risk permanent conversion of the landscape. Permanent conversion of the landscape is further described by the team as *“Any landscape change that would result in the loss of a naturally sustaining population or part of a population of tiny cryptantha and that would render the habitat or part of the habitat as unsuitable for the species.”*

The national tiny cryptantha recovery strategy identified activities that likely constitute the destruction of critical habitat including

- Compression, covering, inversion, or excavation/extraction
- Alteration to hydrological regimes
- Indiscriminate application of fertilizers or herbicides
- Spreading of waste
- Deliberate introduction of invasive alien species.

Details and definitions of these activities can be found in *Recovery Strategy for Tiny Cryptantha (Cryptantha mimina) in Canada* (Environment Canada 2010).

The Alberta Tiny Cryptantha Recovery Team recognizes that the land use activities listed above may negatively impact critical habitat for tiny cryptantha. But in many situations, appropriate management techniques and tools are available to eliminate, reduce, or mitigate destruction. Implementation of appropriate beneficial management practices (BMPs) can be used to prevent destruction of critical habitat. Rather than a total ban on such activities, The team recommends that measures be taken by land owners and users to ensure appropriate management, mitigation tools, and BMPs are used in areas defined as critical habitat for tiny cryptantha.

4.2 Effective Protection of Critical Habitat

The national tiny cryptantha recovery plan did not define what constitutes effective protection of critical habitat. The team has identified a number of actions and tools that under certain circumstances may constitute effective protection.

- On provincial public lands under native prairie cover, a “no cultivation policy” will continue in order to provide protection from agricultural cultivation.
- Land use approval processes which consider species at risk in the decision making for new land use applications will be continued and strengthened.
- Protective Notations, timing and setback guidelines and predevelopment surveys will continue to be required on public lands.
- A recently developed tiny cryptantha habitat model that currently informs decision making within AESRD will be made available for use as a screening tool to inform potential developers, land users or public land sales in areas of potential habitat for this species.
- On private lands and associated grazing leases where tiny cryptantha occurs, landowners/lessees should engage in stewardship programs such as MULTISAR, in order to provide grazing management consistent with that recommended in BMPs for tiny cryptantha.

- Stewardship incentives (e.g., conservation easements) with associated tiny cryptantha conservation strategies should be encouraged on private land through various conservation organizations or government programs.

5.0 KNOWLEDGE GAPS AND RESEARCH PRIORITIES

Several areas of research (identified in order of priority) would help elucidate aspects of the tiny cryptantha biology. These research items are relevant to the implementation of specific activities outlined in the recovery plan, the species status in Alberta, and the long-term conservation and management of the species.

5.1 Standardized Guidelines for Inventory and Monitoring

Currently there are no standardized guidelines for inventorying or monitoring populations of tiny cryptantha. Specifically, guidelines to address the size of area surrounding known populations that should be searched, and the timing and frequency of inventories to determine average population size and area of occupancy of seed banks, are needed. A standardized monitoring system would allow data collected over a period of time to be compared and analyzed to determine population trends, area of occupancy trends and impacts of threats to the species. Understanding population trends and population estimates will allow managers to appropriately rank the species and prioritize recovery actions.

5.2 Seed Bank

There is little information on seed productivity, seed bank longevity, and dispersal rates and distances for the tiny cryptantha. The tiny cryptantha seed production fluctuates based on moisture availability. Production of seeds in good moisture years can sustain the species on the landscape in dry years. Research into seed productivity between years, viability of seeds over time and dispersal rates and distances is required to understand the population viability of the species.

5.3 Industrial Setback and Impacts on the Species

Set-back distance and timing restriction guidelines for prairie plant species at risk have been developed by Environment Canada (Henderson 2011). These guidelines are based on the best information available on the impacts of industrial developments on rare plants. Questions have been raised by industrial proponents and members of the team regarding the current impact rating system (high vs. low disturbance), footprint size of the disturbance and frequency of disturbance. Research on a variety of disturbance sizes, types and frequencies needs to be undertaken to further support or update the current rare plant industrial guidelines. Research on industrial impacts should include oil and gas developments, road developments, wind farm developments and transmission lines.

In 2009, a research project was initiated to examine the long term effects of pipeline development activities on tiny cryptantha populations. Results from this project and other similar

projects will be used to update current operating procedures and land use setback guidelines. This project intends to monitor populations over a 10-year time period to elucidate any ongoing population level effects from proximate development activities.

5.4 Grazing Studies

Studies are needed on how variation in grazing regimes as currently practiced by landholders influences plant life history (e.g., seed set) and habitat (e.g., stabilization or destabilization of dunes). Grazing methods that should be investigated include stocking rates, timing, frequency and duration of grazing. This information would be used to develop BMPs for livestock grazing that will conserve or enhance habitat for this species.

5.5 Invasive Species

Surveys are needed to monitor for invasive species in tiny cryptantha habitat. Leafy spurge (*Euphorbia esula*) was detected in proximity to tiny cryptantha during surveys conducted in 2007 (ASRD 2009). Determining if invasive species are a direct threat should be a priority. If invasive species are identified as a threat, research will be required to determine the impacts of these species on tiny cryptantha. If needed, work should be done to develop methods of invasive species eradication that will not negatively impact tiny cryptantha populations.

6.0 RECENT RECOVERY AND CONSERVATION EFFORTS

During the development of the Alberta Tiny Cryptantha Recovery Plan a number of identified actions were initiated including:

- Critical habitat was designated by the Government of Canada in 2010.
- Designated Protective Notations (PNTs) were placed around all known populations of the species that occur on public land.
- Research on industrial setbacks and impacts on tiny cryptantha was initiated to investigate the impacts of proximate disturbance from a large diameter pipeline on the species
- Species monitoring- In 2007 AESRD commissioned a survey of all the known locations of the species. Canadian Wildlife Service has continued to monitor all known locations on federal lands and all other locations on a rotating basis.
- Development of Habitat Suitability Index model- AESRD has developed an HSI model for use by industrial developers (Suitor 2010 unpublished data).

These actions have assisted the team in identifying areas of concern for the species, provided protection for the species and associated habitat during the plans development, and developed tools to assist in the implementation of the Plan.

7.0 RECOVERY

7.1 Biological and Technical Feasibility of Recovery

The recovery of the tiny cryptantha is considered by the team both biologically and technically feasible. The primary reason for the species being listed as *Endangered* in Alberta is its relatively small and localized distribution. The specific habitat requirements of the species (sandy soils, sand dunes) and its limited distribution make it unlikely that the species will spread to new locations within Alberta. However it is believed that there are additional undocumented populations of tiny cryptantha in Alberta.

Despite these limitations there is potential to maintain the species within Alberta. At each of the known sites in Alberta there is evidence of persisting populations and sizeable seed banks. Careful and cooperative management of tiny cryptantha habitat by all stakeholders will be key to the persistence of the species in Alberta. The team expects that a viable population of tiny cryptantha can be maintained if current populations are conserved and the efforts outlined below are undertaken

7.2 Guiding Principles

The conservation and management of the tiny cryptantha in Alberta will be guided by the following principles:

- The conservation of tiny cryptantha is possible and it is important to maintain this unique prairie species.
- Loss of habitat for tiny cryptantha is unacceptable and preventable. Prevention of habitat loss can be achieved through the application of BMPs and stewardship programs.
- The Plan is based on the assumption that all land users and managers within the range of the tiny cryptantha, including all affected branches of government, share responsibility for, and are committed to, conserving tiny cryptantha habitat.
- A cooperative approach with land managers, landholders, industry, and other agencies is essential to the success of the plan. This includes shared stewardship, compatible land uses, and local commitment to management initiatives.
- Knowledge gaps will be identified and will be communicated in the plan.
- Management and recovery actions will use tools resulting in the most immediate benefits to tiny cryptantha and will be based on the best available information. Implementation will not be delayed because of a lack of specific supporting information.
- Recovery action will focus on achievable initiatives and on those initiatives deemed most effective in conserving tiny cryptantha in Alberta.
- The recovery process will be guided by the concept of adaptive management, whereby specific actions are implemented, evaluated, and revised on an iterative basis to ultimately improve the outcome.

7.3 Recovery Goal

The goal of the recovery plan is to maintain the existing habitat and distribution of tiny cryptantha, and to maintain a self-sustaining population of tiny cryptantha in Alberta.

7.4 Recovery Objectives

1. Maintain the population and distribution of tiny cryptantha by ensuring no loss of habitat quality or quantity on public land from human-caused disturbances.
2. Maintain the population and distribution of tiny cryptantha by encouraging voluntary stewardship on privately owned lands occupied by the species.
3. Understand the population dynamics and trends of tiny cryptantha to aid in the long-term conservation of the species.

7.5 Strategies for Recovery

The Alberta Tiny Cryptantha Recovery Plan for will serve for an initial period of five years (2012-2017); during this time, multiple strategies, as outlined below, will be concurrently implemented.

7.5.1 Population Conservation and Management

1. Establish a monitoring protocol and monitor population size, trend, dynamics and distribution of the Alberta population of tiny cryptantha.
2. Establish legal protections for tiny cryptantha under the *Wildlife Act* or new legislation.

7.5.2 Habitat Conservation and Management

1. Apply protective notations for tiny cryptantha where required.
2. Identify risks to critical habitat for tiny cryptantha and work cooperatively with landholders (private and public), land managers, industry and other stakeholders to develop BMPs, policies, and procedures for eliminating or mitigating risks.
3. Communicate and encourage general principals of range/habitat management that are compatible with the maintenance of tiny cryptantha.

7.5.3 Information and Outreach

1. Communicate and promote understanding of the recovery plan to the public and stakeholders.
2. Increase awareness of landholders (private and public) and of the general public of the requirements to conserve tiny cryptantha, with landholders (private and public), land managers, industry and other stakeholders.

7.5.4 Research

1. Highlight key areas of study that will inform and facilitate the conservation of tiny cryptantha, encourage these studies to be initiated, and support researchers in their efforts to secure funding to undertake the necessary research.

7.5.5 Resourcing

1. Secure logistical, financial and in-kind support to implement the Plan.

7.5.6 Plan Management and Administration

1. Monitor and evaluate the effectiveness of conservation activities for tiny cryptantha.
2. Ensure that new information on tiny cryptantha is made available to the recovery team, resource managers, and stakeholders.
3. Ensure that recovery actions for tiny cryptantha complement, where possible, the conservation of other provincially and federally listed species.

8.0 ACTION PLAN

8.1 Population Conservation and Management

1. **Development of Survey Protocol:** AESRD, the Alberta Conservation Information Management System (ACIMS, formerly ANHIC), Canadian Wildlife Service, and/or researchers from non-government conservation organizations or universities will develop a survey protocol for monitoring tiny cryptantha. This will enable long-term, consistent monitoring of this species in Alberta and provide information to the team. The team recommends that this initiative be completed in year one of the plan.
2. **Survey and Monitoring:** Researchers from government agencies, non-government organizations, or universities will conduct monitoring surveys for the species. Monitoring surveys will focus on species distribution, abundance, and population trends. Monitoring will occur on all known tiny cryptantha sites and at all sites with favourable habitat for the species.
3. **Invasive Species Inventories:** Government agencies and non-government organizations, in association with landholders, will survey for invasive species in habitats containing or adjacent to tiny cryptantha populations. If invasive species are identified, surveyors will recommend and/or implement measures to remove or reduce their presence.
4. **Develop Supporting Protection:** AESRD will develop supporting protection for all legislated plants under the *Alberta Wildlife Act*, including the tiny cryptantha, similar to the protections currently afforded wildlife. The team recommends that this initiative be completed by year two of the plan.

8.2 Habitat Conservation and Management

1. **Habitat Mapping:** Government agencies with the assistance of non-government organizations and/or universities will identify and map potential habitat (including identified critical habitat) for tiny cryptantha. These maps will be provided to landholders and land managers (e.g., AESRD, ACIMS, Alberta Energy) and should be used as the basis for prioritizing survey locations for the species, and for permitting/mitigating land use

activities and sale or trade of public lands in these areas. The team recommends that this initiative be undertaken by year two.

2. **Designate Protective Notations:** AESRD will place PNTs, Consultative Notations or other protective designation on all quarter sections of public lands with naturally occurring populations of tiny cryptantha, including all those that have been identified as critical habitat. The team recommends that this initiative be undertaken in year one and updated as necessary.
3. **Industrial Development (excluding Upstream Oil and Gas) Process and Procedures on Public Lands:** AESRD will work cooperatively with industrial developers to ensure surveys for tiny cryptantha are carried out in areas of known occurrences or potential habitat prior to development. The recently developed tiny cryptantha habitat model will be made available for use as a screening tool to inform land users of areas of concern for this species. If the species is found to occur in an area of proposed development, the developers will work with AESRD to mitigate the effects of the development on the species.

The federal government *Activity Setback Distance and Timing Restriction Guidelines for Prairie Plant Species at Risk* (Henderson 2011) or the *Upstream Oil and Gas Approval Standards for the Enhanced Approval Standards* (Government of Alberta 2010a) will be used to facilitate mitigation. Conflict situations will be assessed based on the specific site and development to determine appropriate mitigation techniques. This will be done under the context of the recovery goal. This process is already occurring successfully on the landscape. The team recommends that this initiative be ongoing through the life of this recovery plan.

4. **Upstream Oil and Gas Process and Procedures on Public Lands:** AESRD, through the Enhanced Approval Process, will ensure that surveys for tiny cryptantha are carried out in areas of known occurrences or potential habitat as defined by the Landscape Analysis Tool (LAT), prior to development (Government of Alberta 2010a). The recently developed tiny cryptantha habitat model will be made available for use as a screening tool to inform land users of areas of concern for this species.

If tiny cryptantha is found to occur in an area of proposed development, the proponents will apply the standards identified in the *Upstream Oil and Gas Approval Standards for Enhanced Approval Process*. Conflict situations will be assessed based on the specific site and development to determine appropriate mitigation techniques through the Non-standards EAP stream (Government of Alberta 2010b). This will be done under the context of the recovery goal. The team recommends that this initiative be ongoing through the life of the Plan.

5. **Industrial Development Process and Procedures on Private Land:** Industrial developers will work cooperatively with AESRD and the local landowner to ensure surveys for tiny cryptantha are carried out in areas of known occurrences or critical habitat prior to developments. The recently developed tiny cryptantha habitat model will be made available for use as a screening tool to inform land users of areas of concern for this species.

If the species is found to occur in an area of proposed development, the developers will work with AESRD to mitigate the effects of the development on the species. The federal government *Activity Setback Distance and Timing Restriction Guidelines for Prairie Plant Species at Risk* will be used to facilitate this (Henderson 2011). Conflict situations will be assessed based on the specific site and development to determine appropriate mitigation techniques. Additional tools or incentives (e.g., paid easements, stewardship programs) may be needed in private land situations. This will be done under the context of the recovery goal. The team recommends that this initiative be ongoing through the life of this recovery plan.

6. **Development of Industrial BMPs:** BMPs for industrial developments within or adjacent to tiny cryptantha habitat will be developed in cooperation with AESRD and industrial developers with the intention that these BMPs be adopted as standard protocol by industrial stakeholders. BMPs will be based on up to date research that illustrates additional or alternative mitigation methods that will effectively conserve habitat for the species. These will be complementary to the current Environment Canada Guidelines (Henderson 2011) and Enhanced Approval Process (Government of Alberta 2010a). BMPs will be refined and updated as new information becomes available. This will assist in the pre-planning of industrial developments in areas where tiny cryptantha occurs. The team recommends that this initiative be ongoing through the life of the Plan.
7. **Update of Industrial Guidelines/Standards:** AESRD will work with Environment Canada and industrial developers to update the *Activity Setback Distance and Timing Restriction Guidelines for Prairie Plant Species at Risk* (Henderson 2011) and the *Upstream Oil and Gas Approval Standards for the Enhanced Approval Process* (Government of Alberta 2010a) based on the most up to date scientific knowledge for the species. Related tools, including the LAT, will be updated based on the best scientific digital models to focus surveys and setback and timing restrictions to the appropriate landscapes and areas. The team recommends that this initiative be ongoing through the life of the recovery plan.
8. **Commercial and Residential Development:** AESRD will work with local governments (City and municipal) to ensure the species is surveyed for and potential conflicts are mitigated prior to any new residential or commercial developments. The federal government's *Activity Set-Back Distance and Timing Restriction Guidelines for Prairie Plant Species at Risk* (Henderson 2011) should be used to facilitate mitigation. Conflict situations will be assessed based on the specific site and development to determine appropriate mitigation techniques. The team recommends that this initiative be ongoing through the life of the recovery plan.
9. **Land Sale Policy:** AESRD will establish appropriate government policy for public land transfers and/or sales, including sale of Tax Recovery Lands, where tiny cryptantha or other threatened or endangered species occur. The team recommends that this initiative be undertaken in year one.

10. **Development of Grazing BMPs:** AESRD, other agencies, and/or researchers will develop BMPs for livestock grazing within tiny cryptantha habitat. The intention is for the BMPs to be adopted by local landholders. The team recommends that this initiative be undertaken in year 4 and be updated as information become available.
11. **Implementation of Grazing BMPs:** The team will work with local landholders, non-government organizations, and government agencies and to implement BMPs for the species through existing stewardship programs on private and public lands. Stewardship activities may include, but are not limited to, range assessments, funding for grazing improvements, and provision of stewardship incentives. The team recommends that this initiative be undertaken in year two and be updated as information become available.

8.3 Information and Education

1. **Develop and Distribute a Fact Sheet:** AESRD will develop a fact sheet for the tiny cryptantha in cooperation with members of the recovery team and non-government agencies. Fact sheets will be made available to the public and interested stakeholders through the Alberta Species at Risk Program website and in hardcopy through the Alberta Environment and Sustainable Resource Development Information Center.
2. **Information Distribution:** For landholders that currently have or have the potential to have tiny cryptantha on their land, AESRD will provide information to them including: known locations and details of the population on their land (if applicable), how to identify the species, and how to conserve the species and its habitat (e.g., species fact sheets, BMPs, etc.). The team recommends that this initiative be undertaken in year one and continue through the life of the Plan.
3. **Recovery Plan Distribution:** AESRD will make the Plan available to the public and interested stakeholders on the Alberta Species at Risk Program website and in hard copy through the Alberta Environment and Sustainable Resource Development Information Center. The team recommends that this initiative be undertaken in year one.

8.4 Research

1. AESRD, ACIMS, non-government organizations, and universities will work together to research the following:
 - a. Determine the size and longevity of seed banks for the species. The team recommends that this initiative be undertaken when an appropriate researcher is located.
 - b. Measure the effects of livestock grazing on tiny cryptantha and determine suitable stocking rates and grazing systems to encourage and promote habitat for the species in key areas. The team recommends that this initiative be undertaken as soon as an appropriate researcher is located.
 - c. Determine the effects of industrial developments, including oil and gas and wind farm developments. Studies should measure the effects of actual footprint size in comparison to current guidelines and timing restrictions recommended in the federal *Activity Setback Distance and Timing Restriction Guidelines for Prairie Plant Species at Risk* (Henderson 2011). The findings from this study should be used to update the current operational guidelines and develop BMPs for industrial developments. The team recommends that this initiative be undertaken in year two.
 - d. Monitor the effects of invasive species encroachment on tiny cryptantha habitat and the species. The team recommends that this initiative continue through the life of the recovery plan.

8.5 Resourcing

1. **Funding:** government, non-government organizations, universities, and landholders will be approached regularly to participate in or fund tiny cryptantha recovery initiatives.

8.6 Plan Management and Administration

1. **Annual Meetings:** AESRD will convene the team as needed, to review progress on implementation of the plan, review the effectiveness of recovery actions, and develop new recovery actions as required.
2. **Data Storage:** All survey data should be submitted to ACIMS. ACIMS, in cooperation with other agencies and researchers, will enter all accumulated tiny cryptantha data into their database following each survey season.
3. **Coordinate Research Effort:** The team, in association with AESRD (Prairies Area), will ensure that all research activities are properly permitted and coordinated in order to maximize benefits from research and minimize disturbance to the population.
4. **Communication with other Recovery Teams:** The Chair of the team will communicate with other recovery teams, particularly those for other prairie plants or species associated with sand dune habitats, to ensure recovery actions for tiny cryptantha complement, whenever possible, recovery of other provincially or federally listed species at risk.

5. **Review and Update of Related Recovery Plans:** Every five years the Chair of The team will review all actions within recovery plans of other species at risk whose ranges' overlap with that the tiny cryptantha. Measures will be taken to ensure compatibility of all recovery actions implemented for the tiny cryptantha and other species at risk on the same land base.

9.0 TIMETABLE FOR IMPLEMENTATION AND SCHEDULE OF COSTS

The following schedule (Table 2) provides a timeline for implementation of actions identified by the team as being important to the conservation of the tiny cryptantha in Alberta, and provides an estimate of the costs associated with their implementation. Costs are not provided for actions that are part of the daily operations of the identified agencies. Cost associated with team members' expenses to attend recovery team meetings are also not included, but represent valued and necessary contributions associated with implementation of the Plan.

Table 2. Tiny cryptantha recovery action implementation table.

Action	Lead	Cost and Actions by Year				
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
8.1.1 Development of survey protocol	<i>AESRD, ACIMS, CWS and Non-government organizations (NGOs)</i>	In-kind, Development	Apply	Apply	Apply	Based on 8.1.2 evaluate and update
8.1.2 Survey and monitoring	<i>AESRD, CWS, NGOs</i>		\$10 000 Conduct Surveys	\$10 000 plus in-kind	\$10 000 plus in-kind	Evaluate
8.1.3 Invasive species inventories	<i>AESRD, NGOs, landholders</i>	In-kind plus \$5 000	In-kind, plus \$5 000	In-kind, plus \$5 000	In-kind, plus \$5 000	Evaluate
8.1.4 Develop supporting protection	<i>AESRD</i>	Initiate, In-kind	Complete, In-kind			
8.2.1 Habitat mapping	<i>AESRD</i>	In-kind, \$10 000	Implement and evaluate	Complete	Complete	Evaluate
8.2.2 Designate PNTs	<i>AESRD</i>	In-kind	In-kind	Update as needed	Update as needed	Update as needed
8.2.3 Industrial development (excluding Upstream Oil and Gas) process and procedures on public lands	<i>AESRD, Industry</i>	Initiate	Ongoing	Ongoing	Ongoing	Ongoing
8.2.4. Upstream oil and gas process and procedures on public lands	<i>AESRD, Industry</i>	Initiate	Ongoing	Ongoing	Ongoing	Ongoing
8.2.5 Industrial development process and	<i>AESRD, Industry</i>	Initiate	Ongoing	Ongoing	Ongoing	Ongoing

Action	Lead	Cost and Actions by Year				
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
procedures on private lands						
8.2.6 Development of industrial BMPs	<i>AESRD, Industry</i>	\$20 000 plus in-kind, Development	\$20 000 plus in-kind, Apply	Evaluate and update	Evaluate and update	Evaluate and update
8.2.7 Update industrial guidelines	<i>Environment Canada, AESRD</i>	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
8.2.8 Commercial and residential developments	<i>AESRD, Cities, Municipal Districts and Counties</i>	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
8.2.9 Land sale policy	<i>AESRD</i>	In-kind, Development	In-kind, Development	In-kind, Implement	Evaluate	
8.2.10 Development of Grazing BMPs	<i>AESRD, NGOs</i>		\$10 000 plus In-kind,	In-kind	Complete	Complete
8.2.11 Implementation of grazing BMPs	<i>NGOs, landholders</i>		\$20 000 plus in-kind, Implement	\$20 000 plus in-kind, Ongoing	\$20 000 plus in-kind, Ongoing	\$20 000 plus in-kind, Ongoing
8.3.1 Development and distribution of fact sheets	<i>AESRD, NGO's</i>	\$5 000, plus in-kind, Development	In-kind, Distribution	In-kind, Ongoing	In-kind, Ongoing	In-kind, Ongoing
8.3.2 Information distribution	<i>AESRD</i>	Initiate	Ongoing	Ongoing	Ongoing	Ongoing
8.3.3 Plan distribution	<i>Various</i>	Initiate	Ongoing	Ongoing	Ongoing	Ongoing
8.4.1 Research	<i>Various</i>	\$65 000, plus In-kind	\$65 000, plus In-kind	\$65 000, plus In-kind	\$65 000, plus In-kind	\$65 000, plus In-kind
8.5.1 Funding	<i>Various</i>	In-kind	In-kind	In-kind	In-kind	In-kind
8.6.1 Annual meetings	<i>Various</i>	In-kind	In-kind	In-kind	In-kind	In-kind

Action	Lead	Cost and Actions by Year				
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
8.6.2 Data Storage	<i>Alberta Tourism, Parks and Recreation (ACIMS)</i>	In-kind	In-kind	In-kind	In-kind	In-kind
8.6.3 Coordinate Research Effort	<i>AESRD</i>	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
8.6.4 Communication with other recovery teams	<i>AESRD</i>	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
8.6.5 Review and update of related recovery plans	<i>AESRD</i>					In-kind
Estimated Totals		\$105 000 + In kind	\$130 000 + In kind	\$100 000 + In kind	\$100 000 + In kind	\$85 000 + In kind

10.0 SOCIO-ECONOMIC CONSIDERATIONS

Tiny cryptantha is localized to small geographic areas of southern Alberta, which will limit the potential socio-economic impacts of implementation of this recovery plan. The Plan recognizes the value of the landscape for grazing and industrial development. It is hoped that stakeholder involvement during the recovery process will help minimize or mitigate the potential costs associated with the implementation of this plan. Implementation of BMPs may result in potential economic costs associated with changes to grazing management systems. Costs could also result from restrictions on resource extraction, or from mitigation measures required during extraction or development..

There are several social and economic benefits that may be realized from implementation of the recovery Plan. There is potential for leaseholders and landholders to realize increased productivity of their rangelands through range habitat plans or through the provision of improvements to their operations. Economic benefits may also be realized through the proactive identification and control of invasive species before they expand throughout native rangelands. Activities that lead to the maintenance of an intact prairie landscape may also lead to increased recreational opportunities, such as nature viewing, hunting, and ecotourism.

There could be negative economic impacts on stakeholders due to increased costs associated with implementation of BMPs, pre-development surveys, and reclamation work required. Additionally, some areas may have limits to the type and amount of industrial developments, cultivation, recreational use, or residential developments allowed. Through the processes identified within this Plan these effects will be minimized as much as possible; nonetheless, they are recognized by the team.

Tiny cryptantha is a unique prairie species and there is an inherent value in keeping it on the landscape. Implementation of action items that conserve or improve the quality of native rangelands should lead to rangelands with high native biodiversity and should help to conserve other prairie species at risk. Conservation of native prairie is also beneficial for continuing Alberta's ranching heritage and ultimately contributes to providing ecosystem services for society.

11.0 MULTIPLE SPECIES AT RISK AND RELATED RECOVERY STRATEGIES

The Grassland Natural Region (GNR) of Alberta, which includes the entire Alberta population of tiny cryptantha, contains the highest number of species at risk of any natural region in the province (Achuff *et al.* 1988; ASRD 2005). Due to the large number of species at risk that have overlapping habitat needs within this natural region, there is potential for the various recovery actions identified in the individual species recovery plans to be in conflict with each other. Efforts should be made by Recovery Team Chairs to communicate with Chairs of other potentially impacted species to prevent conflicts from occurring and to facilitate collaboration.

There are currently nine species at risk recovery plans that may impact the same area as tiny cryptantha, and they are as follows::

- Burrowing owl
- Ferruginous hawk
- Northern leopard frog
- Ord's kangaroo rat
- Greater sage-grouse
- Soapweed and yucca moth
- Swift fox
- Small-flowered sand verbena
- Western spiderwort

The majority of the recovery actions included in each of these plans are compatible with the recovery actions identified for tiny cryptantha. These include conservation of native prairie habitats, invasive species control or elimination, development of BMPs for various land users, and use of guidelines or BMPs for industrial developments. Based on the team Chair's review of the above species recovery plans and associated actions, potential for conflicting recovery actions with other existing plans is limited.

To avoid conflict at any point of the tiny cryptantha recovery process, a program that considers multiple species at risk rather than individual species (e.g. MULTISAR) should be the main delivery agents for the *Alberta Tiny Cryptantha Recovery Plan* actions. A multi-species program can examine the land base as a whole and achieve a balance between the habitat needs and recovery actions for each of the listed species. Agencies delivering recovery actions for tiny cryptantha will consider all impacts to other species at risk before implementing the recovery actions. This is of particular importance in areas where the critical habitat of more than one species overlaps.

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2.0 PLAN EVALUATION AND AMENDMENT

The life of this plan is five years. The team Chair will conduct an annual review of the plan to monitor the implementation of the actions and determine the effectiveness of recovery actions. The team Chair may decide to reconvene the team at that time, if warranted. Recovery plans are considered “living” documents and amendments may be made between the five year updates if circumstances warrant.

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Personal Communications

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