AMENDMENT TO THE FINAL RECOVERY STRATEGY FOR THE TINY CRYPTANTHE (*CRYPTANTHA MINIMA*) IN CANADA

RE: IDENTIFICATION OF CRITICAL HABITAT AND ACTION PLANNING

2010

1. INTRODUCTION

The *Recovery Strategy for the Tiny Cryptanthe* (Cryptantha minima) *in Canada* (Environment Canada 2006) was posted on the Species at Risk Registry in October 2006.

Under Section 45 of the *Species at Risk Act* (SARA), the Minister of the Environment may amend a recovery strategy at any time.

This amendment to the *Recovery Strategy for the Tiny Cryptanthe* (Cryptantha minima) *in Canada* is for the purpose of:

- Identifying tiny cryptanthe critical habitat; and
- Clarifying Environment Canada's timelines for action planning for the tiny cryptanthe, which were adjusted to allow for the identification of critical habitat and the finalization of this amendment.

This amendment is being posted on the Species at Risk Public Registry for a 60-day comment period. At the time of final posting, the following text will replace sections 2.6 and 2.10 of the complete recovery strategy as well as revising the section on Literature cited and adding Appendices A to E.

2.6. CRITICAL HABITAT

2.6.1 Approaches to Identifying Critical Habitat

The approach used for identifying critical habitat for the tiny cryptanthe is based on a decision tree developed by the Recovery Team for Plants at Risk in the Prairie Provinces as a guidance for identifying critical habitat for all terrestrial and aquatic prairie plant species at risk (see Appendix A).

The first decision is regarding the quality of available information on tiny cryptanthe occurrences in Canada, with the choice of accepting or rejecting any given occurrence for consideration as critical habitat based on three criteria that were used to define the quality of information. The three criteria relate to the number of years since the last known occurrence was relocated and/or revisited, the precision and accuracy of the geographic referencing systems used to locate the occurrence and an evaluation of whether the habitat, in its current condition, remains capable of supporting the species. If the result of this first decision is that a given occurrence is accepted for consideration as critical habitat, then the second decision can be considered. If the result of this first decision is that a given occurrence is not accepted for consideration, then the location of the postulated occurrence is excluded from consideration as critical habitat at this time. However it may be considered in future identification of critical habitat, depending on the outcome of future surveys.

The second decision is based on how well the habitat is defined. If habitat is not well defined, as in the case of the tiny cryptanthe, critical habitat consists of the area encompassing the occurrence (area of occupancy of the population) and all natural landform, soil, and vegetation features within a 300 meter distance of the occurrence.

Tiny cryptanthe habitat is restricted to semi-arid grasslands on coarse-textured soils. These areas are influenced by some level of disturbance and are poorly defined in space and time. Thus, critical habitat for the tiny cryptanthe is identified at this time as the area encompassing the occurrence (area of occupancy of the population) and all natural landform, soil, and vegetation features within a 300 meter distance of those plants. Conversely, all existing human developments and infrastructure within the area identified as critical habitat are exempt from consideration as critical habitat. The 300 m represents the minimum distance needed to maintain the habitat required for long term survival of the species at this occurrence. This specific distance was based upon a detailed literature review that examined edge-effects of various land use activities that could affect resource availability for native prairie plants generally, and could contribute to negative population growth (see Appendix B).

2.6.2 Identification of the Species' Critical Habitat

Critical habitat for tiny cryptanthe is identified in this document based on the best available knowledge at this time. A map showing the location and extent of this critical habitat is provided in Appendix C. The grand total area of critical habitat identified is 8298 hectares (83 km^2) which occupies or overlaps into 206 quarter-sections of land in the Dominion Land Survey System. In Saskatchewan, 4 quarter sections that partially contain critical habitat are privately owned, 6 quarter sections are provincially owned, and 3 have both provincial and privately owned portions. In Alberta, 19 quarter sections are privately owned, 15 municipally owned, 53 provincially owned, and 99 federally owned, with 7 having both provincial and federal owned portions (see Appendix D). Out of the total, 59 quarter sections that contain portions of critical habitat are within Canadian Force Base (CFB) Suffield National Wildlife Area. The critical habitat displayed in Appendix C have not excluded existing human developments and infrastructure, cultivated land, rivers, wetlands and unsuitable natural vegetation and landforms, but these are exempt from the critical habitat identification as per the approach described above (Section 2.6.1).

In accordance with Section 124 of the *Species at Risk Act*, the precise locations of the tiny cryptanthe occurrences are not presented in this document to protect the species and its habitat. In order to locate this critical habitat, a list of quarter sections is provided (Appendix D). All jurisdictions and landowners who are controlling surface access to the area, or who are currently leasing and using parts of this area, will be provided with Geo-referenced Information System spatial data or large-format maps delineating the critical habitat displayed in Appendix C upon request. No permanent signs have been, or will be, placed in the field to delineate this critical habitat. The location information is housed with Environment Canada, Prairie and Northern Region, Environmental Stewardship Branch, Edmonton, Alberta.

2.6.3 Examples of Activities Likely to Result in Destruction of Critical Habitat

Destruction is determined on a case by case basis. Destruction would result if part of the critical habitat were degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from a single or multiple activities at one point in time or from the cumulative effects of one or more activities over time (Government of Canada 2009).

Examples of activities that may result in destruction of the tiny cryptanthe critical habitat include, but are not limited to:

1) Compression, covering, inversion, or excavation/extraction of soil – Examples of compression include the new creation or expansion of permanent/temporary structures, trails, roads, repeated motorized traffic, and objects that concentrate livestock activity and alter current patterns of grazing pressure such as spreading bales, building new corrals, adding more salting stations, or adding more water troughs. Compression can damage soil structure and porosity, or reduce water availability by increasing runoff and decreasing infiltration, such that the critical habitat is destroyed. Examples of covering the soil include the new creation or expansion of permanent/temporary structures, spreading of solid waste materials, or road bed construction. Covering soil prevents solar radiation and water infiltration needed for germination or survival of plants, such that the critical habitat is destroyed. Examples of soil inversion and/or extraction include new or expanded cultivation, sand and gravel extraction pits, dugouts, road construction, pipeline installation, and stripping of soil for well pads or fireguards. Soil inversion or excavation/extraction can alter soil porosity, and thus temperature and moisture regimes, such that vegetation communities change to those dominated by competitive weedy species, and the habitat is therefore destroyed. Activities required to manage, inspect and maintain existing facilities and infrastructure, which are not critical habitat but whose footprints may be within or adjacent to the identified critical habitat, are not examples of activities likely to result in the destruction of critical habitat due to soil compression, covering, inversion, or excavation/extraction, provided that they are carried out following the most current guidelines aimed at protecting the critical habitat of the tiny cryptanthe (e.g., Henderson 2010).

2) Alteration to hydrological regimes - Examples include temporary or permanent inundation resulting from construction of impoundments downslope or downstream, and accidental or intentional releases of water upslope or upstream. As the seed bank and plants of tiny cryptanthe are adapted to semi-arid conditions, flooding or inundation by substances like water or hydrocarbons, even for a short period of time, can be sufficient to render habitat unsuitable for survival and re-establishment. Even construction of a road can interrupt or alter overland water flow, altering the conditions of the habitat required for the long-term survival of the species at this occurrence enough to render it unsuitable for growth.

3) Indiscriminate application of fertilizers or pesticides – Examples of both pesticides and fertilizer effects that change the habitat include increasing soil water and nutrient availability such that species composition of the surrounding community changes. The altered interspecific competition could render the habitat unsuitable for the species at risk. Additional examples are the single or repeated use of broad-spectrum insecticides that may negatively affect pollination rates and reduce reproductive output, such that the functioning of critical habitat may be negatively impacted.

4) Spreading of liquid wastes – Examples include spreading of materials such as manure, drilling mud, and septic fluids. These have the potential to negatively alter soil resource availability, species composition, increase surrounding competitor plants, such that population declines occurs. This effectively destroys the critical habitat. Unlike covering the soil, these liquid or semi-liquid materials can infiltrate the surface in the short-term, but leave little long-term evidence at the surface that could point to the cause of negative changes observed thereafter.

5) Deliberate introduction or promotion of invasive alien species – Examples of deliberate introduction include intentional dumping or spreading of feed bales containing viable seed of invasive alien species, or seeding invasive alien species onto a disturbed area within critical habitat where the invasive alien species did not already occur. Examples of deliberate promotion include use of uncleaned motorized recreational vehicles on existing race courses, where many of the vehicles arrive contaminated from off-site use and represent significant dispersal vectors for invasive alien species. Once established, these invasive alien species can alter soil resource availability and directly compete with species at risk, such that population declines occur. This effectively destroys the critical habitat. The following invasive alien species are not restricted by any other legislation due to their economic value, yet invasion by these species could destroy critical habitat for tiny cryptanthe: crested wheatgrass (*Agropyron cristatum*), yellow sweet clover (*Melilotus officinalis*), white sweet clover (*Melilotus alba*), and baby's breath (*Gypsophila elegans*). This form of destruction is often a cumulative effect resulting from the first four examples of critical habitat destruction.

While the human activities listed above can destroy critical habitat, there are a number of activities that can be beneficial to tiny cryptanthe and its habitat. These activities are described in Appendix E.

2.10 Statement on Action Plan

Completion of an Action Plan has been delayed pending identification of critical habitat and finalization of this amendment to the Recovery Strategy for tiny cryptanthe. The Action Plan for tiny cryptanthe will now be completed by 2013. There is a potential for a multispecies or an ecosystem–based Action Plan that could benefit multiple species at risk inhabiting this ecosystem.

3. LITERATURE CITED

Environment Canada. 2006. Recovery Strategy for the Tiny Cryptanthe (*Cryptantha minima*) in Canada. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. vi + 24 pp.

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APPENDIX A. Decision Tree for Determining the Type of Critical Habitat Identification Based on Biological Criteria

This decision tree was developed by the Recovery Team for Plants at Risk in the Prairie Provinces, to guide the approach for identifying critical habitat for all terrestrial and aquatic prairie plant species at risk.

The first decision is regarding the quality of available information on the species occurrences in Canada, with the choice of accepting or rejecting any given occurrence for consideration as critical habitat based on three criteria.

The second decision is based on how well the habitat is defined. If habitat is not well defined, critical habitat consist of the area encompassing the occurrence and all natural landform, soil, and vegetation features within a 300 m distance of the occurrence.

For species that occupy well-defined and easily-delineated habitat patches, a third decision relates to the ease of detection of the species and the spatial and temporal variability of their habitat.

Decision Tree:

1a. Occurrences have not been revisited for >25 years, **or** use imprecise and/or inaccurate geographic referencing systems, **or** the habitat no longer exists at that location to support the species (no critical habitat will be defined until more is known about the population and location)
1b. Occurrences have been relocated and revisited in past 25 years, **and** habitat has been revisited in past 5 years to confirm it has the potential to support an occurrence, **and** geographic reference is accurate and precise (go to 2)

2a. Species is a generalist associated with widespread habitats, **or** a specialist that occupies dynamic disturbance regimes difficult to delineate as patches in space, **or** occupies habitat that is otherwise poorly defined (***critical habitat area = occurrences +*** all natural landform, soil, and vegetation features within a 300 meter distance of each occurrence)
2b. Species occupies well-defined and easily delineated habitat patches in space (go to 3)

3a. Habitat patches are spatially static in the medium to long term, **or** species is easy to reliably detect (***critical habitat area = occupied habitat patches +*** all natural landform, soil, and vegetation features within a distance of 300 meters of the habitat patches)
3b. Habitat patches are spatially dynamic in the medium to long term, **or** species is difficult to reliably detect (***critical habitat area = occupied and potentially occupied habitat patches +*** all natural landform, soil, and vegetation features within a distance of 300 meters of the habitat patches).

Notes

Criterion 1a is consistent with NatureServe guidelines for data quality, in that records >25 years old with no subsequent revisit record are least accurate.

Criterion 1b is consistent with SARA Sections 46 and 55 which require reporting on progress towards meeting recovery objectives at five-year intervals.

Criteria 2a, 3a and 3b are consistent with recommendations in Appendix B. In some cases a large barrier exceeding 150 m in width creates a discontinuity in the natural habitat within the 300 m like a major river channel or cultivated field. These barriers effectively overwhelm other edge effects at the distal end of the 300 m, or prevent effective dispersal of the plant at the proximal end closest to the occurrence. In these particular cases, some patches of natural vegetation on natural landforms within a distance of 300 m, but discontinuous from the habitat occupied by the plants, may be exempt from consideration as critical habitat.

Criterion 3 will be applied only after the results of appropriate studies indicate something beyond Criterion 2 can be defended biologically.

APPENDIX B. Rationale for Including a Distance of 300 m from Plant Occurrences in Critical Habitat Identification

Critical habitat will always be spatially linked to confirmed locations of individual plant species at risk. Terrestrial plants are sessile and their propagules (seeds, rhizomes, or stolons) are more dispersal-limited than the offspring of mobile organisms like vertebrates and invertebrates. Terrestrial plants also compete for the same primary resources of space aboveground for sunlight and gas exchange, and space belowground for water and nutrients. To protect habitat required for survival or recovery of a plant, it is also necessary to protect the current distribution of these resources where the plants are known to occur. Any human activity that could disrupt this otherwise natural distribution of resources could effectively destroy the critical habitat of a plant species at risk. Often human activity may occur at one site but the effects of that activity occur at another site. Alternatively, the effect of human activity may decline with distance from the site where the activity took place, or the effects of human activity could be cumulative over time (Ries *et al.* 2004). The question then becomes, what is a reasonable minimum distance from a plant species at risk that may encompass habitat required for its survival or recovery? The answer will define the area requiring protection as critical habitat under the *Species at Risk Act* (SARA).

Protection of Habitat Subject to Edge-Effects of Human Activities

An area including a distance of 300 m from detectable plants will be critical to ensure long-term survival of plant populations.

Edge Effects of Soil Disturbance

The only research to describe edge effects on short-term survival of plant species at risk indicated 40 m was the minimum distance needed to avoid negative impacts of road dust on plant health and population growth (Gleason *et al.* 2007); however, that was also the maximum distance at which measurements were made. In detailed reviews by Forman and Alexander (1998) and Forman *et al.* (2003), most roadside edge effects on plants resulting from construction and repeated traffic have their greatest impact within the first 30 to 50 m. However, salinity, nitrogen and hydrological effects could extend 100 to 200 m from a road, and invasive alien species may spread up to 1 km. Invasive alien species have the potential to competitively exclude plant species at risk, and alter the ecosystem such that the plant species at risk can no longer use the habitat. This particular threat may then destroy critical habitat, without some active restoration.

Hansen and Clevenger (2005) observed no decline in the frequency of invasive alien species up to 150 m away from roads and railways in a grassland environment, although sampling did not extend further than 150 m. Gelbard and Harrison (2005) concluded that edge effects of roads on the plant and soil habitat was such that invasive alien species could more readily establish and survive within 10 m of roads compared with plants up to 1000 m from roads. Of course, not all roads are the same and Gelbard and Belnap (2003) found that paved or graded roads tend to have a higher cover and richness of invasive alien species compared with 4 x 4 vehicle tracks. All classes of road created habitat for the dispersal and establishment of these species in roadside verges and 50 m beyond. The difference was that greater frequency of traffic and intensity of disturbance on improved roads increased the process of invasion.

The road density typical of the Canadian prairies is one road every 1.6 to 3.2 km. As such, it is unlikely that source populations for invasive alien species can be accurately identified beyond 800 m from roadside or cultivated field edges (the center of a 1.6 x 1.6 km section assuming it is surrounded by roads or cultivated lands). Considering that significant effects of invasive alien species can currently be detected up to 150 m from roads and other developed sites, but can occur >800 m from a source population, some compromise distance between 150 and 800 m seems reasonable for protection of critical habitat.

Edge Effects of Atmospheric Industrial Emissions

Atmospheric emissions from industrial activity, including intensive agriculture, can lead to a cumulative deposition of nitrogen on surrounding soils. Elevated concentrations of nitrogen and sulphur become analytically detectable in plants and soils up to 1 to 2 km away (Meshalkina *et al.* 1996, Hao *et al.* 2006). It is not clear if these detectable increases in macronutrients are biologically meaningful, but since most plant species at risk occupy nutrient-poor, early to mid-successional grassland habitats, any increase in soil nutrient availability is likely to intensify competition, speed succession, and eliminate habitat critical for the species survival.

Reich *et al.* (2001) observed an increase in the productivity of hairy prairie clover (*Dalea villosa*) in response to nitrogen fertilizer, but in a mixed community any positive effect would be offset by the greater productivity response of other competing species. Kochy and Wilson (2001) observed nitrogen deposition in Elk Island National Park several kilometers downwind of petroleum refineries and an urban center to be 22 kg ha^{-1} $year^{-1}$, while background rates in the wilderness at Jasper National Park were only 8 kg ha^{-1} $year^{-1}$. These increased deposition rates appeared to promote forest encroachment at the expense of native grasslands at Elk Island, moreso than rates at Jasper. Experiments by Plassmann *et al.* (2008) found that low additions of nitrogen (15 kg ha^{-1} $year^{-1}$) to sand dunes increased germination rates of annual plants from the seedbank, which risks depleting the seedbank and eliminating a species from a low-nitrogen site to which it is adapted.

Similar to the effects of industrial emissions, some invasive alien species like the legume sweet clover (*Melilotus* spp.) can elevate soil nitrogen through biological fixation and facilitate invasions by other invasive alien species (Jordan *et al.* 2008, Van Riper and Larson 2009). This particular plant has become one of the most widespread invasive alien species in the northern Great Plains, due initially to deliberate planting in roadside edges, forage crops, and other reclaimed areas (Lesica and DeLuca 2000). These findings reinforce the idea that an area greater than 150 m to avoid invasive alien legumes, and possibly greater to avoid negative effects of industrial nitrogen and sulphur emissions, is necessary to protect habitat critical for prairie plant species at risk.

Edge Effects of Fluid Spills

Water, hydrocarbons or other fluids leaking from pipeline ruptures will have edge effects that vary greatly depending upon topography of the site. For example, an Alberta Energy Resources Conservation Board (ERCB) investigation during 2008 at CFB Suffield found a surface leak of crude oil spread 165 m along ungulate trails and ultimately covered 1200 m^2 of native grassland, killing more than 200 migratory birds (ERCB Investigation Report 2009-06-18). A second incident investigated by ERCB involved a natural gas blowout that released “lower explosive levels” of gas at 100% within 50 m of a wellhead decreasing to 0% at 500 m. This incident also involved a spill of fluids up to 25 m from the wellhead that resulted in excavation and removal of 540 tonnes of soil for remediation (ERCB Investigation Report 2009-06-01). ERCB investigations elsewhere have found oil spills that spread 1.6 km across the surface from rupture points before clean-up could begin (ERCB Investigation Report 2007-05-09).

As plants are not mobile, flooding and inundation for any period of time may be sufficient to destroy critical habitat for several months, years, or decades. The probability of such a rupture is unknown, particularly in proportion to the density of all existing and planned pipelines, and in proportion to habitat availability and species at risk occupancy in the area. The risk of an irreversible change to the habitat is high, so the addition of pipelines within several hundred meters of plant occurrences should not be permitted.

Summary

All of the factors discussed above are potentially cumulative, particularly in the more industrialized parts of southern Alberta and south-western Saskatchewan. Industrial emissions, road construction, and fluid spills are logically co-located land use activities, and land spreading of agricultural wastes can add to the effects. Given the uncertainty regarding the outer distance for possible edge effects exceeding 150 meters, and the difficulty of identifying a point source for effects beyond 800 m, a precautionary approach is to include a distance of 300 m from the plant species at risk occurrences as habitat critical to survival of the species. This value of 300 m is simply twice the 150 m value for which published evidence indicates that significant negative effects can occur to the habitat of plant species at risk. A doubling of the 150 m value is intended to be precautionary to avoid the risk of irreversible destruction of critical habitat.

Research is needed to more specifically address the edge-effects of major land use activities on habitat critical to survival of prairie plant species at risk. A smaller or larger distance may be suggested based on the results of that research, and changes to the definition of habitat critical to the survival of prairie plant species at risk could result from that work.

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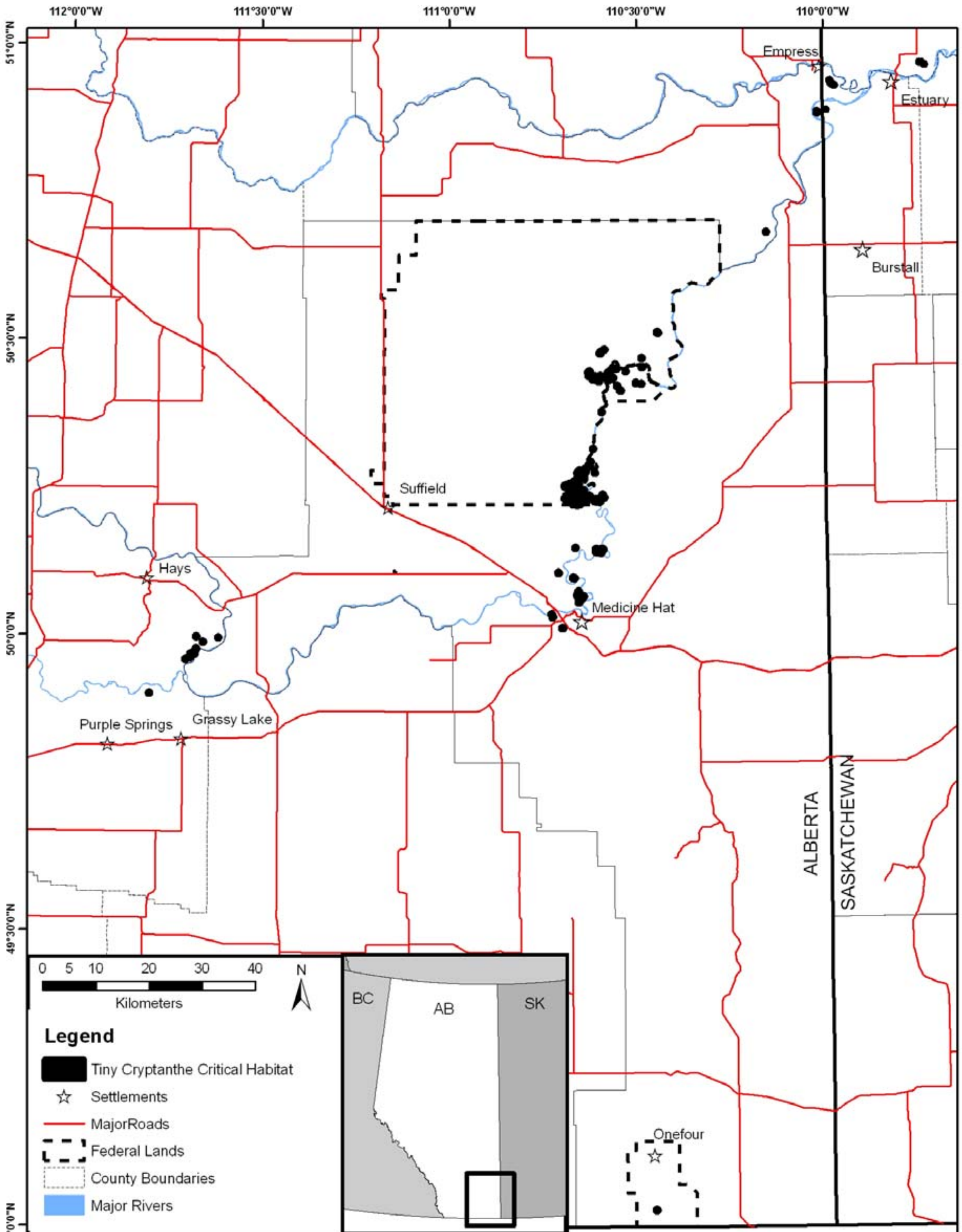
APPENDIX C. MAP OF TINY CRYPTANTHE CRITICAL HABITAT IN CANADA



APPENDIX D. QUARTER-SECTIONS IN CANADA CONTAINING PORTIONS OF CRITICAL HABITAT FOR TINY CRYPTANTHE[1]

SASKATCHEWAN					
Quarter section	**Section**	**Township**	**Range**	**Meridian**	**Tenure**
NE	19	22	29	3	Private
NW	20	22	29	3	Private
NW,NE	17	23	27	3	Provincial
SE	19	23	27	3	Private
SW,SE	20	23	27	3	Provincial
SW	3	23	29	3	Provincial
NE,NW	3	23	29	3	Provincial, Private
NE	4	23	29	3	Provincial
SE	9	23	29	3	Private
SW	10	23	29	3	Provincial, Private

ALBERTA					
Quarter section	**Section**	**Township**	**Range**	**Meridian**	**Tenure**
NE,NW	10	1	4	4	Federal (AAFC)
SE, SW	15	1	4	4	Federal (AAFC)
NE	34	11	13	4	Provincial
NW	35	11	13	4	Provincial
NE,NW	12	11	14	4	Provincial
SE, SW	13	11	14	4	Private
NE,NW	24	12	6	4	Municipal
SW	24	12	6	4	Private
NW	26	12	6	4	Municipal
NE	27	12	6	4	Municipal
SE	34	12	6	4	Municipal
SW	35	12	6	4	Municipal
NE,NW,SE,SW	17	12	12	4	Provincial
NW	1	12	13	4	Provincial
NE,NW,SE,SW	2	12	13	4	Provincial
SE	3	12	13	4	Provincial
SE	11	12	13	4	Provincial
NE, SW	12	12	13	4	Provincial
NW,SE,SW	13	12	13	4	Provincial
NE,SE	14	12	13	4	Provincial
NE,NW,SW	5	13	5	4	Municipal
NE	6	13	5	4	Municipal

[1] Quarter sections identified in this table include those within which are located the boundaries of critical habitat as described in section 2.6.2. The table may include some quarter sections which are, in fact, excluded because they consist of anthropogenic features or other exemptions listed in Appendix A of this amendment.

ALBERTA					
Quarter section	**Section**	**Township**	**Range**	**Meridian**	**Tenure**
NE,SE	7	13	5	4	Private
NE, NW,SE,SW	8	13	5	4	Municipal
SW	17	13	5	4	Private
SE	18	13	5	4	Private
NE,NW,SE,SW	19	13	5	4	Private
NE	23	13	6	4	Municipal
SW	25	13	6	4	Private
SE	26	13	6	4	Private
NW	2	14	5	4	Private
NE,SE,SW	3	14	5	4	Provincial
NW	3	14	5	4	Private
NE	6	14	5	4	Private
SE	7	14	5	4	Provincial
SE	10	14	5	4	Provincial
SW	10	14	5	4	Private
SW	11	14	5	4	Private
NE,NW	31	14	5	4	Provincial
NE,NW	32	14	5	4	Provincial
NE,NW,SW	2	15	5	4	Provincial
NW,SW	3	15	5	4	Federal (DND-NWA)
NE,SE	3	15	5	4	Federal(DND-NWA), Provincial
SE,SW	4	15	5	4	Federal (DND-NWA)
NE,NW	4	15	5	4	Federal(DND-NWA), Provincial
NE,NW,SE,SW	5	15	5	4	Federal (DND-NWA)
NE,NW,SE,SW	6	15	5	4	Federal (DND-NWA)
NE,NW,SE,SW	7	15	5	4	Federal (DND-NWA)
SW	8	15	5	4	Federal (DND-NWA)
NW,SE	8	15	5	4	Federal(DND-NWA), Provincial
NE	8	15	5	4	Provincial
NW,SE,SW	9	15	5	4	Provincial
SE	10	15	5	4	Provincial
SW	11	15	5	4	Provincial
NE,NW,SW,SE	17	15	5	4	Federal (DND-NWA)
NE,NW,SW,SE	18	15	5	4	Federal (DND-NWA)
NE,NW,SW,SE	20	15	5	4	Federal (DND-NWA)
NW,SW	21	15	5	4	Federal (DND-NWA)
NW	22	15	5	4	Provincial
NE	28	15	5	4	Federal(DND-NWA), Provincial
NW,SE,SW	28	15	5	4	Federal (DND-NWA)
SE,SW	29	15	5	4	Federal (DND-NWA)
SE	33	15	5	4	Provincial
NE	1	15	6	4	Federal (DND-NWA)
NE,SE	12	15	6	4	Federal (DND-NWA)
SE	13	15	6	4	Federal (DND-NWA)
NW,SW	3	16	5	4	Provincial

ALBERTA					
Quarter section	**Section**	**Township**	**Range**	**Meridian**	**Tenure**
NE,SE	4	16	5	4	Provincial
NW	26	16	5	4	Provincial
NW,SW	7	17	4	4	Federal (DND)
NE	8	17	4	4	Federal (DND)
NE,NW	9	17	4	4	Federal (DND)
SE,SW	16	17	4	4	Federal (DND)
SE	17	17	4	4	Federal (DND)
NE,NW,SE	19	17	4	4	Federal (DND)
NW,SW	20	17	4	4	Federal (DND)
NE	21	17	4	4	Federal (DND)
NE,SE	28	17	4	4	Federal (DND-NWA)
SE	33	17	4	4	Federal (DND-NWA)
NE	12	17	5	4	Federal (DND)
NE,NW,SW	13	17	5	4	Federal (DND)
NE,SE	14	17	5	4	Federal (DND)
NW	14	17	5	4	Federal (DND-NWA)
NE,NW,SE,SW	15	17	5	4	Federal (DND-NWA)
NE,NW,SE	16	17	5	4	Federal (DND-NWA)
NE,NW	21	17	5	4	Federal (DND)
SE,SW	21	17	5	4	Federal (DND-NWA)
SE	22	17	5	4	Federal (DND)
SW	22	17	5	4	Federal (DND-NWA)
NE, SE	23	17	5	4	Federal (DND)
SW	23	17	5	4	Federal (DND-NWA)
NE,NW,SW	24	17	5	4	Federal (DND)
SE	25	17	5	4	Federal (DND)
NE,SE	34	17	5	4	Federal (DND)
NE,NW,SW	35	17	5	4	Federal (DND)
NE,NW	11	18	4	4	Federal (DND-NWA)
SE,SW	14	18	4	4	Federal (DND-NWA)
SE,SW	2	18	5	4	Federal (DND)
NE,NW	12	20	2	4	Private
SE,SW	12	20	2	4	Provincial
NE,NW,SE,SW	24	22	1	4	Provincial

APPENDIX E. BENEFICIAL OR BEST RANGELAND MANAGEMENT PRACTICES

Tiny cryptanthe occupies a variety of locations that vary in ecology, land use history, and land tenure in two provinces. For these reasons, it is not possible to propose a general set of beneficial or best rangeland management practices that would be appropriate for all locations of critical habitat. Instead, specific recommendations will be made in multiple Action Plans at scales appropriate for general recommendations and application. At this time only a few general statements can be made regarding on-going activities that benefit tiny cryptanthe.

Grazing by one or more classes of livestock may help maintain open sandy habitats needed by tiny cryptanthe, much the way wild ungulates would have historically. Management of these livestock requires occasional and randomly dispersed overland access on-foot, on-horseback, by all terrain vehicle, or on existing trails by vehicles up to 1 tonne. In light of these facts, no changes are recommended at this time to current stocking rates, grazing seasons, classes of livestock, fence, salt, feed or water distribution, or access methods used by property owners of critical habitat.

Integrated weed management to control crested wheatgrass or downy brome (*Bromus tectorum*) invasion could directly reduce competition with tiny cryptanthe, or indirectly change ungulate grazing behaviour that would otherwise improve habitat for the species. Approaches used to reduce the occurrence and density of invasive alien species on critical habitat needs to be dealt with on a site-specific basis or in multiple action plans. Until that time, a proponent should apply for a SARA permit or agreement under SARA for activities that may contravene general prohibitions.

Fires resulting from accidental or deliberate ignition by people will not destroy critical habitat nor harm individual plants under most circumstances. In fact, fire is likely to improve habitat by reducing grass litter, insect pests and pathogens from the habitat.

Environment Canada will work with all of its partners to define and improve best practices for conserving the tiny cryptanthe across its range. In addition, Environment Canada will work with the Department of National Defence to define best practices for managing multiple species at risk at CFB Suffield, that reflect the unique land use activities posed by military training at that site.