

# Management Plan for the Great Plains Toad (*Anaxyrus cognatus*) in Canada

## Great Plains Toad



2012

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## PREFACE

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996) agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of management plans for listed Special Concern species and are required to report on progress within five years.

The Minister of Environment is the competent minister for the management of the Great Plains Toad and has prepared this plan, as per section 65 of SARA. The plan has been prepared in cooperation with the provinces of Manitoba, Saskatchewan and Alberta.

Success in the management of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment Canada or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this management plan for the benefit of the Great Plains Toad and Canadian society as a whole.

Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

## ACKNOWLEDGMENTS

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## EXECUTIVE SUMMARY

The global range of the Great Plains Toad (*Anaxyrus cognatus*) is the dry grasslands of central North America, from the southern prairies of Canada south to the northern third of Mexico. About 5% of the species range is in Canada in the southern periphery of Alberta and Saskatchewan, and the extreme southwestern corner of Manitoba. Most occurrence information is from Alberta with far fewer records in Saskatchewan and Manitoba. While the general distribution of the species in Canada is reasonably well-known, estimates of abundance are not available, in part because of the scarcity of survey information and also because of the irruptive and unpredictable nature of their populations.

The Great Plains Toad is a relatively large toad that reproduces at high levels following intense rainstorms which fill small seasonal wetland basins, its preferred breeding habitat. Adult, subadult, and newly metamorphosed young toads disperse into grassland to forage during the summer. The Great Plains Toad is not freeze-tolerant and must burrow below the frost line to overwinter.

Threats to Great Plains Toads include the continued loss of breeding and foraging habitat due to drainage and degradation of wetlands and cultivation of grasslands. Additional threats to the species include pesticide and fertilizer applications, excessive livestock grazing, oil and gas development and operations, mortality from traffic, epidemic disease and parasites, and persistent drought, possibly to be exacerbated by climate change.

The objective of this management plan is to maintain the current distribution of the Great Plains Toad by promoting and implementing conservation measures that will reduce threats to the species. This will be achieved by actions that improve monitoring of the species' distribution and abundance, promote targeted stewardship activities, increase public involvement in the species' conservation through outreach and communication and address additional information requirements through research.

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## 1. COSEWIC\* SPECIES ASSESSMENT INFORMATION

**Date of Assessment:** April 2010

**Common name (population):** Great Plains Toad

**Scientific name:** *Anaxyrus cognatus*

**COSEWIC Status:** Special Concern

**Reason for designation:** This species is widespread but has a scattered distribution of mostly small populations that fluctuate in numbers. It almost meets criteria for Threatened and could become Threatened because of ongoing loss and degradation of habitat, particularly loss of intermittent wetlands from cultivation, oil and gas development and increase in droughts. These threats increase fragmentation of populations and jeopardize their persistence.

**Canadian Occurrence:** Alberta, Saskatchewan, Manitoba

**COSEWIC Status History:** Designated Special Concern in April 1999. Status re-examined and confirmed in May 2002 and April 2010.

\*COSEWIC – Committee on the Status of Endangered Wildlife in Canada

## 2. SPECIES STATUS INFORMATION

About 5% of the range of the Great Plains Toad (*Anaxyrus cognatus*) occurs in Canada (COSEWIC, 2010). The Great Plains Toad is ranked as secure (G5) globally and is nationally ranked in Canada as N3 (vulnerable - at moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors) (NatureServe, 2011). It was listed as a species of Special Concern on Schedule 1 of the *Species at Risk Act* in 2005.

The Great Plains Toad is ranked as imperiled (S2) in Alberta and Manitoba and as vulnerable (S3) in Saskatchewan (NatureServe, 2011). In Manitoba, the Great Plains Toad was listed as threatened in 2001 under Manitoba's *Endangered Species Act*; the species is not listed under provincial legislation in Alberta or Saskatchewan. In the United States, the Great Plains Toad is ranked as secure (N5). In the neighbouring states to the Canadian prairies, the species is ranked as imperiled (S2) in Montana and unranked (SNR) in Minnesota and North Dakota (NatureServe, 2011).

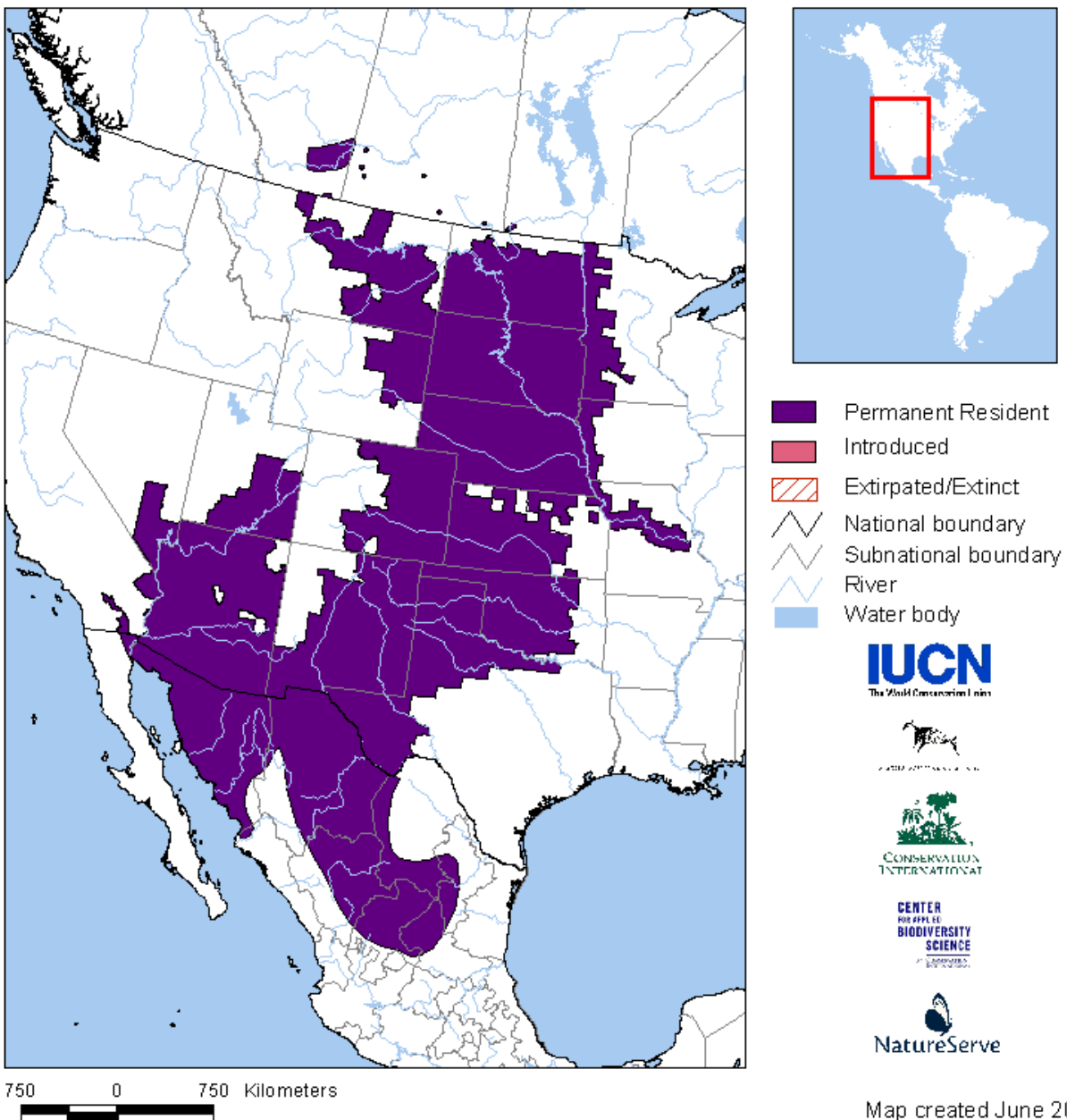
## 3. SPECIES INFORMATION

### 3.1. Species Description

The Great Plains Toad may be distinguished from other toad species by the “L” shaped cranial ridges behind the eyes which come together to form a ‘V’ shaped raised area between the eyes, and by their skin pattern, which exhibits irregular pairs of dark-coloured spots outlined with light borders (Stebbins, 2003). Adult females are larger (49-115 mm body length) than males (47-103 mm body length) (Krupa, 1990).

### 3.2. Populations and Distribution

The global range of the Great Plains Toad is the dry grasslands of central North America, from the southern prairies of Canada south to the northern third of Mexico (Figure 1).



Map created June 2005

Figure 1. Global distribution of the Great Plains Toad in North America (From NatureServe, 2011).

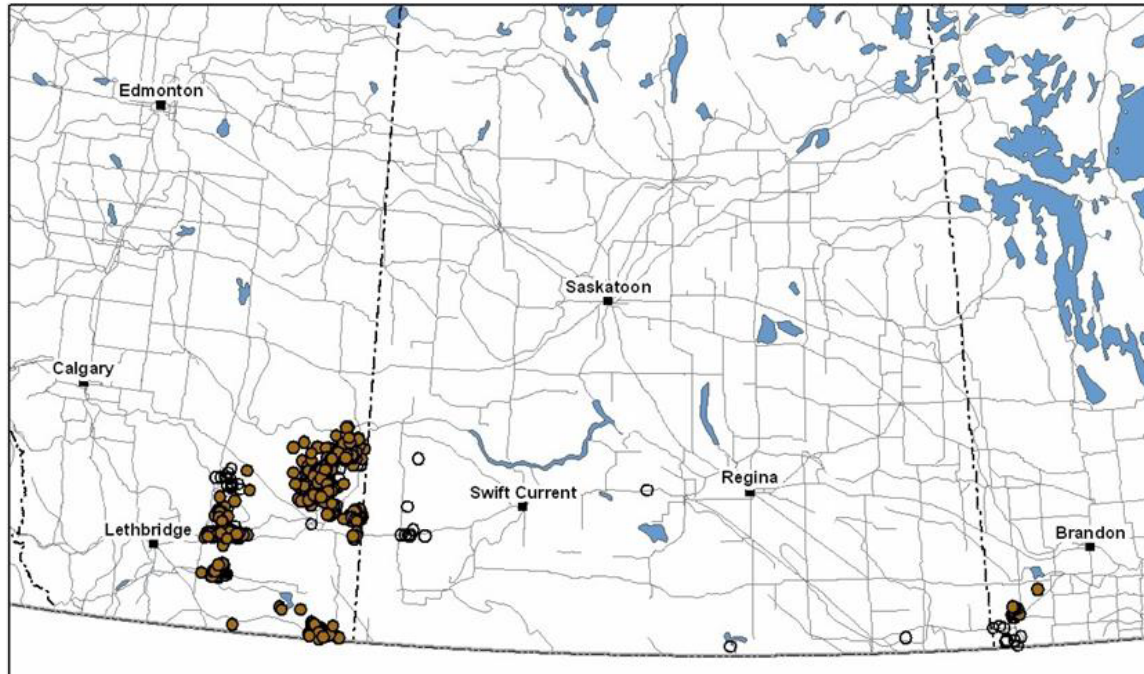


Figure 2. Distribution of the Great Plains Toad in prairie Canada (from COSEWIC 2010). Open circles are records from and prior to 1997, closed circles are records from and after 1998).

In Canada, this species is reported in the southern portions of the Prairie Provinces (Figure 2). Most of the records in Canada are in southeastern Alberta. There are three major population clusters in Alberta - in and around the Suffield National Wildlife Area north of Medicine Hat, in the vicinity of Highway 36 in the Taber/Brooks area, and near Onefour in the extreme southeastern corner of Alberta (Figure 2).

In Saskatchewan, the species is primarily known from records in the western half of the southern part of the province, directly across the border from Alberta's major population cluster associated with the Suffield National Wildlife Area. There are also a small number of records from the southeastern area along the US border, possibly contiguous with the range in adjacent Manitoba (Figure 2).

In Manitoba, Great Plains Toads have been recorded only within the extreme southwestern corner of the province, as far north and east as Grand Clairiere.

It is not currently possible to provide estimates of abundance of the Great Plains Toad in Canada because (1) the precipitation-dependent, irruptive nature of their populations results in large and unpredictable inter-annual variation in population size and (2) the paucity of records in Saskatchewan precludes a reasonable estimate of population abundance in that province (COSEWIC, 2010).



### 3.3. Needs of the Great Plains Toad

#### 3.3.1 Habitat and biological needs

The Great Plains Toad requires three distinct habitat types for its seasonal activities – shallow, somewhat ephemeral wetlands for reproduction, adjacent upland grasslands for summer foraging and dispersal, and most likely the occurrence of friable soils to allow burrowing for overwintering.

The Great Plains Toad is primarily a fossorial<sup>1</sup>, grassland-dwelling species but it is also found in sagebrush plains in the western portions of its range (Stebbins, 2003). In Alberta and Saskatchewan the species is generally associated with areas of sandy soils on native grasslands (Didiuk, 1999b). Manitoba populations inhabit an area with numerous wetlands in cultivated areas, with the exception of scattered grasslands and sandy soils that occur along a glacial beach ridge that stretches from the extreme southwestern corner of the province to Oak Lake.

Clear and shallow wetlands and somewhat ephemeral wetlands including shallow depressions filled by significant rainfall events, are used for breeding (Bragg, 1937; 1940; 1950). Males use emergent vegetation or algal clumps (Wershler and Smith, 1992) as perches while calling. Climatic conditions within much of the species range are characterized by frequent droughts when shallow wetlands remain dry and reproduction is not possible.

Upland grassland as well as cultivated fields, pastures and roadways are used for foraging for arthropod prey while wooded areas and coarse emergent vegetation tend to be avoided (Ewert, 1969; Smith and Bragg, 1949). Creusere and Whitford (1976) reported movement of Great Plains Toads up to 1600 m from the breeding site. Some have speculated that the Great Plains Toad may be unaffected by, or even have benefited from agricultural activities (possibly due to increased wetland productivity associated with fertilizer runoff, or possibly better tolerance for dry conditions) but it is unknown whether this is the case in Prairie Canada (Anderson et al., 1999; Degenhardt et al., 1996; Gray et al., 2004).

Great Plains Toads appear to be dependent upon friable soils in which they burrow for overwintering (Didiuk, 1999b; Ewert, 1969) as this species is not freeze-tolerant and normally overwinters below the winter frost line. The type of soil to which Great Plains Toads are adapted for wintering is poorly understood (COSEWIC, 2010). Elevated areas in individuals' home ranges (e.g. roadsides) (Ewert, 1969) have been shown to be used for overwintering. Sand hill and sand plain areas are suspected to be important for overwintering (C. Wershler, pers. comm., in COSEWIC, 2010) despite the absence of evidence supporting this.

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<sup>1</sup> Fossorial – adapted for or used to burrowing or digging

### 3.3.2 Limiting factors

Reproduction by Great Plains Toads is highly dependent on local weather conditions, occurring episodically only when precipitation and moisture conditions are suitable. The episodic reproduction of the Great Plains Toad results in pulses in the population. Successive years of low reproduction may limit the species, especially when compounded with threats posed by human activities. The Great Plains Toad also exhibits communal egg laying and breeding site fidelity which concentrates reproductive effort such that the species is vulnerable to impacts upon breeding pools.

The dispersal capability of the Great Plains Toad is likely limited in extent. Therefore, its occurrence is likely limited to areas that contain all three of the habitat types it requires in close proximity to one another.

The Great Plains Toad completes its reproductive phase in wetlands where, like other amphibians, it is particularly vulnerable to pathogens which may be present, or may be introduced by natural means or by human activity.

## 4. THREATS

### 4.1. Threat Assessment

**Table 1. Threat assessment table**

Threat	Level of Concern <sup>1</sup>	Extent	Occurrence	Frequency	Severity <sup>2</sup>	Causal Certainty <sup>3</sup>
<b>Habitat Loss or Degradation</b>						
Cultivation of Grassland	Medium	Widespread	Current	Continuous	Medium	High
Drainage and Degradation of Wetlands	Medium	Widespread	Current	Continuous	Medium	High
Excessive Livestock Grazing	Medium	Local	Current	Seasonal	Medium	High
Oil and Gas Development and Operations	Medium	Local	Current	Frequent	Medium/Low	Low
<b>Climate and Natural Disasters</b>						
Increased Frequency of Droughts	Medium	Widespread	Current Anticipated	Recurrent	Medium/High	Medium/Low
<b>Pollution</b>						
Pesticide and Fertilizer Applications	Medium	Unknown	Current	Seasonal	Medium	Low
Oil and Gas Development and Operations	Low	Local	Current	Recurrent	Medium/Low	Low

<b>Accidental Mortality</b>						
Oil and Gas Development and Operations	Low	Local	Current	Recurrent	Low	Low
Road Development/Increased Traffic	Low	Local	Current	Recurrent	Low	Low
<b>Changes in Ecological Dynamics and Natural Processes</b>						
Introduction, or Increased Incidence of Disease and Parasites	Low	Widespread	Current	Unknown	Medium/Low	Medium

<sup>1</sup> *Level of Concern: signifies that managing the threat is of (high, medium or low) concern for the management of the species, consistent with the management objectives. This criterion considers the assessment of all the information in the table).*

<sup>2</sup> *Severity: reflects the population-level effect (High: very large population-level effect, Medium, Low, Unknown).*

<sup>3</sup> *Causal certainty: reflects the degree of evidence that is known for the threat (High: available evidence strongly links the threat to stresses on population viability; Medium: there is a correlation between the threat and population viability e.g. expert opinion; Low: the threat is assumed or plausible).*

For a detailed list of specific threats and stresses, refer to Appendix A.

## 4.2. Description of Threats

As stated previously, the Great Plains Toad requires three distinct habitat types for its seasonal activities – shallow wetlands for reproduction, adjacent upland grasslands for summer foraging and dispersal, and friable soils to allow burrowing for overwintering. All three of these habitat types must co-exist and be in close proximity to allow use and seasonal access, as individual juvenile and adult toads migrate among a variety of habitats during their seasonal activities. Human land-use activities fragment upland habitat for the Great Plains Toad and result in fewer and smaller areas of suitable habitat separated by increasingly large areas of unsuitable habitat. Some human activities act as barriers to dispersal which promote local population extinctions and compromise population persistence (Pope et al., 2000). Increasing upland habitat loss and habitat fragmentation increase the isolation among local populations, which may reduce or prevent individuals from dispersing and re-colonizing habitats. The following threats are described in order of decreasing level of concern.

### *Cultivation of Grassland*

By 1996, cropland, summer fallow and improved pasture accounted for about 70% of all land use in the Canadian prairies (Agriculture and Agri-Food Canada, 2000). While most of the prime agricultural land was converted to agricultural use long ago, some conversion has continued to occur in recent years. Between 1985 and 2001, about 6-8% and 8-11% of remaining native grasslands were converted to other uses within different grassland ecoregions of Saskatchewan and Alberta, respectively (Watmough and Schmoll, 2007). Most of these losses were the result of small remnant grassland areas within larger mosaics of cultivated land being converted to cropland (Watmough and Schmoll, 2007). In western Canada, it is anticipated that the biofuel industry will grow rapidly in the coming years in order to meet a federal regulation enacted

in 2010, requiring an average of 5% renewable energy content in gasoline. The growth in this industry is anticipated to increase competition for grains among livestock, food and fuel sectors, resulting in the sacrifice of forage and pasturelands to grain and biomass production and to a shift in livestock production to increasingly marginal land, which is environmentally fragile (Alberta Agriculture and Rural Development, 2008).

There has been increasing cultivation of native grasslands on sandy soils for crops such as potatoes, particularly along the western periphery of the Alberta range of the Great Plains Toad, resulting in loss of upland habitat. Cultivation may impact prey availability and diversity (Gray et al., 2004) and the growth of many amphibians after metamorphosis is lower in degraded habitats (Gray and Smith, 2005), which can affect subsequent survival and reproductive performance.

### ***Drainage and Degradation of Wetlands***

In southern prairie Canada the drainage of wetlands for agricultural use has been extensive. From surveys in the 1980s, it was estimated that 60% of wetland basins and 80% of wetland margins in the prairies and parkland regions of Alberta were impacted by agricultural activities. Similarly in Saskatchewan 59% of wetland basins and 78% of wetland margins had been impacted and in Manitoba 48% of basins and 64% of wetland margins were impacted (Turner et al., 1987). Cultivation and irrigation alter the hydrological cycle of ephemeral pools (Luo et al., 1997) and modify drainage patterns which may degrade wetlands used by Great Plains Toads.

### ***Excessive Livestock Grazing***

The numbers of livestock, if excessive, can damage Great Plains Toad habitat. Great Plains Toads prefer clear water for breeding. Wetlands that have been contaminated either by livestock feces or by physical disturbance of wetland sediments by livestock are less likely to be successful breeding sites because of water turbidity, excessive nutrient levels and low oxygen concentration (Bragg, 1937; 1940). Artificial habitat in the form of dugouts and stock ponds can also be affected by excessive stocking rates which cause turbidity and high nutrient concentrations of the water, and damage or eliminate shoreline vegetation. Creation of new water bodies, through damming of streams or excavation of dugouts for livestock watering, can produce new breeding habitat. However, excessive livestock stocking rates at these sites may render them unsuitable for breeding Great Plains Toads. Excavation of dugouts within existing wetland basins can reduce the time surface water is maintained.

### ***Oil and Gas Development and Operations***

The intensity of oil and gas industrial development has been increasing greatly over the last 20 years within the Canadian range of the Great Plains Toad. Construction of well sites, pipelines, and access roads may result in disturbance or destruction of breeding, foraging and overwintering sites. Chemical spills, increased traffic, and entrapment within pipeline trenches or natural gas well caissons may all contribute to higher than normal mortality rates or reduced levels of fitness. Water extraction for oil and gas production may affect near surface aquifers and reduce water levels in wetlands, leading to unsuitable breeding conditions in wetlands.

### ***Increased Frequency of Droughts***

Drought can affect Great Plains Toad populations when breeding wetlands for toads are not available. Although this species is adapted to an arid climate with frequent and prolonged droughts, very long drought periods may result in extirpation of local populations. Drought conditions were believed to be associated with a decline in amphibian populations in southern Alberta in the 1930s (Fowler, 1935).

The impacts of predicted future climate conditions upon Great Plains Toad populations and other amphibians have not been adequately assessed to understand how changes (increases and decreases) of seasonal average temperatures and average precipitation will affect different life history stages.

### ***Pesticide and Fertilizer Applications***

Pesticides introduced to wetlands at high concentrations either directly or via runoff from adjacent agricultural land, can cause direct mortality, reduce invertebrates and algae used for food and reduce growth rates of tadpoles. Glyphosate, the most widely used herbicide in Alberta, has been implicated in high rates of mortality in some species of amphibians (Relyea, 2005), although at concentrations far higher than those known to occur in prairie wetlands. The spatial and temporal overlap between wetland contamination by pesticides and wetland use by Great Plains Toads is unknown. Nevertheless, even exposure to relatively low concentrations of pesticides may represent a risk to Great Plains Toads because amphibians may be more susceptible to pathogens following exposure to sublethal concentrations of pesticides (Kiesecker, 2002; Taylor et al., 1999).

Fertilizers may also contribute to reduced fitness and mortality in Great Plains Toad populations. Surface water run-off from agricultural lands can increase the extent and concentration of algal blooms and reduce water oxygen concentration (Marco and Blaustein, 1999) which may reduce survival and growth of Great Plains Toads. Nitrate concentrations in surface water run-off from Ontario cropland, arising from fertilizers applied to these croplands, were high enough to cause deformities and mortality in amphibians (Hecnar, 1995; Rouse et al., 1999), although it is unknown if similarly high nitrate concentrations occur widely in prairie wetlands.

### ***Road Development/Increased Traffic***

A source of mortality for amphibians is road traffic (Carr and Fahrig, 2001; Fahrig et al., 1995). While feeding and dispersing, Great Plains Toads have been observed to follow roadways (Smith and Bragg, 1949), probably due to the improved sightlines and advantages for movement provided by the flat, open surface. As a species that disperses widely, Great Plains Toads may be more prone to road mortalities (Carr and Fahrig, 2001). Paved roads probably result in higher mortality rates than graveled roads due to the increased traffic volumes on the former type of road.

### ***Introduction or Increased Incidence of Disease and Parasites***

Human activity can serve to introduce pathogens and may stress Great Plains Toads such that vulnerability to pathogens is increased. The importance of disease and parasites, including chytrid fungus, *Ranavirus* and trematodes, to Great Plains Toads in prairie Canada is unknown although the effect of epidemic diseases is of global concern for many species of amphibians.

## **5. MANAGEMENT OBJECTIVE**

The objective of this management plan is to maintain the current distribution of the Great Plains Toad by promoting and implementing conservation measures that will reduce threats to the species.

This management objective can be attained by conserving and managing recently- or currently-occupied grassland and wetland habitats as well as habitats of any populations of Great Plains Toads that are discovered in the future. This management objective should be implemented uniformly across the species' range in Canada.

## **6. BROAD STRATEGIES AND CONSERVATION MEASURES**

### **6.1. Actions Already Completed or Underway**

Recent and current activities specific to the monitoring or conservation of Great Plains Toads include:

- Environment Canada is currently investigating the associations among soil type, land cover, and known occurrences of the Great Plains Toad in southwestern Saskatchewan in order to identify important habitat for the species and to predict areas with a high likelihood of being used by toads (A. Didiuk, unpub. data).
- Saskatchewan Ministry of Environment has conducted calling surveys to improve knowledge of the distribution of the Great Plains Toad in the vicinity of the Great Sandhills located in southwestern Saskatchewan.
- Distribution and habitat use of Great Plains Toads were investigated at Suffield National Wildlife Area, Alberta (Didiuk, 1999a).
- Great Plains Toads were included in the amphibian surveys carried out by the Multiple Species at Risk program (MULTISAR), an Alberta based multi-species assessment program, in 2002, 2006, 2008, 2010 and 2011.
- Alberta Sustainable Resource Development has prepared guidelines for the inventory of sensitive species, such as amphibians, to advise environmental consultants.

- Surveys of occurrences of the Great Plains Toad were conducted in southwestern Manitoba in 2010 and 2011.
- Occurrences of the Great Plains Toad continue to be recorded in Alberta's provincial Fish and Wildlife Management Information System (AFWMIS), the Alberta Amphibian Monitoring Program, the Alberta Natural History Information Centre (ANHIC), the Saskatchewan Herpetology Atlas Project, The Manitoba Herps Atlas (currently underway - <http://www.naturenorth.com/>), the Saskatchewan Conservation Data Centre and the Manitoba Conservation Data Centre.
- No stewardship projects focused upon the Great Plains Toad have been delivered although some populations have probably benefited from grassland conservation and stewardship programs.
- The Great Plains Toad has occasionally been included in species at risk media products and in stewardship conservation tool kits. As an example, Manitoba Conservation has developed a Great Plains Toad fact sheet ([http://www.gov.mb.ca/conservation/wildlife/sar/pdf/gp\\_toad.pdf](http://www.gov.mb.ca/conservation/wildlife/sar/pdf/gp_toad.pdf)).

## 6.2. Broad Strategies

Progress towards the objective for this management plan will be achieved from 2012 until 2017 through the following broad strategies and conservation measures:

1. **Monitoring and Assessment:** Determine the distribution of the Great Plains Toad in Canada and determine trends in distribution and abundance of Great Plains Toad population and habitat indices.
2. **Stewardship:** Maintain or improve habitat quality through the development and implementation of targeted stewardship activities.
3. **Outreach and Communication:** Develop and implement tools that will increase public involvement in the species' conservation.
4. **Research:** Conduct research to address additional information requirements for the Great Plains Toad.

## 6.3. Conservation Measures

As more information is obtained, additional conservation measures may be added to the implementation schedule (Table 2), and depending on their priority level, may supersede currently listed measures of equal or lower priority.

It should also be noted that implementation of some or all of the conservation measures outlined in this management plan may extend past the timeframe indicated below for various reasons beyond the scope and control of the jurisdictions responsible for this plan.

The conservation measures listed in this management plan are written so as to be applicable across the species' range. Jurisdictions and stakeholders responsible for the protection and recovery of Great Plains Toads in Canada should further refine these measures wherever possible to accommodate regional differences and opportunities. As well, as knowledge of this species, its habitats, and management practices increases, additional detailed actions will need to be considered. The recommended measures to be undertaken between 2012 and 2017 correspond to the four broad strategies mentioned in Section 6.2: Monitoring and Assessment; Stewardship; Outreach and Communication; and Research. Conservation measures related to these broad strategies are summarized in Table 2.

**Table 2: Conservation Measures and Implementation Schedule**

Conservation Measure	Priority	Threat(s) addressed	Timeline
<b>Broad Strategy: Monitoring &amp; Assessment</b>			
1. Conduct provincial surveys with standard survey protocols to determine distribution, monitor relative abundance, habitat suitability, and threats.	High	All	2012-2017
2. Design and implement focused surveys at selected sites to monitor fluctuations in populations, and changes in and severity of threats.	Medium	All	2012-2017
<b>Broad Strategy: Implement stewardship activities</b>			
3. Engage selected landowners to explore opportunities for cooperative management.	High	Drainage and Degradation of Wetlands, Cultivation of Grassland, Pesticide and Fertilizer Applications, Excessive Livestock Grazing, Introduction / Increased Incidence of Disease and Parasites,	2012-2017
4. Integrate focused stewardship programs and activities for Great Plains Toads with broader conservation initiatives.	High	Drainage and Degradation of Wetlands, Cultivation of Grassland, Pesticide and Fertilizer Applications, Excessive Livestock Grazing, Oil and Gas Development and Operations, Road Development / Increased Traffic, Introduction / Increased Incidence of Disease and Parasites	2012-2017



**Broad Strategy: Outreach and Communication**

5. Communicate conservation issues and opportunities to the public.	High	Drainage and Degradation of Wetlands, Cultivation of Grassland, Pesticide and Fertilizer Applications, Excessive Livestock Grazing, Oil and Gas Development and Operations, Road Development / Increased Traffic, Introduction / Increased Incidence of Disease and Parasites	2012-2017
6. Promote cooperation among provincial, federal, and municipal government, First Nations groups and self-governments, agricultural organizations, industries and other stakeholders.	High	Drainage and Degradation of Wetlands, Cultivation of Grassland, Pesticide and Fertilizer Applications, Excessive Livestock Grazing, Oil and Gas Development and Operations, Road Development / Increased Traffic, Introduction / Increased Incidence of Disease and Parasites	2012-2017

**Broad Strategy: Conduct research**

7. Establish research programs to determine the association of populations with particular soil types to assist in development of predictive occurrence models.	Medium	Drainage and Degradation of Wetlands, Cultivation of Grassland, Pesticide and Fertilizer Applications, Excessive Livestock Grazing, Oil and Gas Development and Operations, Road Development/Increased Traffic	2012-2017
8. Establish research programs to determine if populations persist in areas where natural grassland has been converted to cropland or tame forage.	Medium	Drainage and Degradation of Wetlands, Cultivation of Grassland, Pesticide and Fertilizer Applications, Excessive Livestock Grazing	2012-2017

## 7. MEASURING PROGRESS

Every five years, success of this management plan implementation will be measured against the following performance indicator:

- ◆ The distribution of the Great Plains Toad has been maintained in Canada by promoting and implementing conservation measures that will reduce threats to the species.

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## APPENDIX A: EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that plans may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the plan itself, but are also summarized below.

Other species that would be positively affected by improved conservation of the Great Plains Toad in Canada and its habitat would likely include the Plains Spadefoot Toad (*Spea bombifrons*) and the Plains Hognose Snake (*Heterodon nasicus*). The former species occupies similar habitats and the latter preys upon these toad and other amphibians. It is unlikely that adverse effects could result from any of the conservation measures proposed in this management plan.