

Management Plan for the Pygmy Snaketail (*Ophiogomphus howei*) in Canada

Pygmy Snaketail



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 species of special concern and are required to report on progress within five years.

The Minister of the Environment is the competent minister under SARA for the management of the Pygmy Snaketail and has prepared this management plan as per Section 65 of SARA. It has been prepared in cooperation with the Governments of New Brunswick and Ontario, and aboriginal organizations.

Success in the conservation 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 plan and will not be achieved by Environment Canada or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this plan for the benefit of the Pygmy Snaketail and Canadian society as a whole.

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

ACKNOWLEDGMENTS

The initial draft of this management plan was prepared by Mark McGarrigle. It was produced in collaboration with Samara Eaton of Environment Canada, Canadian Wildlife Service – Atlantic, Maureen Toner of the New Brunswick Department of Natural Resources, Ken Tuininga of Environment Canada, Canadian Wildlife Service – Ontario, as well as Scott Gibson and John Vandebroek of the Ontario Ministry of Natural Resources. Others, including John Klymko of the Atlantic Canada Conservation Data Centre and species specialist Paul Brunelle provided valuable input and comments during the development of this management plan.

EXECUTIVE SUMMARY

Pygmy Snaketail (*Ophiogomphus howei*) is one of the smallest dragonflies in North America. Adults are black, with brown stripes and yellow markings on their abdomen, green on the thorax, and a transparent yellow-orange tint on the basal side of the wings. Aspects of the Pygmy Snaketail life cycle requirements are poorly understood and habitat requirements for the species are complex. Larvae take up to two years to develop to the adult stage, drifting downstream from where eggs are laid; the majority of their adult life is then spent in the upper canopy of riparian areas.

Pygmy Snaketail, in Canada, is known from 11 sites in New Brunswick and 1 site in Ontario. Little is known of the species' distribution, abundance, and habitat needs in Canada. There are several knowledge gaps with regards to characterizing threats to this species. Dam construction is a threat of high concern in Ontario. All other threats, in both New Brunswick and Ontario, are either of low concern or the impact is unknown and include; dam construction, pollution, invasive species, residential development, forest harvesting and agriculture land use, wakes from boats, and vehicle traffic on roads. The species was assessed as Special Concern by COSEWIC in 2008, and was listed as Special Concern under Schedule 1 of the *Species at Risk Act* in 2011. In New Brunswick the species is not listed under provincial legislation. In Ontario it is listed as Endangered under the provincial *Endangered Species Act, 2007*.

The management objective for the Pygmy Snaketail is to maintain the presence of existing populations at all sites where they are currently known to occur and conserve new occurrences that are identified.

This will be achieved by implementing conservation measures that are organized under the following three broad strategies:

1. Population monitoring and surveys of suitable habitat
2. Maintenance of aquatic habitat quality and quantity
3. Outreach, education, and stewardship to promote conservation

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1. COSEWIC* SPECIES ASSESSMENT INFORMATION

Date of Assessment: November 2008

Common Name (population): Pygmy Snaketail

Scientific Name: *Ophiogomphus howei*

COSEWIC Status: Special Concern

Reason for Designation: This globally rare species is known from few locations and has a specialized and restricted habitat with low population numbers and one significant site is threatened.

Canadian Occurrence: Ontario, New Brunswick

COSEWIC Status History: Designated Special Concern in November 2008.

*COSEWIC = Committee on the Status of Endangered Wildlife in Canada

2. SPECIES STATUS INFORMATION

Pygmy Snaketail (*Ophiogomphus howei*) was assessed in 2008 by COSEWIC as a species of Special Concern and was listed as Special Concern under Schedule 1 of the *Species at Risk Act* (SARA) in 2011. In New Brunswick, the species' General Status rank is May be at Risk (2008) and it is not listed under the *New Brunswick Endangered Species Act*. In Ontario the species is listed as Endangered under Ontario's *Endangered Species Act, 2007*. The NatureServe conservation status ranks include: globally "Vulnerable" (G3) (2006), "Critically Imperiled" (N1) in Canada, and "Vulnerable" (N3) in the USA (Table 1). The percentage of the global population that occurs in Canada is unknown.

Table 1. Conservation status ranks* for the Pygmy Snaketail (from NatureServe 2010 with year of assessment in brackets).

Global (G) Rank*	National (N) Rank	Sub-National (S) Rank
G3 (2006)	Canada N1 (2005) USA N3	<i>Provincial Status:</i> NB (S1), ON (S1) <i>State Status (USA):</i> Kentucky (S1S2), Maine (S2S3), Massachusetts (SX), Michigan (S1), Minnesota (SNR), New York (S1), North Carolina (S1S2), Pennsylvania (S1), Tennessee (S3?), Virginia (S1S2), Wisconsin (S3)

* The conservation status of a species is designated by a number from 1 to 5, preceded by a letter reflecting the appropriate geographic scale of the assessment. (G = Global, N = National, and S = Subnational). The numbers have the following meaning: 1 = critically imperiled, 2 = imperiled, 3 = vulnerable. The (?) symbol indicates uncertainty surrounding the rank, the NR = Not Assessed, and X = Extirpated.

3. SPECIES INFORMATION

3.1. Species Description

The Pygmy Snaketail is one of the smallest dragonflies in North America, with an adult body length of 31-37 mm (COSEWIC 2008). Adults are black, with brown stripes and yellow markings on their abdomen and green on the thorax (MDIFW 2003). The Pygmy Snaketail belongs to the group of dragonflies called Clubtails (family *Gomphidae*). Unique to the group of Clubtails is the transparent yellow-orange tint on the basal side of the wings (COSEWIC 2008). The mature larval nymphs are roughly 20 mm in length, greenish-brown in colour (younger stages are more yellowish), and distinguishable from similar *Ophiogomphus* species by their small size and lack of dorsal hooks (Kennedy and White 1979).

In northern latitudes, adult emergence and activity occurs between late May and mid July, with reproduction occurring between mid-June and early-July (COSEWIC 2008). Adults deposit eggs in the watercourse which then move with the current before eventually sinking to the bottom. Larvae require a minimum of two years to develop (Kennedy and White 1979). Larvae spend the day buried in the substrate, emerging at night to drift with the current (COSEWIC 2008).

3.2. Populations and Distribution

The Pygmy Snaketail is endemic to North America, with two geographically distinct population centers. The first follows the Appalachian Mountain Range from northern New Brunswick in Canada to southeastern Tennessee in the USA; the second population is found near the Great Lakes in Ontario, Michigan, Minnesota, and Wisconsin (COSEWIC 2008) (Figure 1a).

The Canadian population includes 12 known locations; 11 in New Brunswick and 1 in Ontario (Figure 1b and 1c). Locations appear to be restricted to large, fast-flowing rivers and their tributaries. The 11 locations found in New Brunswick are distributed over 5 river systems (Table 2). In Ontario it has been found in the Namakan River. Survey efforts have focused primarily on documenting areas of occurrences based on the presence of exuviae (cast-off skins); the collection of which is limited and thus abundance of the species in Canada is unknown. It is likely, but yet unproven that the population is stable in Canada (COSEWIC 2008).

Table 2. Pygmy Snaketail distribution by watercourse, number of sites and evidence of presence.

Province	Watercourse	Number of Sites	Life Cycle Stage
NB	Cains River	1	Adult, exuviae
	Magaguadavic River	3	Teneral
	Southwest Miramichi River	5	Adult, teneral, exuviae
	Salmon River	1	Exuviae
	Saint John River	1	Teneral, exuviae
ON	Namakan River	1	Exuviae



Figure 1a. The North American distribution of Pygmy Snaketail (Source: COSEWIC 2008).

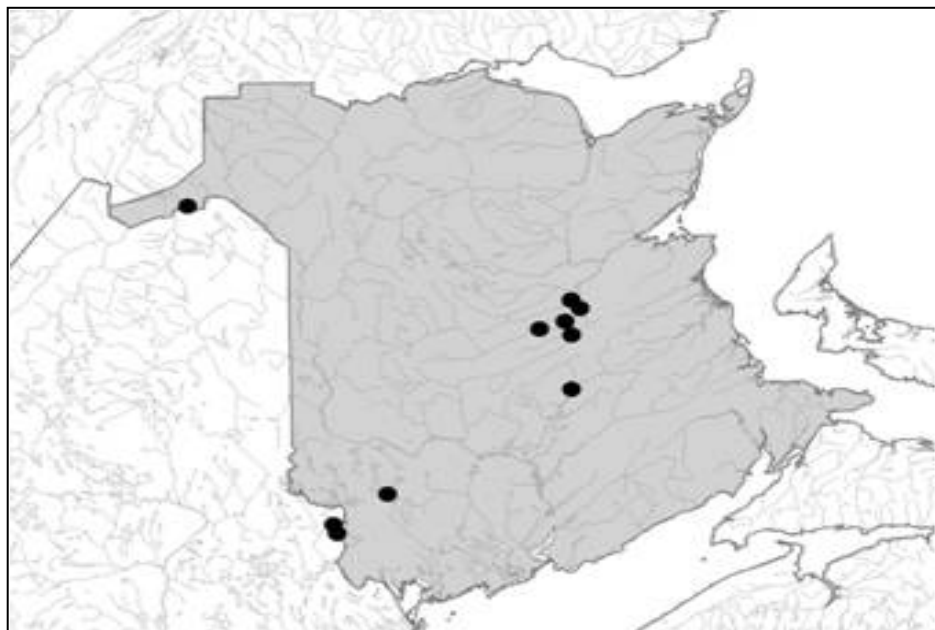


Figure 1b. The eleven known locations of occurrence of Pygmy Snaketail in New Brunswick as of 2007 (one location hidden due to overlapping points) (Source: COSEWIC 2008).

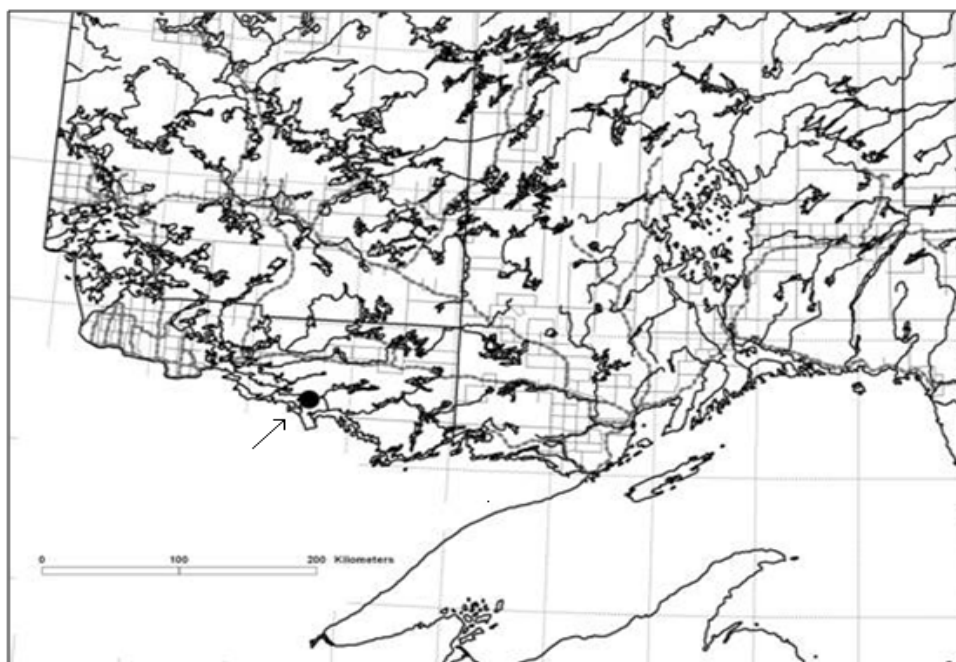


Figure 1c. The one Pygmy Snaketail known location of occurrence (black dot) in Ontario (Source: COSEWIC 2008).

3.3. Needs of the Pygmy Snaketail

The Pygmy Snaketail life cycle requirements are poorly understood. Habitat requirements for the species are complex, given the differences in habitat requirements of the adult and larval forms. Pygmy Snaketails are thought to be a habitat specialist given that the larval form requires fast flowing rivers greater than 10m in width, a moderate to low gradient stream bed with significant areas of fine sand and/or pea gravel substrate (COSEWIC 2008, Kennedy and White 1979). The number of locations within a river that provide suitable conditions in terms of flow and substrate may be quite limited. Prior to emergence larvae drift within the river, settling out where strong currents slow abruptly. The teneral (newly emerged adults) fly from the river for an extended period of maturation (COSEWIC 2008). Many adult Odonata species return frequently to rivers to establish territories and breed, however, the Pygmy Snaketail seems to spend little time at its larval river. Adult Pygmy Snaketails are believed to spend the majority of their time in the canopy of the forests surrounding watercourses (COSEWIC 2008). It is not a migratory species and dispersal is likely along river corridors and small streams within a catchment, however, the forest-dwelling nature of the species suggests it is capable of crossing between catchments. Females return to water for egg deposition (COSEWIC 2008) and it is believed that, in general, the adults of the species do not move more than a few kilometers from their larval habitat. The species is predatory at all stages of its life cycle, but the types of prey consumed by adults and larvae are unknown (COSEWIC 2008).

4. THREATS

4.1. Threat Assessment

Table 3. Threat Assessment Table

Threat	Location	Level of Concern ¹	Extent	Occurrence	Frequency	Severity ²	Causal Certainty ³
Habitat Loss or Degradation							
Dam construction and operation	ON, NB	Low (NB) / High (ON)	Localized	Potential (ON) / Historic/ Current (NB)	Continuous (NB)	High (ON)/ Unknown (NB)	High
Residential Development	NB	Low	Localized	Current	Continuous	Low	Medium
Forest harvesting and agriculture land use	ON, NB	Low	Unknown	Unknown	Unknown	Unknown	Unknown
Disturbance or Harm							
Vehicle traffic on roads	ON, NB	Low	Widespread	Current	Seasonal	Low	Medium
Wakes from boats and vehicles	ON, NB	Low	Widespread	Current	Seasonal	Low	Medium
Pollution							
Pesticide, herbicide, or fertilizer application from forestry and agriculture practices	NB, ON	Unknown	Unknown	Unknown	Seasonal	Unknown	Medium
Eutrophication from sewage, forest harvesting, and agriculture	ON, NB	Low	Localized	Unknown (ON)/ Current (NB)	Unknown	Unknown	Medium
Exotic, Invasive, or Introduced Species/Genome							
Crayfish and Spiny Water Flea	ON, NB	Low	Widespread	Anticipated (ON)/ Current (NB)	Continuous	Unknown	Low
Chain Pickerel, Smallmouth Bass, Muskellunge	NB	Low	Widespread	Current	Continuous	Unknown	Low

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

² Severity: reflects the population-level effect (High: very large population-level effect, Moderate, Low, Unknown).

³ 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).

4.2. Description of Threats

Threats are presented in decreasing level of concern.

Dam construction and operation

The effects of dams on the aquatic environment may be dramatic and long term, potentially affecting long stretches of the watercourse both upstream and downstream of the dam location and altering hydrological patterns. In Ontario this threat is of high concern as dam construction is planned for the Namakan River where the sole location of the species in the province (COSEWIC 2008). In New Brunswick, dam construction has occurred on three of the river systems from which the Pygmy Snaketail is known; the Magaguadavic, Saint John, and St. Croix Rivers. Due to a lack of data on the species prior to dam construction, the impact to this species at the time of construction is unknown. The known locations of Pygmy Snaketail on these watercourses are distant enough from the dams that the impact at the extant locations is believed to be negligible. There are no current plans for further dam development on these systems in New Brunswick.

Residential development

Development in riparian areas has the potential to impact the habitat of both adults and larvae through clearing of vegetation, sedimentation and soil compaction, pollution, and increased recreational traffic. Residential development in Ontario is not a concern for the known population.

Forestry and agriculture land use

Forestry and agricultural land use along watercourses supporting Pygmy Snaketail has the potential to impact larval habitat through sedimentation from surface runoff and clearing of vegetation near the watercourse, as well as alteration of adult habitat through harvesting of forests surrounding the rivers. However, the extent and severity of impacts of this threat is unknown.

Vehicle traffic on roads and wakes from boats and vehicles

Vehicle traffic on riverside roads can cause mortality (road kill) of teneral and possibly adults. Wakes from boats and vehicles can result in mortality during emergence. Both of these were identified as threats in the COSEWIC status report, however, the impact of these threats at the population level are unknown and are of low priority. In Ontario the threat from vehicle traffic is very low as the location is in a remote area with low road density and low traffic.

Eutrophication from sewage, forest harvesting and agriculture

Dragonflies are used throughout the world as indicators of ecosystem health (Lavilla et al. 2010, Kalkman et al. 2008, Stone et al. 2005, Hornung and Rice 2003). The Pygmy Snaketail is thought to be intolerant of eutrophication (COSEWIC 2008). The threat of eutrophication from sewage, forest harvesting, and agricultural input is dependent upon the level of development and waste water and surface run-off management programs. Water quality summaries (NB Department of Environment web site, 2011) and state of the environment reports (Miramichi River, 2007; Saint John River, 2011) suggest that increased attention and investment in sewage treatment has led to an improvement in water quality along rivers in New Brunswick. The concern associated with this threat for the Ontario population is very low.

Pesticide, herbicide, or fertilizer application from forestry and agriculture practices

The threat associated with pesticide application during forestry and agriculture operations is unknown and warrants further investigation for this species. The concern associated with this threat in Ontario is very low.

Invasive species

The invasive species described below have the potential to impact the Pygmy Snaketail directly with the larval nymphs becoming prey for new predators. Invasive aquatic plant species can result in the alteration of habitat characteristics, making a site unsuitable (COSEWIC 2008). The impact of introduced, invasive species on Pygmy Snaketail in New Brunswick and Ontario is unknown at the present time.

In New Brunswick there are several species that are introduced in the river systems containing Pygmy Snaketail and that may be a threat for the Pigmy Snaketail. These include three species of fish: Muskellunge (*Esox masquinongy*), Chain Pickerel (*Esox niger*), and Smallmouth Bass (*Micropterus dolomieu*) and three species of crayfish: Spinycheek Crayfish, (*Orconectes limosa* (Rafinesque)), Virile Crayfish (*Orconectes virilis* (Hagen)) and, the Appalachian Brook Crayfish (*Cambarus bartoni* (Fabricius)).

Introduced fish species are not considered a threat in Ontario where the above three fish species are not exotic invasives. In Ontario species such as the introduced Rusty Crayfish (*Orconectes rusticus*) may be a concern for Pygmy Snaketail as it has been discovered in lake systems bordering the Namakan River (OMNR pers. comm.). Also, the Spiny Water Flea (*Bythotrephes longimanus*) could become a concern in the Namakan River (OMNR pers. comm.).

5. MANAGEMENT OBJECTIVE

The management objective for the Pygmy Snaketail is:

To maintain the presence of existing populations in Canada at all sites where they are currently known to occur and conserve new occurrences that are identified.

Maintaining existing populations is important to prevent the species from becoming threatened or endangered. Given the mobility of adults and the potential impacts of currents on aquatic stages it is difficult to describe locations with precision and thus it is important to consider conservation measures at the watershed level.

6. BROAD STRATEGIES AND CONSERVATION MEASURES

6.1. Actions Already Completed or Currently Underway

Although not targeted towards the conservation of Pygmy Snaketail explicitly, many of the rivers where the species is known to occur have active watershed-based environmental non-government organizations working on conservation initiatives. Assessments of water quality and the impact of anthropogenic activities have been conducted for several rivers in New Brunswick. In addition, the Saint John River State of the Environment Report was released in 2011 and is available on the web site of the Canadian Rivers Institute. This information can serve as the basis for clarification of threats and management for this species.

6.2. Broad Strategies

In order to achieve the management objective, conservation measures (detailed in Table 4) will be organized under the following three broad strategies:

1. Population monitoring and surveys of suitable habitat for Pygmy Snaketail,
2. Maintenance of habitat quality and quantity for watercourses that support Pygmy Snaketail,
3. Outreach, education, and stewardship to promote conservation of the species and its habitat.

6.3. Conservation Measures

Table 4. Conservation measures and implementation schedule

#	Conservation Measure	Priority	Threats or concerns Addressed	Timeline
Broad Strategy 1: Population monitoring and surveys of suitable habitat for Pygmy Snaketail				
1.1	Develop and implement a monitoring protocol appropriate for the species	High	Lack of knowledge	2012-2015
1.2	Conduct surveys for determining presence or absence of Pygmy Snaketail in suitable habitat at priority sites	Medium	Lack of knowledge	2014-2021
Broad Strategy 2: Maintenance of habitat quantity and quality for watercourses that support Pygmy Snaketail				
2.1	Clarify the extent of overlap between threats and sites	High	All threats	2012-2016
2.2	Increase the understanding of the impact of threats and determine the most appropriate management approaches to promote	Medium	All threats	2012-2021

2.3	Support enforcement of existing acts and regulations pertaining to threats impacting the Pygmy Snaketail and its habitat	Medium	All threats	2012-2021
Broad Strategy 3: Outreach, education, and stewardship to promote conservation of the species and its habitat				
3.1	Support programs that promote best practices and conservation of riparian habitat	Medium	All threats	2012-2021
3.2	Increase the public profile of the Pygmy Snaketail through partnerships with NGOs that play roles in the watersheds where the species is found	Low	All threats	2012-2021

6.4. Narrative to Support Implementation Schedule

Broad Strategy 1: Population monitoring and surveys of suitable habitat

The development of a simple, repeatable monitoring protocol that is appropriate for the species is a high priority as it is required to verify the persistence of the Pygmy Snaketail at currently known occurrences. Also important, but a medium priority, are surveys of suitable habitats which are necessary to refine knowledge of the species' range and distribution. In Ontario all data should be submitted to the Atlas of Ontario Odonata which is maintained by the Natural Heritage Information Centre.

The difficulty in detecting this species is such that a clear site survey protocol is required combined with an overall systematic selection of potential sites and the recording of search effort (Table 5). Post-emergence, adults spend their time in the forest canopy, making capture difficult. Surveys to date have focused on finding exuviae and larva; this stage of the life cycle provides the best opportunity to identify the species. Timing of surveys is critical to ensure success in finding exuviae post-emergence (P. Brunelle, July 1, 2011, pers. comm.).

The COSEWIC report (2008) indicated that in Ontario, based upon considerable dragonfly survey work and relatively little suitable habitat the discovery of new occurrences in the province is unlikely. However, there still exist some areas such as the Petawawa River that may support new occurrences (Dr. P. Catling, July 7 2011, pers. comm.). For New Brunswick less than 45% of potentially suitable habitat has been subjected to targeted survey efforts (COSEWIC 2008). Highest priority should be placed on the Magaguadavic River, where only teneral, not exuviae, have been collected, and the additional areas identified by experienced biologists as listed in Table 5.

Table 5. Areas identified as priorities for additional survey work.

Province	River	Tributaries
NB	Northern section of the Saint John River ^{1,2}	Madawaska, Grande, Tobique, Becaguimec, Presque Isle, Meduxnekeag,
	Miramichi River ^{1,2}	Northwest, Little Southwest, Renous, Dungarvon, Bartholemew, Taxis
	Digdeguash River ¹	
	New River ¹	
	Lepreau River ^{1,2}	
	St. Croix River ^{1,2}	
	Magaguadavic River ^{1,2}	
ON	Petawawa River ³	

Source: ¹ D. Sabine, July 7 2011, pers. comm.

² P. Brunell, July 6 2011, pers. comm.

³ Dr. P. Catling, July 7 2011, pers. comm.

Broad Strategy 2: Maintenance of aquatic habitat quantity and quality

The conservation of this species will depend largely on the quality of habitat in and along the rivers where it is found. However, it will be important to clarify the overlap that exists between threats and sites, and to increase our understanding of the impacts of threats in order to develop relevant management approaches for this species and its habitat. Threats to Pygmy Snaketail habitat, particularly those related to water quality and rivershore habitats, are already the focus of various existing conservation and stewardship programs and projects. Integrating the management of this species with these pre-existing approaches to conserving this habitat and co-occurring species would be particularly effective. Encouraging the enforcement of existing acts and regulations that eliminate, minimize, or mitigate threats to the species will be an important measure in the conservation of this species at risk.

Broad Strategy 3: Outreach, education, and stewardship to promote conservation

Outreach, education, and stewardship will likely play an important role in the success of this management plan. Partnerships with non-government organizations (NGOs), industry, and other stakeholders working in watersheds where the Pygmy Snaketail occurs will help promote the protection and conservation of water quality, good water use/land use practices, and will facilitate raising the public profile of the species. Many of the rivers in NB known to have Pygmy Snaketail already have active watershed-based non-government organizations that are involved in conservation initiatives.

7. MEASURING PROGRESS

The performance indicators presented below provide a way to define and measure progress toward achieving the management objectives.

- Continued presence of the Pygmy Snaketail at all currently known locations

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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.

Management 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 in this statement.

This management plan will clearly benefit the environment by promoting the conservation of the Pygmy Snaketail. The potential for the plan to inadvertently lead to adverse effects on other species was considered. The SEA concluded that this plan will clearly benefit the environment and will not entail any significant adverse effects. The reader should refer to the following sections of the document in particular: Section 3 which contains a description of the species' habitat and biological needs as well as Section 6 which includes the implementation schedule.