

DRAFT AMENDED Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed
Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent
population) in Ontario

1 **Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and**
2 **Unisexual Ambystoma (Small-mouthed Salamander dependent**
3 **population)**
4 **Ontario Government Response Statement**

5 *Please note that a multi-species government response statement for Blue Racer, Lake*
6 *Erie Watersnake and Small-mouthed Salamander was previously finalized in 2017. This*
7 *updated policy now includes the recently listed Unisexual Ambystoma (Small-mouthed*
8 *Salamander dependent population) and associated updates to the salamander sections.*
9 *Comments are requested on the revised salamander sections only.*

10 **Protecting and Recovering Species at Risk in Ontario**

11 Species at risk recovery is a key part of protecting Ontario's biodiversity. The
12 *Endangered Species Act, 2007* (ESA) is the Government of Ontario's legislative
13 commitment to protecting and recovering species at risk and their habitats.

14
15 Under the ESA, the Government of Ontario must ensure that a recovery strategy is
16 prepared for each species that is listed as endangered or threatened. A recovery
17 strategy provides science-based advice to government on what is required to achieve
18 recovery of a species.

19
20 Within nine months after a recovery strategy is prepared, the ESA requires the Ontario
21 government to publish a statement summarizing the government's intended actions and
22 priorities in response to the recovery strategy. The response statement is the
23 government's policy response to the scientific advice provided in the recovery strategy.
24 In addition to the strategy, the government response statement considered (where
25 available) input from Indigenous communities and organizations, stakeholders, other
26 jurisdictions, and members of the public. It reflects the best available local and scientific
27 knowledge, including Traditional Ecological Knowledge where it has been shared by
28 communities and Knowledge Holders, as appropriate and may be adapted if new
29 information becomes available. In implementing the actions in the response statement,
30 the ESA allows the government to determine what is feasible, taking into account social,
31 cultural and economic factors.

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

32 The recovery strategies for the Blue Racer (*Coluber constrictor foxii*), the Lake Erie
33 Watersnake (*Nerodia sipedon insularum*) and the Small-mouthed Salamander
34 (*Ambystoma texanum*) in Ontario were completed on March 2, 2015. On May 30, 2018,
35 an updated and expanded recovery strategy for Small-mouthed Salamander
36 (*Ambystoma texanum*) and Unisexual Ambystoma (Small-mouthed Salamander
37 dependent population) (*Ambystoma laterale – texanum*) was finalized. Unisexual
38 Ambystoma (Small-mouthed Salamander dependent population) are also referred to as
39 Small-mouthed Salamander dependent unisexuales in this document. Given their similar
40 distribution and threats, the recovery efforts for the Blue Racer, Lake Erie Watersnake,
41 Small-mouthed Salamander, and Small-mouthed Salamander dependent unisexuales
42 are addressed collectively in a single government response statement, which has been
43 updated following the completion of the updated recovery strategy noted above. The
44 combined government response statement also recognizes the importance of
45 collaborative implementation of recovery actions with partners on Pelee Island. This
46 GRS does not aim to outline additional habitat protection for the four species; at this
47 time, the general habitat protection under the ESA already in place will continue to
48 apply.

49

50 The Blue Racer is a large, non-venomous snake that can grow up to 1.5 m in length.
51 Adult Blue Racers are greyish-blue in colour with a white, cream or bluish-white belly
52 and a characteristic black mask. Juveniles have dark blotches along their body that
53 eventually fade completely.

54

55 The Lake Erie Watersnake is a non-venomous, highly-aquatic snake that is rarely found
56 far from the shoreline. It averages between 59 and 88 cm and is pale grey to dark
57 brown in colour, with ranging patterns of darker brown or reddish blotches on the back
58 and sides that often connect to form a banding pattern.

59

60 The Small-mouthed Salamander is a medium-sized, heavy-bodied salamander that is
61 dark brown to greyish-black with gray-blue patches that resemble lichen on its tail and
62 sides. It can grow to a maximum length of about 18 cm and has a relatively small head
63 and a short, narrow snout.

64

65 The Unisexual Ambystoma (Small-mouthed Salamander dependent population), which
66 co-exist with Small-mouthed Salamanders, are intermediate in appearance to other

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

67 mole salamander species it co-exists with but cannot be readily distinguished from
68 these species without genetic testing.

69
70 Pelee Island

71 The Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander, and Small-
72 mouthed Salamander dependent unisexuales are all found on Pelee Island. Within
73 Canada, Blue Racer, Small-mouthed Salamander and Small-mouthed Salamander
74 dependent unisexuales are known to occur exclusively on Pelee Island. Within Canada,
75 the largest population of Lake Erie Watersnake occurs on Pelee Island. Pelee Island is
76 located in the western basin of Lake Erie and has a vast amount of biodiversity and a
77 rich cultural heritage. The community of Pelee Island celebrates its natural history. The
78 Township of Pelee works with private landowners and partner organizations to create
79 and expand nature reserves on the island and works to integrate other conservation-
80 focused initiatives.

81
82 The Official Plan for the Township of Pelee outlines in the overall objectives the
83 importance of understanding the value of the island's natural heritage, of fostering
84 stewardship of the natural environment, and of protecting and enhancing the natural
85 environment of the island. An environmental advisory committee for Pelee Island has
86 also been formed to bring together representatives from the municipality, non-
87 governmental organizations, the local conservation authority and provincial ministries to
88 cooperate on issues of environmental importance. The Pelee Island community actively
89 collaborated to support the Nature Conservancy of Canada (NCC) in purchasing over
90 10% of the island (435 ha) for the proactive preservation of priority conservation lands.
91 Additional lands owned by a variety of land owners and managers are also in
92 conservation ownership for a total of 18% of the island set aside for conservation
93 purposes. The municipality, private landowners and NCC have also taken multiple
94 additional steps to protect and support biodiversity on Pelee Island:

- 95 • In order to reduce road impacts to species, the municipality has significantly
96 lowered speed limits on almost all roads on the island.
- 97 • Through the updating of waste disposal methods, the Township of Pelee has
98 allowed for previous retaining ponds that were constructed to progress into
99 functioning wetlands.
- 100 • All municipal infrastructure projects include site-specific collaboration with the
101 local conservation authority, local Indigenous communities and organizations,
102 and pertinent provincial and federal ministries.
- 103 • The municipality has intentionally created endangered species habitat such as
104 snake hibernacula.

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

- 105 • To benefit both terrestrial and aquatic species, many stretches of shoreline
106 habitat are being actively preserved and restored using native vegetation and
107 materials.
- 108 • Many private landowners continue to preserve natural habitat, construct and
109 protect wetlands, plant native species, and use low impact farming practices on
110 their individual properties to support biodiversity and the natural heritage of Pelee
111 Island.
- 112 • With the support of the municipality, NCC has secured key natural areas
113 including three alvars, critical shoreline and forested swamp areas. NCC also
114 continues to restore agricultural lands to create habitat corridors and buffers and
115 enhance connectivity for species.
- 116 • NCC has implemented a community-based conservation plan to protect key
117 biodiversity features and functions, while supporting continuation of existing land
118 uses and expansion of the island's ecotourism-based economy.
- 119 • The municipality, community members, NCC and other partners collaborate to
120 exchange knowledge, promote the island's unique wildlife, interpret the natural
121 surroundings for visitors and promote natural heritage events.
122

123 There are a variety of land uses on Pelee Island, including agriculture, hunting,
124 recreation and tourism. Given the island formation, a finite amount of land is available to
125 carry out all activities, which may result in competing land uses. The community's
126 health, as well as prosperity, fundamentally rely on biodiversity and the ecosystem
127 services it provides, such as food, clean water, fresh air and fertile soil. All of these
128 factors highlight the importance of mobilizing partnerships and collectively working to
129 conserve biodiversity while supporting local economic sustainability.

130 **Protecting and Recovering the Blue Racer, Lake Erie Watersnake, Small-mouthed**
131 **Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent**
132 **population)**

133 The Blue Racer, Small-mouthed Salamander and Unisexual Ambystoma (Small-
134 mouthed Salamander dependent population) are listed as endangered species under
135 the ESA, which protects both the animals and their habitat. The ESA prohibits harm or
136 harassment of endangered and threatened species and damage or destruction of their
137 habitat without authorization. Such authorization would require that conditions
138 established by the government be met.
139

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed
Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent
population) in Ontario

140 The Lake Erie Watersnake is listed as special concern under the ESA. The species was
141 downlisted provincially from endangered to special concern on June 2, 2017, based on
142 the Committee on the Status of Species at Risk in Ontario's (COSSARO) assessment.
143 The species is included in this GRS to foster continued stewardship and in recognition
144 of the value of collective efforts to conserve biodiversity.

145
146 A collaborative, stewardship first approach that partners the municipality, the provincial
147 and federal governments, and local partners is intended to meet both the needs of the
148 community and of the species that help contribute to the island's biodiversity, including
149 Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Small-mouthed
150 Salamander dependent unisexuals.

151
152 Blue Racer

153 The historical distribution of the Blue Racer in North America ranges from extreme
154 southwestern Ontario, west to Minnesota, south to Illinois and east to Ohio. In the
155 United States, the only states with current populations of the Blue Racer are Ohio,
156 Indiana, Illinois, Michigan, Wisconsin and Iowa. In Canada, Blue Racers have
157 disappeared from the mainland in southwestern Ontario and this species is now known
158 to only occur on Pelee Island. Blue Racers inhabit forest edges and dry, open to semi-
159 open habitat types such as alvars, savannahs, grasslands and thickets. They exhibit
160 high fidelity to hibernation sites, which are usually underground cavities that are
161 accessed through cracks and fissures in the bedrock.

162
163 The primary threat to the Blue Racer is habitat loss, largely due to succession of
164 vegetation communities. Historically, clearing of land for agriculture and development
165 posed a major threat but has been less significant in recent years. As woody plants
166 succeed in the ecosystem, suitable habitat features for the species disappear, such as
167 open canopies, dry open to semi-open areas, and edge habitat. As is the case with
168 most snake species, road mortality and persecution are also significant threats to the
169 Blue Racer. Working together to reduce negative perceptions of snakes is an important
170 component of conserving biodiversity and addressing these threats for all snake
171 species. It is possible that chemical contamination poses a threat to the species and
172 that introduced Wild Turkeys (*Meleagris gallopavo*) may pose a threat as a potential
173 new predator, though the extent of these potential threats is currently unknown.
174 Continuing to increase the level of knowledge and understanding of interactions
175 between introduced Wild Turkeys and Blue Racers will be of value.

176

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed
Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent
population) in Ontario

177 Population estimates for the Blue Racer have not been completed since 2002, when the
178 combined population size for three study sites on Pelee Island was estimated to be
179 approximately 140 adult Blue Racers. The possible population range identified through
180 this study was 59 to 284. Hatchlings and juveniles have been observed as recently as
181 2015, suggesting that the population is successfully reproducing. However, anecdotal
182 evidence from some research and site visits since 2002 suggest the Canadian
183 population of the Blue Racer may have experienced further decline in recent years, and
184 a decline in overall habitat quality and quantity has also been noted at several occupied
185 sites on the island.

186
187 Given the small population size found in 2002, anecdotal evidence of potential decline
188 since that time, and the threats to the Blue Racer and its habitat, approaches to
189 recovery should focus on working together to increase the level of knowledge of the
190 species, increase the amount of suitable habitat available for the Blue Racer and
191 minimize threats to the species to enable natural increases in the species' population.

192
193 **Government's Recovery Goal for the Blue Racer**

194 The government's goal for the recovery of the Blue Racer in Ontario is to maintain the
195 species' distribution and ensure a viable, self-sustaining population.

196
197 Lake Erie Watersnake

198 The Lake Erie Watersnake is a subspecies of the Northern Watersnake (*Nerodia*
199 *sipedon*) and is endemic to the islands of Lake Erie and a small peninsula on the Ohio
200 mainland. Previously listed as endangered in Ontario, the species was downlisted to
201 special concern in June 2017 based on updated information that informed COSSARO's
202 assessment. In Ontario, Lake Erie Watersnakes are known to occur on Pelee, East
203 Sister, and Middle Islands. This species was previously known to also occur on Hen,
204 North Harbour and Middle Sister Islands. Recent data suggest that it is likely extirpated
205 from North Harbour and Middle Sister Islands. However, surveys have not occurred on
206 Hen Island, which is privately owned, since the early 1990s. As a result, the 2016
207 Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status report
208 identifies that the species' status on Hen Island is currently unknown. Hen, East Sister,
209 North Harbour, and Middle Sister Islands all lie northwest of Pelee Island in Lake Erie,
210 while Middle Island lies south of the southwest corner of Pelee Island.

211

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

212 Lake Erie Watersnakes are highly aquatic and rarely travel inland more than 50 m from
213 the shoreline during the active season, although they will travel greater distances inland
214 to hibernation sites. Adult snakes may hibernate singly or communally, using
215 underground cavities, burrows, or human-made structures such as old wells or building
216 foundations.

217
218 As indicated in scientific literature, significant threats to snakes such as the Lake Erie
219 Watersnake are road mortality and persecution. The colouration of Lake Erie
220 Watersnakes can make them difficult to see against unpaved or dust covered roads.
221 Additionally, fear or dislike of snakes can foster negative human behaviours that may
222 result in harm to individual snakes. Habitat loss due to shoreline development,
223 vegetation clearing, increased presence of shoreline invasive species such as
224 Phragmites (European Common Reed)(*Phragmites australis* ssp. *australis*), and
225 removal of winter hibernation habitat is also a significant threat to the species. Other
226 possible threats to the Lake Erie Watersnake include environmental contaminants and
227 adverse effects of high-density nesting or roosting areas of waterbirds, such as Double-
228 crested Cormorants (*Phalacrocorax auritus*), on habitat.

229
230 Populations of the Lake Erie Watersnake experienced historical declines, but may have
231 stabilized in recent years; there is insufficient data to document population trends of
232 Lake Erie Watersnake in Canada. An increase in the abundance of the invasive Round
233 Goby (*Neogobius melanostomus*), which has become an important food source for the
234 Lake Erie Watersnake, has shown to have increased populations in the United States. It
235 is unknown whether there has been a similar effect in Canada due to potential
236 differences in the magnitude of threats that are faced by the species. In 2016, the
237 Committee on the Status of Endangered Wildlife in Canada estimated the number of
238 mature individuals on Pelee Island to be 3,286, and estimated approximately another
239 200 individuals inhabiting the other islands. Approaches to recovering the Lake Erie
240 Watersnake will focus on minimizing the threats of accidental and intentional human-
241 caused mortality by increasing public awareness and understanding on managing its
242 habitat to support the current abundance and distribution of the species in Ontario.

243
244 **Government's Recovery Goal for the Lake Erie Watersnake**
245 The government's goal for the recovery of the Lake Erie Watersnake is to maintain the
246 current abundance and distribution of the species in Ontario.

247

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

248 Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander
249 dependent population)

250
251 The Small-mouthed Salamander ranges from eastern Texas to western Alabama and
252 across the central United States, reaching its northern range in Michigan, northern Ohio
253 and Pelee Island in Ontario. The global population is thought to exceed 100,000 but is
254 unknown. In Canada, the species is only known to occur on Pelee Island. Small-
255 mouthed Salamander dependent unisexuals have been found in Michigan, Indiana and
256 Ohio, and several Lake Erie islands. The full global distribution and population are
257 uncertain because genetic testing is required to identify these animals and this has not
258 occurred for many populations. In Canada, the Small-mouthed Salamander dependent
259 unisexuals are only known to occur on Pelee Island.

260
261 Small-mouthed Salamanders, Unisexual Ambystoma (Small-mouthed Salamander
262 dependent population) and Blue-spotted Salamanders (*Ambystoma laterale*) (not at
263 risk) all co-occur on Pelee Island. Unisexual Ambystoma (Small-mouthed Salamander
264 dependent population) is a genetically distinct, all-female salamander lineage that
265 depends on the other two salamander species to carry out reproduction.

266
267 Small-mouthed Salamander and Small-mouthed Salamander dependent unisexuals in
268 Ontario are known historically to occur at five breeding sites on Pelee Island, but the
269 most recent survey efforts (2015-2017) found Small-mouthed Salamanders and Small-
270 mouthed Salamander dependent unisexuals at only three of those five breeding sites.
271 These surveys did, however, identify three additional breeding sites in use by the two
272 species on Pelee Island for a total of six confirmed sites. The status of one additional
273 breeding site, and the current population abundance, are unknown.

274
275 The Small-mouthed Salamander and Small-mouthed Salamander dependent
276 unisexuals are members of the Mole Salamander family (*Ambystomatidae*), a family
277 name that refers to the biological characteristic of spending most of their time
278 underground or beneath cover except when breeding.

279
280 All Unisexual Ambystoma (Small-mouthed Salamander dependent population)
281 salamanders are females and have a unique reproductive strategy whereby the sperm
282 from male Small-mouthed Salamanders or Blue-spotted Salamanders is needed to
283 initiate egg development. Their offspring are unique in that they are also all females and
284 are all considered Unisexual Ambystoma (Small-mouthed Salamander dependent)

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

285 regardless of what species' sperm initiated egg development. While the sperm may or
286 may not be incorporated into the Small-mouthed Salamander dependent unisexual egg,
287 the species does not appear to be able to reproduce in the absence of a Small-mouthed
288 Salamander or Blue-spotted Salamander. Therefore, the persistence of the Unisexual
289 species is dependent on the presence of the other salamander species.

290
291 It is thought that these three species that make up the salamander complex on Pelee
292 Island were isolated together in the area roughly 4000 years ago. Small-mouthed
293 Salamander dependent unisexuals vastly outnumber both Small-mouthed and Blue-
294 spotted Salamanders, making up over 80 percent of all the Ambystoma salamanders on
295 the island. Recent survey efforts examined more than 830 samples (adults and larvae)
296 on Pelee Island collected from 2015 to 2017 and found that unisexuals made up over 95
297 percent of the sample (Hossie and Murray 2017).

298
299 The habitat needs of both species include: fish-free, shallow water bodies that retain
300 water from March through July, used for breeding, and adjacent suitable terrestrial
301 areas that are shaded and provide soft moist soils, logs, rocks and leaf litter that are
302 used for cover, shelter and overwintering.

303
304 The main threat to the species is habitat degradation, loss and fragmentation. This
305 includes the temporary or permanent loss of water from breeding sites during critical
306 periods, and the loss of forest canopy cover, rotting logs and other ground cover. Small-
307 mouthed Salamanders and Small-mouthed Salamander dependent unisexuals rely on
308 wetland sites, vernal pools and ephemeral ponds for breeding; therefore, activities and
309 climate conditions that affect the hydrology of the habitat and surrounding areas also
310 pose a threat. Threats from invasive species, such as Phragmites, can also reduce
311 suitable habitat conditions for the species and the local extent of impacts of
312 environmental contaminants (e.g., pesticides, de-icing salt) is unknown. Additional
313 potential threats to the species include disease (e.g., ranaviruses, chytrid fungi) and
314 predation and habitat alteration caused by Wild Turkeys. As the relative impacts of
315 many of these potential and known threats on local populations are currently unknown,
316 further research is necessary to support recovery actions for the species.

317
318 The Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed
319 Salamander dependent) populations on Pelee Island are small and the salamanders
320 themselves are difficult to distinguish from other salamander species on Pelee Island
321 without the assistance of genetic testing. Continuing to manage the salamander

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

322 complex will support recovery for all associated salamander species at risk. Given the
323 lack of population estimates, there is a need to focus on conducting inventories of
324 recent breeding sites and monitoring population trends and habitat usage. Approaches
325 to recovery will focus on working in collaboration with the local community to monitor
326 current populations, manage current habitat effectively, increase the amount of suitable
327 habitat available for Small-mouthed Salamander and dependent unisexuales, and
328 increase our knowledge of potential threats to the species.

329

330 **Government's Recovery Goal for the Small-mouthed Salamander and Unisexual**
331 **Ambystoma (Small-mouthed Salamander dependent population)**

332 The government's goal for the recovery of the Small-mouthed Salamander and
333 Unisexual Ambystoma (Small-mouthed Salamander dependent population) is to ensure
334 long-term viability and persistence of the Ontario populations by managing threats and
335 increasing population abundance, distribution and connectivity.

336 **Actions**

337 Protecting and recovering species at risk is a shared responsibility. No single agency or
338 organization has the knowledge, authority or financial resources to protect and recover
339 all of Ontario's species at risk. Successful recovery requires inter-governmental co-
340 operation and the involvement of many individuals, organizations and communities. In
341 developing the government response statement, the government considered what
342 actions are feasible for the government to lead directly and what actions are feasible for
343 the government to support its conservation partners to undertake.

344 **Government-led Actions**

345 To help protect and recover the Blue Racer, Lake Erie Watersnake, Small-mouthed
346 Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent
347 population) the government will directly undertake the following actions:

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

- Explore opportunities to work collectively with the Township of Pelee, including the Pelee Island Environmental Advisory Committee, the federal government and local partners to develop an integrated (landscape/place-based) approach to managing species at risk with consideration of ecosystem values and sustainable resources on Pelee Island. This may include:
 - developing a strategic plan for species at risk and their habitats on Pelee Island;
 - continuing to implement the Ontario Invasive Species Strategic Plan to address the invasive species (e.g., Phragmites) that threaten Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population);
 - continuing to implement Ontario's *Invasive Species Act* to address the invasive species identified in the Act (e.g., Phragmites) that threaten Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population);
 - supporting the coordination of provincial and federal species at risk legislation (i.e., ESA and *Species at Risk Act* (SARA)), in order to collaboratively continue to protect Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) and their habitats; and,
 - educating other agencies and authorities involved in planning and environmental assessment processes on the ESA.

- Explore opportunities to work collectively with the Township of Pelee, including the Pelee Island Environmental Advisory Committee, the federal government and local partners to integrate approaches to stewardship and implementation of recovery activities including:
 - encouraging collaboration, and establishing and communicating annual priority actions for government support in order to reduce duplication of stewardship efforts;

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

- supporting conservation, agency, municipal and industry partners, and Indigenous communities and organizations to undertake activities to protect and recover Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population). Support will be provided where appropriate through funding, agreements, permits (including conditions) and advisory services;
 - undertaking communication and outreach to increase public awareness of species at risk in Ontario; and,
 - encouraging the submission of Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) data to the Ontario's central repository through the citizen science projects that they receive data from (e.g., the [Ontario Reptile and Amphibian Atlas](#)) and directly through the [Natural Heritage Information Centre](#).
- Continue to monitor, protect and manage habitat for the four species in protected areas on Pelee Island (e.g., Lighthouse Point and Fish Point Provincial Nature Reserves). Continue to work collaboratively with local partners to enhance and restore habitat for species at risk within these protected areas.

349

350 **Government-supported Actions**

351 The government endorses the following actions as being necessary for the protection
352 and recovery of the Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander
353 and Unisexual Ambystoma (Small-mouthed Salamander dependent population). Actions
354 identified as "high" will be given priority consideration for funding under the Species at
355 Risk Stewardship Program. Where reasonable, the government will also consider the
356 priority assigned to these actions when reviewing and issuing authorizations under the
357 ESA. Other organizations are encouraged to consider these priorities when developing
358 projects or mitigation plans related to species at risk. The government will focus its
359 support on these high-priority actions over the next five years.

360

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

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Focus Area: **Habitat Management**
Objective: Work collaboratively to increase habitat quality for the Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population).

Habitat loss and degradation is a significant threat to all four species. A landscape level approach to habitat management for the species recognizes the finite amount of land available on Pelee Island. Collectively working to develop and implement best management practices will support habitat management and restoration for the four species, particularly for the Blue Racer, Small-mouthed Salamander and Small-mouthed Salamander dependent unisexauls as habitat is very limited. Without active management of Blue Racer habitat, the open to semi-open habitat succeeds over time and becomes unsuitable for the species. In the case of Small-mouthed Salamander and the Small-mouthed Salamander dependent unisexuals, the species rely on vernal pools and wetland sites and suitable adjacent terrestrial areas. As a result, activities impacting the hydrology or tree canopy of these areas could have substantial consequences for these species. Cooperative, preventative efforts to manage habitat for suitability over the long-term will greatly assist in reducing these impacts.

Actions:

1. **(High)** Using community knowledge and species expertise, develop, promote and implement best management practices to manage existing habitat for the Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) including:
 - prescribed burns to prevent woody succession in Blue Racer habitat, with consideration for the safety of neighbouring properties, snakes and other rare species present on-site;
 - targeted removal of native or invasive woody vegetation in Blue Racer habitat, with consideration for other species at risk, using appropriate and approved methods;
 - removal of invasive species such as Phragmites along shoreline habitat for Lake Erie Watersnake and at known breeding sites for Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population);
 - managing vegetation to support suitable habitat conditions and maintaining appropriate wetland and

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

- 400 forested habitat features such as cover objects and forest
401 cover for Small-mouthed Salamander and Unisexual
402 Ambystoma (Small-mouthed Salamander dependent
403 population);
- 404 ○ buffering against potential site-level effects of
405 environmental contaminants on water quality in Small-
406 mouthed Salamander and Unisexual Ambystoma (Small-
407 mouthed Salamander dependent population) breeding
408 habitat; and,
 - 409 ○ managing existing and new infrastructure, such as
410 drainage works, in a way that reduces the negative
411 effects on Blue Racer, Lake Erie Watersnake, Small-
412 mouthed Salamander and Unisexual Ambystoma (Small-
413 mouthed Salamander dependent population) habitat, with
414 additional consideration for neighbouring properties.
- 415 2. Collaborate with community members and organizations to
416 strategically increase the amount of suitable habitat available for
417 Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander
418 and Unisexual Ambystoma (Small-mouthed Salamander
419 dependent population) by:
- 420 **Blue Racer (High)**
- 421 ○ identifying and assessing existing habitat and identifying
422 candidate areas for habitat enhancement, restoration and
423 creation where there are willing partners;
 - 424 ○ creating a mosaic of suitable habitat types such as
425 grassland, savannah and edge habitat, with a focus on
426 increasing connectivity between suitable habitat patches;
 - 427 ○ creating hibernation, nesting and shelter habitats and
428 monitoring and documenting their effectiveness;
- 429
- 430 **Lake Erie Watersnake**
- 431 ○ identifying and assessing existing habitat and identifying
432 candidate areas for habitat enhancement, restoration and
433 creation where there are willing partners;
 - 434 ○ restoring shoreline habitat and increasing structural
435 heterogeneity, and increasing connectivity between areas
436 of habitat;
 - 437 ○ creating suitable hibernation and shelter habitats and
438 monitoring and documenting their effectiveness;
- 439
- 440 **Small-mouthed Salamander and Unisexual Ambystoma (Small-
441 mouthed Salamander dependent population) (High)**
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DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

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- identifying and assessing existing habitat and identifying sites adjacent to or between known locations for potential habitat enhancement, restoration and creation where there are willing partners; and,
 - enhancing, restoring and creating suitable habitat such as vernal pools and surrounding forested areas in appropriate areas.
3. **(High)** Work with local partners to maintain adequate water levels and quality, and hydrology that sustain the breeding sites and migratory routes for Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population). This may include buffering for the potential effects of climate change on water levels in the future and exploring opportunities to support hydrology at a watershed scale (e.g., restoring riparian habitat).

Focus Area: **Awareness and Threat Management**

Objective: Work in partnership with the Pelee Island community to reduce threats to the Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) through increasing public awareness, promoting local stewardship of the species and their habitats, and implementing threat mitigation techniques.

465 Landowners, local residents and visitors to Pelee Island have an important role to play
466 in the protection and recovery of the Blue Racer, Lake Erie Watersnake, Small-mouthed
467 Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent
468 population). Increasing public awareness and promoting local stewardship are critical to
469 addressing key threats such as road mortality and persecution. Efforts to increase
470 awareness should build off of work completed to date by conservation partners and
471 other jurisdictions, such as the resources and programs developed in the U.S. to
472 support Lake Erie Watersnake recovery. Steps taken in the future to mitigate threats to
473 the species and their habitat can build on research conducted in the coming years. A
474 continued collaborative approach that focuses on stewardship of the species and their
475 habitat will support the effective implementation of protection and recovery actions.

Actions:

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4. **(High)** Collaborate with local organizations and initiatives to reduce threats to the species, including road mortality and persecution. For example:
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DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

- 481 ○ developing programs to reduce road mortality, which may
- 482 include installing signs and publicizing the need for
- 483 cautious driving, particularly in areas of high mortality for
- 484 these species;
- 485 ○ producing educational materials to increase public
- 486 awareness, such as promoting the need to share the
- 487 shoreline with Lake Erie Watersnakes; and,
- 488 ○ implementing techniques to reduce rates of road mortality
- 489 (e.g., ecopassages, barrier fencing, traffic calming
- 490 measures), particularly in areas of high mortality for these
- 491 species.

492

493 5. Promote local stewardship of the Blue Racer and the Lake Erie

494 Watersnake that includes:

- 495 ○ developing social marketing strategies to help influence
- 496 public perceptions and behaviours that negatively affect
- 497 snake populations;
- 498 ○ producing stewardship publications to highlight success
- 499 stories and engage the public in snake conservation;
- 500 and,
- 501 ○ increasing awareness of incentive programs and how
- 502 landowners can benefit from protecting and restoring
- 503 Blue Racer and Lake Erie Watersnake habitat.

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505 **Focus Area: Inventory and Monitoring**

506 Objective: Improve knowledge of species' population trends, habitat usage

507 and distribution.

508 Little is known about the current abundance, local distribution, habitat usage, and

509 population trends of Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander

510 and Unisexual Ambystoma (Small-mouthed Salamander dependent population). A

511 greater understanding of the four species' current population abundance is essential to

512 support the ability to monitor progress and effectiveness of recovery actions and

513 population trends over time. Further information on these topics, as well as additional

514 surveying for potential presence at historical and potential locations would contribute to

515 greater understanding of the status of the four species.

516

517 **Actions:**

- 518 6. Collaborate with local partners and community members to
- 519 develop and implement survey and monitoring programs to:
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DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

- 521 Blue Racer (**High**) and Lake Erie Watersnake
522 ○ estimate the population abundance and distribution of the
523 Blue Racer and the Lake Erie Watersnake and monitor
524 trends over time;
525 ○ monitor changes in Blue Racer and Lake Erie
526 Watersnake use and suitability of habitat;
527 ○ identify areas with high rates of road mortality between
528 occupied habitats;
529 ○ survey for the Lake Erie Watersnake on other Lake Erie
530 islands (e.g., Hen, Middle Sister and North Harbour
531 Islands), where feasible, in order to determine if the
532 species is still present in these areas.

- 533
534 Small-mouthed Salamander and Unisexual Ambystoma (Small-
535 mouthed Salamander dependent population) (**High**)
536 ○ estimate the population abundance and distribution of
537 both salamander species at known sites;
538 ○ estimate the proportion of each species relative to the
539 salamander complex;
540 ○ monitor suitability of habitat including terrestrial (e.g.,
541 canopy cover, soil moisture and cover object availability)
542 and aquatic (e.g., water level, pH, pollutants and fish
543 presence) features;
544 ○ monitor population trends and monitor changes in genetic
545 composition and recruitment of the salamander complex
546 over time;
547 ○ identify areas with high rates of road mortality between
548 occupied habitats;
549 ○ survey for the two species at potential sites with suitable
550 habitat in order to identify additional populations and
551 refine knowledge on the distribution of the salamander
552 species.

| | |
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| Focus Area: | Research and Population Management |
| Objective: | Increase knowledge of threats to the species, species-specific habitat requirements and ecological limitations. |

557 Knowledge gaps related to specific habitat requirements and the significance of threats
558 currently exist for all three species. Investigating and filling these knowledge gaps will
559 help to better inform the implementation of recovery actions for these species, such as
560 habitat management efforts and road mortality reduction techniques. Improving our
561 knowledge of the salamander complex on Pelee Island, including genetic composition

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

562 and any associated limitations, will support future recovery efforts. Increasing our
563 understanding of potential emerging threats, such as disease and climate change, will
564 also support effective mitigation if needed in the future. For both Blue Racer and the two
565 salamander species, impacts of potential diseases could lead to significant impacts
566 given their small population sizes.

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Actions:

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7. Investigate the structural, thermal and chemical properties of hibernation and nest/gestation sites to inform the creation and maintenance of these sites for the Blue Racer and the Lake Erie Watersnake. Assess the effectiveness of created hibernation habitats.

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8. Research Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) habitat use (e.g., breeding sites, migration routes and overwintering sites) and habitat connectivity (including dispersal barriers).

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9. Investigate the effectiveness of techniques to create breeding ponds for the two salamander species, including the factors that influence the quality of created breeding habitats.

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10. Investigate the effects and severity of known and potential threats to Blue Racer and Lake Erie Watersnake, and identify potential mitigation measures as appropriate, including:
○ examining the potential effects of Double-crested Cormorants and Wild Turkeys on the species and/or their habitat; and,
○ investigating the potential effects of disease (e.g., Snake Fungal Disease) and other identified threats to the species and their habitat.

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11. Investigate the effects and severity of known and potential threats to Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population), and identify potential mitigation measures as appropriate, including:

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○ investigating the extent that environmental contaminants are directly or indirectly affecting the productivity and/or survival rates of the two salamander species;
○ examining the potential effects on the salamander complex of predation by Wild Turkeys and habitat alteration caused by the turkeys;

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent population) in Ontario

- 602 o investigating the potential effects of climate change on
603 the species and their habitat, and the relationship
604 between habitat suitability and hydrology; and,
605 o investigating the potential effects of disease (e.g.,
606 ranaviruses, chytrid fungi), and parasites (e.g.,
607 trematode) on Small-mouthed Salamander and
608 Unisexual Ambystoma (Small-mouthed Salamander
609 dependent population).
- 610 12. Conduct assessments to determine population targets for
611 achieving self-sustaining and genetically viable Blue Racer,
612 Small-mouthed Salamander and Unisexual Ambystoma (Small-
613 mouthed Salamander dependent) populations in Ontario.
- 614 13. Investigate the ecological relationships in the Ambystoma
615 salamander complex on Pelee Island to assess potential
616 demographic constraints to species' recovery (e.g., related to
617 reproductive output, recruitment, and survival in the larval and
618 adult life stages).
- 619 14. Investigate the potential need for, and feasibility of, recruitment
620 techniques to support the recovery goal for Small-mouthed
621 Salamander and Unisexual Ambystoma (Small-mouthed
622 Salamander dependent population). If found to be feasible and
623 necessary, implement, evaluate, adapt and improve recruitment
624 techniques with consideration for the species' ecology and the
625 salamander complex as a whole. An example of a priority
626 recruitment technique is:
- 627 o exploring the potential benefits and need for a cost
628 effective head-starting protocol/program (e.g.,
629 reproductive monitoring, artificial incubation of eggs, and
630 release of juveniles).

631 **Implementing Actions**

632 Financial support for the implementation of actions may be available through the
633 Species at Risk Stewardship Program. Conservation partners are encouraged to
634 discuss project proposals related to the actions in this response statement with program
635 staff. The Ontario government can also advise if any authorizations under the ESA or
636 other legislation may be required to undertake the project.

DRAFT Government Response Statement
to the
Recovery Strategies for Blue Racer, Lake Erie Watersnake, Small-mouthed
Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent
population) in Ontario

637 Implementation of the actions may be subject to changing priorities across the multitude
638 of species at risk, available resources and the capacity of partners to undertake
639 recovery activities. Where appropriate, the implementation of actions for multiple
640 species will be co-ordinated across government response statements.

641 **Reviewing Progress**

642 The ESA requires the Ontario government to conduct a review of progress towards
643 protecting and recovering a species not later than five years from the publication of this
644 response statement. The review will help identify if adjustments are needed to achieve
645 the protection and recovery of the Blue Racer, Lake Erie Watersnake, Small-mouthed
646 Salamander and Unisexual Ambystoma (Small-mouthed Salamander dependent
647 population).

648 **Acknowledgement**

649 We would like to thank all those who participated in the development of the recovery
650 strategies for the Blue Racer, Lake Erie Watersnake, Small-mouthed Salamander and
651 Unisexual Ambystoma (Small-mouthed Salamander dependent population) for their
652 dedication to protecting and recovering species at risk.

653 **For Additional Information:**

654 Visit the species at risk website at ontario.ca/speciesatrisk
655 Contact the Natural Resources Information Centre
656 1-800-667-1940
657 TTY 1-866-686-6072
658 mnr.nric.mnr@ontario.ca