

RECOVERY PLAN FOR THE MACROPIS CUCKOO BEE (*EPEOLOIDES PILOSULUS*) IN NOVA SCOTIA



A recovery plan adopted by the Nova Scotia Department of Lands and Forestry

2021 – 2026

Recommended citation:

Nova Scotia Department of Lands and Forestry. 2021. Recovery Plan for the Macropis Cuckoo Bee (*Epeoloides pilosulus*) in Nova Scotia [Final]. *Nova Scotia Endangered Species Act Recovery Plan Series*.

Cover illustration: Macropis Cuckoo Bee — Photo by Cory Bishop

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Adoption of a Recovery Plan per Section 15(9) of the Endangered Species Act

Species:

Macropis Cuckoo Bee (*Epeoloides pilosulus*)

Reference:

Environment and Climate Change Canada. 2021. Recovery Strategy for the Macropis Cuckoo Bee (*Epeoloides pilosulus*) in Canada [Proposed]. *Species at Risk Act Recovery Strategy Series*. Environment and Climate Change Canada, Ottawa. vii + 12 pp.

Whereas a Species at Risk Act Recovery Strategy has been prepared for this species by Environment and Climate Change Canada, and that plan has been reviewed by members of the applicable Nova Scotia Recovery Team and determined to fulfil the requirements of Section 15(4) of the Endangered Species Act as they pertain to Nova Scotia, the above-named recovery strategy shall be adopted in lieu of a Nova Scotia Recovery Plan subject to the following:

Expiry/renewal Date: 5 years

Conditions:

1. Adoption of this recovery plan will be reviewed 5 years from the Date of Adoption.
2. Only elements of this plan that are relevant to Nova Scotia and are in accordance with the Endangered Species Act (Nova Scotia) shall be used.

This includes the following sections of the report: Environment and Climate Change Canada (2021). Species Description (3.1), Species Population and Distribution (3.2), Needs of the Macropis Cuckoo Bee (3.3), Threat Assessment (4.1), Description of Threats (4.2), Identification of the Species' Critical Habitat (5.1), Conservation Approach (6), References (7), Appendix B: Documented records of Macropis Cuckoo Bee in Canada.

3. Core habitat is not identified in this recovery plan due to inadequate information about distribution and description of habitat or essential habitat. The last known individuals (n=2) were collected in 2002 and despite thorough searches of the original collection site and surrounding areas, the species has not been re-found in Nova Scotia. It is unknown whether the species persists in Nova Scotia.

4. Individuals and/or agencies using this adopted Recovery Plan should seek additional guidance from the Recovery Team and/or the Biodiversity Program, Department of Lands and Forestry as needed.

Approved:

Date:

D. Humbert

20 July 2021

Appendix A:

Environment and Climate Change Canada. 2021. Recovery Strategy for the Macropis Cuckoo Bee (*Epeoloides pilosulus*) in Canada [Proposed]. *Species at Risk Act* Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. vii + 12 pp.

Recovery Strategy for the Macropis Cuckoo Bee (*Epeoloides pilosulus*) in Canada

Macropis Cuckoo Bee



2021



1 **Recommended citation:**
2

3 Environment and Climate Change Canada. 2021. Recovery Strategy for the Macropis
4 Cuckoo Bee (*Epeoloides pilosulus*) in Canada [Proposed]. *Species at Risk Act*
5 Recovery Strategy Series. Environment and Climate Change Canada, Ottawa.
6 vii + 12 pp.

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9
10 **Official version**

11 The official version of the recovery documents is the one published in PDF. All
12 hyperlinks were valid as of date of publication.

13
14 **Non-official version**

15 The non-official version of the recovery documents is published in HTML format and all
16 hyperlinks were valid as of date of publication.

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18
19
20 For copies of the recovery strategy, or for additional information on species at risk,
21 including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC)
22 Status Reports, residence descriptions, action plans, and other related recovery
23 documents, please visit the [Species at Risk \(SAR\) Public Registry](#)¹.

24
25
26
27 **Cover illustration:**

28 Macropis Cuckoo Bee (male). Photo by Sam Droege
29

30
31
32 Également disponible en français sous le titre
33 « Programme de rétablissement de l'abeille-coucou de Macropis (*Epeoloides pilosulus*)
34 au Canada [Proposition] »
35

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41
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43 *credit to the source.*

¹ www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

44 Preface

45
46 The federal, provincial, and territorial government signatories under the [Accord for the](#)
47 [Protection of Species at Risk \(1996\)](#)² agreed to establish complementary legislation and
48 programs that provide for effective protection of species at risk throughout Canada.
49 Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent
50 ministers are responsible for the preparation of recovery strategies for listed Extirpated,
51 Endangered, and Threatened species and are required to report on progress within
52 five years after the publication of the final document on the SAR Public Registry
53

54 The Minister of Environment and Climate Change and Minister responsible for the Parks
55 Canada Agency is the competent minister under SARA for the Macropis Cuckoo Bee
56 and has prepared this recovery strategy, as per section 37 of SARA. To the extent
57 possible, it has been prepared in cooperation with the provinces of Ontario, Quebec,
58 and Nova Scotia, as per section 39(1) of SARA.
59

60 It was determined that the recovery of the Macropis Cuckoo Bee in Canada is not
61 technically or biologically feasible. The species still may benefit from general
62 conservation programs in the same geographic area and will receive protection through
63 SARA and other federal, and provincial or territorial, legislation, policies, and programs.
64

65 The feasibility determination will be re-evaluated as part of the report on implementation
66 of the recovery strategy, or as warranted in response to changing conditions and/or
67 knowledge.
68

69 The recovery strategy sets the strategic direction to arrest or reverse the decline of the
70 species, including identification of critical habitat to the extent possible. It provides all
71 Canadians with information to help take action on species conservation. When critical
72 habitat is identified, either in a recovery strategy or an action plan, SARA requires that
73 critical habitat then be protected.
74

75 In the case of critical habitat identified for terrestrial species including migratory birds
76 SARA requires that critical habitat identified in a federally protected area³ be described
77 in the *Canada Gazette* within 90 days after the recovery strategy or action plan that
78 identified the critical habitat is included in the public registry. A prohibition against
79 destruction of critical habitat under ss. 58(1) will apply 90 days after the description of
80 the critical habitat is published in the *Canada Gazette*.
81

² www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding.html#2

³ These federally protected areas are: a national park of Canada named and described in Schedule 1 to the *Canada National Parks Act*, The Rouge National Park established by the *Rouge National Urban Park Act*, a marine protected area under the *Oceans Act*, a migratory bird sanctuary under the *Migratory Birds Convention Act, 1994* or a national wildlife area under the *Canada Wildlife Act* see ss. 58(2) of SARA.

82 For critical habitat located on other federal lands, the competent minister must either
83 make a statement on existing legal protection or make an order so that the prohibition
84 against destruction of critical habitat applies.

85
86 If the critical habitat for a migratory bird is not within a federal protected area and is not
87 on federal land, within the exclusive economic zone or on the continental shelf of
88 Canada, the prohibition against destruction can only apply to those portions of the
89 critical habitat that are habitat to which the *Migratory Birds Convention Act, 1994* applies
90 as per SARA ss. 58(5.1) and ss. 58(5.2).

91
92 For any part of critical habitat located on non-federal lands, if the competent minister
93 forms the opinion that any portion of critical habitat is not protected by provisions in or
94 measures under SARA or other Acts of Parliament, or the laws of the province or
95 territory, SARA requires that the Minister recommend that the Governor in Council make
96 an order to prohibit destruction of critical habitat. The discretion to protect critical habitat
97 on non-federal lands that is not otherwise protected rests with the Governor in Council.

98
99

Acknowledgments

100

101

102 This document was drafted by Julie McKnight – Canadian Wildlife Service, Environment
103 and Climate Change Canada. John Klymko and Cory Sheffield provided valuable
104 comments on earlier drafts of the document. Kathy St-Laurent developed the species'
105 distribution map (Figure 1).

106

107

108 **Executive Summary**

109
110 The Macropis Cuckoo Bee is a distinctive nest parasite of *Macropis* (specifically of
111 highly specialized “oil bees”). A small number of occurrences are known historically
112 from much of eastern and central Canada but the 14 specimens collected between
113 1915 and 2010 were from southern Canada (Nova Scotia and from Quebec to Alberta).
114 The four individuals collected in Canada in the last fifty years were from Elk Island
115 National Park, Alberta (2010); near Middleton, Nova Scotia (two collections from one
116 site in 2002); and Milton, Ontario (1978). Macropis Cuckoo Bee was listed as
117 Endangered on Schedule 1 of the *Species at Risk Act* on May 30, 2018. In the
118 United States, three individuals were collected from Connecticut (2006), New York State
119 (2014), and Maine (2016).

120
121 Cuckoo bees exhibit one of the most specialized sets of ecological relationships known
122 for bees and as such, they are highly vulnerable to any changes in populations of
123 *Macropis* which exhibit a narrow, specialized preference for oil-producing loosestrifes
124 (*Lysimachia*). Loss of large stands of *Lysimachia* and resulting fragmentation are likely
125 affecting populations of *Macropis*, which in turn is probably the main factor contributing
126 to the rarity of Macropis Cuckoo Bee. It may be possible to mitigate the threats to
127 habitat but the population’s extremely small size reduces its potential for recovery.

128
129 The recovery of the Macropis Cuckoo Bee was deemed not feasible at this time but this
130 will be re-evaluated in response to changing conditions and/or knowledge.

131
132 Critical habitat cannot be identified at this time due to inadequate information. Although
133 *Lysimachia* and *Macropis* occur from Nova Scotia to British Columbia, the paucity of
134 recent Macropis Cuckoo Bee records and only a few historical records make it
135 impossible to reasonably identify those *Lysimachia* stands necessary for the survival or
136 recovery of the species. Should inventories document viable populations of Macropis
137 Cuckoo Bees, critical habitat identification may be re-considered in a revised recovery
138 strategy.

139
140
141
142

143 **Recovery Feasibility Summary**

144
145 Based on the following four criteria that Environment and Climate Change Canada uses
146 to establish recovery feasibility, recovery of the Macropis Cuckoo Bee has been
147 determined not to be biologically or technically feasible at this time. Recovery is
148 considered not feasible when the answer to any of the following questions is “no”.

149
150 **1. Individuals of the wildlife species that are capable of reproduction are available**
151 **now or in the foreseeable future to sustain the population or improve its**
152 **abundance.**

153
154 **Unknown.** The species was thought to be extirpated from Canada until two males were
155 collected in 2002 in Nova Scotia. Searches between 2004 and 2008 at the Nova Scotia
156 collection site and in nearby areas did not record additional Macropis Cuckoo Bees.
157 Two additional records have come to light since the COSEWIC status report (2011) was
158 published. An adult was collected in Elk Island National Park in Alberta in 2010 and a
159 female specimen was discovered in a collection from Milton, Ontario in 1978. Only three
160 individuals have been collected in the United States (Connecticut, New York, and
161 Maine) in the last sixty years; making the possibility of rescue from elsewhere unlikely.

162
163 The extreme rarity of the species and the widespread occurrence of historical records,
164 combined with a lack of detailed survey work in areas for the species other than in
165 Nova Scotia, makes it possible that the species occurs elsewhere (COSEWIC 2011).

166
167 **2. Sufficient suitable habitat is available to support the species or could be made**
168 **available through habitat management or restoration.**

169
170 **Unknown.** The Macropis Cuckoo Bee depends on highly specialized host “oil bees”
171 (*Macropis*) which in turn require stands of oil-producing loosestrifes (*Lysimachia*). The
172 Macropis Cuckoo Bee is a distinctive kleptoparasite⁴ of *Macropis*. Macropis Cuckoo
173 Bees deposit their eggs within the host bee’s nest, where the cuckoo larvae consume
174 the food provisions intended for the host bee’s offspring. Two species of *Macropis* are
175 known from Canada (*M. ciliata* and *M. nuda* (Michez and Patiny 2005)). *Macropis nuda*
176 is the main species known from much of the Macropis Cuckoo Bee’s Canadian range
177 (Michez and Patiny 2005) and is a likely host for Macropis Cuckoo Bee (not confirmed).
178 *Macropis ciliata*, recorded in Quebec (Michez and Patiny 2005), could be a possible
179 host for Macropis Cuckoo Bee.

180
181 Over 20 sites were searched for Macropis Cuckoo Bee between 2004 and 2008 in
182 Nova Scotia without success. The host bee, *Macropis nuda*, was collected at all sites
183 (COSEWIC 2011). The site in Alberta has not been revisited for inventories. The
184 distribution of *Lysimachia* is much more widespread than either *Macropis* or the
185 Macropis Cuckoo Bee. Despite the commonness of *Lysimachia*, records of Macropis
186 Cuckoo Bee are extremely rare and the reasons for this are not fully understood

⁴ Kleptoparasite bees lay their eggs inside nests constructed by other bee species (i.e., their host bees).

187 (COSEWIC 2011). Macropis Cuckoo Bee exhibits one of the most specialized sets of
188 ecological relationships known for bees and as such, they are highly vulnerable to any
189 changes in populations of *Macropis* which exhibit a narrow, specialized preference for
190 oil-producing loosestrifes (*Lysimachia*).

191
192 **3. The primary threats to the species or its habitat (including threats outside**
193 **Canada) can be avoided or mitigated.**

194
195 **Unknown.** Threats to habitat, namely habitat loss and encroachment of invasive weed
196 species, can be mitigated but the species' extreme rarity (and the rarity of its host bees)
197 vastly reduces its potential for recovery

198
199 **4. Recovery techniques exist to achieve the population and distribution**
200 **objectives or can be expected to be developed within a reasonable timeframe.**

201
202 **No.** While wetland conservation and management of invasive vegetation are reasonable
203 and relatively easy recovery techniques to implement at this time, the extreme rarity of
204 recent records for this species (COSEWIC 2011, Sheffield and Heron 2018) makes it
205 unlikely that recovery techniques could be used to achieve objectives.

206

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229
230

1. COSEWIC* Species Assessment Information⁵

Date of Assessment: May 2011

Common Name (population): Macropis Cuckoo Bee

Scientific Name: *Epeoloides pilosulus*

COSEWIC Status: Endangered

Reason for Designation: This species is a habitat specialist, requiring both a suitable host (*Macropis* bees) and their host's foodplant. The foodplant requires moist habitat and the host bee requires sunny, sandy slopes for its nest site. Historically in Canada, this species was known from six sites across five provinces. Despite recent increases in bee surveying activity nationwide, it has been found in Canada only once in the past fifty years and has not been seen again at this locality or nearby despite recent extensive searches. With only one location and a predicted continuing decline in habitat area and quality, this species is at imminent risk of extinction.

Canadian Occurrence: Nova Scotia

COSEWIC Status History: Designated Endangered in May 2011.

231
232

* COSEWIC (Committee on the Status of Endangered Wildlife in Canada)

2. Species Status Information

233

234
235 Macropis Cuckoo Bee was assessed by COSEWIC as Endangered in 2011 and listed in
236 Schedule 1 of the *Species at Risk Act* (SARA) in 2018. The species was assessed by
237 the Committee on the Status of Species at Risk in Ontario in 2010 as Data Deficient.
238 As such, it does not receive any special protection in Ontario under the Endangered
239 Species Act. Currently, this species is not designated in Quebec under the threatened
240 or vulnerable Species Act (LEMV;

241 <http://www3.mffp.gouv.qc.ca/faune/especes/menacees/liste.asp>). In addition, it is not on
242 the list of species likely to be designated as threatened or vulnerable, produced under
243 this Act. (<http://www3.mffp.gouv.qc.ca/faune/especes/menacees/liste.asp#insectes>).

244 The species is protected under the Nova Scotia Endangered Species Act.

245

246 Global, national, and sub-national ranks are in Table 1. The distribution data is known to
247 be incomplete or has not been reviewed for this taxon (NatureServe 2018).

248

249

⁵ An additional individual was collected in 2010 from Elk Island National Park, Alberta (described since the species' COSEWIC report).

250 **Table 1. List and description of various conservation status ranks for the Macropis**
 251 **Cuckoo Bee (MB, QC, NS, CT, ME, WI: NatureServe 2018, AB: G. Court pers. comm**
 252 **SK: Saskatchewan Conservation Data Centre 2018, ON: Natural Heritage Information**
 253 **Centre 2018; NY: E. White pers. comm. 2019)**

G-Rank ^a	N-Rank ^b	S-Rank ^c
GU	Canada: N1	AB (S1S2), SK (S1), MB (S1), ON (S1), QC (SNR), NS (S1)
	United States: NH	CT (S1S2), NY (S1), ME (SNR), WI (SH)

254 ^a G-Rank — Global Conservation Status Rank: GU = unrankable; G1 = species is critically imperiled; G2 = species is
 255 imperiled, G3 = species is vulnerable.

256 ^b N-Rank — National Conservation Status Rank: N1 = population within the nation is Critically Imperiled;
 257 N2 = population within the nation is Imperiled, N3 = population within the nation is Vulnerable, NH = Possibly
 258 Extirpated (Historical).

259 ^c S-Rank — sub-national (provincial/territorial/state) ranks: S1 = Critically Imperiled; S2 = Imperiled; SH = Possibly
 260 Extirpated (historical) - species occurred historically in the province, and there is some possibility that it may be
 261 rediscovered; S3 = Vulnerable, S4 = Apparently Secure; SNR = Unranked; SU = Unrankable due to a lack of
 262 information or conflicting information; SX = Presumed Extirpated.

264 3. Species Information

265
 266 The following sections summarize species information; additional information is
 267 available in the COSEWIC Assessment and Status Report on the Macropis Cuckoo Bee
 268 *Epeoloides pilosulus* in Canada (COSEWIC 2011).
 269

270 3.1 Species Description

271
 272 The Macropis Cuckoo Bee is generally accepted to be an obligate kleptoparasite⁶ of
 273 *Macropis* based on known European associations (Ascher 2005). Its hard exoskeleton
 274 (integument) is smooth and shiny black and completely lacks the red and/or yellow
 275 markings of other wasp-like kleptoparasites.
 276

277 3.2 Species Population and Distribution

278
 279 Macropis Cuckoo Bee distribution in North America is closely tied to that of its
 280 uncommon host bees (*Macropis*) which falls within the range of oil-producing species of
 281 native yellow loosestrife (*Lysimachia*). A small number of occurrences are known
 282 historically from much of eastern and central Canada (Sheffield and Heron 2018,
 283 COSEWIC 2011, Figure 1, see Appendix B).
 284

⁶ Kleptoparasite bees lay their eggs inside nests constructed by other bee species (i.e., their host bees),

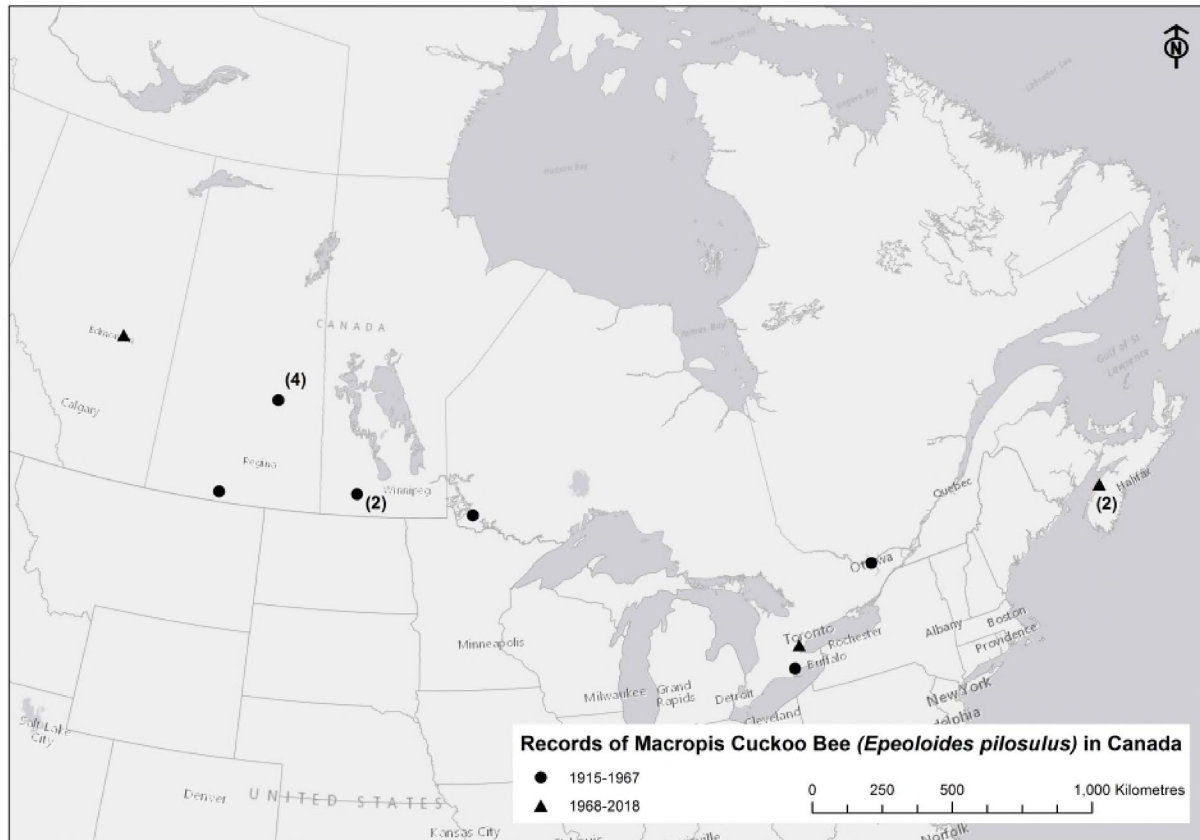


Figure 1. Recent (black triangles) and historical (circles) records of Macropis Cuckoo Bee in Canada (see Appendix B for more details).

Three individuals were collected in the United States in recent years: Connecticut in 2006 (Wagner and Ascher 2008), New York in 2014 (Gibbs et al. 2017), and Maine in 2016 (Dibble et al. 2017). Four individuals were collected in Canada in the past fifty years (see Appendix B for Canadian collections). One individual was collected in 2010 in Elk Island National Park, Alberta (described since the species' COSEWIC report) and this discovery extends the species known range westwards (Sheffield and Heron 2018). Two males were collected in 2002 from a site near Middleton, Nova Scotia (Sheffield and Heron 2018). Over 20 sites were searched for Macropis Cuckoo Bees between 2004 and 2008 in southern and northwestern Nova Scotia. The host bee, *Macropis nuda*, was collected at all sites (COSEWIC 2011) and the population of *Lysimachia terrestris* at the site near Middleton was still present (Sheffield, unpublished observation). Despite this, Macropis Cuckoo Bee has not been re-found at the original Nova Scotia collection site or nearby since the collection in 2002 (COSEWIC 2011). The fourth specimen (described since the species' COSEWIC report) was discovered in a collection from Milton, Ontario taken in 1978. It is unclear whether bee surveys in suitable habitat were completed in this location since 1978.

Macropis Cuckoo Bee is a conspicuous and readily identified bee. Many major North American bee collections have been checked for this species, so the paucity of

308 recent records is real. In contrast, numerous specimens were collected by
309 non-specialists in the late 19th and early 20th Century (Ascher 2005).

310

311 **3.3 Needs of the Macropis Cuckoo Bee**

312

313 Macropis Cuckoo Bees are obligate kleptoparasites of specialised “oil bees” (*Macropis*)
314 which are, in turn, entirely dependent on their floral host (oil-producing loosestrifes
315 (*Lysimachia*)). Refer to Sheffield and Heron (2018) for a list of *Lysimachia* in
316 North America). Macropis Cuckoo Bees deposit their eggs within the host bee’s nest,
317 where the cuckoo larvae consume the food provisions intended for the host bee’s
318 offspring. Two species of *Macropis* are known from Canada (*M. ciliata* and *M. nuda*)
319 (Michez and Patiny 2005, Sheffield and Perron 2014, Sheffield et al. 2017). *Macropis*
320 *nuda* is the main species known from much of the Macropis Cuckoo Bee’s Canadian
321 range (Michez and Patiny 2005). *Macropis ciliata* occurs in Quebec (Michez and Patiny
322 2005) and could be a possible host for Macropis Cuckoo Bees. The majority of native
323 Canadian *Lysimachia* grow in swampy or moist habitats. The distribution of *Lysimachia*
324 is much more widespread than either *Macropis* or Macropis Cuckoo Bee (COSEWIC
325 2011).

326

327 Female *Macropis* typically dig their nests in the ground of sloping banks in sunny areas
328 with sandy, well-drained soil, often in the midst of their floral host.

329

330 **4. Threats**

331

332 **4.1 Threat Assessment**

333

334 The Macropis Cuckoo Bee threat assessment is based on the IUCN-CMP (World
335 Conservation Union–Conservation Measures Partnership) unified threats classification
336 system. Threats are defined as the proximate activities or processes that have caused,
337 are causing, or may cause in the future the destruction, degradation, and/or impairment
338 of the entity being assessed (population, species, community, or ecosystem) in the area
339 of interest (global, national, or subnational). Limiting factors are not considered during
340 this assessment process. For purposes of threat assessment, only present and future
341 threats are considered. Historical threats, indirect or cumulative effects of the threats, or
342 any other relevant information that would help understand the nature of the threats are
343 presented in the Description of Threats section.

344

345 The scope (i.e. proportion of the species that can reasonably be expected to be affected
346 by the threat within 10 years) of this assessment was determined to be “unknown”
347 because the number of individuals persisting in Canada is unknown. Only four
348 specimens were collected in Canada in the past fifty years and the area where two of
349 these individuals were collected in Nova Scotia was thoroughly re-surveyed over
350 multiple years (2004-2008) without finding the species. Due to the extreme rarity of this
351 bee and only one known location in the past 10 years (Elk Island National Park,
352 Alberta), it is not possible to determine the population size of this species.

353 **Table 2.** Threat calculator assessment.
354

Threat #	Threat description	Impact ^a	Scope ^b	Severity ^c	Timing ^d	Detailed threats
7	Natural system modifications	Unknown	Unknown	Unknown	High (Continuing)	
7.2	Dams & water management/use	Unknown	Unknown	Unknown	High (Continuing)	wetland conversion: loss/ reduction/ fragmentation of stands of <i>Lysimachia</i> leading to the loss or reduction of <i>Macropis</i> and their nests
8	Invasive & other problematic species & genes	Unknown	Unknown	Unknown	High (Continuing)	
8.1	Invasive non-native/alien species	Unknown	Unknown	Unknown	High (Continuing)	e.g., Purple Loosestrife, Common Reed
9	Pollution	Unknown	Unknown	Unknown	High (Continuing)	
9.3	Agricultural & forestry effluents	Unknown	Unknown	Unknown	High (Continuing)	<i>Macropis</i> Cuckoo Bee and their hosts may be vulnerable to insecticides used for mosquito control
11	Climate change & severe weather	Unknown	Unknown	Unknown	High (Continuing)	
11.1	Habitat shifting & alteration	Unknown	Unknown	Unknown	High (Continuing)	Timing mismatch between emergence of floral host, host bees, and/or <i>Macropis</i> Cuckoo Bee (e.g., host bees emerge before floral resources are available or due to an earlier snow melt, floral hosts emerge earlier resulting in host bees having access to fewer floral resources)
11.2	Droughts	Unknown	Unknown	Unknown	High (Continuing)	Droughts affect floral resources of host bees

355 ^a **Impact** – The degree to which a species is observed, inferred, or suspected to be directly or indirectly threatened in the area of interest. The
356 impact of each threat is based on Severity and Scope rating and considers only present and future threats. Threat impact reflects a reduction of a
357 species population or decline/degradation of the area of an ecosystem. The median rate of population reduction or area decline for each
358 combination of scope and severity corresponds to the following classes of threat impact: Very High (75% declines), High (40%), Medium (15%),
359 and Low (3%). Unknown: used when impact cannot be determined (e.g., if values for either scope or severity are unknown); Not Calculated:
360 impact not calculated as threat is outside the assessment timeframe (e.g., timing is insignificant/negligible or low as threat is only considered to be
361 in the past); Negligible: when scope or severity is negligible; Not a Threat: when severity is scored as neutral or potential benefit.

362 ^b **Scope** – Proportion of the species that can reasonably be expected to be affected by the threat within 10 years. Usually measured as a
363 proportion of the species' population in the area of interest. (Pervasive = 71–100%; Large = 31–70%; Restricted = 11–30%; Small = 1–10%;
364 Negligible < 1%).

365 ^c **Severity** – Within the scope, the level of damage to the species from the threat that can reasonably be expected to be affected by the threat
366 within a 10-year or three-generation timeframe. Usually measured as the degree of reduction of the species' population. (Extreme = 71–100%;
367 Serious = 31–70%; Moderate = 11–30%; Slight = 1–10%; Negligible < 1%; Neutral or Potential Benefit ≥ 0%).

368 ^d **Timing** – High = continuing; Moderate = only in the future (could happen in the short term [< 10 years or 3 generations]) or now suspended
369 (could come back in the short term); Low = only in the future (could happen in the long term) or now suspended (could come back in the long
370 term); Insignificant/Negligible = only in the past and unlikely to return, or no direct effect but limiting.

371 4.2 Description of Threats

372 373 7.2 Dams & water management/use (wetland conversion: loss/ reduction/ 374 fragmentation of *Lysimachia* leading to the loss or reduction of *Macropis* and 375 their nests)

376 Due to the dependence of Macropis Cuckoo Bee's host bees on *Lysimachia*, the
377 survival of the Macropis Cuckoo Bee is also linked to the abundance and distribution of
378 these plant species. Most Canadian species of *Lysimachia* grow in swampy or moist
379 habitats and established populations may be vulnerable to loss and degradation of
380 suitable habitat (e.g. swamps, and stream, pond, and lake margins) (COSEWIC 2011).
381 Indeed, wetland habitat continues to decline over much of the Macropis Cuckoo Bee's
382 historical Canadian range (COSEWIC 2011).

383 384 8.1 Invasive non-native/alien species (usurpation of *Lysimachia* habitat)

385 Alien invasive weeds such as Purple Loosestrife (*Lythrum salicaria*) and Common Reed
386 (*Phragmites australis*) are known to usurp the habitat of *Lysimachia* and can effectively
387 choke wetlands. Four species of *Lysimachia* are introduced to North America and it is
388 not known whether these species are suitable food plants for *Macropis*. If they are not
389 suitable floral hosts and they are able to outcompete native *Lysimachia* in appropriate
390 habitat, they would be a threat to the Macropis Cuckoo Bee.

391 392 9.3 Agricultural & Forestry Effluents

393 In the European Food Safety Authority's risk assessment (2013), worker bees, queens,
394 and larvae of bumble bees and adult females and larvae of solitary bees were
395 considered to be categories of bees that are most exposed to pesticides via ingestion.
396 Specifically, larvae of solitary bees (i.e., *Macropis* and Macropis Cuckoo Bees) are
397 provisioned with large amounts of unprocessed pollen and are more exposed to
398 residues in pollen and oil. Additionally, solitary bees may be further exposed by contact
399 with nesting material (soil or floral resources).

400
401 Because they occur in wetland margins, *Macropis* and Macropis Cuckoo Bee may be
402 especially vulnerable to insecticides used for mosquito control (Asher 2005).

403 404 11 Climate Change & Severe Weather

405 Climate Change may disrupt the relationships between *Lysimachia*, *Macropis*, and
406 Macropis Cuckoo Bee as it is likely their individual responses to Climate Change will be
407 different. As temperatures rise, flowers may bloom earlier in the spring or bees may
408 emerge earlier in response to warm daytime temperatures; either situation potentially
409 creates a mismatch in timing between when flowers produce oil and pollen and when
410 host bees are able to exploit such floral resources.

411
412 Hotter, drier summers (drought) may lead to increased stress on flowering plants and
413 may affect the quantity and/or quality of floral resources for *Macropis* (Phillips et al.
414 2018).

415 **5. Critical Habitat**

416

417 **5.1 Identification of the Species' Critical Habitat**

418

419 Critical habitat cannot be identified at this time due to inadequate information. The last
420 known individuals of this species from Nova Scotia were collected in 2002 and despite
421 thorough searches of the original collection site and nearby from 2004-2008, the
422 species has not been re-found in Nova Scotia (COSEWIC 2011). At this time, it is
423 unknown whether the species persists in Nova Scotia. Although *Lysimachia* and
424 *Macropis* occur in Nova Scotia, the absence of individual Macropis Cuckoo Bees and
425 the paucity of historical records make it impossible to reasonably identify *Lysimachia*
426 stands necessary for the survival or recovery of the species. The site of the Alberta
427 collection has not been resurveyed for bees but presumably the habitat remains intact.
428 Should inventories document viable populations of Macropis Cuckoo Bees in Canada,
429 critical habitat identification may be re-considered in a revised recovery strategy.

430

431

432 **6. Conservation Approach**

433

434 A priority for research is to locate viable population of Macropis Cuckoo Bee in
435 association with *Macropis* nest sites. Surveys for *Lysimachia* and *Macropis* in
436 suitable habitat in Nova Scotia, and the northern Great Plains and adjacent areas
437 (e.g., southcentral Canada from western Ontario to Alberta) would be particularly
438 worthwhile.

439

440 The Alberta specimen was collected in Elk Island National Park. Elk Island National
441 Park protects a representative portion of the Southern Boreal Plains and Plateaux
442 Natural Region. If Macropis Cuckoo Bee (with associated *Macropis*) is confirmed in
443 Elk Island National Park, the *National Parks Act* will benefit the Macropis Cuckoo Bee,
444 its host bees (*Macropis*), and its *Lysimachia* habitat.

445

446 The Nova Scotia Wetland Conservation Policy may provide for the conservation and
447 management of wetlands in Nova Scotia. If Macropis Cuckoo Bees are present in
448 Nova Scotia, the Nova Scotia Wetland Conservation Policy and the promotion of
449 wetland stewardship may benefit the Macropis Cuckoo Bee, its *Macropis* hosts, and its
450 *Lysimachia* habitat.

451

452 The determination of recovery feasibility will be re-evaluated in response to changing
453 conditions and/or knowledge (i.e., if viable populations of Macropis Cuckoo Bees are
454 observed during inventories).

455

456

457

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521 **Appendix A: Effects on the Environment and Other Species**

522

523 A strategic environmental assessment (SEA) is conducted on all SARA recovery
524 planning documents, in accordance with the [Cabinet Directive on the Environmental](#)
525 [Assessment of Policy, Plan and Program Proposals](#)⁷. The purpose of a SEA is to
526 incorporate environmental considerations into the development of public policies, plans,
527 and program proposals to support environmentally sound decision-making and to
528 evaluate whether the outcomes of a recovery planning document could affect any
529 component of the environment or any of the [Federal Sustainable Development](#)
530 [Strategy](#)'s⁸ (FSDS) goals and targets.

531

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

539

540 This recovery strategy concludes that recovery for the Macropis Cuckoo Bee is not
541 feasible at this time. The recovery strategy does not include population and distribution
542 objectives or a recovery planning table and critical habitat cannot be identified at this
543 time. As such, there is no risk for the implementation of this strategy to inadvertently
544 lead to adverse effects on other species.

545

546

547

⁷ www.canada.ca/en/environmental-assessment-agency/programs/strategic-environmental-assessment/cabinet-directive-environmental-assessment-policy-plan-program-proposals.html

⁸ www.fsds-sfdd.ca/index.html#/en/goals/

548 **Appendix B: Documented records of Macropis Cuckoo Bee in Canada**549 (accessed 06-Jun-2018: doi: <https://doi.org/10.5886/vfi8nn>)

550

Recorded By	Individuals	Collection date	Year	Country	Province	Locality	Identified by
Collector(s): L. Provancher	1	unknown	unknown; pre 1900	Canada	Québec	Cap Rouge	L. Provancher
Collector(s): L. Provancher	1	unknown	unknown; pre 1900	Canada	Québec	Cap Rouge	L. Provancher
Collector(s): F.W.L. Sladen	1	21/06/1915	1915	Canada	Québec	Aylmer	H.L. Viereck
Collector(s): G.J. Spencer	1	02/07/1915	1915	Canada	Ontario	Simcoe	R. Lambert
Collector(s): F.W.L. Sladen	1	13/07/1919	1919	Canada	Manitoba	Aweme	T. Romankova
Collector(s): R.D. Bird	1	06/07/1924	1924	Canada	Manitoba	Aweme	H.L. Viereck
Collector(s): J.D. Ritchie	1	16/07/1942	1942	Canada	Saskatchewan	Wallwort	C.D. Michener
Collector(s): J.D. Ritchie	1	17/07/1942	1942	Canada	Saskatchewan	Wallwort	C.D. Michener
Collector(s): J.D. Ritchie	1	20/07/1942	1942	Canada	Saskatchewan	Wallwort	C.D. Michener
Collector(s): J.D. Ritchie	1	10/07/1942	1942	Canada	Saskatchewan	Wallwort	C.S. Sheffield
Collector(s): A.R. Brooks	1	05/08/1955	1955	Canada	Saskatchewan	Wood Mountain	T. Romankova
Collector(s): S.M. Clark	1	24/07/1960	1960	Canada	Ontario	One Sided Lake	T. Griswold
Collector(s): D. Morris	1	06/07/1978	1978	Canada	Ontario	Milton	T. Romankova
Collector(s): C.S. Sheffield	1	17/07/2002	2002	Canada	Nova Scotia	near Middleton	C.S. Sheffield
Collector(s): C.S. Sheffield	1	11/07/2002	2002	Canada	Nova Scotia	near Middleton	C.S. Sheffield
Collector(s): BIObus 2010	1	11/08/2010	2010	Canada	Alberta	Elk Island National Park	J.K. Stahlhut

551