

**Ontario Species at Risk Evaluation Report for
Davis's Shieldback
Sauterelle de Davis
(*Atlanticus davisii*)**

Committee on the Status of Species at Risk in Ontario
(COSSARO)

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Assessed by COSSARO as Threatened

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Final

Sauterelle de Davis (*Atlanticus davisii*)

La sauterelle de Davis (*Atlanticus davisii*) est classée dans la catégorie des espèces menacées en Ontario par le CDSEPO.

La sauterelle de Davis est relativement grande (2 à 3 cm de longueur), incapable de voler, de couleur gris-marron, avec quelques taches sombres et pâles, de courtes ailes de dimension réduite et partiellement recouvertes par le prolongement du pronotum. On les croit omnivores, s'alimentant principalement d'autres insectes, mais aussi peut-être de certaines plantes ou de carcasses d'insectes morts.

On ne connaît actuellement la présence de la sauterelle de Davis que dans le comté de Norfolk en Ontario, où elle est associée à des habitats de chênaies, de savanes à chênes aux sols sableux bien drainés. On la trouve également dans la majeure partie du nord-est des États-Unis.

La sauterelle de Davis est considérée comme une espèce menacée, en raison de son aire de répartition réduite et du déclin des occurrences d'élément, de sa zone d'occurrence, de son nombre de localités et de la qualité de son habitat.

Cette publication hautement spécialisée n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la Loi sur les services en français. Pour obtenir des renseignements en français, veuillez communiquer avec le ministère l'Environnement, de la Protection de la nature et des Parcs au cossarosecretariat@ontario.ca

Executive summary

Davis's Shieldback is a relatively large (2–3 cm in length) flightless katydid that is grey-brown with some dark and pale mottling. The wings are reduced and are partially hidden beneath a pronotal extension. They are thought to be omnivorous, feeding largely on other insects but may also feed on some plants or scavenge.

Currently, Davis's Shieldback is known in Ontario only from Norfolk County, where it is associated with oak woodland and savannah sites with well-drained sandy soils. It is also found throughout much of the northeastern USA.

Davis's Shieldback is considered Threatened based on having a small geographic range and having a decline in elements of occurrence, area of occupancy, number of locations and quality of habitat.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Davis's Shieldback is recognized as a unique and distinct species, and can be separated from all other species of *Atlantiscus* by morphological characters, with the exception of *A. monticola*. It is similar to *Atlantiscus monticola*, with which it had previously been considered a subspecies or synonym, but has since been recognized as a unique species, although there remains an inconsistent treatment in the literature; *A. monticola* is thought to be restricted to the Appalachians while Davis's Shieldback has a more extensive range (Rentz and Birchim 1968; COSEWIC 2020). In Ontario, the only other species of *Atlantiscus*, *Atlantiscus testaceus*, occurs in extreme southwestern Ontario and is easily separated based on adult morphological characters.

1.1.2. Designatable units

There is only one designatable unit, which includes the entire provincial population, in Ontario.

1.1.3. Native status

Davis's Shieldback has been recorded in Ontario from Norfolk County from as early as 1939 (COSEWIC 2020).

1.1.4. Occurrence

Davis's Shieldback is recorded from Michigan to Vermont, south to North Carolina and Arkansas, although the historical treatment of Davis's Shieldback as a synonym or subspecies of *Atlantiscus monticola* makes some records in parts of its range somewhat difficult to determine which species was reported, but this does not impact records in Ontario. All historical reports of *Atlantiscus monticola* in Ontario are treated here as *Atlantiscus davisii*.

1.2. Eligibility results

Davis's Shieldback (*Atlantiscus davisii*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: GNR (NatureServe 2021)

- IUCN: NR
- NRANK Canada: N1
- COSEWIC: Threatened (November 2020)
- SARA: Not on Schedule 1
- ESA 2007: No Status
- SRANK: S1 (ranked in 2015)

2.2. Distribution in Ontario

In Ontario, Davis’s Shieldback is currently known from a few sites in Norfolk County. These sites are oak woodlands or savannahs and are found on sandy soils in the Norfolk Sand Plain, a region where large amounts of sand were deposited from glacial activity (Chapman and Putnam 1984). This restricted distribution is similar with a number of other oak savannah associated. Directed search efforts by Heagy and Gartshore (COSEWIC 2020) expanded the number of known sites in Ontario but were focused within the county; additional sampling is needed to determine if this species occurs in other sites in the Niagara Region and, possibly, east of Lake Ontario.

2.3. Distribution, status and the broader biologically relevant geographic range outside Ontario

Davis’s Shieldback is found from Vermont to Michigan, and south to North Carolina and Arkansas, where it usually occurs in sites with sandy soils, such as pine barrens, inland dunes, and oak savannahs. There has been little done in the assessment of this species throughout its range, with only two states noting a conservation status (Table 1), and there is no data on general trends of this species. Occurrences in southern Ontario are not at the northern extent of its range, with more northern occurrences in Michigan. There are no known populations in the USA that are immediately adjacent to Ontario which are not separated by Lake Huron or Lake Erie.

Table 1. Condition of the Species in Adjacent Jurisdictions and Broader Biologically Relevant Geographic Range

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Condition	Notes & Sources
Quebec	n/a		
Manitoba	n/a		
Michigan	S2S3	Unknown	NatureServe 2021
Minnesota	n/a		
Nunavut	n/a		
New York	SNR	Unknown	
Ohio	SNR	Unknown	
Pennsylvania	SNR	Unknown	
Wisconsin	SNR	Unknown	

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Condition	Notes & Sources
<i>Other Relevant Jurisdiction</i>			

2.4. Ontario conservation responsibility

Ontario’s conservation responsibility is relatively low, with less than 2% of the EOO, based on a current value of 172 km² and global projections from data points in COSEWIC (2020).

2.5. Direct threats

COSEWIC (2020) found various Low level threats, along with several threats of Negligible and Unknown impact, and considered the overall threat impact as Medium-Low. In general, the largest threats to Davis’s Shieldback are habitat degradation and fragmentation of the oak savannah and woodland habitat caused by changes in management practice, land use (such as damage from off-road vehicle traffic on a site), or through other modification caused by both plant and insect species that may degrade the habitat quality.

2.6. Specialized life history or habitat use characteristics

As a flightless species, Davis’s Shieldback is incapable of travelling long distances or cross major bodies of water. As their oak savannah habitat is continuing to be fragmented and degraded from a variety of different causes, the limited vagility of this species makes it difficult to migrate between sites with suitable habitats.

Davis’s Shieldback is closely associated with sandy soils and is generally associated with oak savannahs and woodlands, or pine barrens. In Ontario, it is known only from the Norfolk Sand Plains, in Norfolk County.

3. Ontario status assessment

3.1. Application of endangered/threatened status in Ontario

3.1.1. Criterion A – Decline in total number of mature individuals

Not applicable. Although there is a projected decline in one of the sites, the loss does not approach the thresholds for Threatened.

3.1.2. Criterion B – Small distribution range and decline or fluctuation

Meets Criteria B1ab(i,ii,iii,iv)+B2ab(i,ii,iii,iv) for Threatened. The EOO is 172 km² and

the IAO is 48 km², satisfying both the thresholds for Endangered of B1 and B2, respectively, but only satisfies the threshold for Threatened in subcriteria B1a and B2a, having eight to eleven locations. For subcriterion B1b and B2b, there is a projected decline in extent of occurrence, area of occupancy, quality of habitat, and number of locations.

3.1.3. Criterion C – Small and declining number of mature individuals

Not applicable. While the number of mature individuals reaches the threshold for Endangered, there is no population data that suggests any substantial decline or fluctuation in the population.

3.1.4. Criterion D – Very small or restricted total population

Not applicable. The population estimate, IAO and number of locations are too large and do not satisfy the criteria.

3.1.5. Criterion E – Quantitative analysis

Not applicable. No Population Viability Analysis has been conducted.

3.2. Application of Special Concern in Ontario

Does not apply as it meets criteria above.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Not applicable.

3.3.2. Status modification based on rescue effect or level of risk in broader biologically relevant geographic range

There is no modification from rescue effect or broader biologically relevant geographic range. There is suitable habitat in other parts of the province, but these areas are disjunct from the current population and extra-limital populations and do not have substantial habitat corridors. States considered within the Great Lakes – St. Lawrence Basin region have not ranked the status of Davis's Shieldback

3.4. Other status categories

3.4.1. Data deficient

Not applicable. There is sufficient data to provide evaluation under other criteria.

3.4.2. Extinct or extirpated

Not applicable. Davis's Shieldback has extant populations in Ontario.

3.4.3. Not at risk

Not applicable. Davis's Shieldback has a sufficiently low enough population number, and IAO and EOO values to be considered under other criteria.

4. Summary of Ontario status

Davis's Shieldback (*Atlantiscus davisii*) is classified as Threatened in Ontario based on meeting criterion B1ab(i,ii,iii,iv)+B2ab(i,ii,iii,iv).

This status of this species is consistent with the definition of Threatened under the Endangered Species Act, 2007.

5. Information sources

Chapman, L.J. and D.F. Putnam. 1984. *Physiography of southern Ontario*. Published for the Ontario Research Foundation by University of Toronto Press. 270 pp.

COSEWIC. 2020. IN PRESS. COSEWIC assessment and status report on Davis's Shieldback *Atlantiscus davisii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Xi + 46 pp. (<https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>).

NatureServe. 2021. NatureServe Explorer: An online encyclopedia of life. Version 7.1. NatureServe, Arlington, VA. Website: <http://explorer.natureserve.org> [Accessed 31 March 2021].

Rentz, D.C. and J.D. Birchim. 1968. Revisionary studies in the Nearctic Decticinae. *Memoirs of the Pacific Coast Entomological Society Vol 3*. California Academy of Sciences, San Francisco. 173 pp.

Appendix 1: Technical summary for Ontario

Species: Davis's Shieldback (*Atlanticus davisii*)

Demographic information

Demographic attribute	Value
Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.	1 year
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Unknown
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	Unknown
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over any 10 years, or 3 generations, over a time period including both the past and the future.	Unknown
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a. Unknown, but probably not b. Unknown, but probably not c. Unknown, but probably not
Are there extreme fluctuations in number of mature individuals?	No

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence (EOO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	< 250 km ²
Index of area of occupancy (IAO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	60–80 km ²
Is the total population severely fragmented? i.e., is >50% of its total area of occupancy in habitat patches that are:	a. No b. No

Extent and occupancy attributes	Value
(a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	
Number of locations. <i>See Definitions and Abbreviations on COSEWIC and IUCN websites for more information on the term "location". Use plausible range to reflect uncertainty if appropriate.</i>	8–11, with occurrence at 3 locations not reconfirmed.
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	n/a
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Yes, due to projected loss of a known site
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Yes, due to projected loss of a known site
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes, due to projected loss of a known site
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes, due to projected loss of a known site
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes, due to observed loss of habitat at one site and general decline in habitat quality in the region due to human development
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of mature individuals in each sub-population or total population (if known)

Sub-population (or total population)	Number of mature individuals
1. <i>Simcoe West (1 adult in 2019; habitat loss in 2020)</i>	<i>~0-10 adults</i>
2. <i>Turkey Point (22 adults in 2019, 5 adults at additional site in 2020)</i>	<i>~100-500 adults</i>
3. <i>St. Williams Forest (69 adults in 2019)</i>	<i>~100-500 adults</i>
4. <i>Nixon East (4 adults in 2019)</i>	<i>~20-100 adults</i>
5. <i>Bill's Corners West (~53 adults in 2020)</i>	<i>~80-200 adults</i>
6. <i>Pinegrove (1 adult in malaise)</i>	<i>Unknown</i>

<i>trap in 2019; unknown)</i>	
Total	Estimated 300-1310 adults (COSEWIC 2020)

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown. No population viability analysis has been conducted..

Threats

A threats calculator for Davis's Shieldback was done by in 2019 by members of COSEWIC and external experts (COSEWIC 2020). Although no one threat was deemed to be above a Low level, the combination of Low level threats and threats whose impacts were unknown found the level adjusted to Medium-Low. Low threats included impact from commercial and industrial areas, recreational activities and natural system modifications (fire suppression, natural forest succession, inappropriate afforestation and invasive non-native plant and insect species). There were also several threats whose impact is unknown, which were impact of roadways, invasive and problematic species (native and non-native), agricultural and forestry effluents, and climate change/severe weather impacts. Several other negligible threats were also listed.

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Yes/Probably
Status of outside population(s) most likely to provide immigrants to Ontario	Unknown
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Unlikely as Davis's Shieldback is unable to swim or fly, making waterways and fragmentation of suitable habitat a major obstacle. Rafting could theoretically occur, but very unlikely due to access of viable habitat upon arrival.
Would immigrants be adapted to survive in Ontario?	Probably
Is there sufficient suitable habitat for immigrants in Ontario?	Possibly
Are conditions deteriorating in Ontario?	Yes
Is the species of conservation concern in bordering jurisdictions?	Yes, in Michigan it is listed as S2S3
Is the Ontario population considered to be a sink?	No
Is rescue from outside populations likely?	No

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Yes/Probably

Sensitive species

This is not a data sensitive species.

Acronyms

COSEWIC: Committee on the Status of Endangered Wildlife in Canada
COSSARO: Committee on the Status of Species at Risk in Ontario
ESA: Endangered Species Act
EO: Element occurrence (as defined by NHIC)
EOO: extent of occurrence
GRANK: global conservation status assessments
IAO: index of area of occupancy
IUCN: International Union for Conservation of Nature and Natural Resources
MNRF: Ministry of Natural Resources and Forestry
NHIC: Natural Heritage Information Centre
NNR: Unranked
NRANK: National conservation status assessment
SARA: Species at Risk Act
SNR: unranked
SRANK: subnational conservation status assessment
S1: Critically Imperiled
S2: Imperiled
S3: Vulnerable
S4: Apparently Secure
S5: Secure
IUCN: International Union for Conservation of Nature and Natural Resources
CDSEPO: Le Comité de détermination du statut des espèces en péril en Ontario