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July 23, 2024

Request for Clarification Respecting the Assessment of Red-sided Garter Snake

Dear Ms. Sayine-Crawford,

Thank you for your letter received on July 2, 2024, requesting clarification on the assessment of red-sided garter snake in the Northwest Territories (NWT). The Species at Risk Committee (SARC) reviewed your request and provides further clarification below.

Request:

“The Government of the Northwest Territories (GNWT) would like clarification on two topics and how they were considered in the assessment:

- 1) Uncertainty about the number of snake hibernacula
- 2) Wildfire as a natural process and the context of 2023 wildfires”

REQUEST FOR CLARIFICATION #1

How uncertainty in the number of snake hibernacula affected the status assessment. We request that clarification include (but need not be limited to) responses to the following questions:

- a) In determining the IAO, how did SARC consider the suspected hibernacula near Hay River and Fort Resolution?**

The Index of area of occupancy (IAO) for red-sided garter snake was calculated based on known hibernacula in the NWT (12 km²) – this did not include the suspected hibernacula near Hay River and Fort Resolution.

b) In determining the number of locations and the IAO, how did SARC consider other hibernacula that it is reasonable to assume may exist in the NWT (near Fort Smith, Hay River, Fort Resolution, and perhaps along the southern shores of Great Slave Lake)?

SARC defines location as “a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the species present”. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a species is affected by more than one threatening event, location should be defined by considering the most serious plausible threat (SARC 2015). Wildfires were identified as the most serious plausible threat to red-sided garter snakes in the NWT. As described in the status report, the availability of suitable overwintering sites is considered a limiting factor for red-sided garter snakes. In this context, each hibernaculum was considered a separate location and a range of locations (4-6 locations) was identified to account for known hibernacula and suspected hibernacula in the NWT. This includes the four known hibernacula in the NWT as well as two suspected hibernacula near Hay River and Fort Resolution (along Little Buffalo River). These two additional suspected locations were included based on threats and how threats (fire and drought) could impact suspected hibernacula for which there was information (e.g., possible distance to other locations, occupancy).

The IAO for red-sided garter snake was calculated based on known hibernacula in the NWT (12 km²) – this did not include the suspected hibernacula near Fort Smith, Hay River, Fort Resolution, or along the southern shores of Great Slave Lake.

Were these (number of locations and the IAO) considered “inferred” sites of present occurrences (as per guidance in IUCN 2024), and why or why not?

For red-sided garter snake, each hibernaculum was considered a separate location and a range of locations (4-6 locations) was identified to account for known hibernacula and suspected hibernacula in the NWT. This includes the four known hibernacula in the NWT as well as two suspected hibernacula near Hay River and Fort Resolution (along Little Buffalo River). These two additional suspected locations were included based on threats and how threats (fire and drought) could impact suspected hibernacula for which there was information (e.g., possible distance to other locations, occupancy).

The extent of occurrence (EO) of red-sided garter snake in the NWT is approximately 8,900 km². SARC did consider all confirmed snake observations in the calculation of EO, including those near Hay River and Fort Resolution.

The IAO for red-sided garter snake was calculated based on known hibernacula in the NWT (12 km²) – this did not include the suspected hibernacula near Fort Smith, Hay River, Fort Resolution, or along the southern shores of Great Slave Lake.

SARC determined that only confirmed hibernaculum should be considered as an occurrence site for the calculation of IAO. If during an observation, no sign of hibernaculum was noted, SARC did not assume that observation to be inferred as a hibernaculum site for the calculation of IAO. SARC followed the IUCN Guidance (note that IAO and AOO are the same in this context¹)

"...AOO (IAO in SARC's guidelines) calculations that include 'inferred sites of occurrence', i.e., sites that are inferred from presence of known appropriate habitat, information about habitat requirements and dispersal capability of the taxon, rates and the effects of habitat destruction and other relevant factors

....

However, inferred sites of occurrence should only be used to calculate the upper bound of the size of area, such that incorporating inferred sites results in a range of

¹ <https://cosewic.ca/index.php/en/reports/preparing-status-reports/guidelines-index-area-occupancy.html>

plausible values ...of AOO, which may lead to a range of plausible Red List Categories (status in SARC's guidelines)." ² Underline added by SARC.

Specifically, SARC did not attempt to include any additional sites (1-2 sites) as "inferred to be a hibernaculum" as these additional sites would not be leading "to a range of plausible status". (see next question).

c) If additional hibernacula that are suspected to exist in the NWT were in fact confirmed, how might this change the status of the species? Could the discovery of additional hibernacula lead to a determination of Not at Risk?

During SARC's 2024 assessment, red-sided garter snake qualified for Threatened under criterion SK(D2) because the index area of occupancy is less than 20 km² (the known hibernacula cover 12 km² in the NWT) and the number of locations is low (4-6 locations in the NWT) such that it is prone to stochastic events (e.g., drought and wildfires) within a short period of time. However, because there is a clear indication of rescue effect from extra-limital subpopulations it was assessed as Special Concern under criterion SK(d).

IUCN provides additional guidance when applying D criterion. SARC has inserted terms in parentheses as used in its process to increase clarity of the text. The original text can be consulted here³). Taxon may be read as "species, subspecies, or distinct population".

"This criterion identifies very small or restricted populations (...). Under the (Threatened) category there are two options, D1 and D2. (Text about D1 omitted as it does apply to the question at hand).

A taxon qualifies for (Threatened) D2 if the (IAO) area of occupancy is very restricted (typically less than 20 km²) or exists at typically five or fewer locations, and if there is a plausible natural or anthropogenic threat. Criterion D2 is provided for taxa that may not be declining but are characterized by an acute restriction in their

² <https://www.iucnredlist.org/resources/redlistguidelines>

³ *Ibid.*

area of occupancy or in their number of locations thereby rendering them particularly susceptible to a plausible threat. The subcriterion D2 under (Threatened) was intended to be used for taxa with very small distributions. However, the thresholds for area of occupancy and the number of locations, although given as indicators (i.e., typically less than 20 km² or typically five or fewer locations), are frequently interpreted literally, which is not appropriate. Some people have argued that the subcriterion is too inclusive and results in massive over-listing, while others argue that it is too exclusive (e.g., many marine species) and so leads to under-listing. It must be emphasized that the restricted area of occupancy under criterion D2 is defined such that the population is prone to the effects of human activities or stochastic events in an uncertain future, and is thus capable of becoming (Endangered) or even (Extirpated) in a very short time period (e.g., within one or two generations—or within three to five years, if this is longer—after the threatening event occurs). The numerical thresholds are given more by way of example and are not intended to be interpreted as strict thresholds. The focus of subcriterion D2 is not the area or the location count (for which many taxa could qualify), but the risk that the taxon could suddenly become (Endangered) or Extinct (i.e., if the plausible threat is realized, then the species will within a very short time qualify for listing in one of these categories under, for example, criterion A or B). So, simply meeting the suggested (or any other) threshold for (IAO) AOO or number of locations is not sufficient. It is necessary that this restriction makes the species capable of becoming (Endangered) or (Extirpated) within a very short time, because of the effects of human activities or stochastic events.”...⁴

SARC applied D2 (Threatened) correctly by considering all available information related to current threats and the species susceptibility to threatening events in an uncertain climate future. Based on this information, adding two more hibernacula, thus increasing

⁴ <https://www.iucnredlist.org/resources/redlistguidelines>

the IAO up to 20 km², would not lead to a different determination that D2 (Threatened) applies to the red-sided garter snake in the NWT.

For addressing any number of additional hibernacula, in or near the NWT, SARC would require information to determine the number of locations (e.g., about threatening events) and recalculate the IAO (e.g., distance to previously known hibernacula). As the information about these additional hibernacula would be new to SARC, we would require a formal re-assessment to determine status.

d) Given that the area of occupancy does not need to occur within the NWT (as per the definition in SARC 2022, page 30), what is the rationale for excluding nearby hibernacula on the Alberta side of the border from the calculation of IAO and the number of locations? Would garter snakes overwintering in northern Wood Buffalo National Park (Alberta) be considered part of the same population as those that overwinter on the NWT side of the border?

The IAO for red-sided garter snake was calculated as 12 km². The IAO is measured as the surface area of 2 x 2 km grid cells that intersect the actual area occupied by the species (i.e., the biological area of occupancy). The biological area of occupancy for red-sided garter snake was based on known hibernacula in the NWT.

SARC used the principle of parsimony where we based our decisions on the best available information and inserted the least number of assumptions to determine status. The available information confirms that (a) red-sided garter snakes are present (there are occurrences) in the NWT and (b) habitat is present for their survival (hibernacula and summer ranges) in the NWT. The information also confirmed that (c) outside the NWT, six snake hibernacula occurs within 25 km of the NWT border (two are about 3-6 km, and four are about 19-21 km from the NWT border), (d) other hibernacula exist further south but more than 25 km away. There is also evidence that red-sided garter snakes do travel a few kilometers, up to 20 km, and that northern snakes may be capable of travelling longer distances.

SARC assumed (in fact we strongly suspected) that snakes do move back and forth across the border between the NWT and northern Alberta. However, SARC did not have, nor assumed to have, information to recognize a distinct population that would meet SARC criteria⁵.

SARC would require evidence that this distinct population is genetically different from others of its kind or that this population lives in an environment that is unusual and unique, leading to local adaptation, or that the population is naturally disjunct, or that the population live in different ecological regions than others.

Biological and geographical distinctions may be informed, for example, by ecological studies, genetic sampling and movement tagging and this information may be available in the future. With little information available to recognize a distinct population that only would occur across NWT-Alberta's borders, SARC assessed the entire (sub)species of red-sided garter snake in the NWT.

The concept of rescue effect is essential for assessments at any sub-global levels, that is the so-called "national and sub-national" assessments. The concept allows for non-biological population delineations when assessing species with ranges crossing jurisdictional boundaries.

SARC considered that rescue effect was valid as a modifier of the status of red-sided grater snakes in the NWT during the assessment process, based on SARC guidelines⁶. SARC did use the rescue effect concept to account for snakes regularly crossing the NWT border and for the possibility that NWT's snakes may be part of a larger meta-population of snakes in northern Alberta and beyond. Although there is enough information to assume this large meta-population is present, there is not enough information to recognize a distinct population in NWT-northern Alberta and to make a biological or

⁵ https://www.nwtspeciesatrisk.ca/sites/species/files/sarc_assessment_process_and_obc_january2022.pdf

⁶ *Ibid.*, See also <https://www.cosewic.ca/index.php/en/assessment-process/cosewic-assessment-process-categories-and-guidelines/modifications-rescue-effect>

geographical delineation of this population. The rescue effect concept does not require the additional information that would be necessary to recognize a distinct population. Rescue effects allow for uncertainties in biological distinctness (variability in meta-population structures, variability in genetic exchanges) and in geographical distinctness (variability in distance travelled, variability in the permeability of barriers, variability in ecology).

SARC will always strive to use all the best available information and to make as few assumptions as possible. When SARC did have the information necessary to recognize a distinct population, SARC conducted its status assessment on the entire distinct population. In cases when a distinct population occurred across jurisdictional boundaries, the assessment was conducted irrespective of these jurisdictional boundaries, and the rescue effect no longer applied as the population was deemed distinct.

REQUEST FOR CLARIFICATION #2

How wildfire as a natural process, and the context of 2023 wildfires, were considered in the assessment. We request that the clarifications include (but need not be limited to) responses to the following questions:

- a) **How does the 2023 fire season fit in context of the natural fire regime in this area? Has the species historically experienced large, intense fires and been able to recover? Please include information about past fires that have occurred in this area, as well as their impacts on snakes (if known). How are the context factors mentioned above (from SARC 2024, pages 59-60), such as fire behaviour, species' biology and habitat, likely to apply to the NWT red-sided garter snake population during the wildfire season of 2023? What may be inferred about the probable impact of those wildfires on the snakes, in this specific situation?**

During the assessment process, SARC produced a status report with all of the information available and necessary for the assessment. SARC approved the species status report

before conducting its assessment. The SARC status report includes the best information available on the biology, habitat, threats, and impacts available as of April 2024⁷. SARC did consider drought and the latest wildfire regimes as threats (in climate and weather section) to red-sided garter snakes. SARC does not have additional information about the specific effects of the 2023 wildfires on red-sided garter snakes (July 2024).

I hope these responses address your questions about SARC's assessment of red-sided garter snakes.

Sincerely,



Suzanne Carrière
Alternate Chairperson
Species at Risk Committee

- c. Northwest Territories Species at Risk Committee
Northwest Territories Conference of Management Authorities

⁷ <https://www.nwtspeciesatrisk.ca/en/our-species-risk/red-sided-garter-snake>