

Disparalona hamata (a cladoceran, no common name)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2023

Revised, March 2023

Web Version, 4/30/2024

Organism Type: Crustacean

Overall Risk Assessment Category: Uncertain



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1 Native Range and Status in the United States

Native Range

From Neretina et al. (2018):

“*D. hamata* is widely distributed in the New World (from North America to Central America).”

“From Central America to Canada”

Multiple different geographic distributions of *D. hamata* have been reported in the literature, and older descriptions of *D. hamata* have been suggested to represent a species complex rather than a

single species (see Remarks). This ERSS adopts the geographic distribution provided in Neretina et al.'s (2018) redescription of *D. hamata*.

Status in the United States

From Neretina et al. (2018):

“[...] *D. (M.) hamata* is detected in the Great Lakes basin [...].”

NOAA and USEPA (2019) reports *Disparalona hamata* as native and observed in littoral habitats in Lake Erie, Lake Ontario, and the Huron-Erie Corridor (St. Clair River, Lake St. Clair, and Detroit River).

No records of *Disparalona hamata* in trade in the United States were found.

Regulations

No species-specific regulations on possession or trade were found within the United States.

Means of Introductions within the United States

No nonnative records of *Disparalona hamata* in the wild in the United States were found.

Remarks

From Kotov et al. (2022):

“During the last decade, there has been a rapid increase in the amount of morphological and molecular data in the Cladocera, in particular in the Anomopoda. Such new data allow for a more rigorous identification of taxa, a comparison with similar morpho- and genotypes, and more detailed knowledge of the natural phylogeographical patterns, to understand the deviations from such patterns through direct or indirect human intervention.”

“Some records, especially of rare taxa with very specific ecologies, could be explained by insufficient previous sampling efforts, and other records of so-called exotics have appeared following changes in Cladocera taxonomy after global and local revisions of several macro-taxa.”

“[...] care should be taken before labeling a new record as a potential exotic cladoceran, considering cryptic diversity, taxonomical confusion and a specific ecology. In-depth knowledge of the taxonomy and biogeography of these taxa, and a reliable comparative molecular database, are key.”

From Neretina et al. (2018):

“Results of [earlier] studies confirmed the non-cosmopolitanism concept of cladoceran distribution which is now an important basis for inventories of global chydorid diversity. This concept was proposed initially by Prof. D.G. Frey (Frey 1982, 1986, 1987). [...] In the frame of the non-cosmopolitanism concept, all species of chydorid taxa with a very broad or cosmopolitan

distribution range and considered as ‘species’ are likely to be groups or complexes which need careful taxonomic revision.”

“The genus *Disparalona* Fryer, 1968 is a potentially interesting model for detailed revision, but the taxonomy of this genus is complicated and confused (Smirnov 1996a, 1996b).”

“[...] *D. hamata* (Birge, 1879) is regarded as a very widely distributed taxon, preferring warm regions of different continents: North and South Americas, tropical parts of Asia and Africa (Smirnov 1996a; Kotov et al. [2013]). It has not been recorded from Australia (Shiel and Dickinson 1995; Smirnov 1995). Such wide distribution does not comply with Frey’s non-cosmopolitanism concept (Frey 1982, 1987) and could indicate existence of a species complex, as was already found in many other Chydorinae.”

“Populations of *D. cf. hamata* from different continents are very similar in their habitus. But even analysing previous descriptions we could already conclude that there are differences in the labral keel length between populations from geographically distant localities. Also, it became obvious to us that males from the USA (described by Kiser 1950) are different in the postabdomen shape and structure from Chinese males (Chiang and Du 1979). Moreover, Sinev and Sanoamuang (2011) studied the males from Thailand and also revealed their rather strong differences from American males in morphology of their rostrum and postabdomen. Based on such observations, Sinev and Sanoamuang (2011) concluded that East Asian populations of *D. cf. hamata* are not conspecific with American *D. hamata* s. str.”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2023):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Protostomia
Superphylum Ecdysozoa
Phylum Arthropoda
Subphylum Crustacea
Class Branchiopoda
Order Diplostraca
Suborder Cladocera
Infraorder Anomopoda
Family Chydoridae
Genus *Disparalona*
Species *Disparalona hamata*

According to Kotov (2018), *Disparalona hamata* is the current valid name for this species.

The following synonyms of *Disparalona hamata* from Kotov (2018) were used to search for information for this report: *Pleuroxus hamata*, *Pleuroxus hamulatus*.

Size, Weight, and Age Range

From Neretina et al. (2018):

“Maximum length of adult parthenogenetic females up to 0.63 mm, maximum height 0.40 mm (therefore females could be larger than previously reported by Birge (1879) – 0.45 mm and Smirnov (1971) – 0.6 mm). Maximum length of ephippial females up to 0.56 mm, height 0.30 mm. Maximum length of adult males up to 0.48 mm, height 0.29 mm.”

Environment

From Neretina et al. (2019):

“Fuentes-Reinés et al. (2018) found *D. hamata* in the Tomo River (Vichada, Colombia). According to their observations *D. hamata* was most abundant in the habitats, associated with roots of *Campsiandra comosa* Benth., characterized by slightly acidic pH (6.6) and relatively low conductivity ($6.7 \mu\text{S}\cdot\text{cm}^{-1}$) (Fuentes-Reinés et al. 2018).”

From Neretina et al. (2018):

“It occurs in stagnant and rheophilic habitats (lakes, ponds, rivers and oxbows).”

Climate

From Neretina et al. (2018):

“*D. (M.) hamata* is detected in the Great Lakes basin – a northern area with humid continental (in its southern part) and subarctic (in its northern part) climate [...]”

Distribution Outside the United States

Native

From Neretina et al. (2018):

“*D. hamata* is widely distributed in the New World (from North America to Central America).”

“From Central America to Canada”

Multiple different geographic distributions of *D. hamata* have been reported in the literature, and older descriptions of *D. hamata* have been suggested to represent a species complex rather than a single species (see Remarks). This ERSS adopts the geographic distribution provided in Neretina et al.’s (2018) redescription of *D. hamata*.

Introduced

From Illyová and Hudec (2004):

“*Disparalona hamata* (Birge, 1879) (Crustacea, Branchiopoda, Anomopoda) was found in the plankton of Slovakian lowlands. [...] So far the only European record was reported from the Czech Republic by ŠRÁMEK-HUŠEK (1946), who labelled the species as *Pleuroxus striatoides* n. sp. and synonymized it with *Pleuroxus chappuisi* Brehm, 1934 in ŠRÁMEK-HUŠEK [et al.] (1962).”

The European Alien Species Information Network (European Commission – Joint Research Centre 2024) describes the status of *D. hamata* in Europe as “alien.”

Tuo and Young (2011) reported new records of *Disparalona hamata* in Taoyuan, Hsinchu, and Maioli counties, Taiwan. It is unclear whether *D. hamata* was interpreted to be a new addition to the fauna of Taiwan.

Means of Introduction Outside the United States

From Illyová and Hudec (2004):

“The author [Šrámek-Hušek] supposed that [*Disparalona hamata*] was introduced to Europe from tropical area [sic].”

Short Description

From Sousa et al. (2018):

“Body elongated, length 0.48–0.50 mm, dorsal margin uniformly arched, ventral margin with wide aperture which is located at the middle of the body. Carapace covered by longitudinal lines and striae between them, posterodorsal corner with a notch, posteroventral corner rounded, posterior part bears a group of long and thin spinulae exceeding the border. Rostrum short, about 2.8 times as long as antennular body, not curved, pointed downwards. Antennule length about 1.7 times the width, not exceeding the tip of rostrum. Antenna with coxal setae about 0.55 the length of the first exopodite segment, first endopodite segment armed with a short spine about 0.35 of the length of the apical spine. First limb with IDL seta 1 slender and armed with thin spines at distal part, about 2.2 times shorter than third seta; setae 2 about 1.2 times shorter than third seta, armed with long setulae, third seta relatively thick, hook-like, heavily chitinized and with a group of short spines at distal part. Second limb with exopodite armed with a long seta, about three times longer than exopodite itself, inner limb portion armed with eight slender scrapers decreasing in length towards gnathobase. Third limb exopodite rectangular, about 2.5 times as high as wide, fourth seta about 1.2 times as long as third seta. Fourth limb first seta slender and short, about 0.4 of length of the second seta. Fifth limb exopodite wide, rounded, armed with four plumose setae. Postabdomen anal and preanal margins similar in length, 11 marginal denticles, distalmost denticles not bearing spinulae or spines, proximalmost denticles are merged; distalmost denticles with width-at-base/height ratio about 0.25. Basal spines naked, distalmost about 0.27 of length of the postabdominal claw, proximal about 1.7 times shorter than distal one.”

Biology

From Neretina et al. (2019):

“*D. hamata* inhabit both lentic and lotic ecosystems, however more observations are required in order to clarify its ecology.”

From Neretina et al. (2018):

“It occurs in stagnant and rheophilic habitats (lakes, ponds, rivers and oxbows). In an arid zone of Mexico specimens morphologically similar to *D. hamata* [...] were found in bromeliads (Romero et al. 2011). In this case bromeliads seem an important refugium for aquatic organisms during the dry season (Jocque et al. 2013).”

Human Uses

No information was found on human uses of *Disparalona hamata*.

Diseases

No information was found associating *Disparalona hamata* with any diseases listed by the World Organisation of Animal Health (March 2023).

No information was found on diseases associated with *Disparalona hamata*.

Threat to Humans

No information was found on threats to humans from *Disparalona hamata*.

3 Impacts of Introductions

No information available.

No species-specific regulations on possession or trade were found within the United States for *Disparalona hamata*.

4 History of Invasiveness

The History of Invasiveness for *Disparalona hamata* is classified as Data Deficient. There are records of reported introductions of this species to Europe and possibly Taiwan, but confidence in these reports is low. *D. hamata* is considered by multiple sources to represent a species complex, so further data on the taxonomy of this species is needed to accurately evaluate its native and potential nonnative ranges. No information was available on impacts of introduction or trade of *D. hamata*.

5 Global Distribution



Figure 1. Reported global distribution of *Disparalona hamata*. Map from GBIF Secretariat (2023). Observations are reported from the United States, Mexico, Bolivia, and France. These occurrences do not represent the complete range of this species, which is reported to have a wide distribution in North and Central America (Neretina et al. 2018). The status of reported occurrences in Bolivia and France is unknown, so these occurrences were not used in the climate matching analysis.

6 Distribution Within the United States

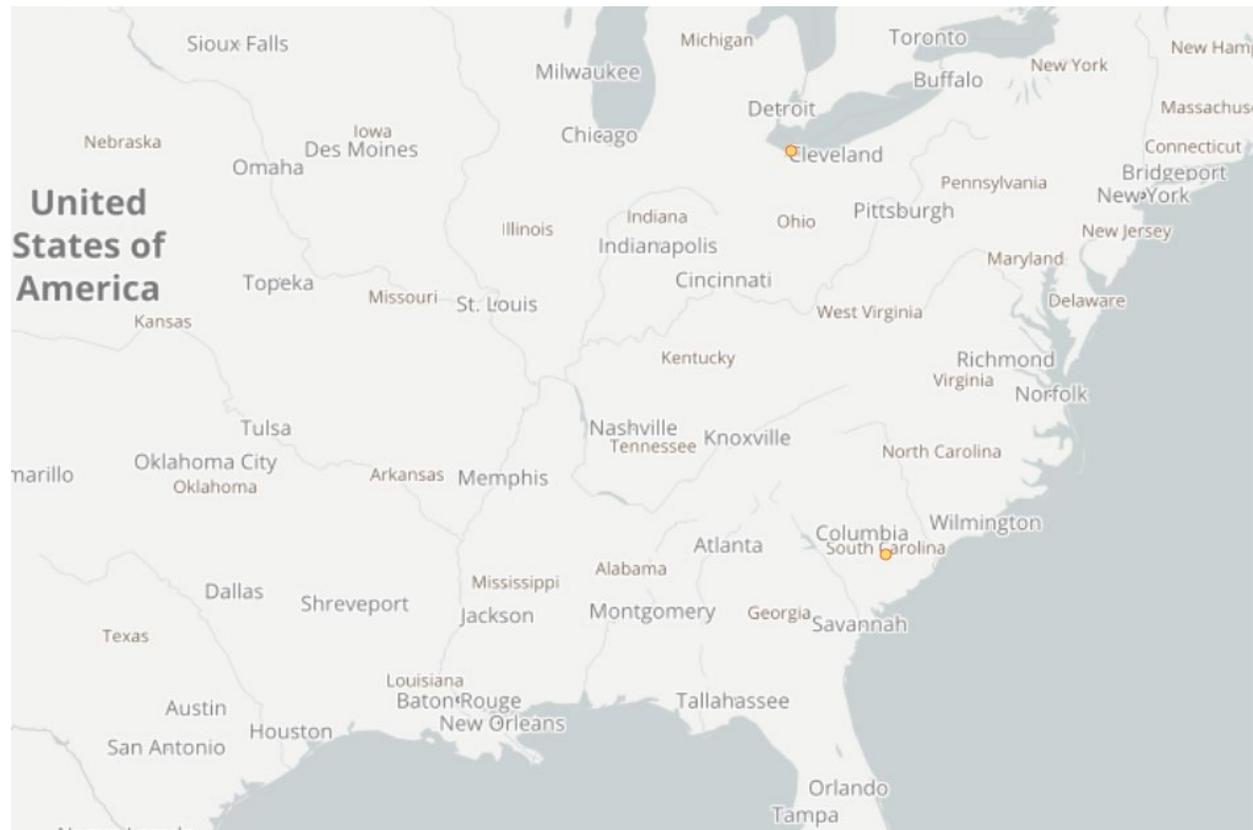


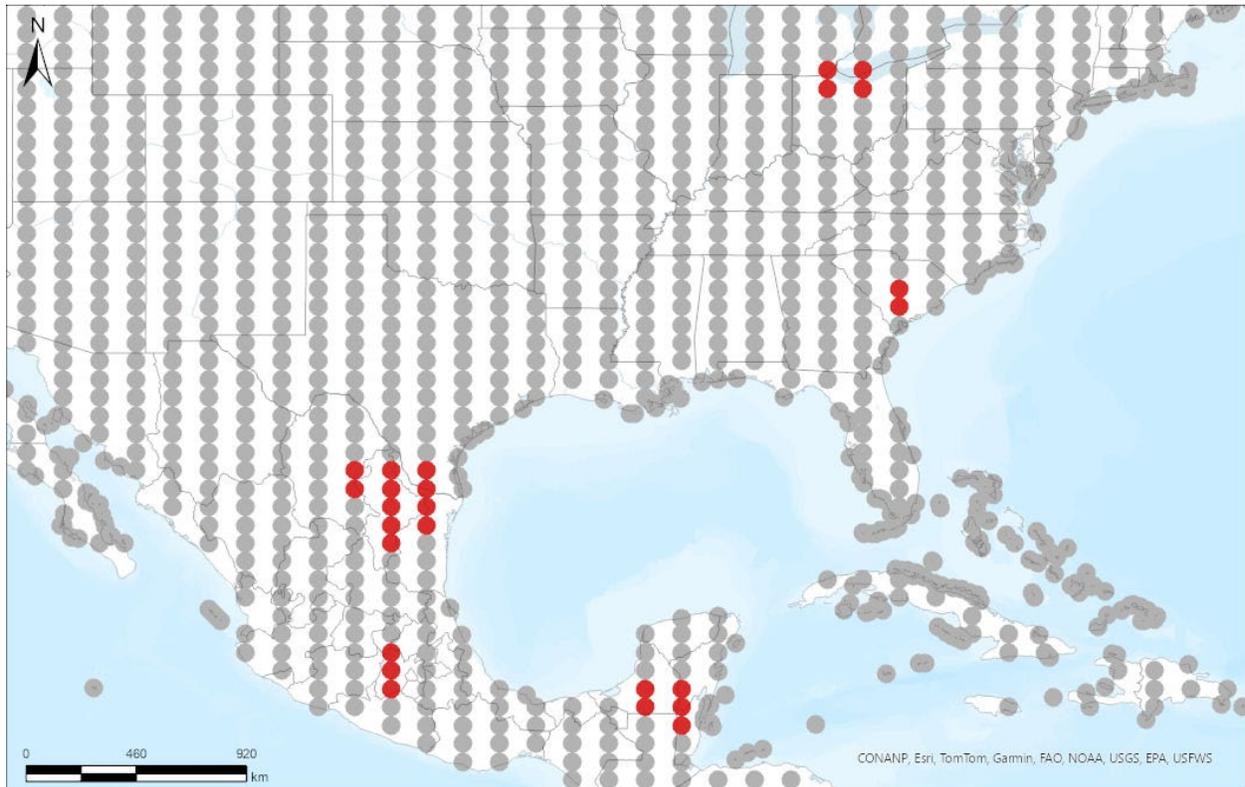
Figure 2. Reported distribution of *Disparalona hamata* in the United States. Map from GBIF-US (2023). Observations are reported from Ohio and South Carolina. These occurrences do not represent the complete range of this species, which is reported to have a wide distribution in North and Central America (Neretina et al. 2018).

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Disparalona hamata* to the contiguous United States was highest in the southern Great Lakes basin, along the Southern Atlantic coast, in the Mid-Atlantic region, and in southern Texas. High matches were also predicted for other parts of the eastern United States, from Vermont to Florida, and in the Southwest. *D. hamata* may be native to many or all of these regions. The remainder of the western United States and the Great Plains region generally had low to medium matches. Due to the lack of available occurrence data for this species, this assessment may underestimate the climate match with the contiguous United States. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.547, indicating that Yes, there is establishment concern for this species outside its native range. The Climate 6 score is calculated as: (count of target points with scores ≥ 6)/(count of all target points). Establishment concern is warranted for Climate 6 scores greater than or equal to 0.002 based on an analysis of the establishment success of 356 nonnative aquatic species introduced to the United States (USFWS 2024).

Projected climate matches in the contiguous United States under future climate scenarios are available for *Disparalona hamata* (see Appendix). These projected climate matches are provided as additional context for the reader; future climate scenarios are not factored into the Overall Risk Assessment Category.



Species: *Disparalona hamata*

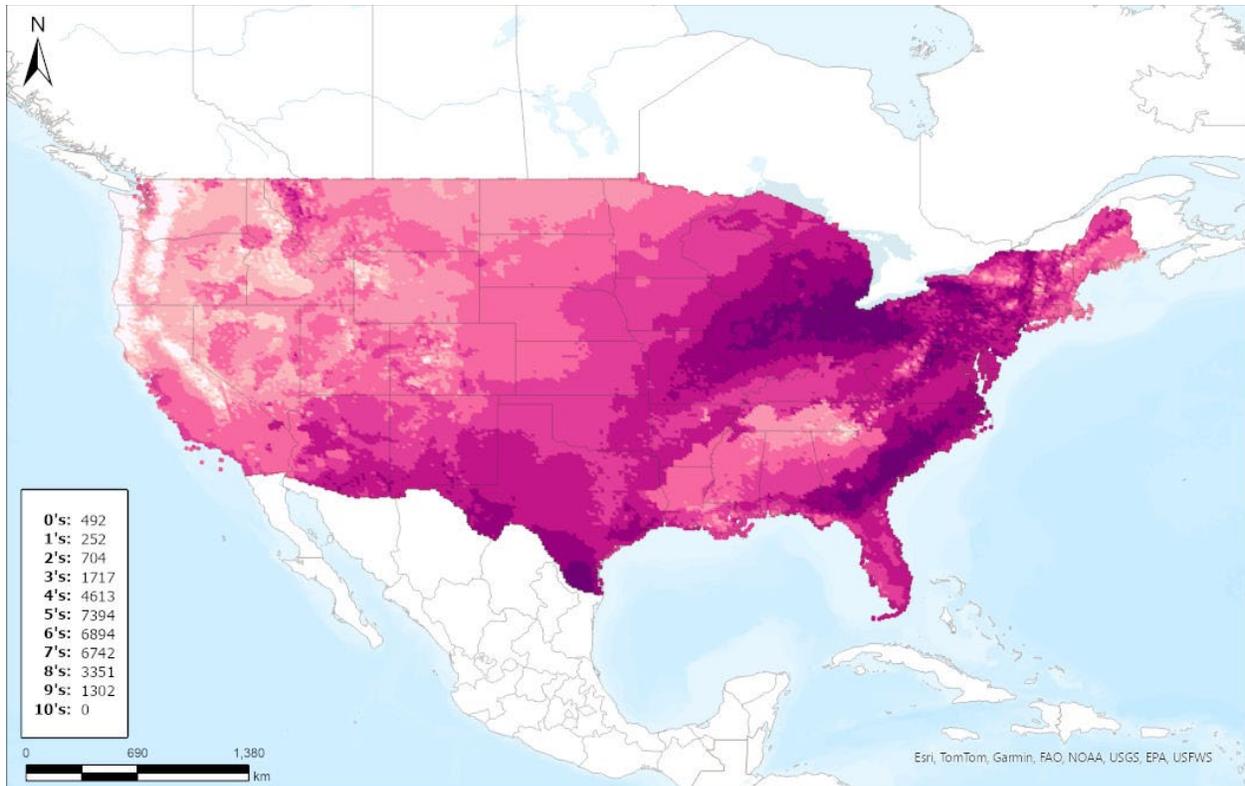
Selected Climate Stations ●



RAMP

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Figure 3. RAMP (Sanders et al. 2023) source map showing weather stations in North America selected as source locations (red; United States, Mexico) and non-source locations (gray) for *Disparalona hamata* climate matching. Source locations from GBIF Secretariat (2023). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.



Species: *Disparalona hamata*

Current

Climate 6 Score: 0.547



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Figure 4. Map of RAMP (Sanders et al. 2023) climate matches for *Disparalona hamata* in the contiguous United States based on source locations reported by GBIF Secretariat (2023). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The Certainty of Assessment for *Disparalona hamata* is classified as Low. There are records of reported introductions for this species in Europe, but no information is available on the impacts of these introductions. There is little information available on the biology of *D. hamata*, and this species' range is uncertain in part due to taxonomic uncertainty around this species. Furthermore, due to the lack of occurrence data for *D. hamata*, this assessment may underestimate the climate match with the contiguous United States.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Disparalona hamata is a cladoceran that is native to North and Central America. There is taxonomic uncertainty in the genus *Disparalona*, and various sources have defined *D. hamata* differently. The History of Invasiveness for *Disparalona hamata* is classified as Data Deficient

because no impacts of its reported introduction to locations in Europe have been reported. The climate matching analysis for the contiguous United States indicates that Yes, there is establishment concern for this species outside its native range, despite minimal source points available for the analysis. The highest climate matches were found in the Great Lakes basin, Southeast, and Mid-Atlantic regions, and in southern Texas. The Certainty of Assessment for this ERSS is classified as Low due to a general lack of available information on the biology, ecology, and distribution for this species, along with taxonomic uncertainty. The Overall Risk Assessment Category for this species in the contiguous United States is Uncertain.

Assessment Elements

- **History of Invasiveness (see section 4): Data Deficient**
- **Establishment Concern (see section 7): Yes**
- **Certainty of Assessment (see section 8): Low**
- **Remarks, Important additional information: None**
- **Overall Risk Assessment Category: Uncertain**

10 Literature Cited

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in section 11.

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11 Literature Cited in Quoted Material

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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Appendix

Summary of Future Climate Matching Analysis

Future climate projections represent two Shared Socioeconomic Pathways (SSP) developed by the Intergovernmental Panel on Climate Change (IPCC 2021): SSP5, in which emissions triple by the end of the century; and SSP3, in which emissions double by the end of the century. Future climate matches were based on source locations reported by GBIF Secretariat (2023). The low number and incomplete coverage of source points for the climate matching analysis increases the uncertainty of these predictions.

Under the future climate scenarios (figure A1), on average, high climate match for *Disparalona hamata* was projected to occur in the Great Lakes and Mid-Atlantic regions of the contiguous United States. High match was also predicted for southern and western Texas. Areas of low climate match were projected to occur in the Northern Pacific Coast region, along the Cascade and Sierra Nevada ranges, and along the Gulf Coast into the interior Southeast. In general, the areas of high climate match shifted northward from SSP3 to SSP5 and from the 2055 time step to the 2085 time step. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.455 (model: MPI-ESM1-2-HR, SSP5, 2085) to a high of 0.597 (model: MRI-ESM2-0, SSP3, 2085). All future scenario Climate 6 scores were above the Establishment Concern threshold, indicating that Yes, there is establishment concern for this species outside its native range under future scenarios. The Climate 6 score for the current climate match (0.547, figure 4) falls within the range of scores for future projections. Under multiple time step and climate scenarios, areas within the Colorado Plateau, northern Great Lakes, and Western Mountains saw a moderate increase in the climate match relative to current conditions. Large increases in climate match were observed in limited areas of Colorado and Wyoming at the 2085 time step. Under multiple time step and climate scenarios, areas within the Northeast and Southeast saw a large decrease in the climate match relative to current conditions. Additionally, areas within the Appalachian Range, Great Basin, southern Great Lakes, Gulf Coast, Mid-Atlantic, Southwest, and Western Mountains saw a moderate decrease in the climate match relative to current conditions. The degree of change relative to current climate conditions was larger under SSP5 than under SSP3 and increased with time.

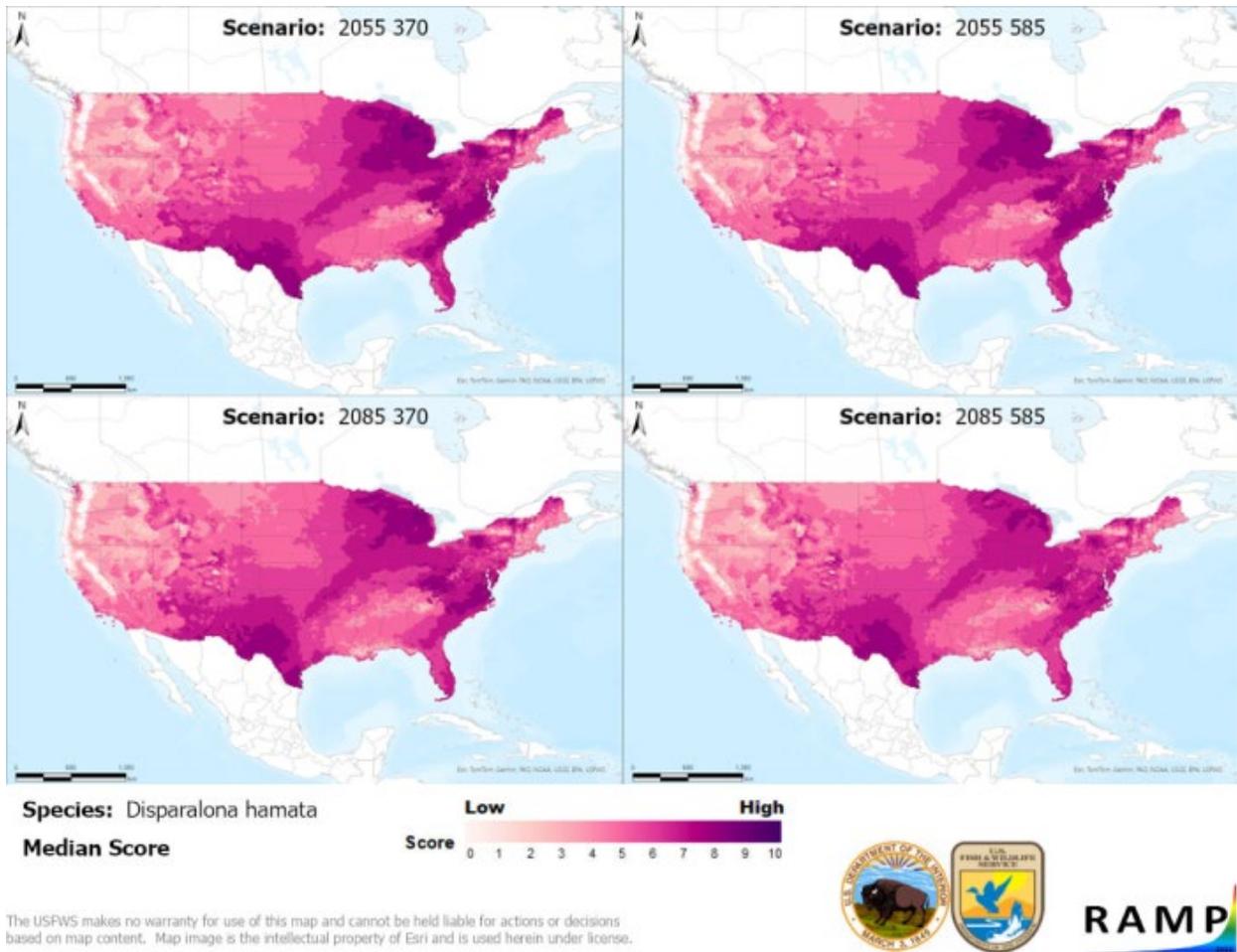


Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Disparalona hamata* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2023). Shared Socioeconomic Pathways (SSPs) used (from left to right): SSP3, SSP5 (IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global climate models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

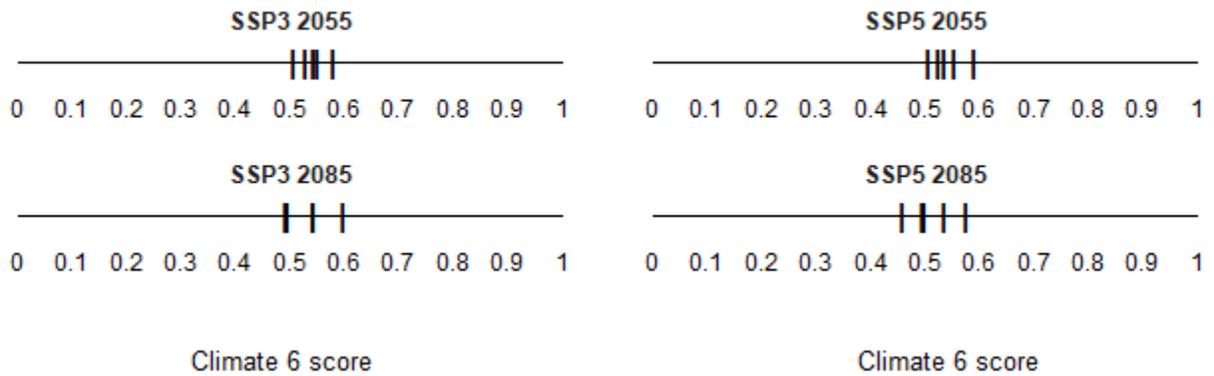
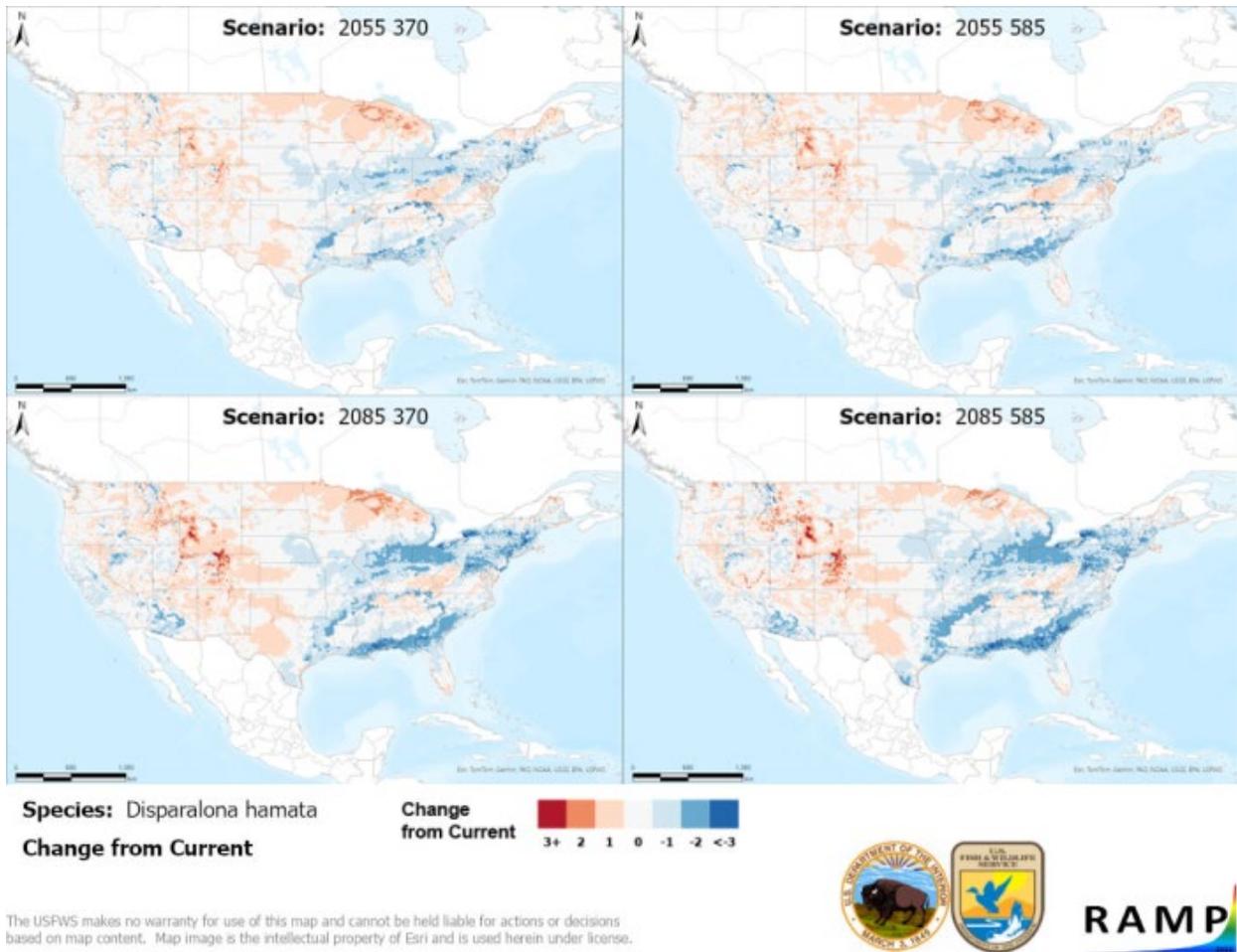


Figure A2. Comparison of projected future Climate 6 scores for *Disparalona hamata* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018; IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global climate models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0.



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Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 4) and the median target point score for future climate scenarios (figure A1) for *Disparalona hamata* based on source locations reported by GBIF Secretariat (2023). Shared Socioeconomic Pathways (SSPs) used (from left to right): SSP3, SSP5 (IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0. Shades of blue indicate a lower target point score under future scenarios than under current conditions. Shades of red indicate a higher target point score under future scenarios than under current conditions. Darker shades indicate greater change.

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