

***Drepanothrix dentata* (a cladoceran, no common name)**

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2023

Revised, February 2023, July 2024

Web Version, 7/24/2024

Organism Type: Crustacean

Overall Risk Assessment Category: Uncertain

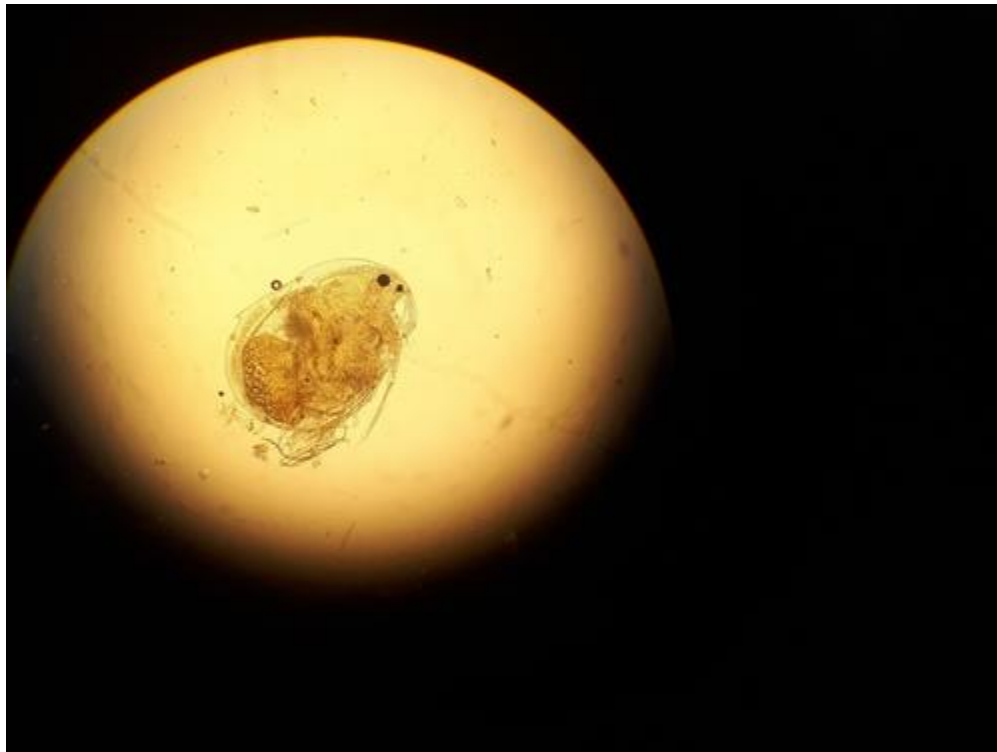


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<https://ecuador.inaturalist.org/taxa/483845-Drepanothrix-dentata> (February 2023).

1 Native Range and Status in the United States

Native Range

From Gaviria-Melo et al. (2005):

“World [distribution]: Holarctic, mainly in the North.”

The following information summarizes reported observations within the described native range of *Drepanothrix dentata*. Effort was made to include as much of the known distribution as possible, but this list is not exhaustive.

In Russia, *D. dentata* has been reported from Lake Glubokoe in the Moscow oblast (Kotov 2006), and Bering Island, Commander Islands, Russian Far East (Novichkova and Chertoprud 2015).

In Europe, *D. dentata* has been reported from Serra Serrada, a reservoir in the River Douro Basin in Portugal (Geraldies and Pasupuleti 2016); Flanders, Belgium (Louette et al. 2007); Finnish Lapland (Rautio 2001); Norway (Jensen et al. 2012); Isle of Skye, Scotland (Duigan and Kovach 1994); northern Wales (Duigan et al. 1998); alpine lakes in Italy (Stoch et al. 2019); Moselle River in France and Luxembourg (Viroux 1999); Lake Piaseczno in Poland (Adamczuk 2022); and Lake Peipsi-Pihkva in Estonia (Mäemets et al. 1996).

In North America, *D. dentata* has been reported from Hicks Lake and Kawkawa lake in Hope, British Columbia (Clifford 1940); Lake Superior, Lake Michigan, and Lake Huron (NOAA and USEPA 2019); Douglas Lake, Michigan (Moore 1939); Lake Itasca, Minnesota (Cole 1955); upper and lower Twin Lakes, Colorado (Bureau of Reclamation 1993); Lake Tahoe, on the California and Nevada border (Frantz and Cordone 1966); Missoula County, Montana (Frey 1982); and Madison, Wisconsin (Fordyce 1901).

Status in the United States

The following information summarizes reported observations within the described native range of *Drepanothrix dentata* within the United States. Effort was made to include as much of the known distribution as possible, but this list is not exhaustive.

Drepanothrix dentata is native to Lake Superior, Lake Michigan, and Lake Huron (NOAA and USEPA 2019). Additionally, *D. dentata* has been reported from the upper and lower Twin Lakes, Colorado between 1902-1903 (Bureau of Reclamation (1993); Lake Tahoe, on the California and Nevada border in sampling from 1961-1964 (Frantz and Cordone 1966); Douglas Lake, Michigan (Moore 1939); and a lake in Missoula County, Montana (Frey 1982).

No records of *Drepanothrix dentata* 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 records of *D. dentata* introductions within the United States were found.

Remarks

The description of the species' range, both native and introduced, was limited. The general description of the native range as 'northern holarctic' may encompass most or all of the

contiguous United States. Occurrences are limited to where invertebrate sampling occurred and can be complicated by the difficulty to identify this group of species.

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 Macrothricidae
Genus *Drepanothrix*
Species *Drepanothrix dentata* (Eurén, 1861)

According to WoRMS (2023), *Drepanothrix dentata* is the current valid name for this species.

Size, Weight, and Age Range

From NBIC (2018):

“Female: Length 0.3–0.9 mm
Male: Length 0.4–0.7 mm”

Environment

From NBIC (2018):

“It is most common in lakes and seems quite tolerant with respect to pH [“4.6-7.7”] and conductivity.”

“It is found from sea level to 1138 m a.s.l. [above sea level]”

From Gaviria-Melo et al. (2005):

“Habitat: benthos of littoral and profundal zones of lakes, ponds, bogs and backwaters; pH 4.5 – 8.5.”

Climate

No information was found regarding climatic requirements for *Drepanothrix dentata*.

Distribution Outside the United States

Native

Part of the native range of *Drepanothrix dentata* is within the United States, see section 1 for a full description of the native range.

From Gaviria-Melo et al. (2005):

“World [distribution]: Holarctic, mainly in the North.”

The following information summarizes reported observations within the described native range of *Drepanothrix dentata*. Effort was made to include as much of the known distribution as possible, but this list is not exhaustive.

In Russia, *D. dentata* has been reported from Lake Glubokoe in the Moscow oblast (Kotov 2006), and Bering Island, Commander Islands, Russian Far East (Novichkova and Chertoprud 2015).

In Europe, *D. dentata* has been reported from Serra Serrada, a reservoir in the River Douro Basin in Portugal (Geraldès and Pasupuleti 2016); Flanders, Belgium (Louette et al. 2007); Finnish Lapland (Rautio 2001); Norway (Jensen et al. 2012); Isle of Skye, Scotland (Duigan and Kovach 1994); northern Wales (Duigan et al. 1998); alpine lakes in Italy (Stoch et al. 2019); Moselle River in France and Luxembourg (Viroux 1999); Lake Piaseczno in Poland (Adamczuk 2022); and Lake Peipsi-Pihkva in Estonia (Mäemets et al. 1996).

In North America, *D. dentata* has been reported from Hicks Lake and Kawkawa lake in Hope, British Columbia (Clifford 1940), and from Lake Superior, Lake Michigan, and Lake Huron (NOAA and USEPA 2019).

Introduced

From Yermolaeva and Fetter (2020):

“*Drepanothrix dentata* (Euren 1861) is found in a quarry lake in the valley of Snezhnaya River, foothills of the Khamar-Daban Mountain Range, southern Baikal region. This species has not been previously recorded from eastern Siberia.”

From Gaviria-Melo et al. (2005):

“*Drepanothrix dentata* was recently reported (Flössner 2000) from one backwaterbody [sic] upstream from Wien [Vienna] (without specific locality, name of the collector or Steuering date). As this species was not known for the region (Hrbáček & al. 1978), it must therefore be considered a recent immigrant to Austria.”

D. dentata has been reported outside its described native range in the Sona Dighi reservoir in Rajshahi, Bangladesh (Naz and Najia 2008), a dam in Cameroon (Sonkeng et al. 2024), Jammu

and Kashmir, India (Chatterjee et al. 2013), and Duya Inn, Hinthada Township, Myanmar (Hnin et al. 2022).

Means of Introduction Outside the United States

No information was found on means of introduction of *Drepanothrix dentata*.

Short Description

From NBIC (2018):

“*Drepanothrix dentata* has a carapace which is especially short and squat, and appears almost perfectly round. The edge protrudes in a peculiar thorn-like protuberance approximately in the middle dorsally. Seen from the side, its head is rather large, and, as in *Acantholeberis curvirostris*, it has a conspicuous, strongly protruding rostrum ventrally. Its postabdomen is very small, and its shape shows a very distinct approximation to that characterizing the genus *Lathonura*. The abdominal claw is difficult to see without dissecting the animal. *D. dentata* has a grey to yellowish/greenish colour. In the summer it can be more or less hyaline.”

From Moore (1939):

“This species [*Drepanothrix dentata*] has a small post-abdomen which is provided with many small spines and a small claw. The antennae are stout and each of the two proximal segments of the lower, 3-segmented ramus bears a long stout seta. These setae are about as long as the antennae. They are directed posteriorly. These setae are effective as structures for pushing the animal over the surface of the ooze film.”

Biology

From Encyclopedia of Life (2014):

“They are associated with freshwater habitat. They are herbivores. [...] They rely on drag powered swimming to move around.”

According to NOAA and USEPA (2019), *D. dentata* are benthic and littoral species.

From Smyly (1952):

“Two of these species, *Chydorus sphaericus* and *Drepanothrix dentata*, show an apparent correlation between their relative abundance and the amount of detritus and vegetation at each station, [...]”

Human Uses

No information on human uses of *Drepanothrix dentata* was found.

Diseases

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

No information was found on diseases associated with *Drepanothrix dentata*.

Threat to Humans

No information was found on threats to humans from *Drepanothrix dentata*.

3 Impacts of Introductions

Records of introduction were found for *Drepanothrix dentata* but no information regarding any impacts from those introductions was found.

There were no species-specific regulations found within the United States.

4 History of Invasiveness

The History of Invasiveness for *Drepanothrix dentata* is classified as Data Deficient. Although there are records of nonnative populations, there was no information regarding the impact of the introduced populations.

5 Global Distribution



Figure 1. Reported global distribution of *Drepanothrix dentata*. Map from GBIF Secretariat (2023). Observations are reported from Canada, France, United Kingdom, Norway, Germany, The Netherlands, Poland, Estonia, and Russia.

Additional observations were reported by Clifford (1940; British Columbia, Canada), Smyly (1952; United Kingdom), Duigan and Kovach (1994; Scotland), Maemets et al. (1996; Estonia), Viroux (1999; France, Luxembourg), Gaviria-Melo et al. (2005; Austria), Naz and Najia (2008; Bangladesh), Kotov (2016; Russia), Novichkova and Chertoprud (2015; Bering Island, Russia),

Geraldes and Pasupule (2016; Portugal), Adamczuk (2022; Poland), Hnin et al. (2022; Myanmar), and Sonkeng et al. (2024; Cameroon).

6 Distribution Within the United States

A distribution map of *Drepanothrix dentata* in the United States was not available. However, *D. dentata* is native to Lake Huron, Lake Superior, and Lake Michigan. Historically, there are records of *D. dentata* being observed in Lake Tahoe, Nevada/California in the mid-1960s (Frantz and Cordone 1966); Douglas Lake, Michigan in the mid-1930s (Moore 1939); Lake Itasca, Minnesota (Cole 1955); a lake in Missoula County, Montana (Frey 1982); and Twin Lakes, Colorado in the early 1900s (Bureau of Reclamation 1993). Those locations were used to select source locations for the climate match.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Drepanothrix dentata* to the contiguous United States was high around the Great Lakes and west into the northern plains. It was also high in areas of the Northeast and in patches throughout the western mountains. The climate match was low in the desert southwest and along the Gulf and Southern Atlantic coasts. It was medium in the remainder of the contiguous United States. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.747, indicating that Yes, there is establishment concern for this species outside the current range. For *D. dentata*, the lack of occurrence data for a potentially substantial portion of the species range may mean that the predicted climate match to the contiguous United States is an underestimate of the true climate match. 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 *Drepanothrix dentata* (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: *Drepanothrix dentata*

Selected Climate Stations ●



RAMP

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Figure 2. RAMP (Sanders et al. 2023) source map showing weather stations in North America, Asia, Africa, and Europe selected as source locations (red; United States, Canada, Poland, France, Portugal, United Kingdom, Norway, Sweden, Finland, Estonia, Austria, The Netherlands, Germany, Italy, Russia, Cameroon, Bangladesh, Myanmar) and non-source locations (gray) for *Drepanothrix dentata* climate matching. Source locations from Fordyce (1901), Moore (1939), Clifford (1940), Smyly (1952), Cole (1955), Frantz and Cordone (1966), Frey (1982), Bureau of Reclamation (1993), Duigan and Kovach (1994), Mäemets et al. (1996), Gaviria-Melo et al. (2005), Naz and Najia (2008), Novichkova and Chertoprud (2015), Geraldès and Pasupuleti (2016), Adamczuk (2022), Hnin et al. (2022), GBIF Secretariat (2023), and Sonkeng et al. (2024). . Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

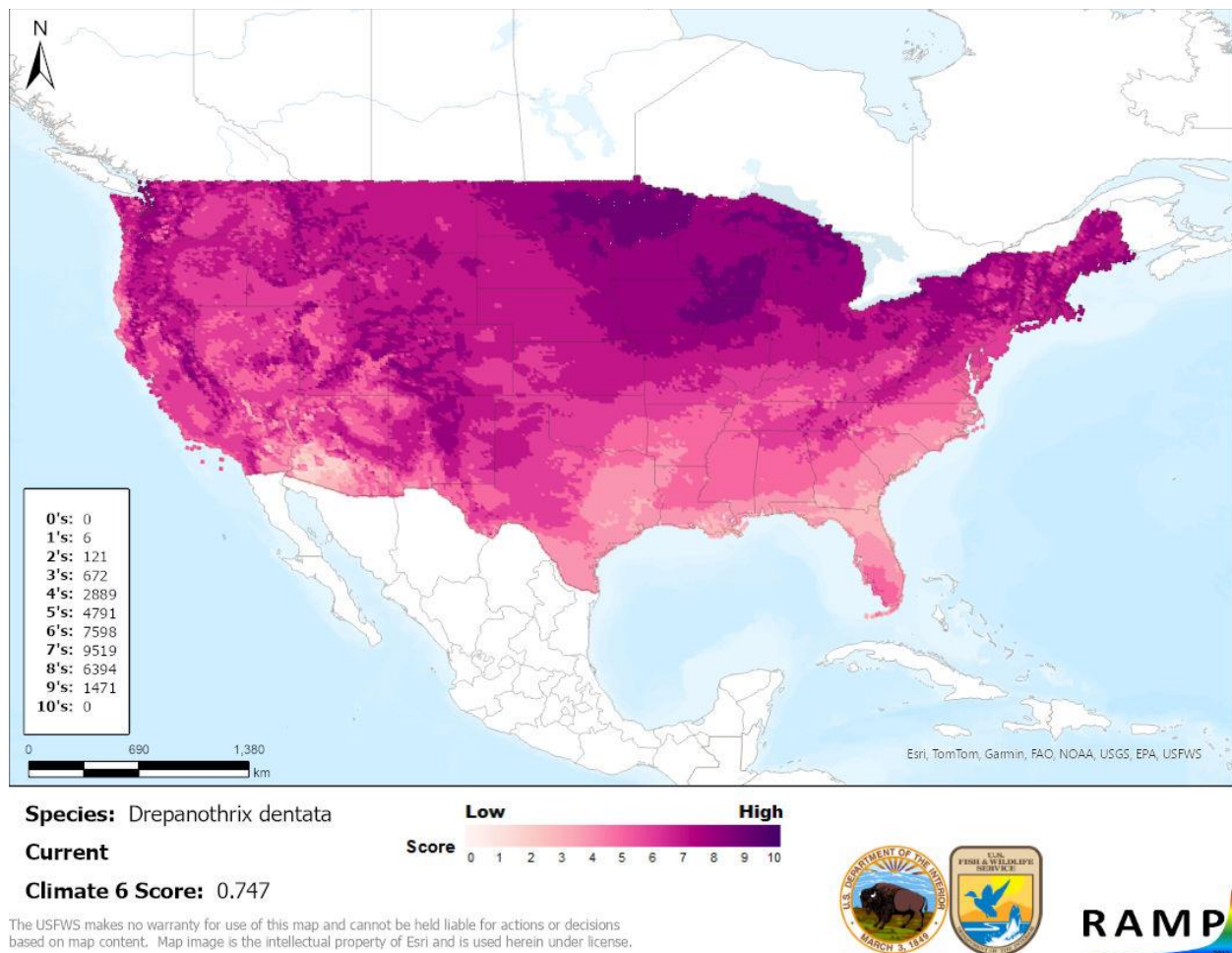


Figure 3. Map of RAMP (Sanders et al. 2023) climate matches for *Drepanothrix dentata* in the contiguous United States based on source locations reported by Fordyce (1901), Moore (1939), Clifford (1940), Smyly (1952), Cole (1955), Frantz and Cordone (1966), Frey (1982), Bureau of Reclamation (1993), Duigan and Kovach (1994), Mäemets et al. (1996), Gaviria-Melo et al. (2005), Naz and Najia (2008), Novichkova and Chertoprud (2015), Geraldles and Pasupuleti (2016), Adamczuck (2022), Hnin et al. (2022), GBIF Secretariat (2023), and Sonkeng et al. (2024).. 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 *Drepanothrix dentata* is classified as Low. There is information regarding species distribution but the information may have large gaps impacting the interpretation of the climate match results. Records of introduction were found but no information on impacts from introduction.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Drepanothrix dentata, is a Cladoceran crustacean that is native to northern Holarctic areas of the world. *D. dentata* is a microscopic invertebrate sometimes referred to as a water flea. *D. dentata* can be found within the benthic and littoral zone of freshwater habitats. This species has been reported to be tolerant to wide conductivity and pH ranges. No regulations associated with this species were found. Records of introductions in Europe, Africa, and Asia were found. However, there was no information regarding the impact of these introduced populations. Therefore, the History of Invasiveness for *Drepanothrix dentata* is classified as Data Deficient. The climate matching analysis for the contiguous United States indicates establishment concern for this species outside of its current range. Areas of high climate match were found in the Great Lakes extending westward into the Northern Plains. There were also areas of high match in the Northeast and the western mountains. The Certainty of Assessment for this ERSS is classified as Low due to the limited understanding of this species' distribution which may impact the interpretation of the climate match results. There was also a lack of information regarding the species' history of invasiveness. The Overall Risk Assessment Category for *Drepanothrix dentata* 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: Limited information regarding species distribution.**
- **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 Fordyce (1901), Moore (1939), Clifford (1940), Smyly (1952), Cole (1955), Frantz and Cordone (1966), Frey (1982), Bureau of Reclamation (1993), Duigan and Kovach (1994), Mäemets et al. (1996), Gaviria-Melo et al. (2005), Naz and Najia (2008), Novichkova and Chertoprud (2015), Geraldles and Pasupuleti (2016), Adamczuck (2022), Hnin et al. (2022), GBIF Secretariat (2023), and Sonkeng et al. (2024). The lack of occurrence data for a potentially substantial portion of the species range brings additional uncertainty to the results of the future climate matching analysis.

Under the future climate scenarios (figure A1), areas of low climate match were projected to occur in the Southern Atlantic Coast region and in the 2085 time steps, the Gulf Coast region. In the 2055 time steps there were areas of high match in the northern Great Lakes and in patches in the western mountains. The areas of high match decrease or disappear in the 2985 time step. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.116 (model: UKESM1-0-LL, SSP5, 2085) to a high of 0.616 (model: MPI-ESM1-2-HR, SSP5, 2055). All future scenario Climate 6 scores were above the Establishment Concern threshold, indicating that Yes, there is establishment concern for this species outside the current range under future scenarios. The Climate 6 score for the current climate match (0.747, figure 3) falls above the range of scores for future projections. The time step and climate scenario with the most change relative to current conditions was SSP5, 2085, the most extreme climate change scenario. Under one or more time step and climate scenarios, areas within the Desert Southwest saw a moderate increase in the climate match relative to current conditions. No large increases were observed regardless of time step and climate scenarios. Under one or more time step and climate scenarios, areas within the Appalachian Range, Colorado Plateau, Great Basin, Great Lakes, Mid-Atlantic, Northeast, Northern Pacific Coast, Northern Plains, Southeast, Southern Plains, Southwest, and Western Mountains saw a large decrease in the climate match relative to current conditions. Additionally, areas within California, Gulf Coast, and Southern Atlantic Coast saw a moderate decrease in the climate match relative to current conditions. The degree of decrease increased with time and from SSP3 to SSP5. Additional, very small areas of large or moderate change may be visible on the maps (figure A3).

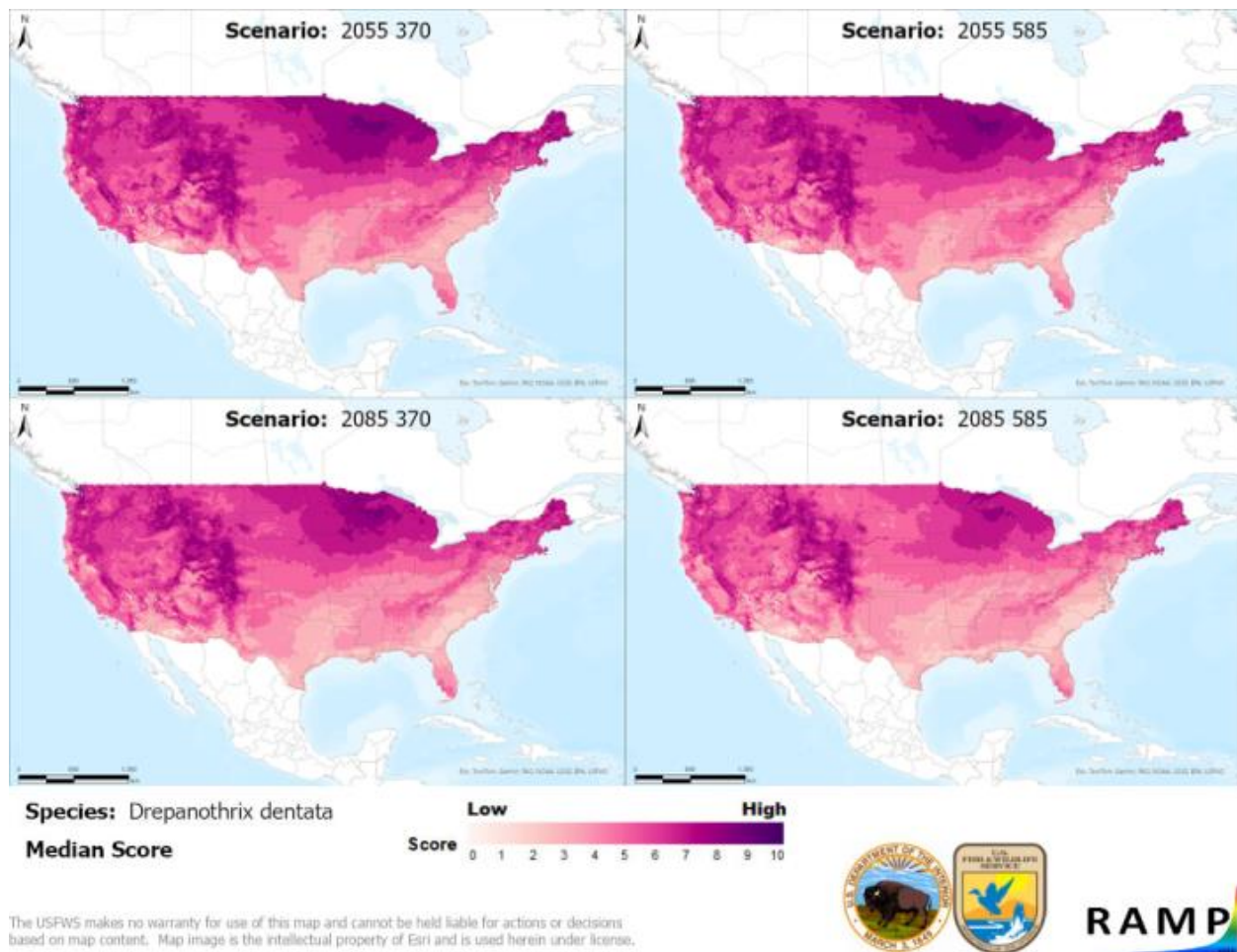


Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Drepanothrix dentata* in the contiguous United States. Climate matching is based on source locations reported by Fordyce (1901), Moore (1939), Clifford (1940), Smyly (1952), Cole (1955), Frantz and Cordone (1966), Frey (1982), Bureau of Reclamation (1993), Duigan and Kovach (1994), Mäemets et al. (1996), Gaviria-Melo et al. (2005), Naz and Najia (2008), Novichkova and Chertoprud (2015), Gerales and Pasupuleti (2016), Adamczuck (2022), Hnin et al. (2022), GBIF Secretariat (2023), and Sonkeng et al. (2024). 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.

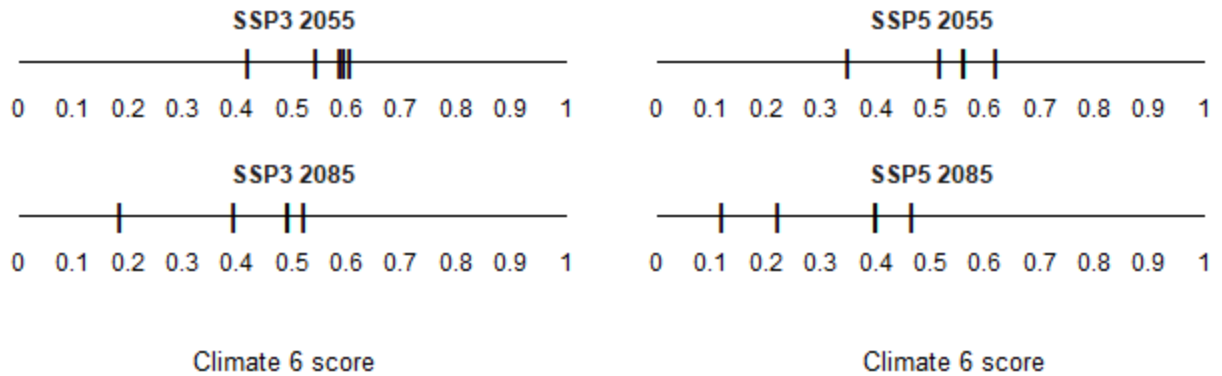


Figure A2. Comparison of projected future Climate 6 scores for *Drepanothrix dentata* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018; 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.

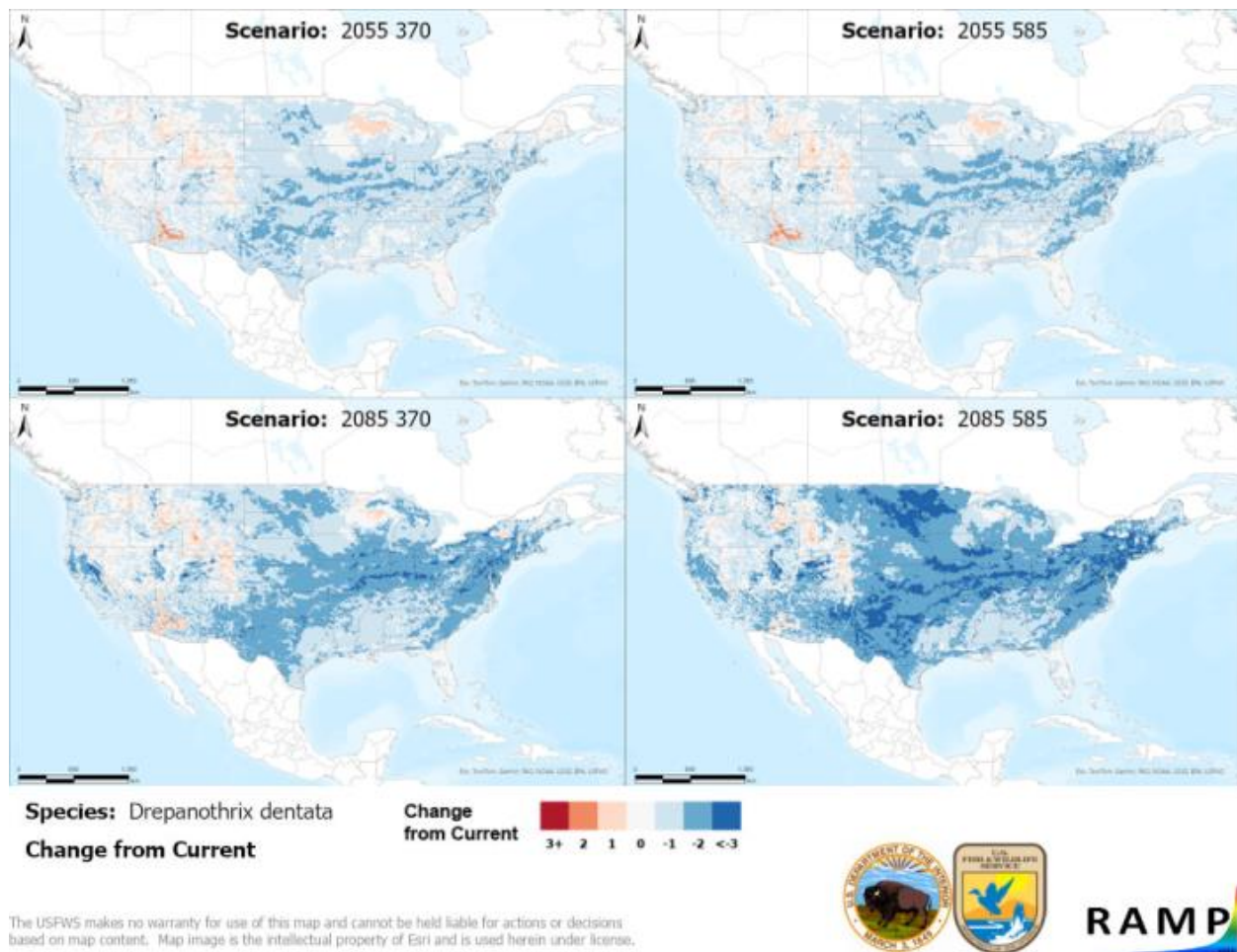


Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 4) and the median target point score for future climate scenarios (figure A1) for *Drepanothrix dentata* based on source locations reported by Fordyce (1901), Moore (1939), Clifford (1940), Smyly (1952), Cole (1955), Frantz and Cordone (1966), Frey (1982), Bureau of Reclamation (1993), Duigan and Kovach (1994), Mäemets et al. (1996), Gaviria-Melo et al. (2005), Naz and Najia (2008), Novichkova and Chertoprud (2015), Geraldles and Pasupuleti (2016), Adamczuck (2022), Hnin et al. (2022), GBIF Secretariat (2023), and Sonkeng et al. (2024). 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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