Seminole Ramshorn (*Planorbella duryi*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2023
Revised, February 2023, August 2024
Web Version, 1/6/2025

Organism Type: Mollusk
Overall Risk Assessment Category: Uncertain

Photo: Dat doris. Licensed under CC BY-SA 4.0. Available: https://commons.wikimedia.org/wiki/File:Planorbella_duryi_01.jpg (February 2023).

1 Native Range and Status in the United States

Native Range

From NatureServe (2023):

"This species is endemic to the Florida peninsula, occurring northwest as far north and west as Taylor County (Thompson, 1999) […]"

Harvey et al. (1989) list *Planorbella duryi* as indigenous to Texas.

Status in the United States

From NatureServe (2023):

"This species is endemic to the Florida peninsula, occurring northwest as far north and west as Taylor County (Thompson, 1999) but has been introduced widely. Many subspecies were described by Pilsbry (1934) but these all appear to represent morphological forms of the nominal *Planorbella duryi*. It was previously recorded as exotic on Hawaii only from O'ahu and Kaua'i (Cowie, 1997) but recently has been found in gardens and nurseries in Mau'i and Hawai'i (Hayes et al., 2007)."

Simpson et al. (2023) lists *Planorbella duryi* as introduced and established outside of captivity in Hawaii.

Harvey et al. (1989) list *Planorbella duryi* as indigenous to Texas.

From Lysne et al. (2011):

"We also collected shells of the nonnative *Planorbella duryi* Wetherby, 1879 in Stanley L. [Idaho] but failed to document an extant population there."

From Oliver et al. (1999):

"Taylor (1986) seems to have questioned the identification of this species [*Planorbella oregonensis*] at Salt Springs [Utah] by Berry (1947) and implied that what Berry (1947) actually found was a related species *Planorbella duryi*. This latter species, which Taylor (1986) indicated was 'not native to Utah, probably introduced by the aquarium trade', has not been reported from Utah by any other author, so far as is known."

From Yost (2008):

"Areas of concern [of disease transmission] include North Carolina where catfish and hybrid striped bass ponds are abundant with large populations of *P. trivolvis* and *Planorbella duryi* snails and pelican populations (J. Flowers, North Carolina State University, personal communication)."

From Taylor (1987):

"In June 1968 I visited the area and collected in Cook Spring [a thermal spring in New Mexico], obtaining only the common *Physa mexicana* Philippi and the introduced *Planorbella duryi* (Wetherby)."

NatureServe (2023) also reported introductions in Mississippi, New Mexico, and Wyoming. No information was found indicating establishment status of these introductions. Tronstad and Tronstad (2022) indicate that the species present in Wyoming may be *Planorbella trivolvis* (authors use the synonym *Helisoma trivolvis*) and not *P. duryi*.

Planorbella duryi can be found for sale within the United States (e.g., Aquarium Roots 2023).

Regulations

The valid name, *Planorbella duryi*, and the synonym *Helisoma duryi* were used to search for information for this report and relevant regulations.

The genera *Helisoma* and *Planorbis* are regulated in Hawaii (HDOA 2019). Please refer back to state agency regulatory documents for details on the regulations, including restrictions on activities involving this species. While effort was made to find all applicable regulations, this list may not be comprehensive. Notably, it does not include regulations that do not explicitly name this species or its genus or family, for example, when omitted from a list of authorized species with blanket regulation for all unnamed species.

Means of Introductions within the United States

From NatureServe (2023):

"[…] it has been dispersed throughout the continent with migratory birds and the aquatic plant trade."

Remarks

None.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2023):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Protostomia
Superphylum Lophozoa
Phylum Mollusca
Class Gastropoda
Order Basommatophora
Family Planorbidae
Genus *Planorbella*
Species *Planorbella duryi* (Wetherby, 1879)

According to MolluscaBase (2023), *Planorbella duryi* (Wetherby, 1879) is the current valid name for this species.

The following synonym of *Planorbella duryi* from MolluscaBase (2023) was used to search for information for this report: *Helisoma duryi* (Wetherby, 1879).

Size, Weight, and Age Range

From Taybi et al. (2023):

"The shell size of the collected juvenile specimens varied between 4 and 7 mm, whereas adult specimens reached a diameter of about 20 mm."

No information was found on weight or age range of *Planorbella duryi*.

Environment

From NatureServe (2023):

"This species is more frequent in lentic water bodies (e.g. spring seeps)."

From Alexandrowicz (2003):

"[…] mainly small water bodies, ponds, dam-lakes as well as artificial irrigation channels, reservoirs in parks, botanical gardens, farms and greenhouses."

Climate

From Alexandrowicz (2003):

"The distribution of the species in natural habitats is now limited to the area between 35° southern and 35° northern latitude. Outside this tropical and subtropical climatic zones it has been introduced in reservoirs with heated water […]"

From El-Emam and Madsen (1982):

"[…] the growth of *H. duryi* was optimal at 26°C […]"

"Survival was high for *H. duryi* with the lowest value found at 33°C (70%)."

Distribution Outside the United States

Native

Native range of *Planorbella duryi* is entirely within the United States, see Native Range in Section 1.

Introduced

From Alexandrowicz (2003):

"Numerous specimens of *Planorbella duryi* (Wetherby) were found unexpectedly by the author in Lake Albano (Central Italy). This species is a dominant component of the malacocoenosis inhabiting the lake and also of the thanatocoenosis accumulated on the beach."

“The rich population of *Planorbella duryi* found in Lake Albano in Italy develops in natural conditions.”

“About fifty years ago *Planorbella duryi* was introduced in Africa to be recorded by BROWN (1967), and a few years later by VAN BRUGGEN (1974) and APPLETON (1977), from five localities in the Republic of South Africa and Namibia. Their populations are less differentiated than those from Florida and only two subspecies (*H*. cf. *duryi seminole*, *H*. *duryi duryi*) have been distinguished there. The species was later found also in countries of equatorial Africa: Tanzania, Kenya and Sudan. […] *Helisoma duryi* was first reported from Brasil (PARAENSE 1976) and later from Peru. It has been found also in Cuba and the Isle of Youth as well as in Martinique and Guadeloupe (PERERA et al. 1984, POINTIER 2001).”

“During the last twenty years *Planorbella duryi* was introduced in Europe. In temperate areas it can live only in reservoirs with heated water, mainly in greenhouses, among plants deriving from the tropical zone. A relatively rich population of the nominotypical subspecies was described from the botanical garden in Cracow [Poland]. […] FECHTER & FALKNER (1990) have mentioned briefly the occurrence of *Planorbella duryi* in Europe, both in botanical gardens and open reservoirs with heated water, namely in Austria (Baden, Villach) and in Malta. It was also found in greenhouses of north-western Germany.”

Alternatively, Grano (2022) identifies the planorbid snail present in Lake Albano, Lazio, Italy, as *Helisoma scalare*, but does report *P. duryi* from the Italian regions of “[…] Liguria, Toscana, Lazio, Puglia, Calabria, Sicilia, Sardegna (Bodon et al., 2021).”

From Sánchez et al. (2021):

“In the Iberian Peninsula, it [*Planorbella duryi*] has been recorded in the city of Barcelona, Ebro River Basin, Tarragona [Quiñonero-Salgado et al. 2014], Elche, Alicante [Soria and Sahuquillo 2009], Castellón, Valencia, Mallorca [Quiñonero-Salgado et al. 2014] and the Canary Islands [Groh and García 2004]. Here, we present the first record of this species for Asturias.”

From Seddon (2011):

“This species […] is widely introduced in Europe, where it is found in aquariums, indoor pools and other artificial habitats. The species is often a temporary resident, and may die out.”

From Pointier et al. (2005):

“For example, its arrival in Guadeloupe was reported in the 1960s (Courmes et al., 1964) but it has not since then been detected at more than a few sites, despite the occurrence of numerous apparently favourable habitats. However, *H. duryi* has been more successful in the Nile Delta in Egypt where it occurs in all categories of canals and drains, co-existing to various degrees with other snail species (Yousif et al., 1993). The recent survey carried out by Lofty et al. (2005) also showed that the distribution of *H. duryi* extended to north-central Delta, Ismailia and Aswan City.”

From Taybi et al. (2023):

"In this paper, we report the first finding of an acclimated population of the exotic snail *Helisoma duryi* in Morocco."

From Mienis and Rittner (2012):

"According to these data, *Planorbella duryi* has been collected in Israel not only from such anthropogenic places as aquariums and pools in gardens and parks (see also Roll et al., 2009), but also from springs, streams and even from the Sea of Galilee (Mienis, 2009). […] Nevertheless, either temporary or permanent populations may be expected to occur near built up areas throughout Israel and Palestine (Milstein, Mienis & Rittner, 2012) […]"

From Tripathy et al. (2019):

"During the malacological survey in the Dalma Wildlife Sanctuary and different regions of Saranda forests of Deccan peninsula in Jharkhand [India], an unusual Florida's native freshwater mollusc Seminole Rams-Horn, *Planorbella duryi* from South Karo River was encountered."

"In India, this species has been reported from Godavari River of Dhule and Naski district in Maharashtra, however, taxonomic validity [of that observation] is in question (Magare, 2015)."

From Saito et al. (2023):

"Our findings indicate that *Planorbella duryi* (Wetherby, 1879) has become established on the Bonin Islands, and represents the first record of *P. duryi* in Japan."

From Laidemitt et al. (2020):

"A dense population of *Planorbella duryi* was found in Collins Pond [Antigua and Barbuda] […]"

Czaja et al. (2020) list *Planorbella duryi* as present in the Durango, Puebla, and Tabasco States of Mexico.

In addition to countries listed above, GBIF Secretariat (2023) lists *Planorbella duryi* as introduced to Norway, France, Sweden, Ireland, Portugal, Ukraine, Latvia, Jamaica, French Polynesia. No indication of establishment status was given with these listings.

Means of Introduction Outside the United States

From Grano (2022):

"Regarding the introduction of *H. duryi* and *H. scalare* in Italy, one of the most accredited hypotheses is that relating to the intentional release of this mollusc which is widely used in aquariology (Appleton, 1977; Giusti et al., 1995; Alexandrowicz, 2003, 2004; Mienis, 2004; Cianfanelli et al., [2007]; Reitano et al., 2007; Hallgass & Vannozzi, 2010; Mienis & Rittner,

2012). Other hypotheses concern the fish trade for sport fishing (Cianfanelli et al., [2007]; Mastrantuono et al., 2011) and the trade in nursery plants (Pons et al., 2003; [Quiñonero-]Salgado et al., 2014)."

Short Description

From Tripathy et al. (2019):

"Shell small, sinistral, pale translucent in coloration, finely striated, spire low and depressed with flat-topped, the aperture not advanced beyond upper margin and presence of wide aperture. Plane of aperture nearly vertical when viewed from the side. Narrowly umbilicate, Whorl 3-3.5."

From Taybi et al. (2023):

"The shells of *Helisoma duryi* are a pale, translucent brown colour. The 4.5 whorls are coiled in a plane, rapidly increasing, the left side is flat, and the right side is deeply umbilicated."

Biology

From El-Emam and Madsen (1982):

"[…] *H. duryi* was able to survive more than 4 weeks at 33°C and to start egg laying at this temperature […]"

"[…] minimum temperature for egg laying by *H. duryi* was 12°C […]"

From NatureServe (2023):

"[…] although seldom recorded, has a wide distribution, presumed large population, tolerance of a broad range of habitats, tolerance to habitat modification, lack of substantial immediate threats […]"

Human Uses

From Pointier et al. (2005):

"This species has become a very popular aquarium snail which might explain why numerous introductions have been reported all over the world […]"

From El-Emam and Madsen (1982):

"*Helisoma duryi* (Wetherby, 1879) has been proposed as a potential biological control agent against schistosomiasis due to its superiority in interspecific competition with various species of intermediate host snails under laboratory and semi-field conditions (Frandsen & Madsen 1979)."

Diseases

No information was found associating *Planorbella duryi* with any diseases listed by the World Organisation for Animal Health (2023).

According to Poelen et al. (2014), *Planorbella duryi* is a host to the following species of parasite: *Cercaria sphaera*, *Cercaria serrula*, *Cercaria tintinnabulum*, *Cercaria vesica*, *Clinostomum marginatum*, *Macroderoides* sp., *Macroderoides typica*, *Paramacroderoides pseudoechinus*, *Plesiocreadium typicum,* and *Spirorchis artericola*.

MolluscaBase (2023) lists *Alaria canis* and *Paramacroderoides echinus* as additional parasites of *Planorbella duryi*.

Threat to Humans

No information was found on threats to humans from *Planorbella duryi*.

3 Impacts of Introductions

From Pointier et al. (2005):

"However, despite numerous and repeated introductions, this snail has almost never shown important abilities to spread, remaining restricted to a limited number of sites."

The following information discusses *potential* impacts of *Planorbella duryi* introductions.

From Laidemitt et al. (2020):

"*Physa marmorata* and *P. duryi* may also have the potential to displace *B*[*iomphalaria*] *glabrata* or prevent its reestablishment because of their competitive ability [Madsen 1979, Ebbs et al. 2018]."

The genera *Helisoma* and *Planorbis* are regulated in Hawaii (HDOA 2019). See section 1 for details.

4 History of Invasiveness

The History of Invasiveness for *Planorbella duryi* is classified as Data Deficient. *Planorbella duryi* is established outside of its native range across the globe. It has established populations across the tropics and in thermally regulated waters outside of the tropics. However, there is a lack of clear, convincing, and reliable documentation regarding impacts or lack of impacts from introductions, or a history of significant trade volume.

5 Global Distribution

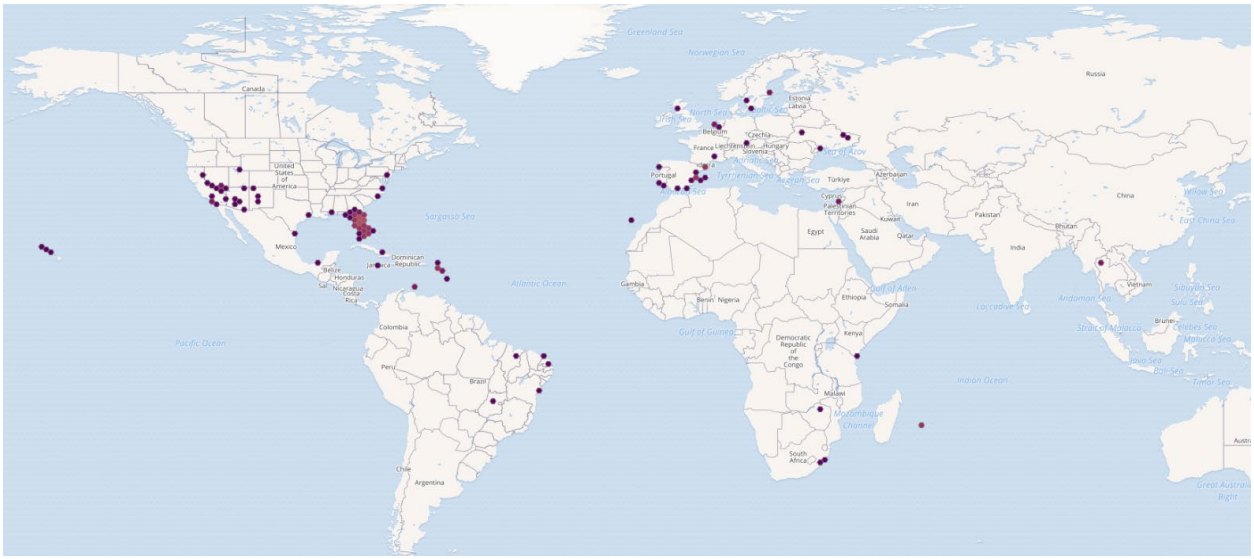

Figure 1. Reported global distribution of *Planorbella duryi*. Map from GBIF Secretariat (2023). Observations are reported from the United States, Canary Islands, Brazil, Anguilla, St Kitts and Nevis, Montserrat, Antigua and Barbuda, Guadeloupe, Dominica, Martinique, St Lucia, Zimbabwe, South Africa, Kenya, France, Spain, Austria, Netherlands, Sweden, Ukraine, the United Kingdom, Mexico, Israel, Thailand, Germany, and Portugal. The observations in Sweden, Poland, the United Kingdom, the Netherlands, eastern Ukraine, northwestern Germany, and Thailand represent populations established inside greenhouses or other thermally regulated structures and were not used to select source points for the climate match. The observations in Austria, Ukraine, Réunion, and Zimbabwe could not be confirmed to represent established wild populations and were not used for the climate match analysis.

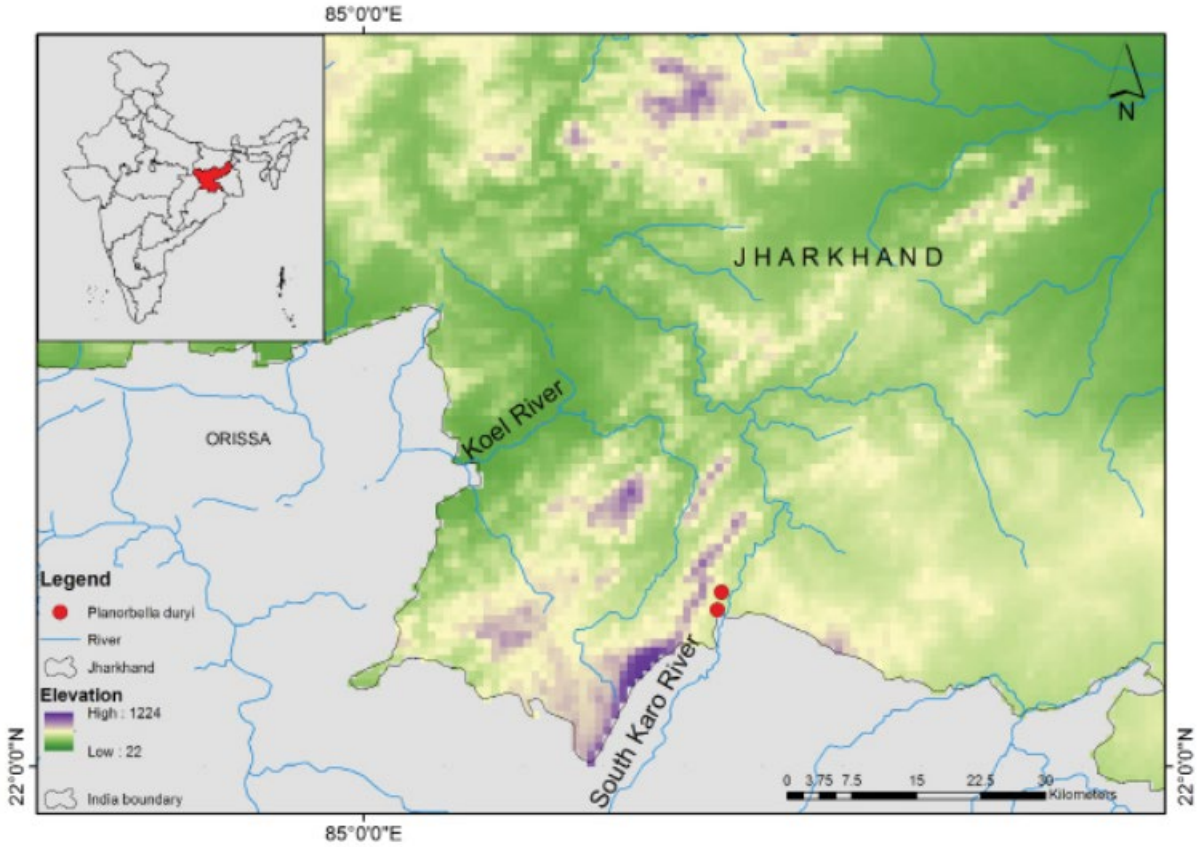

Figure 2. Reported distribution of *Planorbella duryi* in India. Map from Tripathy et al. (2019; CC BY-NC-ND 2.0 FR). Observations are reported in the South Karo River in the southern part of the Jharkhand region of India.

The locations of additional established populations were given in Alexandrowicz (2003; Italy), Lofty and Lofty (2015; Egypt), Saito et al. (2023; Japan), and Taybi et al. (2023; Morocco).

6 Distribution Within the United States

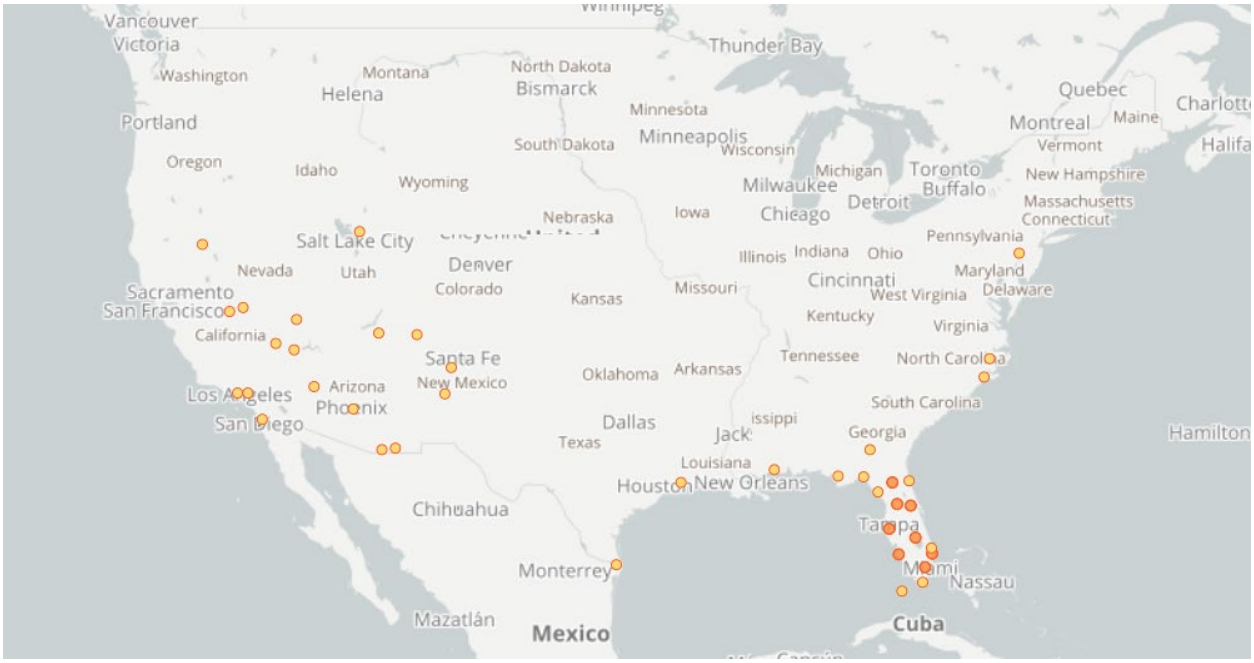

Figure 3. Reported distribution of *Planorbella duryi* in the contiguous United States. Map from GBIF-US (2023). The observations in Arizona, California, Nevada, and Pennsylvania were not indicative of an established wild population and were not used to select source points for the climate match analysis. The observations in New Mexico were from thermally regulated waters and were not used in the climate match analysis. The species identification of the observations in Mississippi and Utah were indicated to be in question in either record information or literature and were not used in the climate match analysis (Oliver et al. 1999, Tronstad and Tronstad 2022, GBIF Secretariat 2023).

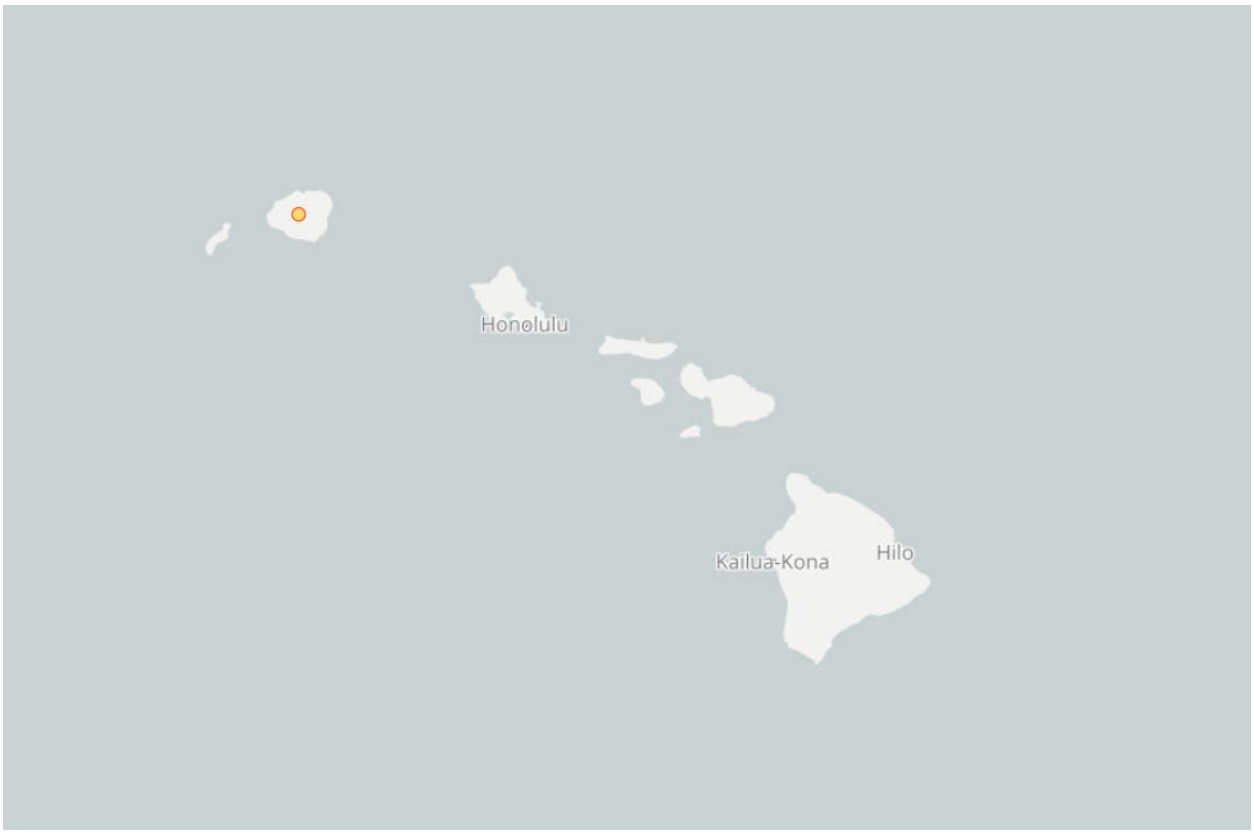

Figure 4. Reported distribution of *Planorbella duryi* in Hawai‘i. Map from GBIF-US (2023). Observation is on the island of Kaua‘i.

7 Climate Matching

Summary of Climate Matching Analysis

Generally, high climate match for *Planorbella duryi* to the contiguous United States was found in the native range in Florida and extending north along the Atlantic coast to southern Virginia. Small areas of high match were also found in eastern Texas and in the western States. Areas of low match were found in the Northeast, Northern Plains, Olympic Peninsula in Washington, and the Sierra-Cascade Mountains. The remaining areas of the contiguous United States had a generally medium climate match. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.647, 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 *Planorbella duryi* (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.

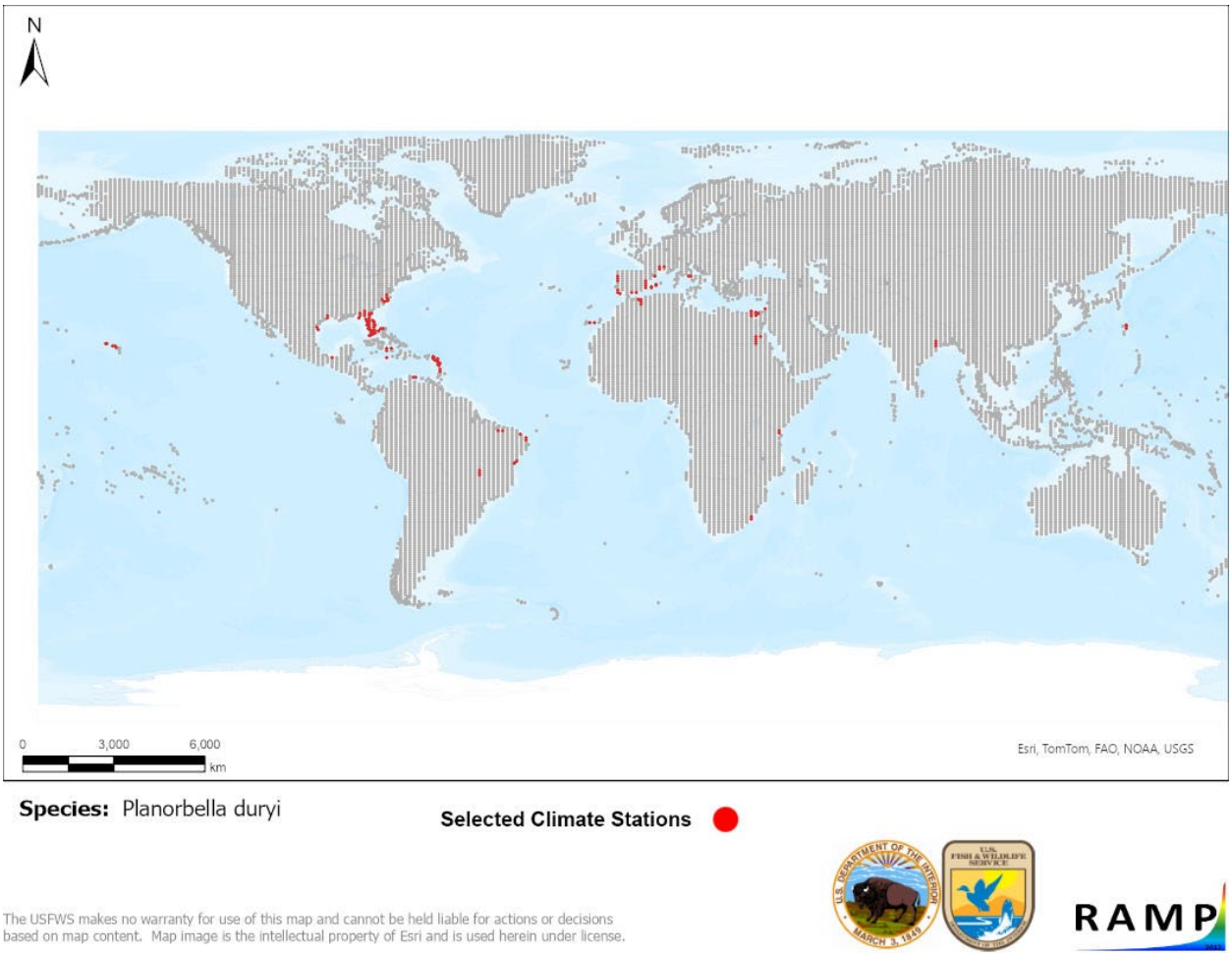

Figure 5. RAMP (Sanders et al. 2023) source map showing weather stations in the world selected as source locations (red; United States (including Hawaii), Spain, Canary Islands, Brazil, Anguilla, St Kitts and Nevis, Montserrat, Antigua and Barbuda, Guadeloupe, Dominica, Martinique, St Lucia, Zimbabwe, South Africa, Kenya, France, Austria, Netherlands, Sweden, Mexico, Israel, Thailand, Germany, and Portugal) and non-source locations (gray) for *Planorbella duryi* climate matching. Source locations from Alexandrowicz (2003), Lofty and Lofty (2015), Tripathy et al. (2019), GBIF Secretariat (2023), Saito et al. (2023), and Taybi et al. (2023). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves. Source locations do not include localities with established nonnative populations within thermally regulated waters.

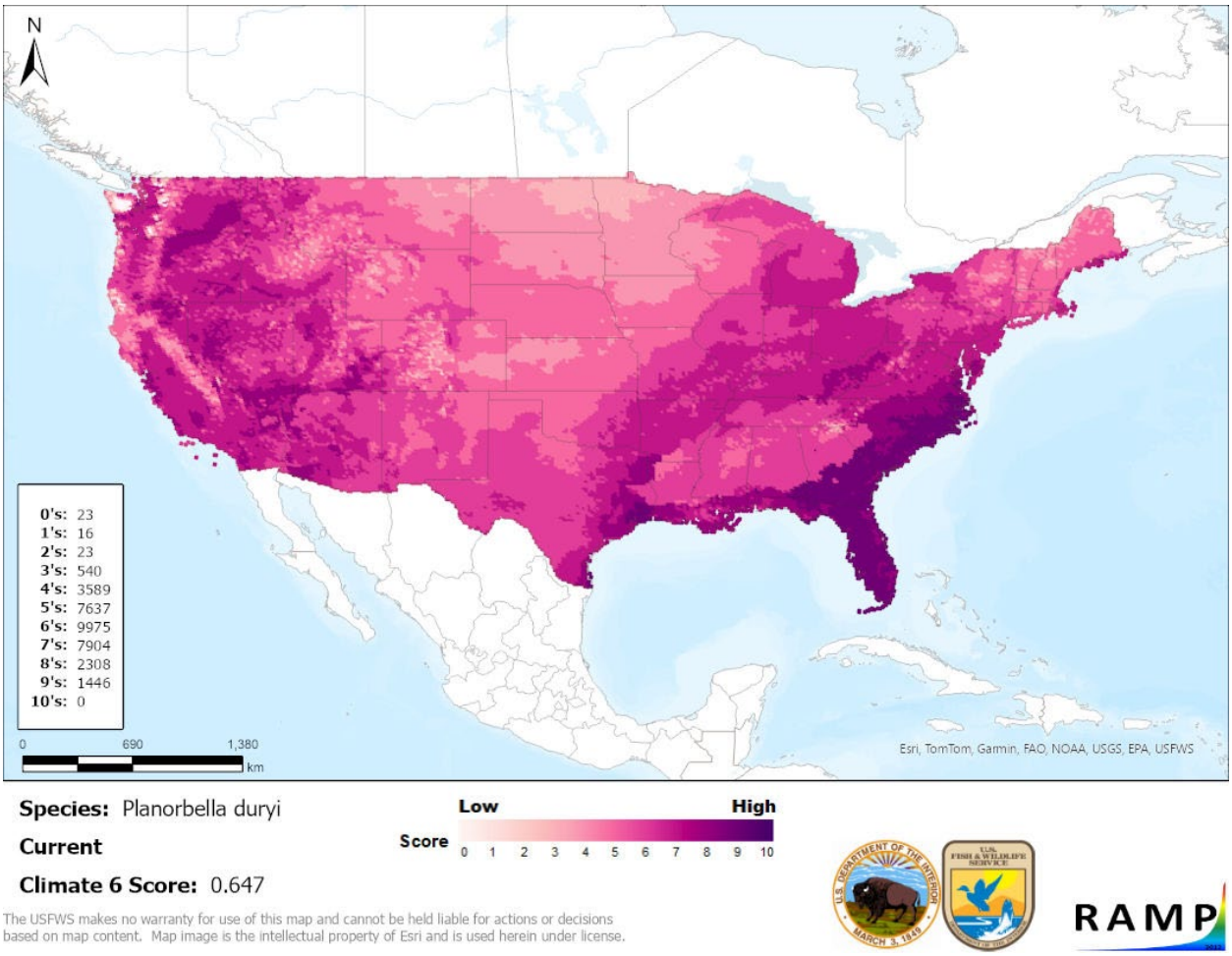

Figure 6. Map of RAMP (Sanders et al. 2023) climate matches for *Planorbella duryi* in the contiguous United States based on source locations reported by Alexandrowicz (2003), Lofty and Lofty (2015), Tripathy et al. (2019), GBIF Secretariat (2023), Saito et al. (2023), and Taybi et al. (2023). Counts 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 *Planorbella duryi* is classified as Low. Information was available regarding the biology and ecology of the species. Information regarding the distribution of the species, particularly regarding introductions and establishment status, was somewhat inconsistent. It is not thought that any issues with the distribution information impact the interpretation of the climate match analysis. Information on impacts from introduced populations was not found.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Planorbella duryi, Seminole Rams-horn, is a mollusk that is native to the Florida Peninsula. *P duryi* can inhabit both man-made and natural freshwater systems, including thermally

regulated waters. This species has become a very popular aquarium snail. Many other hard-to-distinguish planorbid snail species are also popular aquarium snails. Hawaii has listed any species in the genus *Helisoma* on their conditional list, which would include a synonym of *P. duryi*. The History of Invasiveness for *P. duryi* is classified as Data Deficient due to *P. duryi* being established outside of its native range, with a lack of clear, convincing, and reliable documentation of impacts or lack of impacts from introductions. The climate match analysis for the contiguous United States indicates establishment concern for this species outside its native range. The climate match for *P. duryi* was highest in the Southeast, including the native range and areas surrounding the native range. The Certainty of Assessment for this ERSS is classified as Low due to the limited available information regarding *P. duryi*'s history of invasiveness. The Overall Risk Assessment Category for *Planorbella duryi* 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: No additional remarks.**
- **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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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 Alexandrowicz (2003), Lofty and Lofty (2015), Tripathy et al. (2019), GBIF Secretariat (2023), Saito et al. (2023), and Taybi et al. (2023).

Under the future climate scenarios (figure A1), on average, high climate match for *Planorbella duryi* was projected to occur in the Mid-Atlantic, Southern Atlantic Coast, and Southern Florida regions of the contiguous United States. These areas include the native range of the species in Florida. Areas of low match were consistently found in the Northern and Southern Plains under all scenarios. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.527 (model: UKESM1-0-LL, SSP5, 2085) to a high of 0.680 (model: IPSL-CM6A-LR, SSP5, 2055). All future scenario Climate 6 scores were above the Establishment Concern threshold, indicating that Yes, there is establishment concern for this species under future scenarios. The Climate 6 score for the current climate match (0.647, figure 6) falls within 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 Colorado Plateau, Great Lakes, and Northeast 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 most time step and climate scenarios, areas within the Southeast saw a large decrease in the climate match relative to current conditions. Additionally, areas within the Appalachian Range, Colorado Plateau, Gulf Coast, Northern Pacific Coast, Southern Atlantic Coast, Southern Florida, Southwest, and Western Mountains saw a moderate decrease in the climate match relative to current conditions. Additional, very small areas of large or moderate change may be visible on the maps (figure A3). The degree of change increased between 2055 and 2085.

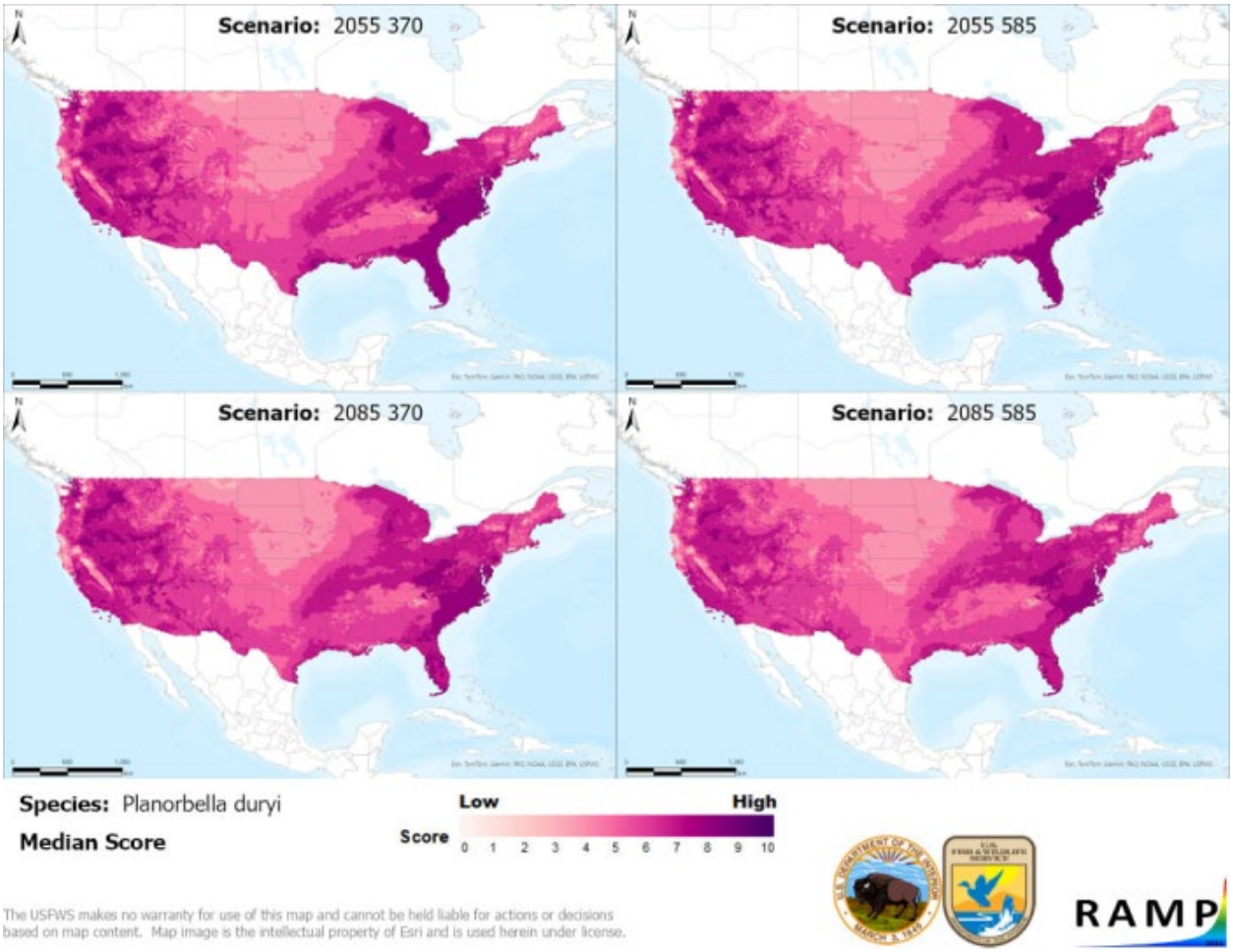

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Planorbella duryi* in the contiguous United States. Climate matching is based on source locations reported by Alexandrowicz (2003), Lofty and Lofty (2015), Tripathy et al. (2019), GBIF Secretariat (2023), Saito et al. (2023), and Taybi et al. (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.

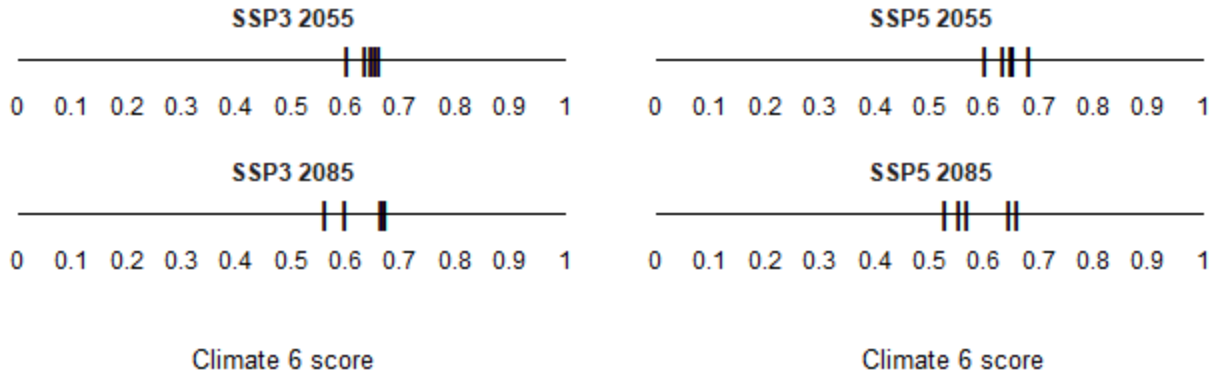

Figure A2. Comparison of projected future Climate 6 scores for *Planorbella duryi* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018;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

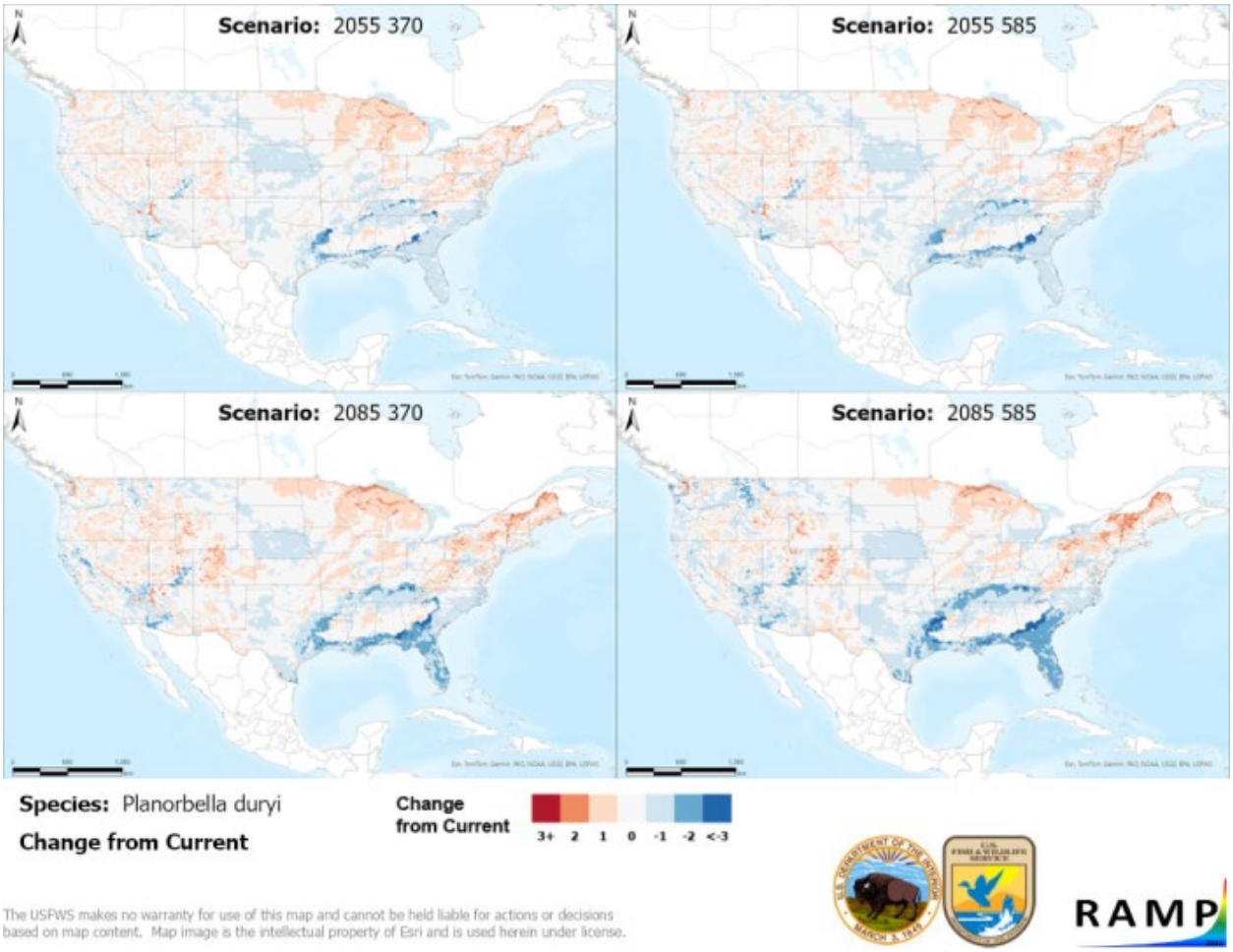

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 6) and the median target point score for future climate scenarios (figure A1) for *Planorbella duryi* based on source locations reported by Alexandrowicz (2003), Lofty and Lofty (2015), Tripathy et al. (2019), GBIF Secretariat (2023), Saito et al. (2023), and Taybi et al. (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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