Sharpbelly (*Hemiculter leucisculus*)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, August 2011
Revised, August 2014 and July 2015

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1 Native Range, and Status in the United States

Native Range
From Froese and Pauly (2015):

"Asia: China, North and South Korea, Hong Kong, Japan and Amur River basin to Red River drainages; Mongolia [Kottelat 2006]."

Status in the United States
This species has not been reported as introduced in the United States.

Means of Introductions in the United States
This species has not been reported as introduced in the United States.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2015):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Ostariophysi
Order Cypriniformes
Superfamily Cyprinoidea
Family Cyprinidae
Genus Hemiculter Bleeker, 1860
Species *Hemiculter leucisculus* (Basilewsky, 1855)"

"Taxonomic Standing: valid"

Size, Weight, and Age Range

From Froese and Pauly (2015):

"Maturity: Lm ?, range 9 - 13 cm
Max length : 23.0 cm SL male/unsexed; [Lu 1991]; common length : 16.9 cm SL male/unsexed; [Nichols 1943]"

From CABI (2015):

"Longevity - 8 years."

Environment

From Froese and Pauly (2015):

"Freshwater; brackish; benthopelagic; pH range: 7.0 - ? ; dH range: 15 - ?; depth range 0 - 10 m [Shao and Lim 1991]."

Climate/Range

From Froese and Pauly (2015):

"Tropical; 18°C - 22°C [Baensch and Riehl 1991]"

Distribution Outside the United States

Native

From Thinh et al. (2012):

"China; Hong Kong; Japan; Korea, Democratic People's Republic of; Korea, Republic of; Mongolia; Russian Federation; Taiwan, Province of China; Viet Nam"

Introduced

From Thinh et al. (2012):

"Afghanistan; Iran, Islamic Republic of; Uzbekistan"

Means of Introduction Outside the United States

From CABI (2015):

"In 1958, *H. leucisculus* was unintentionally introduced in Turkmenistan to the Karametniyaz fish farm and the Karakum Canal from the Yangtze River. Then in 1961 it was introduced (again with larvae of Asian carp) in Uzbekistan to the Akkurgan (later Balykchi) fish farm in the Tashkent region. It was transferred, with fish seed, to other fish farms of the region. *H. leucisculus* has escaped from fish farms and via the extensive network of irrigation canals has spread to the plains of the Aral Sea Basin to the drainages of the Amu Darya, Syr Darya, Zarafshan, Qashqa Darya, and Tedzhen rivers."

"In Iran, *H. leucisculus* was first reported from the Anzali Lagoon by Holcík and Razavi (1992) where it was probably introduced by accident along with Asian carp from Central Asia in 1967 (Holcík and Razavi, 1992)."

"In the Razdolnaya River (Far East Russia) *H. leucisculus* was unintentionally introduced from Khanka Lake and probably from China as a result of aquaculture activity (Kolpakov et al., 2010). In the Artemovka River (Far East Russia) *H. leucisculus* was unintentionally introduced from Khanka Lake as a result of aquaculture activity."

Short description

From Froese and Pauly (2015):

"Dorsal spines (total): 3; Dorsal soft rays (total): 7; Anal spines: 3; Anal soft rays: 11 - 13. Completed lateral line, went downward suddenly at the pectoral fin, forming an angle, going upward along the anal fin, till the middle of the caudal fin. Green gray in the back, white in the stomach [Lu 1991]."

Biology

From Thinh et al. (2012):

"Usually found in large and medium-sized rivers in shallow water over sandy bottom, but sometimes occurs in pools along the bed of mountain streams (Serov et al. 2006). It is also abundant in ponds, lakes and backwaters of rivers. It is highly tolerant to water pollution."

From CABI (2015):

"In Uzbekistan sexual maturity is attained at the age of 2-3 years and at a length of 7-10 cm. Spawning is fractional and takes place from May to July. The average egg diameter is 0.58±0.01 mm. In Kazakhstan the absolute fecundity is 6000-13400 eggs (Mamilov, 2011)."

"*H. leucisculus* is an omnivorous species with a broad feeding plasticity."

"In the native area, e.g. in the Amur drainage, *H. leucisculus* mainly feeds on macrophytes, zooplankton, algae and insects (Markovtsev, 1980). Nikolski (1956) indicated that the basis of diet for this species in Lake Khanka was zooplankton and in particular cladocerans."

"The diet of introduced *H. leucisculus* in Peter the Great Bay (Far East Russia) is discussed in Dolganova et al. (2008)."

"In water bodies of Kazakhstan and Turkmenistan the diet of this fish consists mostly of vegetative food both by the frequency of encounters and volume. Of the animal food, a significant part consists of crustaceans, insects and their larvae. Cases of predation have also been reported (Borisova, 1971; Shakirova and Nikolaev, 1991; Mitrofanov et al., 1992)."

"The intestines of *H. leucisculus* from Uzbekistan mainly contained detritus, and remnants of higher plants and algae (Khurshut and Rakhmatullaeva, 2005). Of the animals, the most frequently recorded were different stages of insects and crustaceans. Of the insects *H. leucisculus* prefers the larvae of dragonflies, chironomids and the larvae of other dipterans; of crustaceans, cladocerans are reported most frequently."

Human uses

From Froese and Pauly (2015):

"Fisheries: minor commercial; gamefish: yes"

Diseases

From Sohn et al. (2009):

"A survey was performed to investigate the infection status of fishborne trematode (FBT) metacercariae in freshwater fish from Guangxi Zhuang Autonomous Region, China. … *C[hlonorchis] sinensis* was found in a *Hemiculter leucisculus*"

There are no known OIE reportable diseases listed for this species.

Threat to humans

From CABI (2015):

"*H. leucisculus* is considered as a pest on fish farms and competitor of juveniles of commercial species. It has also been reported to feed on farmed fish eggs and fry."

3 Impacts of Introductions

From CABI (2015):

"*H. leucisculus* may compete with the native species and might also feed on their eggs and fry. It has displaced native species in the Aral Sea Basin due to its higher resistance to predators, the high fecundity and its ability to eat a wide range of food."

From Patimar (2007):

"Alma-Gol and Ala-Gol contained 89.80% and 79.57% (of total frequency of fishes) of none-indigenous species respectively, indicating decreasing of native fish fauna. The most frequent noneindigenous species were *H. leucisculus* in Alma-Gol (58%), *C. auratus* in Ala-Gol (77.6%) and *H. leucisculus* in Adji-Gol (16.82%). As numerical abundance, two none-indigenous species *H. leucisculus* and *C. auratus* had the highest biomass in the Alma-Gol and Ala-Gol respectively. This situation highlights the importance of conservation and protection measures. Therefore, if greater emphasis is not placed on the conservation of native fishes with no direct economic values, these species could face continuous decline or might be completely lost."

"Previously reported native species *Silurus galnis* (in Alma-Gol and AlaGol) and *Neogobius* sp. (in Alma-Gol) (Abdoli, 2000; Kiabi et al., 1999b) were not observed in the present study. Furthermore, another native species the *B. capito*, which belongs to the "Least Concern" category of IUCN with the widest distribution range in the Caspian basin (Abdoli, 2000), was recorded only occasionally and in small number in Adji-Gol. It can be concluded that degradation has occurred in native fish species communities. The reason for their decline could be habitat degradation due to appearance of none-indigenous species in high frequency. In many cases it has been shown that that variation in abundance of native species in the isolated ecosystems is clearly associated with abundance of noneindigenous species, their ability to utilize available food resources and high reproduction, e.g. *H. leucisculus* and *C. auratus* (Kukuradze and Mariash, 1975; Holcik and Razavi, 1992)."

From Froese and Pauly (2015):

"Displaced local species. Show more rapid growth and higher fecundity than under native conditions [Rosenthal 1976]."

4 Global Distribution

Figure 1. Global distribution of *Hemiculter leucisculus*. Map from GBIF (2015).

5 Distribution within the United States

This species is not currently believed to be in United States waters.

6 Climate Match

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) is high in the north-central U.S. and in southwest Florida under current climate conditions. Medium to medium-high matches are found in patches across the West, in the Southeast along the Atlantic coast, and in a band through the Southern Plains under current conditions. The West Coast and much of the East are a low climate match under current conditions. Climate match is predicted to remain high in the West under a range of potential future climate scenarios. Under more extreme future scenarios, climate match is predicted to decline considerably in the southeast and north-central U.S. Climate 6 score indicates that the contiguous U.S. has a high climate match overall under both current and projected future conditions. The range for a high climate match is 0.103 and greater; Climate 6 score of *H. leucisculus* is 0.373 currently, while scores for future scenarios range from 0.156 to 0.252.

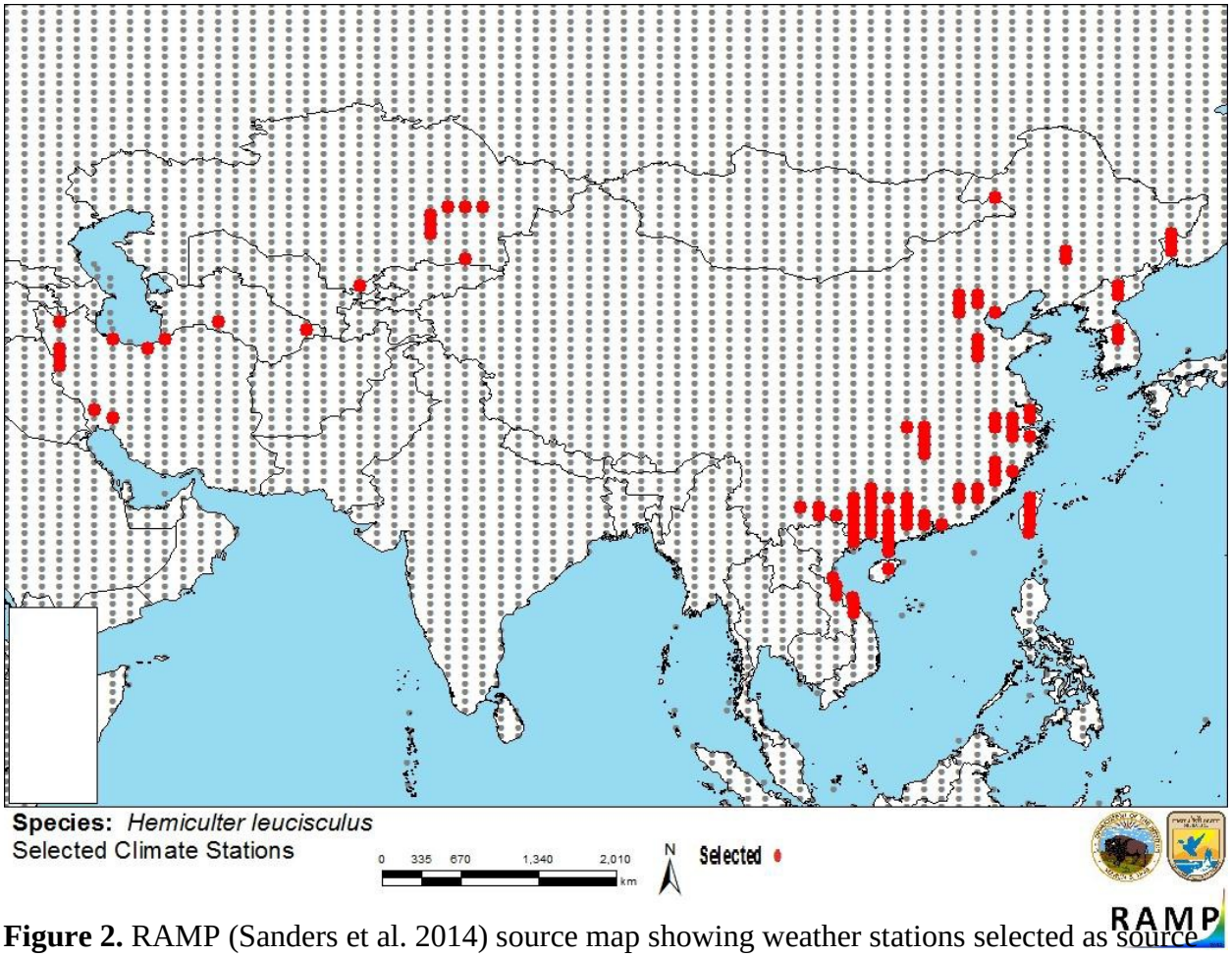

Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Hemiculter leucisculus* climate matching. Source locations from CABI (2015), GBIF (2015), and Zareian et al. (2015).

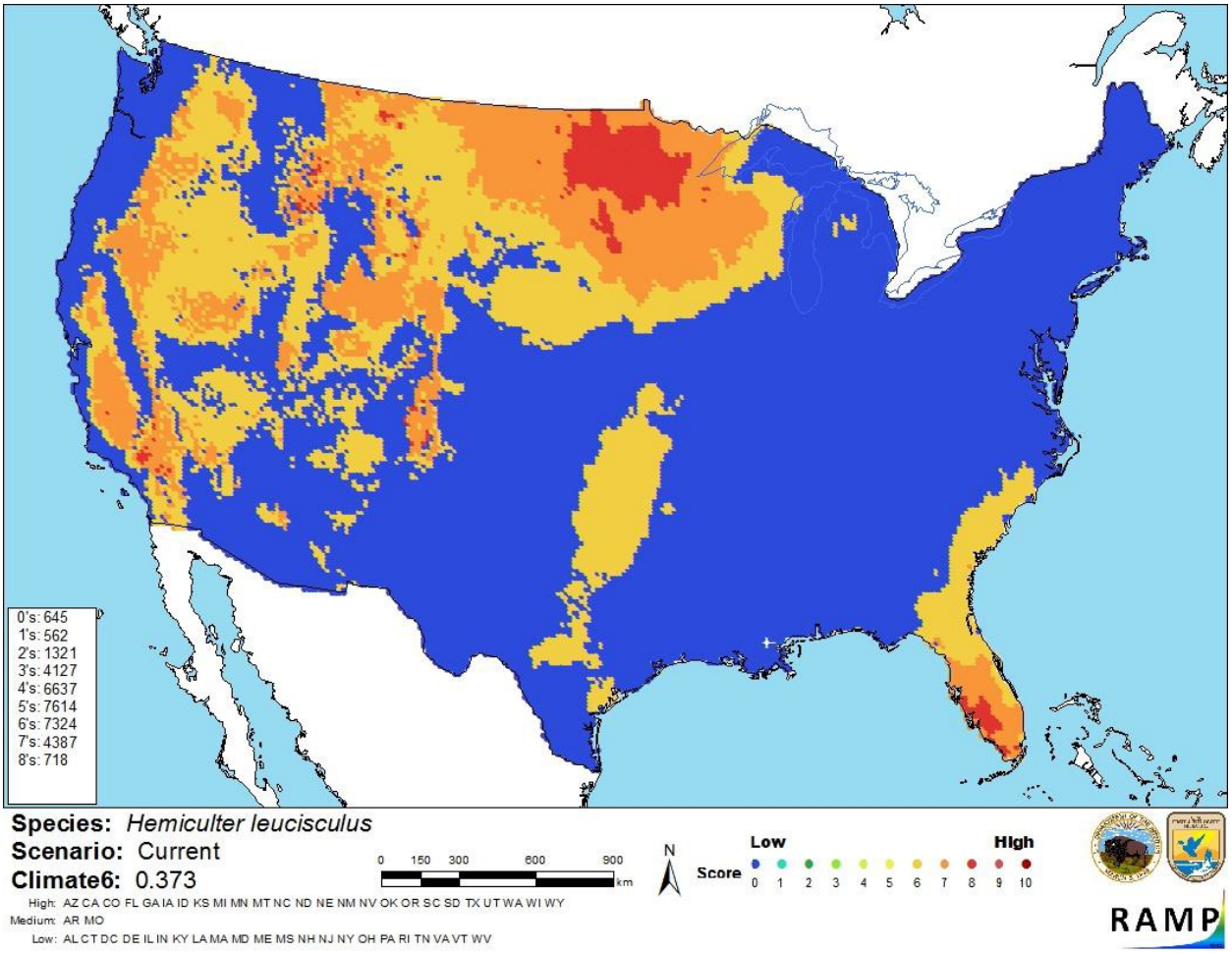

Figure 3. Map from RAMP (Sanders et al. 2014) of current climate match for *Hemiculter leucisculus* in the continental United States based on source locations reported by CABI (2015), GBIF (2015), and Zareian et al. (2015). 0= Lowest match, 10=Highest match.

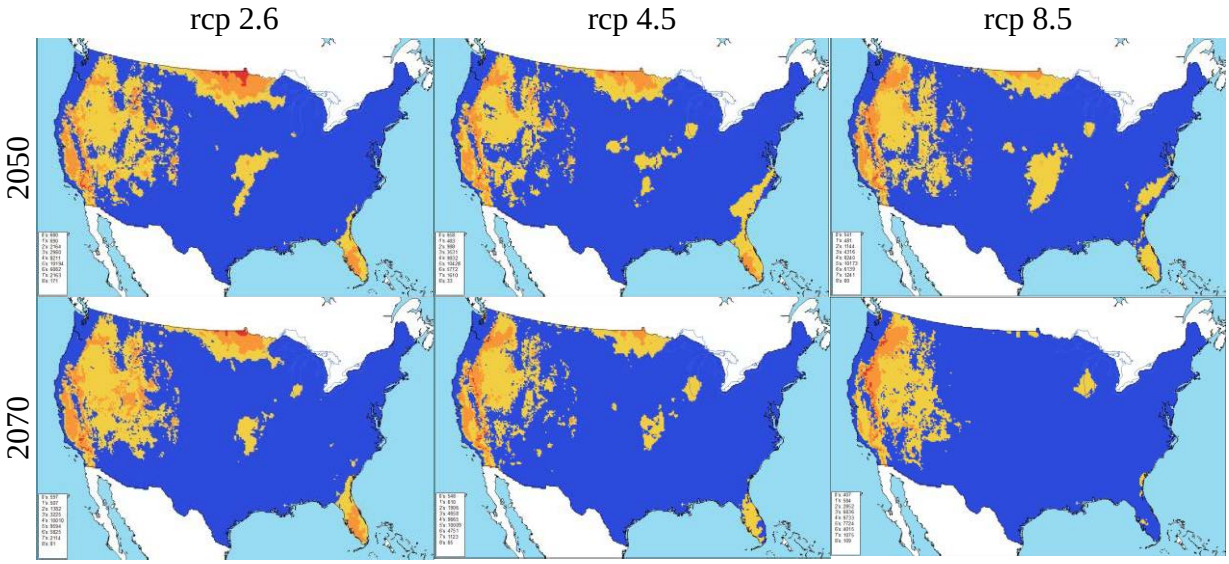

Figure 4. Maps from RAMP (Sanders et al. 2014) of potential future climate matches for *H. leucisculus* in the contiguous United States based on source locations reported by CABI (2015), GBIF (2015), and Zareian et al. (2015). Climate source data provided by Worldclim using the Geophysical Fluid Dynamic Laboratory Couple Physical Model. RCPs used: 2.6, 4.5, and 8.5. Generations: 2050 and 2070. Blue = Lowest match, Red = Highest match.

7 Certainty of Assessment

Information on the biology and distribution of *H. leucisculus* is available, but detailed information on its impacts in non-native ecosystems is lacking. Available information about impacts on native species is generally speculative. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Continental United States

Hemiculter leucisculus has been introduced accidentally outside its native range through aquaculture, mixed in with Asian carp. In central Asia, *H. leucisculus* has become the most common fish species in some water bodies since its introduction, and it readily disperses to new locations through canals. The strong success of *H. leucisculus* where introduced suggests impacts on native species through competition, but no impacts have been clearly documented. Climate match of *H. leucisculus* to the contiguous U.S. is high. Overall risk for this species is uncertain.

Assessment Elements

- ☐ **History of Invasiveness (Sec. 3):** Uncertain
- ☐ **Climate Match (Sec.6):** High
- ☐ **Certainty of Assessment (Sec. 7):** Low
- ☐ **Overall Risk Assessment Category: Uncertain**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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10 References Quoted But Not Accessed

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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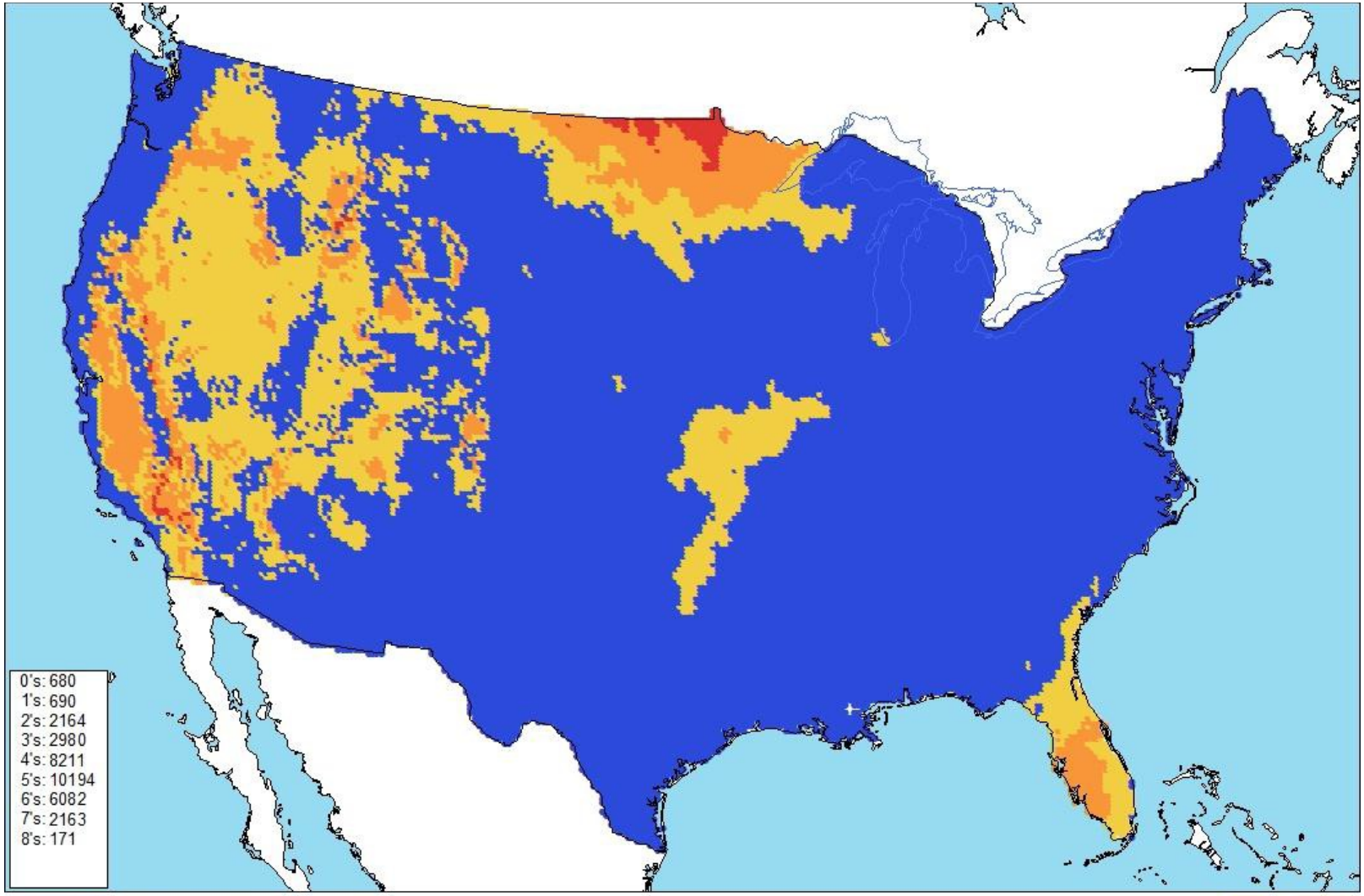
Appendices

The following are larger figures of climate match maps from Figure 4. These larger figures allow the reader to examine results in additional detail.



Species: *Hemiculter leucisculus*

Scenario: GFDL 2050 rcp2.6

Climate6: 0.252

0 150 300 600 900 km

N

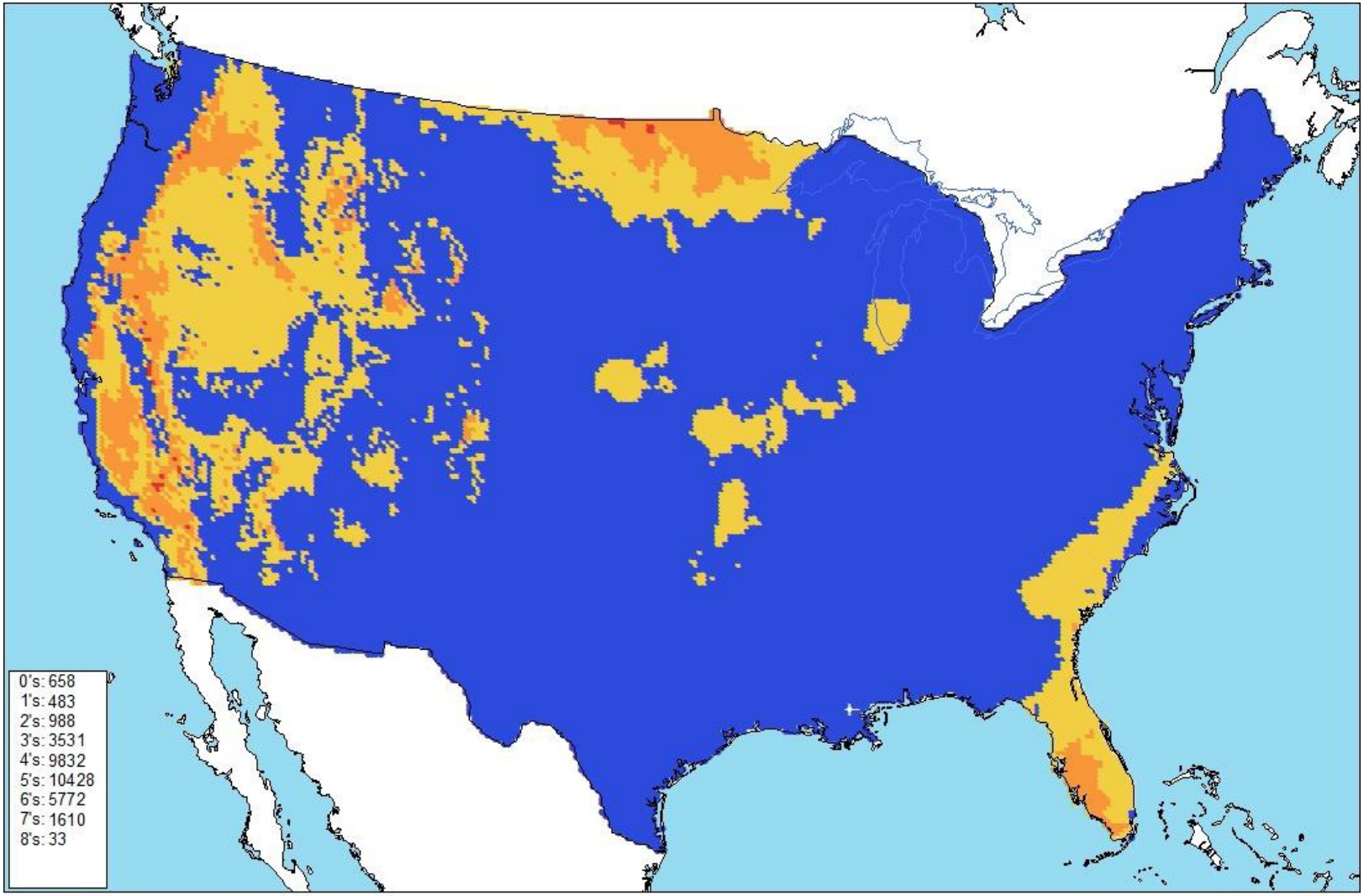
Score: Low 0 1 2 3 4 5 6 7 8 9 10 High

High: AZ CA CO FL ID KS MN MO MT ND NV OK OR SD UT WA WI WY

Medium: GA IL NE NM SC

Low: AL AR CT DC DE IA IN KY LA MA MD ME MI MS NC NH NJ NY OH PA RI TN TX VA VT WV

RAMP



Species: *Hemiculter leucisculus*
Scenario: GFDL 2050 rcp4.5
Climate6: 0.222

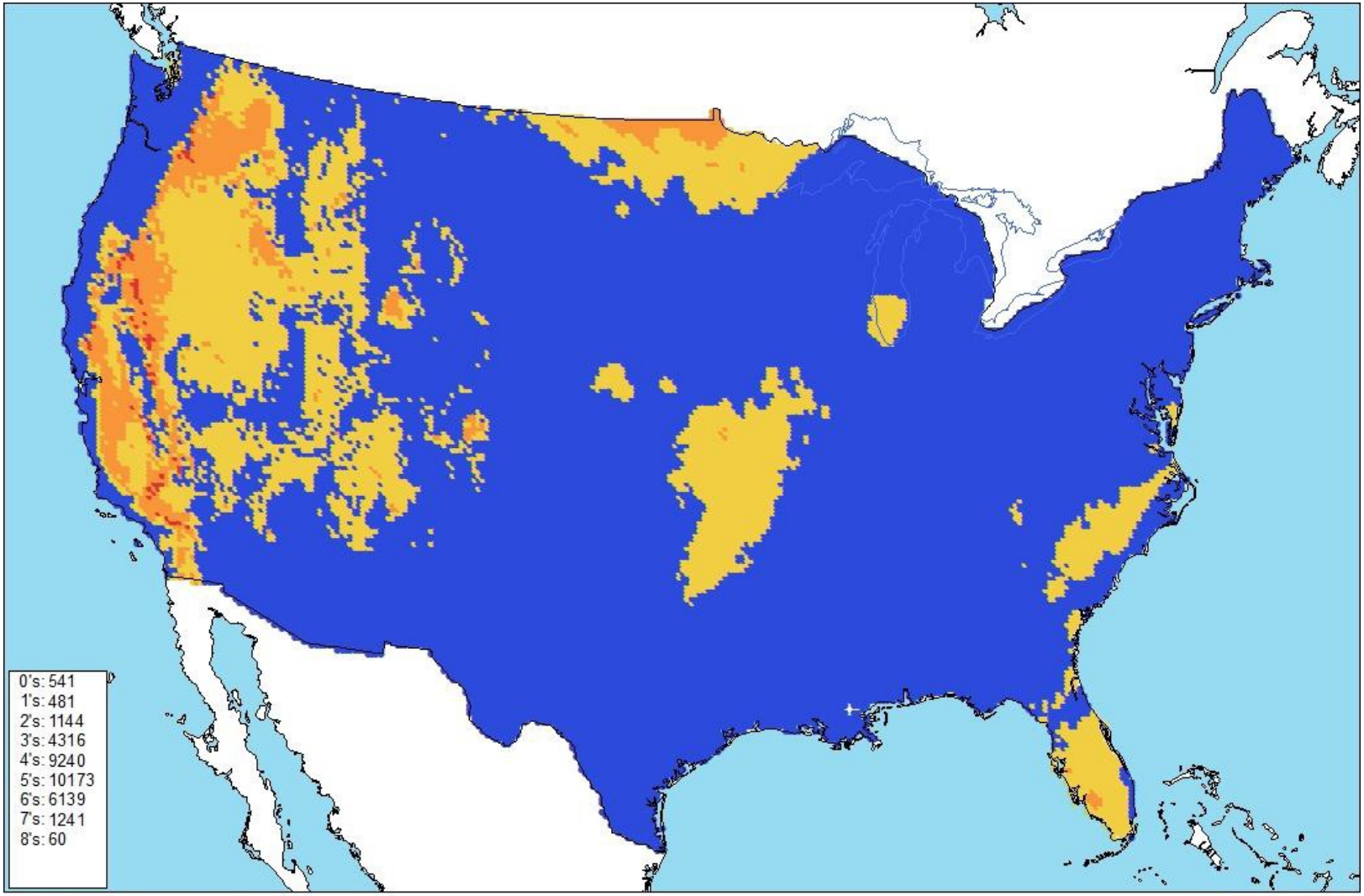
0 150 300 600 900 km

N

Score: Low 0 1 2 3 4 5 6 7 8 9 10 High

High: AZ CA FL GA ID IL MN MO MT NC ND NE NV OR SC UT WA WY
Medium: AR CO IN KS NM OK SD VA WI
Low: AL CT DC DE IA KY LA MA MD ME MI MS NH NJ NY OH PA RI TN TX VT WV

RAMP



Species: *Hemiculter leucisculus*

Scenario: GFDL 2050 rcp8.5

Climate6: 0.223

0 150 300 600 900 km

N

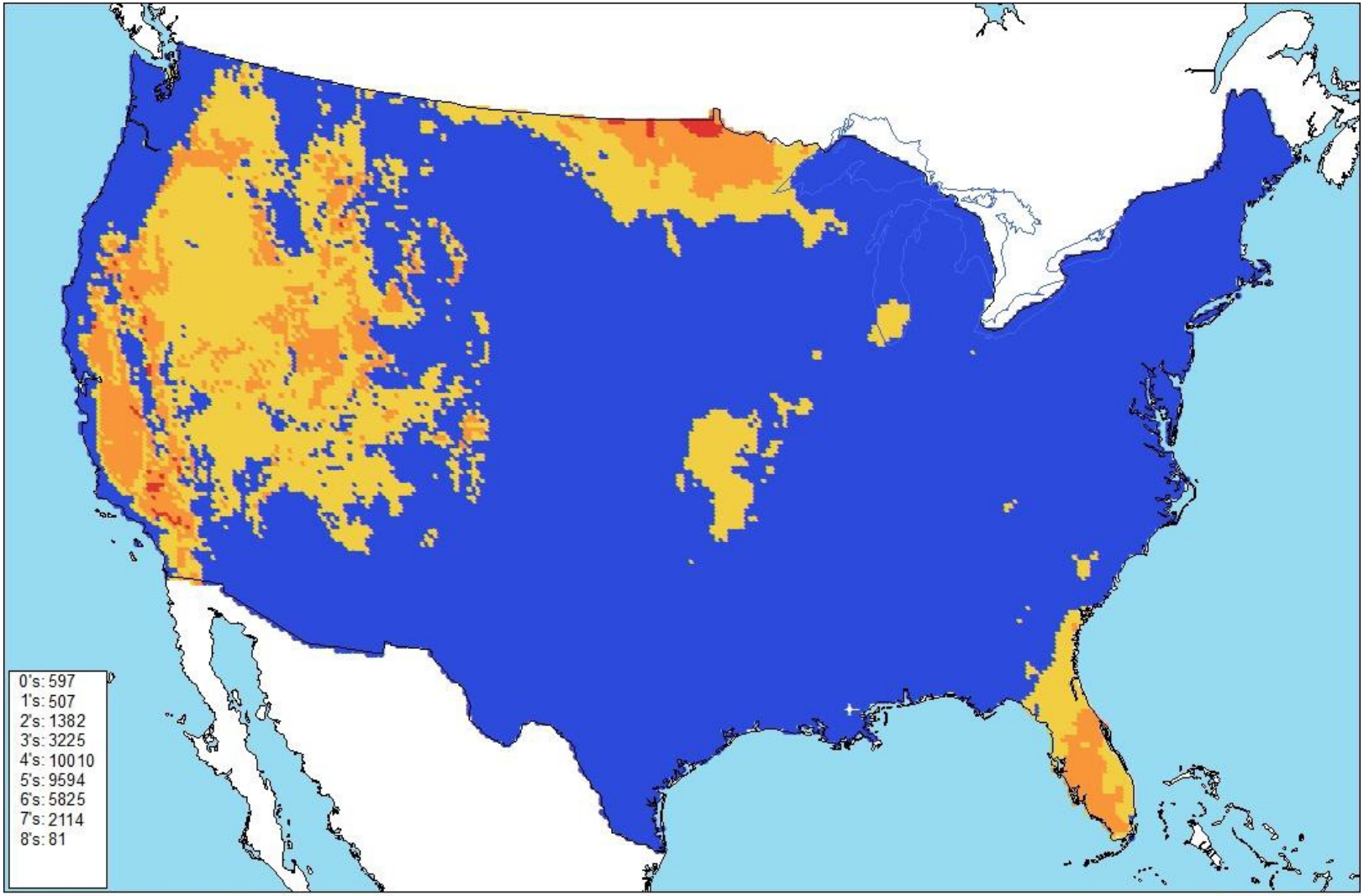
Score: Low 0 1 2 3 4 5 6 7 8 9 10 High

High: AR AZ CA CO FL ID KS MN MO MT NC ND NV OK OR SC UT WA WY

Medium: GA IA IL MD NE NM TN VA WI

Low: AL CT DC DE IN KY LA MA ME MI MS NH NJ NY OH PA RI SD TX VT WV

RAMP



Species: *Hemiculter leucisculus*
Scenario: GFDL 2070 rcp2.6
Climate6: 0.241

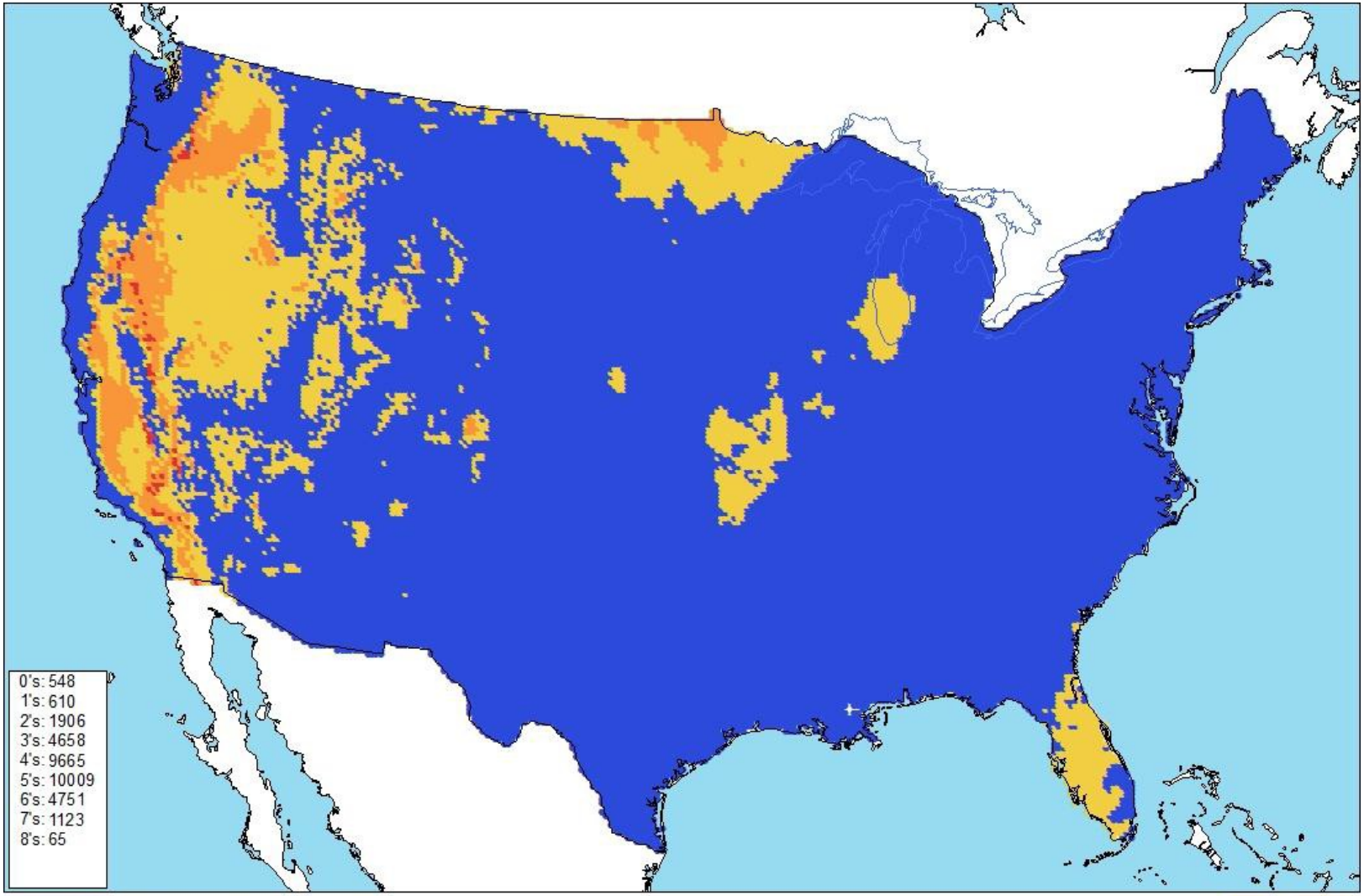
0 150 300 600 900 km

N

Score Low 0 1 2 3 4 5 6 7 8 9 10 High

High: AZ CA CO FL GA ID KS MN MO MT ND NV OR UT WA WI WY
Medium: AR IL NM OK SC SD TN
Low: AL CT DC DE IA IN KY LA MA MD ME MI MS NC NE NH NJ NY OH PA RI TX VA VT WV

RAMP



Species: *Hemiculter leucisculus*
Scenario: GFDL 2070 rcp4.5
Climate6: 0.178

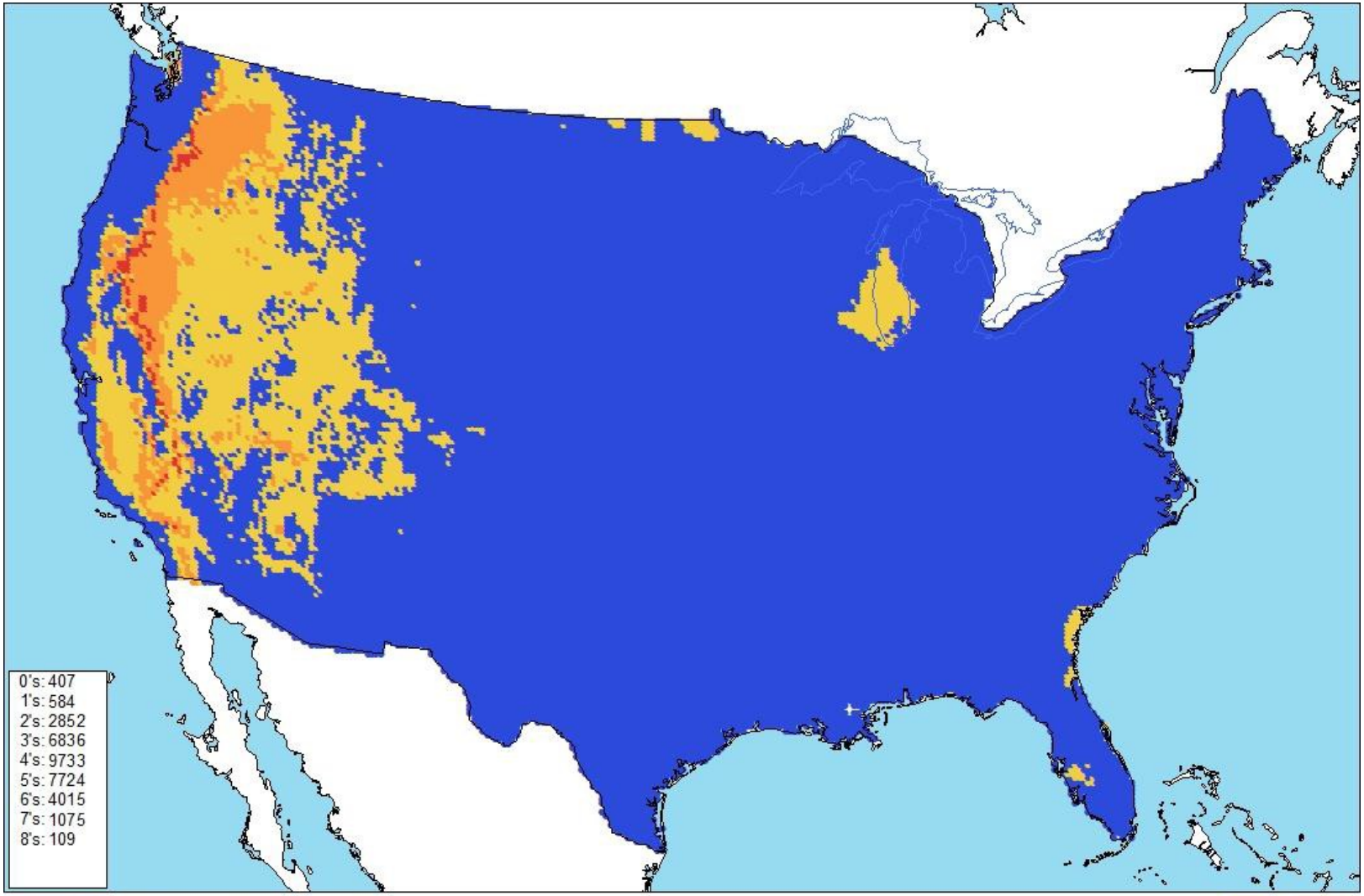
0 150 300 600 900 km

N

Score: Low 0 1 2 3 4 5 6 7 8 9 10 High

High: CA FL ID MN MO MT ND NV OR UT WA WY
Medium: AR AZ CO IA IL IN KS MI NE NM OK WI
Low: AL CT DC DE GA KY LA MA MD ME MS NC NH NJ NY OH PA RI SC SD TN TX VA VT WV

RAMP



Species: *Hemiculter leucisculus*
Scenario: GFDL 2070 rcp8.5
Climate6: 0.156

0 150 300 600 900 km

N

Score: Low 0 1 2 3 4 5 6 7 8 9 10 High

High: AZ CA ID NV OR UT WA
Medium: CO FL GA IL MI MN MT ND NM SC WI WY
Low: AL AR CT DC DE IA IN KS KY LA MA MD ME MO MS NC NE NH NJ NY OH OK PA RI SD TN TX VA VT WV

RAMP