

Rams Horn Snail (*Indoplanorbis exustus*)

Ecological Risk Screening Summary

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1 Native Range and Status in the United States

Native Range

From Budha et al. (2012):

“*Indoplanorbis exustus* is a widely distributed species, known from Iran, the Arabian Peninsula (Saudi Arabia, Oman and Socotra Island in Yemen), China, Malay Peninsula and Archipelago, Myanmar, Pakistan, Persia, Sumatra, Celebes, Java, Malaya, Thailand, Indonesia, Malaysia, Vietnam, Bangladesh, India, Sri Lanka and Nepal (Yueying Liu 1979, Subba Rao 1989).

Native: Bangladesh; China (Tibet [or Xizang]); India; Indonesia (Jawa, Sumatera); Iran, Islamic Republic of; Malaysia (Peninsular Malaysia); Myanmar; Nepal; Oman; Pakistan; Saudi Arabia; Sri Lanka; Thailand; Viet Nam; Yemen (Socotra - Possibly Extinct)”

Status in the United States

GBIF Secretariat (2016) shows records of *Indoplanorbis exustus* in Iowa and Ohio but the confidence in the taxonomic identification was questioned by GBIF. These records could not be confirmed from another source.

Indoplanorbis exustus is listed as locally restricted in the United States by Cowie et al. (2009) but no further information is given.

Means of Introductions in the United States

No information on means of introduction to the United States for *Indoplanorbis exustus* was found.

Remarks

No additional remarks.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Bouchet et al. (2016):

“Accepted scientific name: *Indoplanorbis exustus* (Deshayes, 1834) (accepted name)”

Kingdom Animalia
Phylum Mollusca
Class Gastropoda
Order Hygrophila
Superfamily Planorboidea
Family Planorbidae
Genus *Indoplanorbis*”

From Bouchet (2015):

“Synonymized names: *Planorbis exustus* Deshayes, 1834 (original combination)”

Size, Weight, and Age Range

From India Biodiversity Portal (no date):

“On average: 4 months.”

“The width of the shell is 5-25 mm. The height of the shell is 4.5-13 mm.”

Environment

No information on environmental requirements for *Indoplanorbis exustus* was found.

Climate/Range

From India Biodiversity Portal (no date):

“At water temperatures in excess of 15°C, the snail matures, and at an optimum temperature of 30 °C each snail can lay up to 800 eggs.”

Distribution Outside the United States

Native

From Budha et al. (2012):

“*Indoplanorbis exustus* is a widely distributed species, known from Iran, the Arabian Peninsula (Saudi Arabia, Oman and Socotra Island in Yemen), China, Malay Peninsula and Archipelago, Myanmar, Pakistan, Persia, Sumatra, Celebes, Java, Malaya, Thailand, Indonesia, Malaysia, Vietnam, Bangladesh, India, Sri Lanka and Nepal (Yueying Liu 1979, Subba Rao 1989).”

“Native: Bangladesh; China (Tibet [or Xizang]); India; Indonesia (Jawa, Sumatera); Iran, Islamic Republic of; Malaysia (Peninsular Malaysia); Myanmar; Nepal; Oman; Pakistan; Saudi Arabia; Sri Lanka; Thailand; Viet Nam; Yemen (Socotra - Possibly Extinct)”

Introduced

From Pointier et al. (2005):

“It is also widespread in south-east Asia, following several introductions by man (Brandt, 1974). *Indoplanorbis exustus* was also introduced to the Socotra Island (Wright, 1971) and the Arabian Peninsula (Wright & Brown, 1980). It has also been discovered in Nigeria (Kristensen & Ogunnowo, 1987) and Ivory Coast (Mouchet et al., 1987). Its first record from the neotropical area dates from 2002 when a few adult specimens were discovered in the Mare a Boire pond from the Grande-Terre of Guadeloupe, Lesser Antilles.”

From Yves et al. (2013):

“The third invasive species is the Planorbid *Indoplanorbis exustus*, the type locality is in the Malabar coast of south-west India. This is a species that is now distributed in South and Southeast Asia, Saudi Arabia and has recently been reported in Nigeria (Kristensen and Ogunnowo 1987), Cote d'Ivoire (Mouchet et al. 1987) and Bénin (Ibinkounlé et al. 1984).”

Means of Introduction Outside the United States

From India Biodiversity Portal (no date):

“The desiccation tolerance of adults snails is high while the resistance of juvenile snails is very low. Consequently, dispersal may occur in clumps of mud adhered to the bodies of cattle or across water in flotsam (vegetation mats),”

Short Description

From India Biodiversity Portal (no date):

“The shell of this species is dorso-ventrally flat and, like all planorbids is sinistral in coiling, but is carried upside down and thus appears to be dextral. The shell of *Indoplanorbis exustus* is discoid with rapidly increasing whorls. Each whorl is higher than it is wide. The width of the shell is 5-25 mm. The height of the shell is 4.5-13 mm. The aperture is oval to round and shell is thin.”

Biology

From India Biodiversity Portal (no date):

“The eggs are laid in clusters, with 2-43 eggs and an average of 20 eggs in each cluster. Over its life span of 4 months, this snail lays about 60 egg clusters.”

“In the wild, it feeds on fresh and decaying aquatic plants.”

“The desiccation tolerance of adults snails is high while the resistance of juvenile snails is very low.”

“This is a very common species. Wherever it occurs, it has been seen in very high density. Personal unpublished studies have shown that population densities of this species reach to more than 20 individuals per square metre.”

“This species of snail is found attached to aquatic plants in small ponds, pools, tanks, lakes as well as stagnant pools of water in rivers, and reservoirs. It is also seen less commonly in man-made habitats such as paddy fields, ditches, etc. The snail may also occur in semi-permanent pools formed in flooded areas of fields, where it can survive the dry season buried in mud.”

From Budha et al. (2012):

“It is found in various types of stagnant waters with dense vegetation. It remains attached to floating plants and it also occurs in very polluted waters.”

From Liu et al. (2010):

“*Indoplanorbis exustus* is a hermaphroditic invasive snail species with high fecundity. Within one year of introduction the snail is able to colonize habitats with well established populations of

other pulmonate and prosobranch snails (Pointier et al. 2005). The snail requires a water temperature in excess of 15°C for maturation. At the optimum temperature of 30°C each snail can lay up to 800 eggs (Raut et al. 1992). The capacity for self-fertilization and high fecundity probably underlies the invasive potential of the species.”

Human Uses

From Budha et al. (2012):

“It is used as poultry (duck) feed.”

From India Biodiversity Portal (no date):

“It is used extensively in research.”

Diseases

No records OIE reportable diseases were found.

From Budha et al. (2012):

“It is a vector and intermediate host for many parasites of domestic and wild animals. Cercarial larval stage of many trematode parasites of domestic animals (such as cattle), humans and wild animals develop in this snail. Some important parasites that use the snail as intermediate hosts are *Artyfechinostomum sufrartylfex*, *Schistosoma indicum*, *Schistosoma nasalis*, *Schistosoma spindalis*, *Fasciola gigantica*, *Paramphistomum mehrai*, *Paramphistomum explanatum*, *Gastrodiscus secundus*, *Petagifer srivastavi*, *Plasmiorchis orientalis*, *Pseudodiscus collinsi*, *Gastrothylax crumenifer*, *Enterohaemotrema paleorticum*, *Cotylophoron cotylophorum*, *Cotylophoron indica*, *Cotylophoron bhaleraoi*, *Cotylophoron mathurapurensis*, and *Echinostoma* sp. (Yueying Liu 1979, Subba Rao 1989).”

From India Biodiversity Portal (no date):

“*Indoplanorbis exustus* is the most important host for *Schistosoma nasale* and *Schistosoma spindale*, as well as for *Schistosoma indicum* in certain regions. *Indoplanorbis exustus* may be the sole natural intermediate host for these three *Schistosoma* species on the Indian sub-continent.”

Threat to Humans

From India Biodiversity Portal (no date):

“*Indoplanorbis exustus* has been implicated in outbreaks [sic] of cercarial dermatitis in human populations in India, Laos, Malaysia and Thailand. Cercarial dermatitis results from the cutaneous allergic reaction in people exposed to larval schistosomes (cercariae) shed by infected snails into freshwater bodies such as lakes, ponds, and paddy fields. The cercariae cause pruritis and papular eruptions, with often severe secondary infections, as they attempt to infect a non-permissive definitive host and die in the skin.”

3 Impacts of Introductions

The following information indicates the potential for this species to have impacts on human and livestock health in its introduced range but the following interactions were documented in the species' native range.

From India Biodiversity Portal (no date):

“*Indoplanorbis exustus* has been implicated in outbreaks [sic] of cercarial dermatitis in human populations in India, Laos, Malaysia and Thailand. Cercarial dermatitis results from the cutaneous allergic reaction in people exposed to larval schistosomes (cercariae) shed by infected snails into freshwater bodies such as lakes, ponds, and paddy fields. The cercariae cause pruritis and papular eruptions, with often severe secondary infections, as they attempt to infect a non-permissive definitive host and die in the skin.”

From Pointier et al. (2005):

“*Indoplanorbis exustus* was described in 1838 from the south-western coast of Malabar, India but is widely distributed in this country where it serves as intermediate host for several cattle schistosomes (Mishra & Agrawal, 1998).”

4 Global Distribution



Figure 1. Known global distribution of *Indoplanorbis exustus*. Map from GBIF Secretariat (2016).

GBIF Secretariat (2016) shows records of *Indoplanorbis exustus* in Iowa and Ohio but the confidence in the taxonomic identification was questioned by GBIF. These records could not be confirmed from another source and were not used as source points in the climate match.

5 Distribution Within the United States

GBIF Secretariat (2016) showed records of *Indoplanorbis exustus* in Iowa and Ohio but the confidence in the taxonomic identification was questioned by GBIF. These records could not be confirmed from another source.

There were no reliable records of *I. exustus* in the United States.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Indoplanorbis exustus* was high along the border with Mexico and in patches along the Rocky Mountains. The match was medium along the southern Atlantic, Gulf, and southern Pacific coasts. It was low everywhere else. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean Distance) for the contiguous United States was 0.145, high, and Arizona, California, Florida, Idaho, Nevada, New Mexico, North Carolina, Oregon, South Carolina, Texas, and Washington had individually high climate scores.

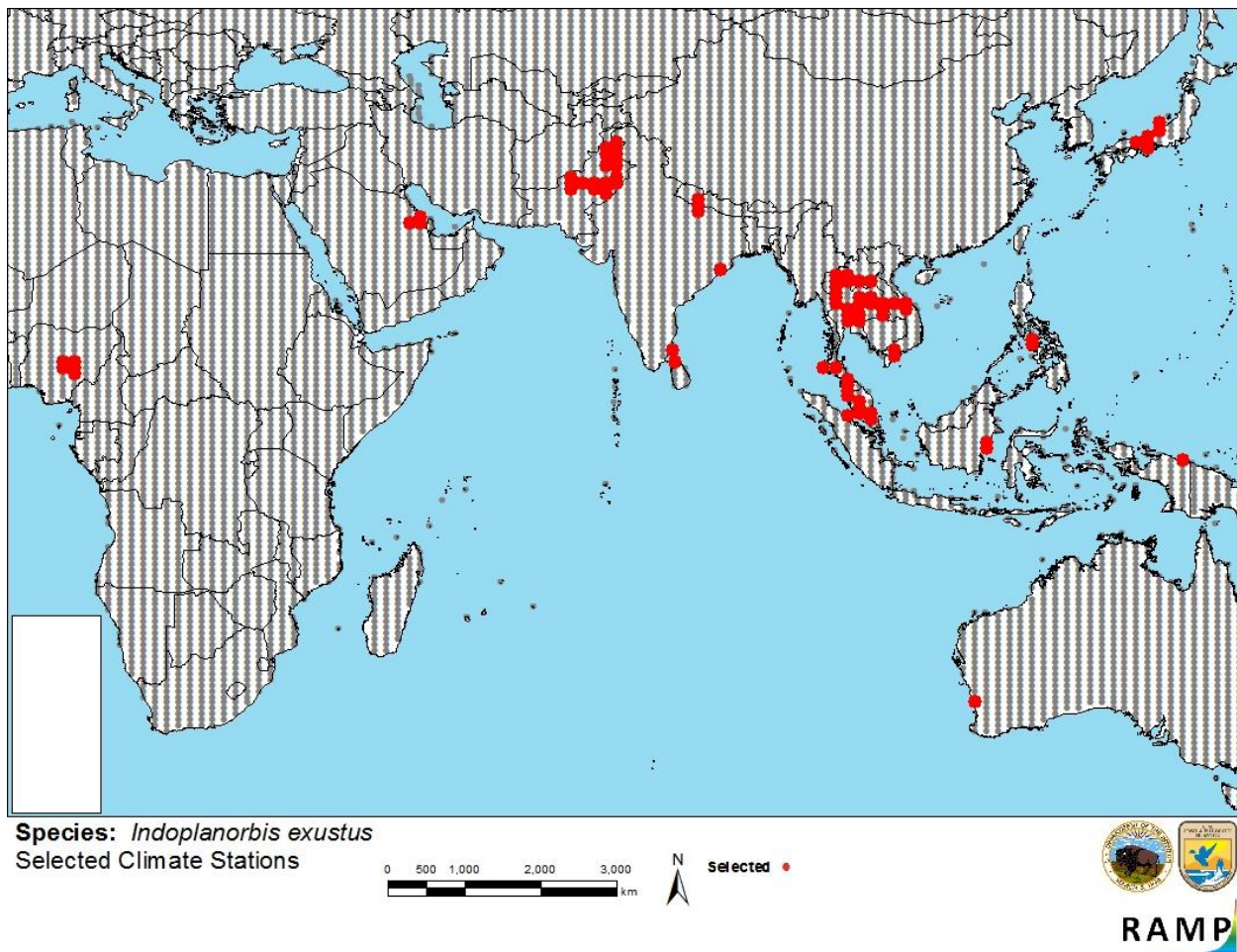


Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (grey) for *Indoplanorbis exustus* climate matching. Source locations from GBIF Secretariat (2016).

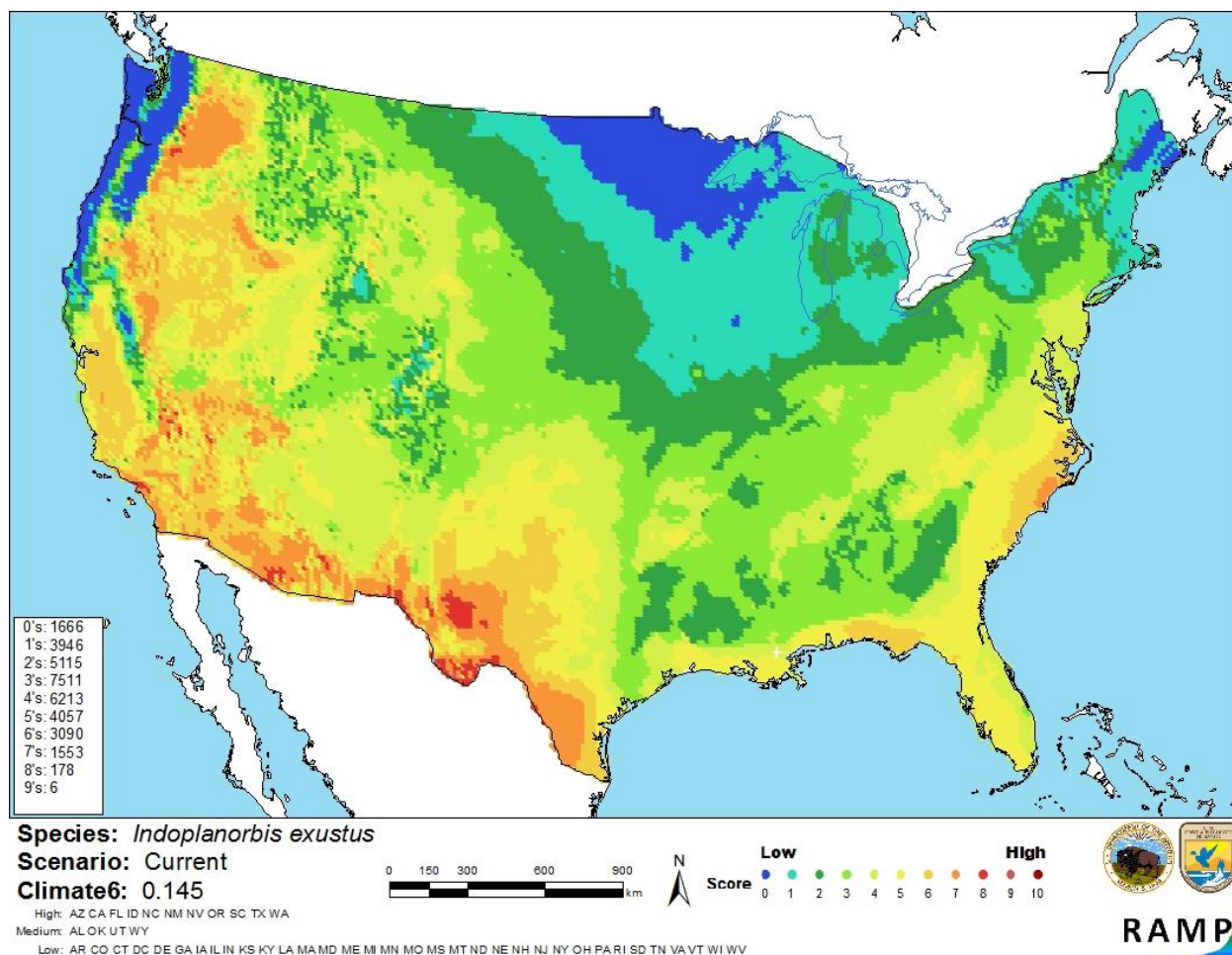


Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Indoplanorbis exustus* in the contiguous United States based on source locations reported by GBIF Secretariat (2016). 0 = Lowest match, 10 = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
$0.000 \leq X < 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

7 Certainty of Assessment

The certainty of assessment for *Indoplanorbis exustus* is medium. There was adequate ecological and biological information available. Information on introductions and impacts of introductions was present but not specific. Two peer-reviewed articles stated threats to human and livestock health that occur in the species native range. Distributional data used for the climate match was not complete. A more detailed distribution could alter the results of the climate match.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Indoplanorbis exustus is a common freshwater snail that has a widespread native range in Asia. The history of invasiveness for *I. exustus* is not documented. There are records of introductions and two sources stated that the species is an intermediate host for parasites that are threats to human and livestock health. However, those studies were conducted in the native range of *I. exustus* and not its introduced range so it is unknown if it would serve the same function in the introduced range. The climate match was high, indicating that the climate in the southwest could potentially support this species. The certainty of assessment was medium. The overall risk assessment category is high.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Medium**
- **Remarks:** No additional remarks
- **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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