Chameleon Goby (*Tridentiger trigonocephalus)*
Ecological Risk Screening Summary

Web Version 10/18/2012

Photo: Chameleon Goby (Tridentiger trigonocephalus) – Credit: Melop (from Nico et al. 2012)

1 Native Range and Nonindigenous Occurrences

Native Range

From Nico et al. (2012):

"Brackish and marine waters of China, Korea, and Japan (Courtenay et al. 1986; Meng et al. 1994)."

Nonindigenous Occurrences

From Nico et al. (2012):

"The species first was recorded in 1960 when two individuals were observed on a rock jetty in Los Angeles Harbor, California (Haaker 1979; Matern and Fleming 1996). In 1962 another specimen was taken from the Redwood City docks in the southern portion of San Francisco Bay (museum specimen; Meng et al. 1994; Matern and Fleming 1996; Carlton 1985). The fish also occurs in Lake Merritt in Oakland (which is connected to San Francisco Bay) (Shapovalov et al.

1981; Courtenay et al. 1986), and in Los Angeles Harbor (Haaker 1979; Eschmeyer et al. 1983). Specimens were taken from San Diego Bay in 1995 and 1998 (Pondella and Chinn 2005).

Means of Introductions

From Nico et al. (2012):

"The initial introduction may have been as fertilized eggs on introduced Japanese oysters (Courtenay et al. 1984, 1986, 1991) or from ballast water (Eschmeyer et al. 1983).

Remarks

From Nico et al. (2012):

"Established in California. Recently, chameleon goby populations in San Francisco Bay have plummeted, possibly because of predation by yellowfin gobies (Meng et al. 1994). Because adults spawn 3-4 months after the piscivorous yellowfin goby, their young are vulnerable (Wang 1986)."

"Some reports in the literature referring to *T. trigonocephalus* collections made in freshwater in California (i.e., Meng et al. 1994) should actually refer to *T. bifasciatus* (Matern and Fleming 1996). This goby gets its name from its ability to rapidly change colors from a striped to a barred pattern (Eschmeyer et al. 1983). *Tridentiger trigonocephalus* is more common in marine environments than is *T. bifasciatus*; it is rarely found in salinities less than 22 ppt. (Matern and Fleming 1995; Fleming, personal communication)."

2 Biology and Ecology

From ITIS (2012):

Kingdom Animalia
Phylum Chordata
Subphylum Vertebrata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Acanthopterygii
Order Perciformes
Suborder Gobioidei
Family Gobiidae
Genus Tridentiger
Species *Tridentiger trigonocephalus*

Taxonomic Status: Valid

Size, Weight, Age
From Froese and Pauly (2011):

"Max length : 11.0 cm TL male/unsexed; (Eschmeyer et al.1983)"

Environment
From Froese and Pauly (2011): "Demersal; brackish; marine"

Climate/Range
From Froese and Pauly (2011): "Temperate; 2°C - 20°C; 53°N - 32°N, 114°E - 146°E"

Distribution
From Froese and Pauly (2011):

"Asia: Eastern Siberia, China, Korea and Japan."

Short description
From Froese and Pauly (2011):

"Dorsal spines (total): 7; Dorsal soft rays (total): 12-14; Anal spines: 1; Anal soft rays: 10 – 11"

Biology
From Froese and Pauly (2011):

"Found in oyster shells and crevices among barnacles and other fouling organisms (Eschmeyer et al.1983). Oviparous (Breder and Rosen 1966). Eggs are deposited in nests which are guarded by the male (Breder and Rosen 1966)."

Human uses
None reported

Diseases
None reported

Threat to humans
None reported

3 Impacts of Introductions

From: Meng et al. (1994)

"Recently, chameleon goby numbers have dropped, perhaps in part to predation by yellowfin gobies. Chameleon gobies spawn 3-4 months after yellowfin gobies (Wang 1986; our unpublished data). Because yellowfin goby diets include fish, chameleon goby progeny and larvae are likely to be vulnerable to predation by the yellowfin goby. The chameleon goby, like the yellowfin goby before it, has shown a dramatic spike in abundance, typical of introduced species invading disturbed habitats (Herbold and Moyle 1986; Moyle 1986). The chameleon goby is the most current introduction able to gain a foothold in the Suisun Marsh due to changed environmental conditions."

"Environmental changes induced by humans modify fish communities and make possible invasions by alien species, and the extremely modified San Francisco Estuary has the greatest rate of aquatic introductions of any estuary studied (Cohen and Carlton 1998). About half of the fish species in the estuary are introduced (Herbold et al.1992), and many arrived in the ballast water from ships (Cohen and Carlton 1998). One of the most recent threats is the chameleon goby."

4 Global Distribution

Figure 1 (above). Global distribution of *T. trigonocephalus*. Map from GBIF (2010).

5 Distribution within the United States

Figure 2 (above). Distribution of *T. trigonocephalus* in the United States. Map from Nico et al. (2012).

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2010; 16 climate variables; Euclidean Distance) was high throughout the West Coast States, some of the Great Lakes States, and the Southeast Coast. Medium matches covered most of the rest of the US, except the Rocky Mountains. Climate 6 match indicated that the US has a high climate match. The range for a high climate match is 0.103 and greater; the climate match of *T. trigonocephalus* is 0.373.

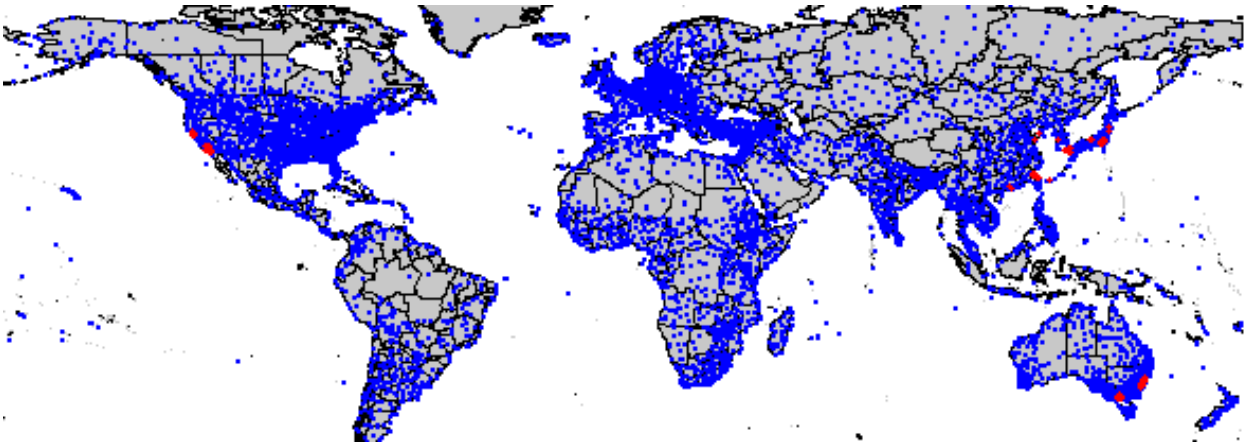

Figure 3 (above). CLIMATCH (Australian Bureau of Rural Sciences 2010) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *T. trigonocephalus* climate matching. Source locations from GBIF (2012) and Nico et al. (2012).

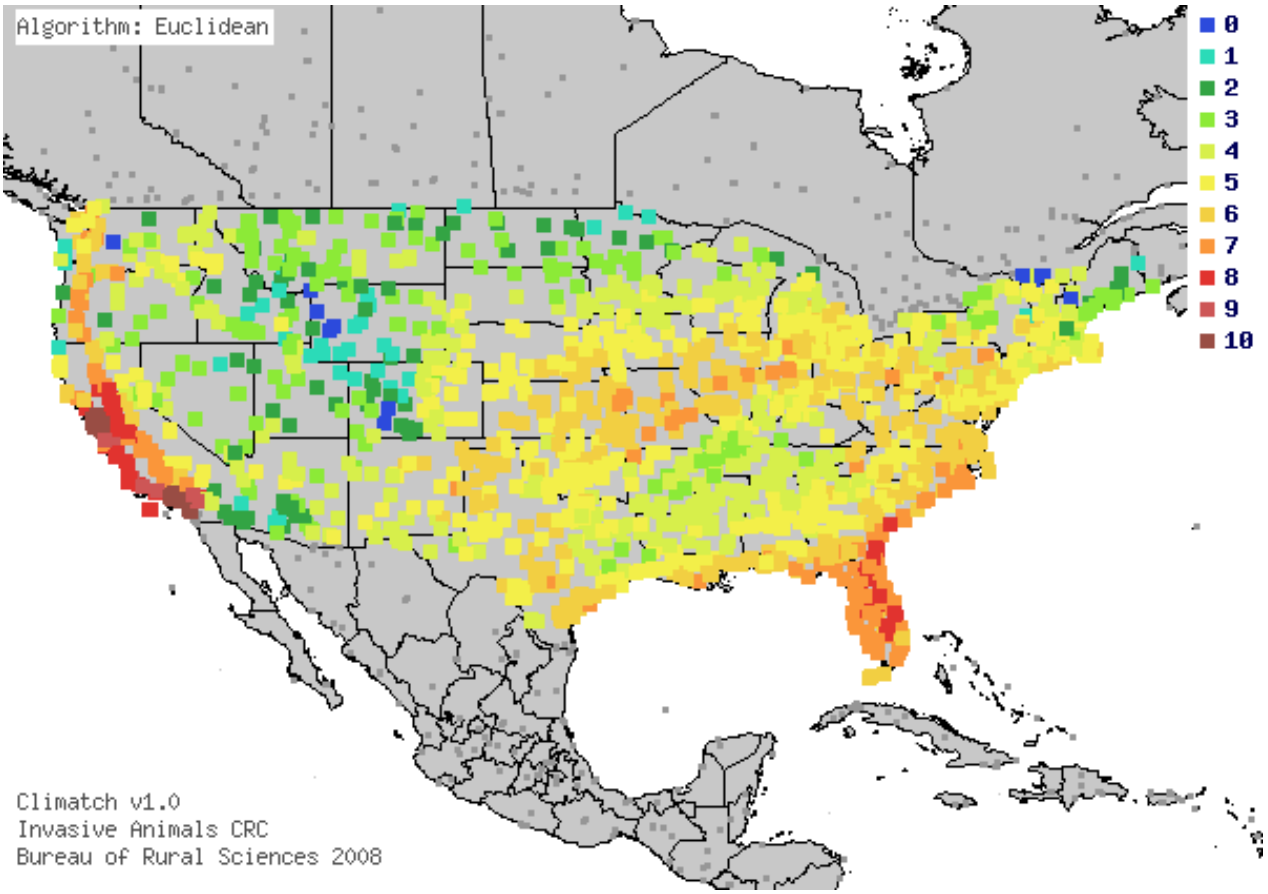

Figure 4 (above). Map of CLIMATCH (Australian Bureau of Rural Sciences 2010) climate matches for *T. trigonocephalus* in the continental United States based on source locations reported by GBIF (2012) and Nico et al. (2012). 0= Lowest match, 10=Highest match.

Table 1 (below). CLIMATCH (Australian Bureau of Rural Sciences 2010) climate match scores.

CLIMATCH Score	0	1	2	3	4	5	6	7	8	9	10
Count	13	42	89	178	386	513	457	158	61	10	39
Climate 6 Proportion =			0.373	(High)							

7 Certainty of Risk Assessment

Although *T. trigonocephalus* has become established in California, there has not been significant evidence of adverse impacts reported in peer-reviewed literature. In order for this ERSS to have a higher level of certainty, more research is needed. The certainty of this assessment is therefore low.

8 Risk Assessment

Summary of Risk to the Continental United States

T. trigonocephalus has established itself in estuaries in California. The latest research indicates that this species may be on the decline in these areas due to competition from another gobiid invader. Though established, there has not been significant research detailing the impacts of this invader. The government of New South Wales lists them as an invasive that "competes with native species". No research was found to detail the competition, however.

Assessment Elements

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

Sec. 9 – References

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

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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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