

Modeling Rangewide Metapopulation Viability and Persistence of the Endangered Tidewater Goby (*Eucyclogobius newberryi*): Implications for Long-term Conservation and Management

The tidewater goby, *Eucyclogobius newberryi*, has been listed as federally endangered since 1994. This small, annual fish species may be predisposed to local extirpation due to its preference for seasonally variable coastal lagoonal settings. These habitats are heavily impacted by anthropogenic effects, limiting the amount of suitable habitat this species needs for recovery. A significant component of my PhD research is directed towards implementing aspects of the US Fish & Wildlife Service Recovery Plan in order to determine the best approach for long-term conservation and sustainability of the species. A primary action essential for assessment of status prior to downlisting, or determination of recovery, is a metapopulation viability analysis (MVA). MVA models are used to assess population viability by predicting patterns of extinction and colonization based on presence/absence survey data, as well as multiple habitat characteristics (e.g. habitat size, climate, water quality, etc.). To be considered viable for downlisting from endangered to threatened, individual Sub-Units (metapopulations) within each Recovery Unit must be projected to have a 75% or better chance of persisting for a minimum of 100 years. In order to accurately inform these models, and assess the health and current status of the species, biannual population surveys in over 100 estuaries are needed, spanning from Bodega Bay to San Diego, CA. Preliminary surveys have already revealed a high degree of endangerment, mainly in southern California due to habitat desiccation from drought conditions, and the introduction of non-native species. Endangerment is especially high in the southern unit of San Diego County where tidewater gobies have been eliminated from all but three small systems on Marine Corps Base Camp Pendleton. This unit is an undescribed, and unequivocally endangered, distinct species in the genus *Eucyclogobius* that is currently being managed as *E. newberryi*.

Funding support from the La Kretz Center Graduate Research Grant will help fund the travel and equipment expenses to conduct these expansive coast wide surveys, including surveys in San Diego County where current efforts (January 2016) are under way to save the southern tidewater goby from going extinct.



Adult tidewater goby (*Eucyclogobius newberryi*)
Photo by Brenton Spies