

Functional morphological adaptations in invasive round goby (*Neogobius melanostomus*) populations across Europe

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Introduction

Round goby can invade diverse ecosystems with widely varying biotic and abiotic conditions, ranging from rivers to lakes and to (brackish) shorelines. Since 1990, they invaded many aquatic systems throughout Europe and North-America (Figure 1). The impact of round goby invasion on the native ecosystem varies between invasion events and cannot simply be estimated by abiotic parameters or native food web composition [1]. Life history and general morphology of round goby differ between invaded ecosystems (e.g. [2,3]); whether this also holds for its functional (feeding) morphology is currently unknown. Can the impact of round goby invasion be predicted by functional morphology?

Research aim

What is the potential for functional morphological adaptation in the round goby for different invaded ecosystems?

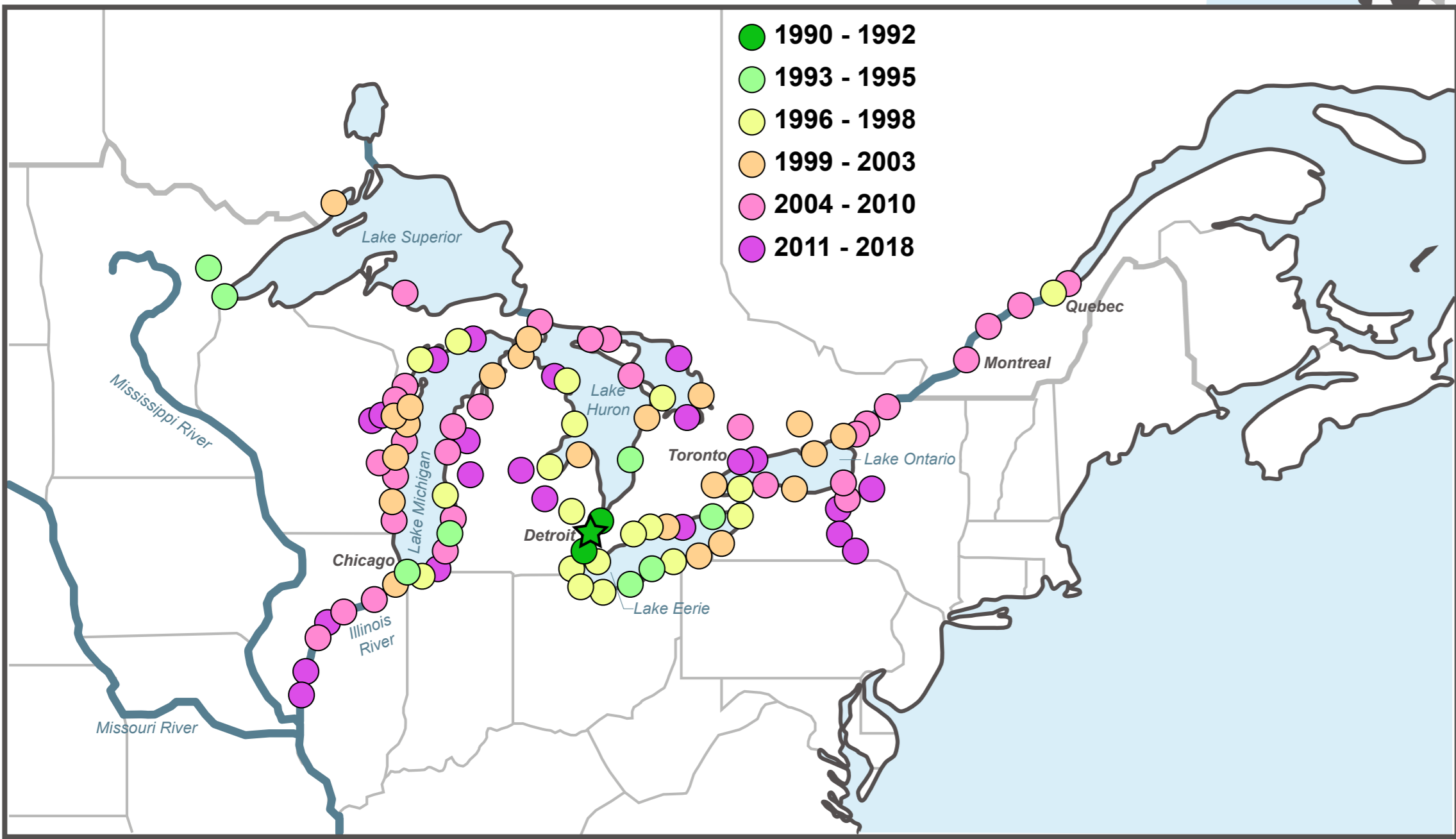
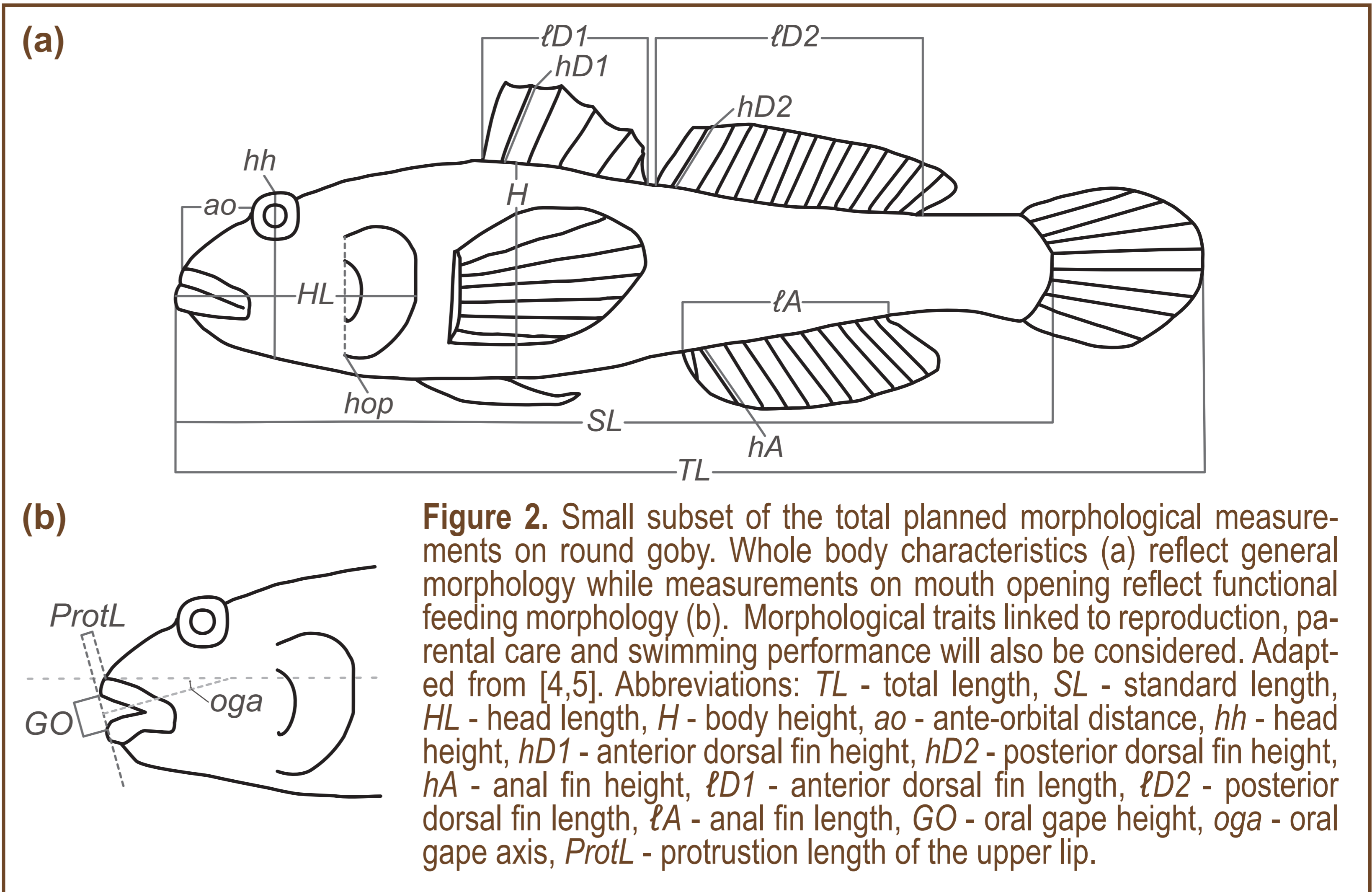


Figure 1. Distribution range and invasion history of round goby throughout Europe and the Laurentian Great Lakes (inset). Colors indicate timing of first observations for that location. Star-shaped markers indicate a first observation that likely corresponds with a major dispersal event. Data obtained from various sources, see references.

Research proposal

Compare functional morphological traits (Figure 2) of populations that differ in their ecological structure, resource availability and in invasion history and impact of the round goby, e.g.:

- Native range
 - Baltic Sea range
 - Lower Rhine (Dutch river delta)
 - Upper Rhine and Danube rivers



References

[1] Hirsch et al., *Ambio* (2016) 45: 267-279; [2] Cerwenka et al., *Hydrobiologia* (2014) 721: 269-284; [3] Kornis et al., *Ecol. Freshw. Fish.* (2017) 26: 563-574; [4] Demchenko and Tkachenko, *Arch. Pol. Fish.* (2017) 25: 51-61; [5] Sibbing and Nagelkerke, *Rev. Fish. Biol. Fisher.* (2010) 10: 393-437. Round goby observation sources, in alphabetical order: Bjorklund and Almqvist (2010), Borchering et al. (2011), Brandner et al. (2013), Brandner et al. (2018), Brunken et al. (2012), Buric et al. (2015), Corkum et al. (2004), Czuga and Wozniczka (2010), Drensky (1951), Eros et al. (2005), Francova et al. (2011), Galanin (2012), Gulugin and Kunitsky (1999), Gut et al. (2003), Hartmann (2010), Hempel and Thiel (2013), Hempel and Thiel (2015), Jude et al. (1992), Jurajda et al. (2005), Kalchauer et al. (2013), Kostrzewa and Grabowski (2002), Kotta et al. (2016), Lavrincikova et al. (2005), Lusk et al. (2010), Manné et al. (2013), Marsden et al. (1996), Ojaveer (2006), Ondrackova et al. (2005), Paintner and Seifert (2006), Piria et al. (2011), Polacik et al. (2008), Roche et al. (2013), Roche et al. (2015), Sapota and Skora (2005), Semenchenko et al. (2011), Shemonaev and Kirilenko (2011), Simonovic et al. (1998), Skóra and Stolarski (1993), Spikmans et al. (2010), Steingraeber (1996), Stranai et al. (2004), USGS, Van Beek (2006), Verreycken et al. (2011), Visnjic-Jeffic et al. (2004), www.waarneming.nl, Wiesner (2005), Wiesner et al. (2000), Winkler (2006). Goby illustrations modified from pictures by Jelger Herder

