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Vocal behavior predicts reproductive success in a teleost fish

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Abstract

The relation between acoustic signaling and reproductive success is important to understand the evolution of vocal communication systems and has been well studied in several taxa but never clearly shown in fish. This study aims to investigate whether vocal behavior affects the reproductive success in the Lusitanian toadfish (Halobatrachus didactylus) that relies on acoustic communication to attract mates. We recorded 56 nest-holding (type I) males during the breeding season and analyzed the calling performance and acoustic features of the mate advertising sounds (boatwhistles) exhibited over circa 2 weeks. Hormonal levels of the subjects and the number of eggs (reproductive success) present in the respective nests were quantified. Nesting males attracted both females and other males, namely smaller type I males with significantly lower total length (TL), body condition, sonic muscle mass, gonad mass, and accessory glands mass. Calling rate (CR), calling effort (CE) (% time spent calling), and sound dominant frequency were significantly higher in nesting males with clutches than in those without clutches. Sex steroids (11-ketotestosterone and testosterone) were not correlated with vocal parameters or number of eggs. Maximum CR and CE were the best predictors of the number of eggs. In addition, these vocal variables were best explained by male's TL, condition, and sonic muscle mass. We provide first evidence that vocal behavior significantly determines reproductive success in a vocal fish and show that acoustic signaling at higher and constant rates can operate as an indicator of the male's size and body condition and probably of elevated motivation for reproduction.

Key words acoustic communication Batrachoididae mate attraction reproductive success toadfish