*Article*

# Acoustic monitoring of swimming motions in the slipper lobster *Scyllarides acquinoctialis* (Lund, 1793)

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**Abstract**
Members of the Malacostraca employ an escape swimming mode called a tail-flip. In this maneuver the uropods and telson are rapidly brought forward until they contact the ventral surface of the abdomen. This movement is the result of stimulation of the ventral cord giant fiber. When swimming at or near the surface the slipper lobster *Scyllarides acquinoctialis* produces a distinct acoustic signature with an average acoustic pulse duration of 82 milliseconds and peak amplitude between 0.1 kHz and 6.0 kHz. The acoustic signature of members of the Malacostraca can be exploited to passively monitor swimming motions in the marine environment.

**Keywords** bioacoustics; passive acoustic monitoring; *Scyllarides acquinoctialis*; tail-flip.

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## 1 Introduction

The Slipper lobster, *Scyllarides acquinoctialis* (Lund, 1793) has been found to produce a distinct acoustic signature when using the tail-flip maneuver when swimming near the surface of the water (Fornshell, 2019). By expanding on this earlier work, a passive acoustic monitoring method is developed for studying near surface swimming behavior of slipper lobsters.

The tail-flip escape maneuver results when the muscles in the abdomen are caused to rapidly contract by stimulation of the ventral nerve cord giant fiber, bringing the uropods and telson forward until they touch the ventral surface of the thorax. Swimming motions involving the use of the tail-flip maneuver, are employed by many members of the Malacostraca to escape from predators (Webb, 1979; Cromarty et al., 1991; Spanier et al., 1991; Newland et al., 1992; Nauen and Shadwick, 1999, 2001; Heitler et al., 2000). Based on a limited initial data set (Five trials), Fornshell (2019) observed an average pulse rate of seven tail-flips per second (the range was 2.5 tail-flips/second to 16 tail-flips/second). The duration of the pulse was 62.5 milliseconds (Fornshell, 2019). Previous researchers have used video recording and/or ceni-photography to record the

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