

# A NOVEL MULTI-SENSOR TAG TO CAPTURE BEHAVIORAL ECOLOGY OF LARGE GROUPERS

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## BACKGROUND

Atlantic goliath grouper (*Epinephelus itajara*) is a large (max 360 kg, 250 cm) tropical and subtropical marine fish that inhabits rocky reefs & wrecks at depths  $\leq 100$  m.

Population status:

Stock status: overfished but overfishing is not occurring

IUCN: "Vulnerable" on red list (2018)

Goliath grouper is a data poor species and few studies have been conducted on free-ranging animals. Further research is required to understand its life history and ecology. Here we present a multi-sensor tag designed to elucidate the latter.



Fig. 1: Captive goliath grouper tagged using band attachment method

## TAG ATTACHMENT METHODS

### METHOD 1: BELLY BAND (FIG 1)

- Latex band passed through tag "band slots"
- Band wrapped around fish and tied off to galvanic timed release (GTR)

*Pros:* Quick attachment, reliable release

*Cons:* Scale abrasion, band snagging, behavioral hinderance

### METHOD 2 (PREFERRED): DORSAL SPINE

- Hole drilled through 1<sup>st</sup> & 3<sup>rd</sup> dorsal spine
- Braided line fed into each end of GTR barrell, secured with eyelet screw
- Working ends fed through pre-drilled holes in tag and dorsal spines
- Working ends secured around a screw on opposite side of tag

*Pros:* more secure than band

*Cons:* longer attachment time (~6 mins)

## PRELIMINARY BEHAVIORAL RESULTS

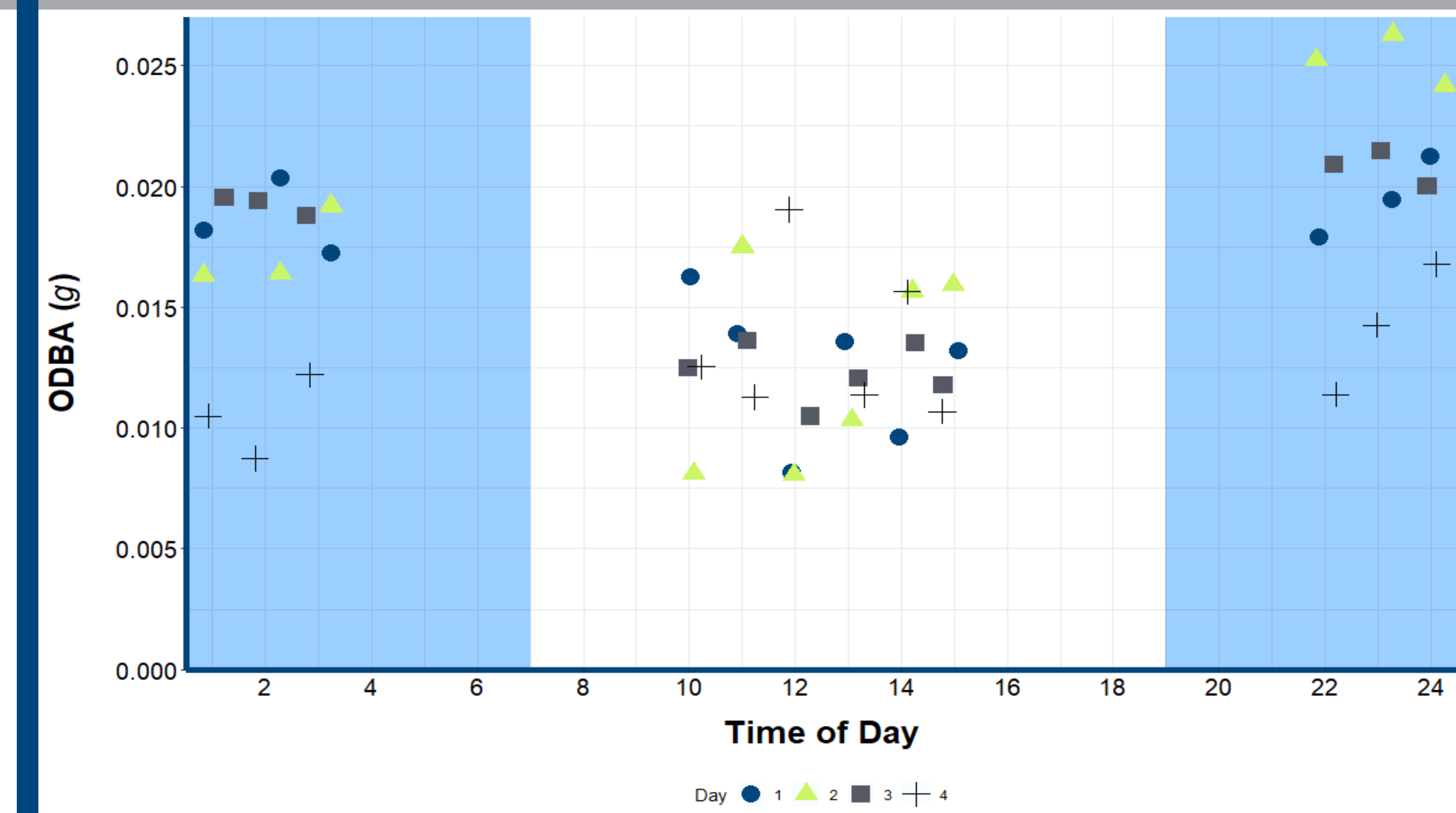
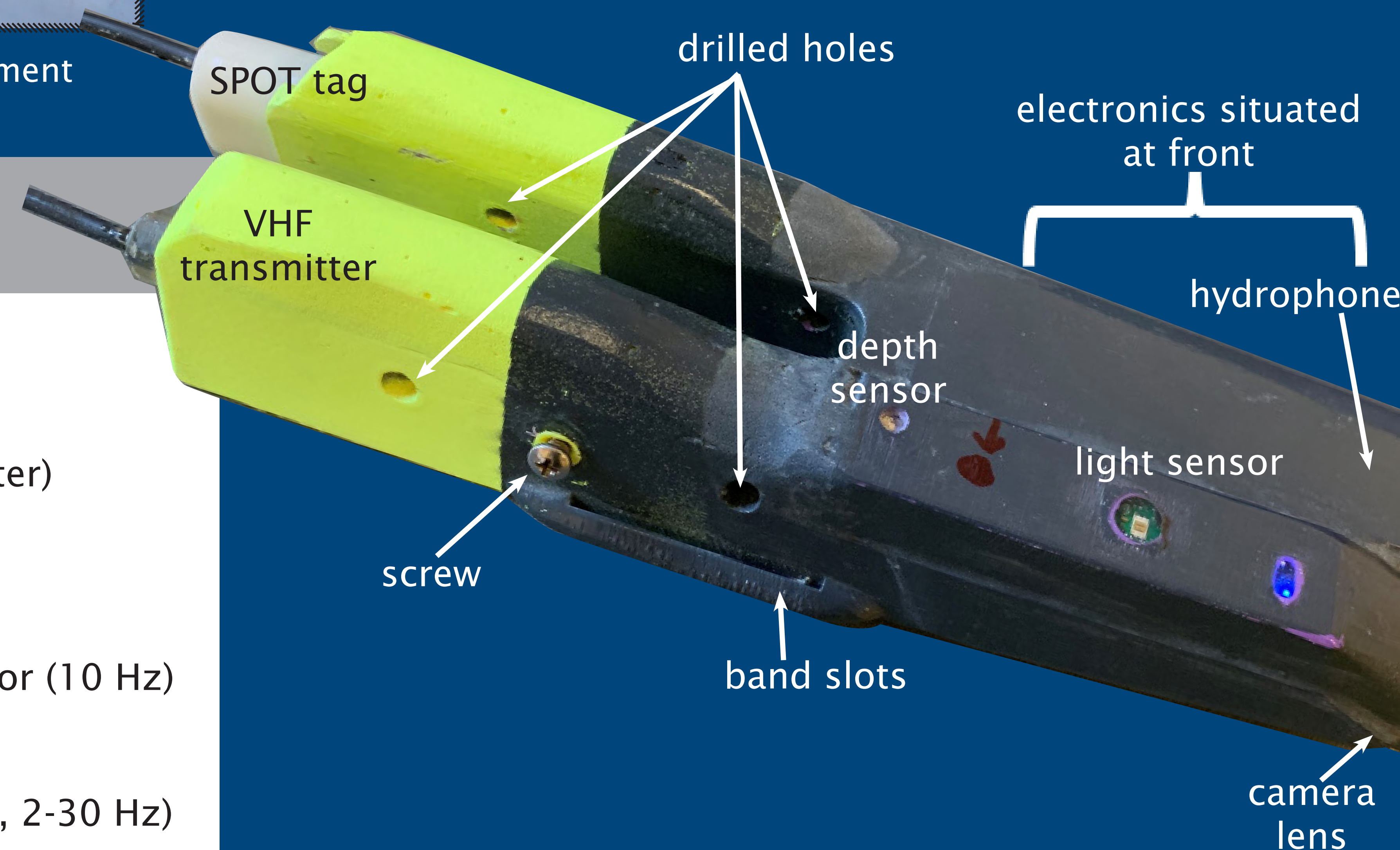


Fig. 2: Overall dynamic body acceleration versus time of day for a captive goliath grouper during night (22:00-04:00) and day (10:00-16:00) over four days

Overall Dynamic Body Acceleration (ODBA) is a single, integrated measure of body motion derived from heave, surge and sway. A dependent t-test revealed that a captive goliath grouper generated significantly higher ODBA values at night ( $M = 0.019$ ,  $SE = 0.001$ ) than during the day ( $M = 0.013$ ,  $SE = 0.000$ ),  $t(23) = -4.692$ ,  $p < .05$ ,  $r = 0.699$ . This may reflect both increased sound production and activity levels. Future directions include: elucidating movement patterns, diel cycles, feeding periodicity and activity budgets in the wild.

## TAG DESIGN

- Size: 24.5(L) x 9(W) x 5(D) cm
- Secures around dorsal fin
- Bouyant for tag retrieval (SPOT and VHF transmitter)
- 3-axis accelerometer, gyroscope (800 Hz) & magnetometer (100 Hz)
- Depth (100 Hz); Temperature (20 Hz); Light sensor (10 Hz)
- Video camera (1920 x 1080 resolution)
- Hydrophone (HTI-96-Min Series, -201 dB re 1  $\mu$ Pa, 2-30 Hz)



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References available on request.