UNIVERSITY OF MIAMI ROSENSTIEL SCHOOL of MARINE, ATMOSPHERIC & EARTH SCIENCE

Feeding-induced variations in ichthyocarbonate production and composition by the Gulf toadfish

Marine fish have a significant impact on the global carbon cycle but are often overlooked. One example of this contribution is their production of ichthyocarbonates (Oehlert et al., 2024). Ichthyocarbonates are Mg-rich calcium carbonate pellets produced by marine bony fish as a byproduct of osmoregulation. Having only been discovered in 1991 (Walsh et al., 1991), much is still unknown about their morphology, geochemical characteristics, and behavior in the natural environment.

Figure 1. Gulf toadfish specimen with excreted ichthyocarbonate precipitates.



Previous studies of ichthyocarbonate production rate have been conducted using unfed fish. Consequently, while prior results provide an important foundation for understanding the role of marine fish in the carbon cycle, of feeding state on production and composition of ichthyocarbonate.

The experimental tanks were stocked with Gulf toadfish (Opsanus beta) weighing 40 - 100 g. Ichthyocarbonate was collected daily from tank bottoms using disposable pipettes. Days since last feeding were recorded, and samples were divided into two treatments based on prior measurements of Specific Dynamic Action (SDA) for toadfish which indicates toadfish experience elevated metabolic rate from days 0-3 after feeding ("Fed"), with a return to baseline conditions after four days ("Fasted"). All experimental protocols were completed in accordance with University of Miami Institutional Animal Care and Use Committee (IACUC) approved practices. After collection, four analyses were performed:

- 1. Measurements of wet weight to calculate **production rate**
- 2. Particle morphology analysis using ImageJ (Fiji) and MATLAB
- 3. Agilent 8900 ICP-QQQ mass spectrometry for assessment
- 4. Zeiss Ultra Plus Field Emission SEM & Apollo 10 EDAX for



calculated in MATLAB.

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