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EXECUTIVE SUMMARY OF THE WAVE TANK MODEL TESTS PERFORMED FOR THE *FISH HAVEN* ARTIFICIAL REEF UNIT

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Physical model tests of the *Fish Haven* artificial reef unit were performed at Florida Institute of Technology during March and April 1998. Two concrete scale models were used in the wave tank tests, with various water depths and wave conditions. The units were tested on the glass tank bottom and on a sand bottom, so that their stability against sliding could be evaluated on both hard and sand bottom conditions. Wave gages were used to measure and record the wave conditions, while larger and larger waves were generated to determine the largest wave conditions for which the unit was stable. The tests were recorded on video, and the inception of movement of the units was determined and the associated wave conditions correlated.

The *Fish Haven* reef units never demonstrated any tendency for overturning, either on the solid glass or sand bottom wave tank tests. The wave heights that caused movement of the individual units were recorded, but in some cases, especially on the sand bottom, the largest waves able to be generated were not able to cause movement of the units. From the test data, the coefficients of friction between the units and the glass and sand bottom were determined, as well as the wave drag, inertia, and lift coefficients. Using the Morison equation and the methods developed by Roehl and Harris (1997), a set of graphs were generated for use in determining the minimum dry weight of individual artificial reef units that would remain stable for various water depths and wave conditions.

The *Fish Haven* artificial unit was found to be a very stable unit, due to its wide base, porous top and sides, and weight. Full scale units average 3000 lbs., with the weight varying with the thickness of the concrete comprising the unit. The units tested were comprised only of a single unit, without the addition of a base or smaller interior unit inside. The addition of a concrete base and/or interior unit (with a weight of 800 to 1000 lbs.) can greatly increase the overall weight and stability of the units.

The results of the wave tank tests and engineering analysis of the *Fish Haven* artificial reef units showed that the units are designed and can be fabricated to be very stable artificial reef units. Using the stability graphs resulting from this study, the required weight of an individual *Fish Haven* artificial reef unit can be determined. Units that are stable in water depths of 50 to 100 feet under storm conditions of 20-year to 100-year intensity can be designed, fabricated and deployed. With proper concrete mixtures, steel or fiberglass rebar, and concrete cover over any steel reinforcement, the units will have excellent strength, durability, and longevity in the marine environment.