SUMMARY
OBSERVATIONS OF FISH BEHAVIOR IN RELATION TO FISH POTS
TEKTITE II, Mission 1-50

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TEKTITE II provided a unique opportunity for fishery biologists to study the behavior of fish relative to commercial fishing gear (pots). Normally, with reduced accuracy, this information is inferred at the surface from catch-per-unit-of-effort data. During TEKTITE II aquanauts were able to make direct observations over a relatively long period of time.

During our experimentation, 6 pots with 3 different designs, were compared. The 3 pot types included: (1) traditional Virgin Island pots constructed of wood lathe and chicken wire; (2) pots similar to those now used in the Northeastern Pacific for sablefish employing an aluminum framework and nylon web; and (3) smaller experimental pots constructed entirely of plastic.

We found individual fish species can be identified or characterized by particular and consistent behavior patterns toward commercial fish pots.

The following general conclusions are suggested:

1. Some reef fishes such as groupers and squirrelfish appear to be territorial and may not range widely.

2. Precise location of traps is a major factor relating to capturing success. A trap placed 15 feet from a squirrelfish congregating area

will capture considerably fewer fish than the same trap placed 10 feet closer. Usually traps placed on a sand bottom close to coral ledges are more successful than those placed directly on the reef.

3. Catch rates were not greatly altered by baits used. Usually equal numbers of fish were captured in both unbaited and baited traps. Baits tested included cut fish pieces, Turk's-head cactus, conch, and fish meal.

4. Typical Virgin Island wire traps utilize a trap gate (entrance) that greatly reduces the likelyhood of fish escaping. However, this gate probably prevents lobsters from entering. On the other hand, a number of lobsters were captured in the experimental sablefish traps.

Divers equipped with double scuba tanks and wet suits were able to make uninterupted direct observations for periods up to one hour. Lack of closed circuit breathing units definately affected some close range observations. Bubbles emitted from conventional scuba gear frightened some species.

PRECISE IN SITU MEASUREMENTS OF SOME CHEMICAL PARAMETERS

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During the first mission of Project TEKTITE II we had proposed to quantitatively investigate several biological and geologically important chemical parameters, namely oxygen and phosphate as well as to monitor several of the standard oceanographic parameters.

The preliminary results of mission 1-50, of the TEKTITE II project, in some aspects, appear to show rather interesting trends and differences which, to these investigators, do not fall into the routine findings of the classical Oceanographer, for shallow coastal waters. The other aspects showed no differences other than what would be expected or predicted by previously recorded data.

The oxygen analysis was performed in a number of ways to determine just how the sample varies as a result of pressure, time and transportation, as well as to determine variations which might occur as a result of where and how the sample was fixed or pickled. Samples which were taken and fixed in the classical way (at the surface), appear to show significant differences from those samples which were fixed in the water at the sample site (in situ).

In the past, the changes in oxygen concentration were attributed to degassing which resulted from decreasing pressure and increasing temperature as the sample was brought to the surface. These changes were considered small if the oxygen sample was the first drawn from the sea water sampler. Our results agree with this but we find that the activity of the biomass trapped in the sampler becomes a very important factor when dealing with biologically active parameters, especially when reasonable storage periods are involved (for example a few hours storage before fixing).

Our pH and alkalinity data shows that there is a small but definite diurnal variation in these parameters as would be expected from the activity in the water and the time of day. There was, however, a small difference between the two methods of collecting sea water samples. A closer inspection of the data must be made before we can determine if this difference is significant or not.

Salinity was measured as a base line parameter (or reference parameter) since it is not a function of temperature and pressure, but rather a function of the total amount of dissolved solids in a known weight of sea water. It showed no significant change.

Calcum and magnesium concentrations were monitored over a three day period and it was observed that there was no noticeable fluctuation in these two parameters as would be expected for a normal ocean system and implied for shallow coastal waters.

The temperature was monitored continuously throughout the project via a Thermistor and the thermistor was calibrated against glass thermometers. It was found that the temperature of Greater Lameshur Bay was increasing at a slow but steady rate, showing an overall change of about 0.8°C over the fourteen day period. A small microstructure was observed in the daily temperature but this was beyond the calibrated accuracy of the thermistor and recalibration must be done before this data can be evaluated.

It is the feeling of these investigators that research involving biologically active or rapidly changing parameters which are to be studied over a daily period, must be performed our of an underwater laboratory in order to obtain the desired precision and accuracy. We feel this precision and accuracy can

only be obtained via an underwater habitat for the following reasons: (1) Analysis can be performed very quickly after the sample has been taken and as a result no long term storage is required. (2) Samples do not see any significant pressure or temperature changes which could easily alter their composition. (3) Frequent and long duration sampling periods can be made, covering a suitable range in depth, without the hazardous, and often dangerous, decompression problem after each sample period. (4) The scientist no longer has to be concerned with the boring task of loading and unloading a ship each time he makes a sample run.

In conclusion we would like to say that our part of TEKTITE II, Mission 1-50, appears to have been very informative and useful to the entire oceanographic community.