Evidence for near shore nocturnal foraging by green turtles at Honokowai, Maui, Hawaii Islands

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A creative methodology was employed to attach Time-Depth Recorders (TDRs) on large green turtles resting at 10-15m depths in benthic habitats off Honokowai, West Maui. The objective of this study was to determine diving profiles for insight into the turtles' diel behavior associated with foraging/resting patterns and locations. Honokowai hosts nearly 100 turtles known to be long term residents, many of which have been afflicted with fibropapilloma disease (Bennett et al. 2002, Davidson 2001). This underwater area and the honu ohana (turtle family) have been documented photographically two months each year since 1989. Individual turtles have been benignly ID'ed and assigned names for permanent recognition using images of facial scale patterns (by UK-B/PB, see for comprehensive details). This effort, requiring an enormous investment of time, resources, and patience, has resulted in a unique dataset for longitudinal research of the Honokowai turtle assemblage.

Green turtles in the Hawaiian Archipelago (19°N,155°W to 28°N,178°W) have shown a significant increase in numbers since annual monitoring was initiated 29 years ago at the population's principal nesting site of French Frigate Shoals (FFS). At some locations prominent changes in the adaptive behavior of the turtles have occurred concomitant with the recovery trend. This includes shifts in near shore foraging from night to daytime, exceptional tolerance to humans, emergence ashore for resting or basking, and formation of underwater cleaning stations (Balazs 1996).

At Honokowai, certain turtles of known identity are undisturbed if carefully approached by a scuba diver. This acceptance offers the unique opportunity to deploy and retrieve small instruments without capture or restraint. TDRs by Wildlife Computers (MK5/MK7), programmed to sample depth once a minute, were placed into small soft pouches on an adjustable pet collar fitted with a quick attach/release buckle. A segment of cotton cloth was sewn into the collar as a break-away link for safety. The resulting "anklets" were easily placed on and retrieved from the femoral region of the hind flipper of three healthy turtles resting on the bottom. This resulted in the collection of nine days of dive profiles for an 80cm subadult (Fig. 1 "Uwapo"), four days for an 80cm subadult male (Fig. 2 "Amuala"), and six days for a 95cm adult female (Fig. 3 "605C") originally tagged in 1997 while nesting at FFS. All turtles demonstrated movements to shallower water at night (1900-0700h). The numerous short dives carried out to 1-4m were indicative of foraging. In contrast, the longer and deeper daytime dives took place where the TDRs were deployed and the turtles are routinely seen resting, but seldom feeding. Turtle 605C differed from this pattern on two days (8/23 and 8/24/01) by moving to shallow depths at 1100-1200h and staying there for 19h each time, presumably feeding, until 0700 the following day. Daytime resting and night-time foraging dives were often separated by a short transition period (<1h) consisting of dives limited to 1-2m deep. This may be when the turtles are swimming near the surface in transit between the two habitat locations, thereby suggesting a distance of about 2km or less.

The identification of food contents of turtle fecal pellets collected where the TDRs were deployed revealed the benthic algae *Melanamansia*, *Cladophora*, and *Pterocladiella*. The latter alga is found almost exclusively in water 1-4m deep and has long been known as prime forage for Hawaiian green turtles.

Shallow water 1-4m deep only exists close to shore, since the ocean bottom descends to great depths seaward of Honokowai and there are no offshore shoals. Turtles in numbers, especially ones of large size, are not seen feeding during the daytime along West Maui. Further investigations are needed to ascertain why turtles at Honokowai, acclimated to the presence of a few scuba divers in resting habitat, would continue to forage mainly in the dark, when many others throughout Hawaii feed openly during the day. Nevertheless, it is now clear that the turtles seen at Honokowai, as featured at , mainly consist of a bedroom community. And, when the sun sets, the turtles come in to pasture.

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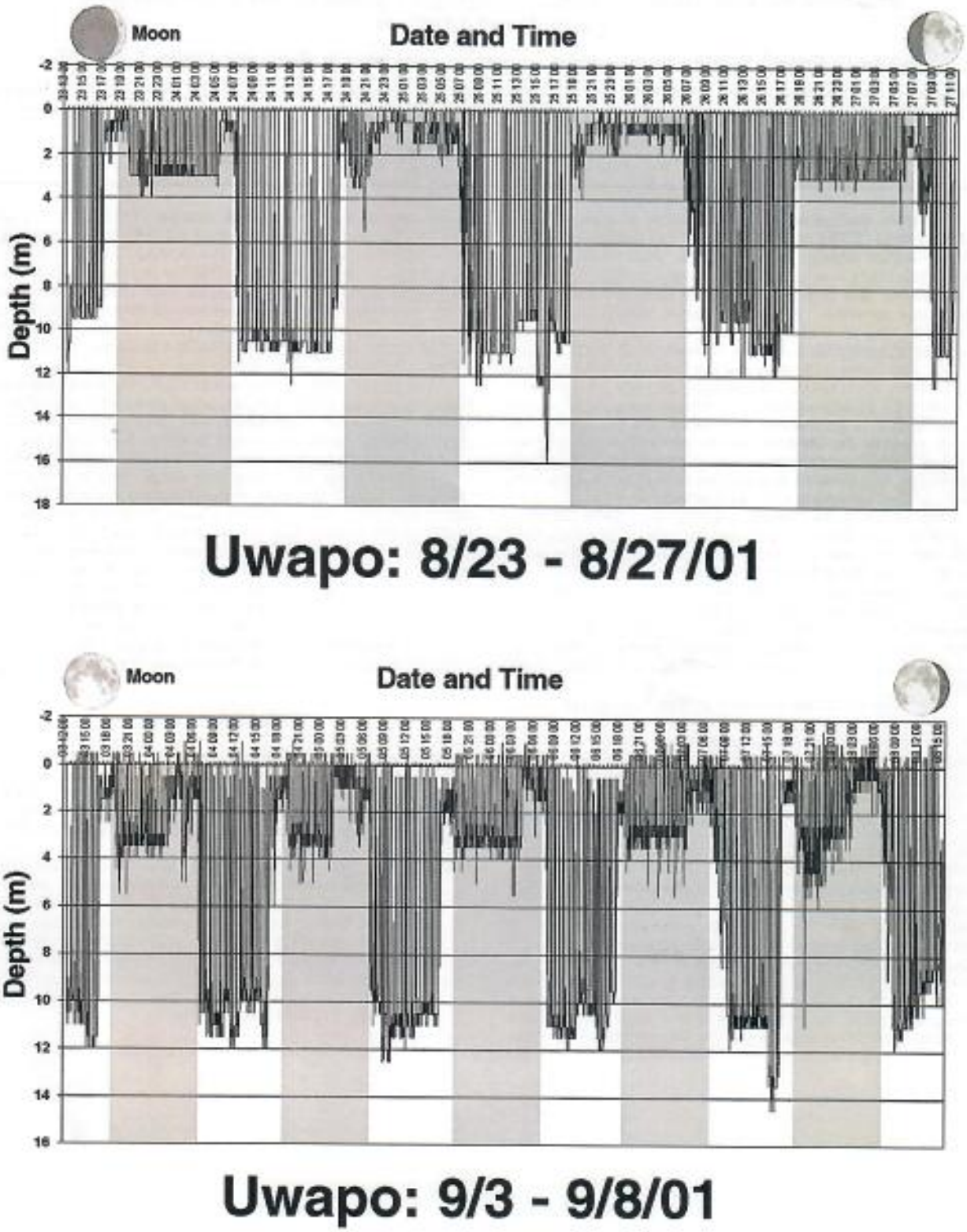

Fig. 1. Dive profiles for subadult green turtle "Uwapo" at Honokowai, West Maui. Shaded areas indicate nocturnal hours.

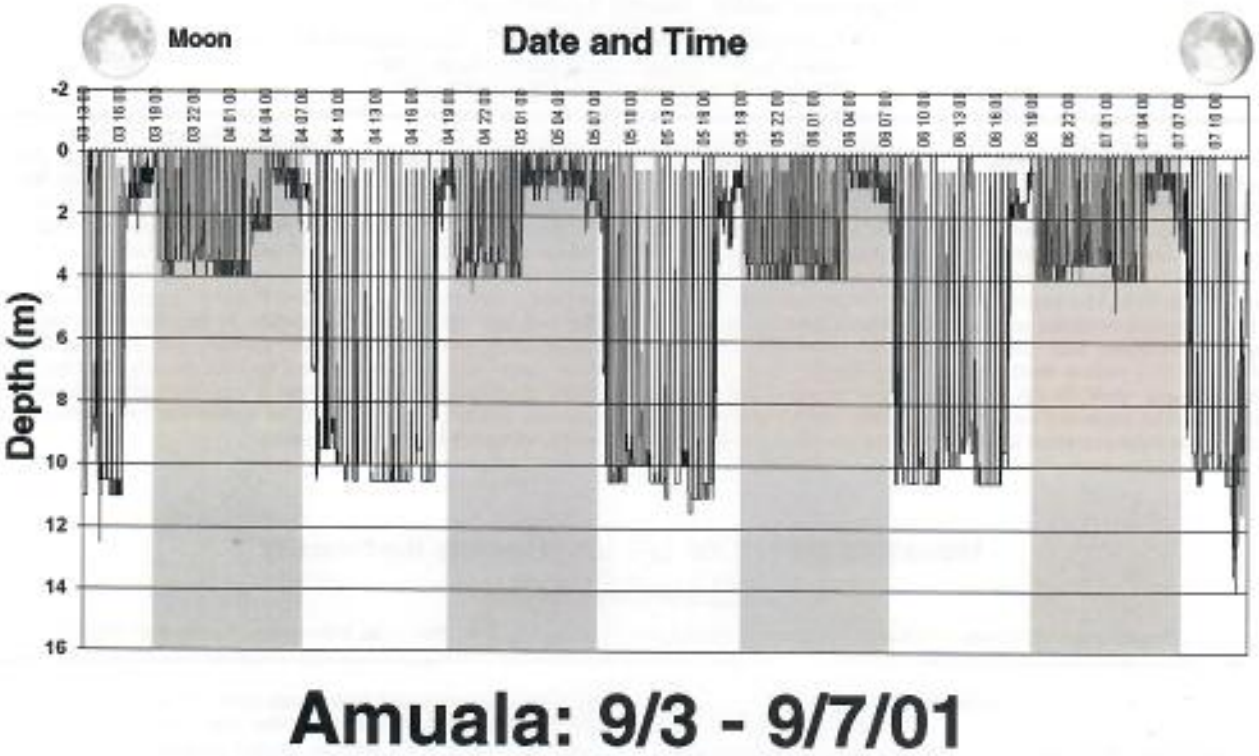

Fig. 2. Dive profiles for subadult male green turtle "Amuala" at Honokowai, West Maui. Shaded areas indicate nocturnal hours.

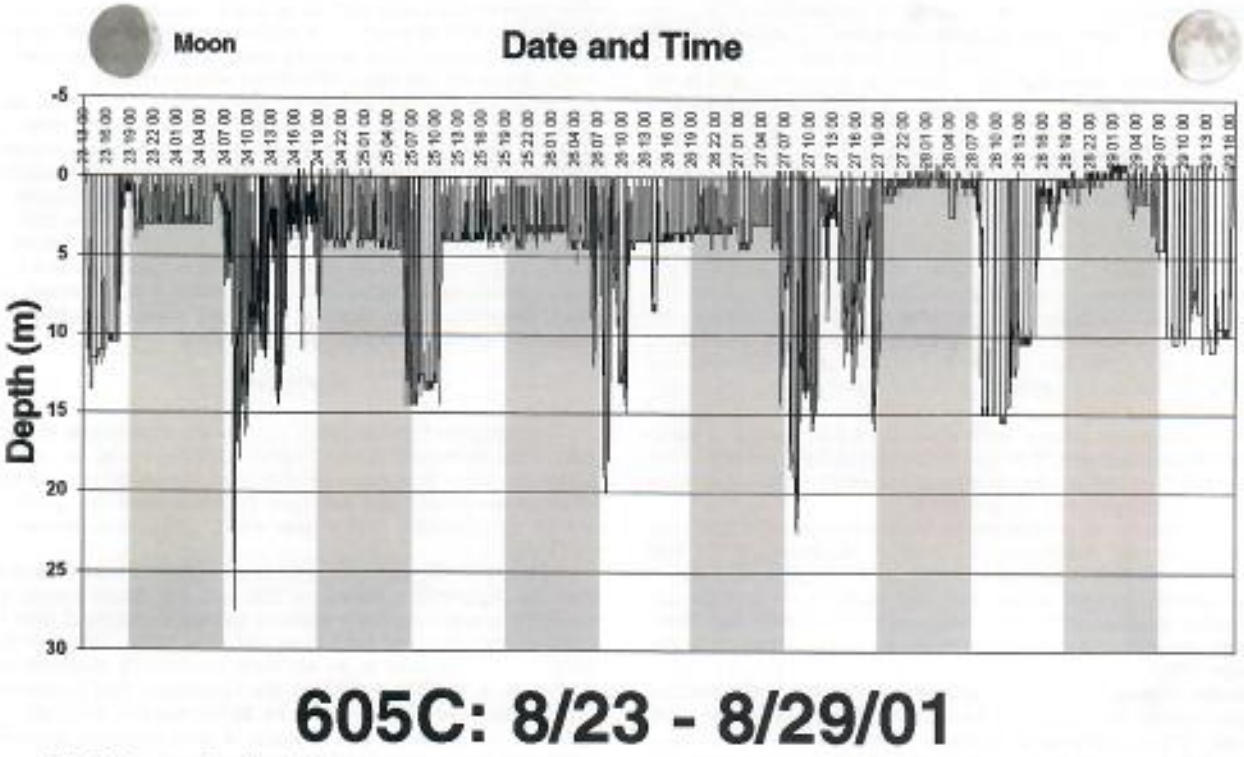

Fig. 3. Dive profiles for adult female green turtle "605C" at Honokowai, West Maui. Shaded areas indicate nocturnal hours.

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