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ADAPTATION OF CAPTIVE-REARED GREEN TURTLES RELEASED INTO HAWAIIAN COASTAL FORAGING HABITATS, 1990-99

George H. Balazs¹, Shawn K. K. Murakawa², Denise M. Parker², and Marc R. Rice³

¹National Marine Fisheries Service, Southwest Fisheries Science Center, Honolulu Laboratory, 2570 Dole Street, Honolulu, Hawaii 96822-2396 USA

²Joint Institute for Marine and Atmospheric Research, 2570 Dole Street, Honolulu, Hawaii 96822-2396 USA

³Hawaii Preparatory Academy, 65-1692 Kohala Mountain Road, Kamuela, Hawaii 96743-8476 USA

Green turtles obtained from Hawaiian waters by Sea Life Park on Oahu in the 1960's have nested and produced hatchlings on an artificial beach every year since 1976 (see Bourke et al., 1977). Most of these hatchlings were released into the wild shortly after emergence. However, starting in 1989, a few were retained each year for an educational loan program to facilitate the display of small turtles less than about 40 cm in straight carapace length (SCL) at qualifying aquaria in Hawaii, Canada, and the mainland USA. Steve Kaiser, the program's originator, called this novel outreach the "Hawaiian Sea Turtle Ambassador Program." Steve's rationale, shared by many, was that live sea turtles, especially small ones, are their own best advocates for conservation when viewed up close by the public. The end-point of each carefully conducted loan occurred when the turtles reached the carrying capacity of their display tanks and were certified healthy for release into Hawaiian waters. "Head-starting" has not been the purpose of the program, although at times this aspect has been given inappropriate emphasis by the news media and others. The program's ongoing fundamental goals, currently being accomplished with distinction, are the enhancement of public awareness and conservation education on behalf of sea turtles.

For the past decade, most of the turtles in the Sea Life Park program have been released as part of the July 4th "Turtle Independence Day" celebration at the Mauna Lani Bay Hotel on the South Kohala Coast of the island of Hawaii (20°N, 156°W). This coastline constitutes rich underwater foraging and resting habitats for an abundance of naturally occurring green turtles. Terrestrial basking also takes place along this lava rock shoreline. Investigations of the biology, ecology, and life history of these turtles have been underway since the 1980's by the National Marine Fisheries Service (NMFS), in partnership with the Hawaii Preparatory Academy (Balazs, 1996; Balazs et al., In press; Davis et al., In press; Harrington et al., This volume; Rice et al., This volume). These research activities have provided excellent opportunities to recapture and evaluate turtles originating from Sea Life Park. Since 1993, all turtles released at Mauna Lani have been measured, weighed, and positively identified by NMFS using Inconel flipper tags and PIT tags. Herein we provide a summary of the results of tag recoveries made to date.

RESULTS

From 1990-99, 102 captive-reared green turtles ranging from 25.5 - 68.0 cm SCL (mean - 40.7 cm) were released at the Mauna Lani Bay Hotel (Figure 1). Twelve turtles (11.7%) have been recaptured/resighted from 1-5 times by hand, net or (in one instance) a visual tag reading during in-water research (Figure 2). Elapsed times from initial release to the most recent recapture ranged from 2.3 - 7.3 years. Eight of the 12 turtles were encountered within 5 km of the Mauna Lani Bay Hotel. Three others were recaptured along the coastline 45-80 km to the south at Honokohau (1), and Honaunau (2). Another turtle was recaptured in the major foraging habitat of Kaneohe Bay on Oahu, a distance of 270 km (Figure 3).

Six other turtles (5.9% of 102) were found stranded 0.8 - 2.4 years after release (Figure 2). Two were dead and four were alive. Necropsy of the former revealed that one was severely emaciated, and the other in good body condition with no indication of the cause of death. This turtle stranded 2.4 years after release along green turtle foraging habitat on the island of Lanai, 150 km from Mauna Lani. The four live strandings included three emaciated and/or excessively buoyant turtles, and one with a severe propeller injury to the carapace. This latter turtle also had two small fishing hooks externally and one internally as revealed by x-ray. All four live strandings required

considerable veterinary treatment and captive rehabilitation by NMFS before being released a second time.

As shown in Figure 4, the SCL growth rates of the 11 turtles recaptured and remeasured during in-water research ranged from 0.7 - 3.2 cm/yr (mean = 2.1 cm/yr). The Kaneohe Bay recapture displayed the most rapid rate of growth (3.2 cm/yr). A small fibropapilloma was recorded on the eye of this turtle. Growth rates for the 11 turtles compare favorably and are consistent with data obtained over the past 25 years for naturally occurring green turtles in a wide array of foraging habitats throughout the Hawaiian Islands. However, three of the 11 turtles are known to have been fed pelleted fish food and lettuce by tourists and others during their post-release residency near the Mauna Lani Bay Hotel. The growth rates of the six stranded turtles ranged from only 0.5 - 0.9 cm/yr (mean = 0.6 cm/yr). These data suggest the failure of the turtles to adapt to the wild and thrive.

CONCLUSION

Nine of the 18 captive-reared turtles encountered have successfully adapted to natural Hawaiian marine habitats. The other nine did not adapt (6 stranded and 3 being fed in the wild). Eighty-four turtles have thus far not been seen again. The two PIT tags used to identify each animal should help ensure longer term recognition if or when the turtles are recaptured during coming years or decades.

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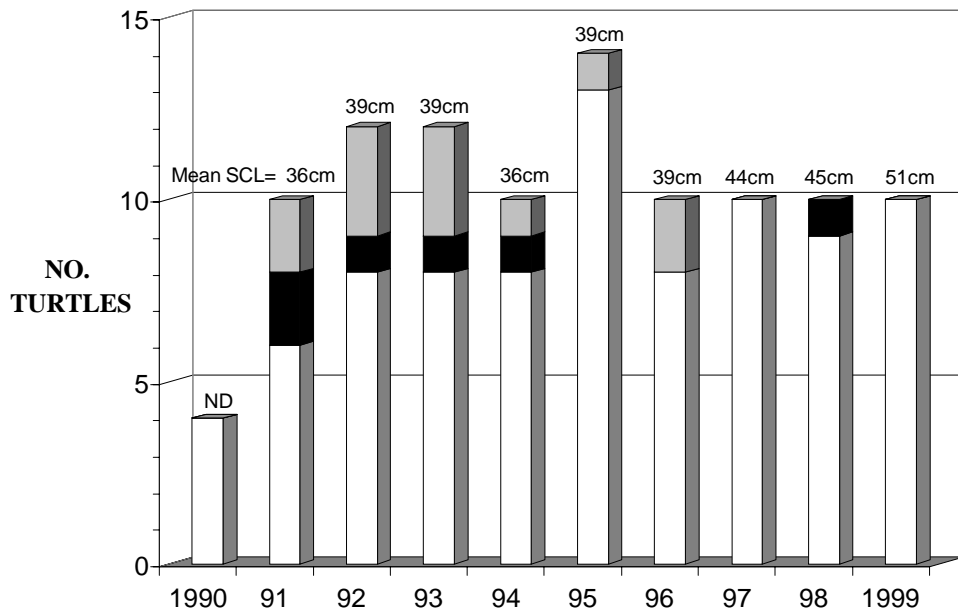
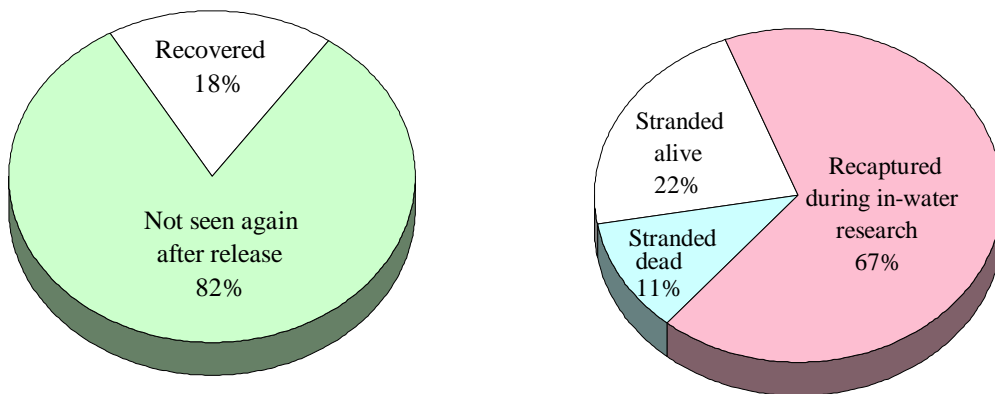


Figure 1. Captive-reared green turtles released annually at the Mauna Lani Bay Hotel. Gray indicates the number recaptured in each year-class during in-water research. Black indicates the number stranded.

Figure 2. HAWAIIAN GREEN TURTLES:
OUTCOME OF A DECADE OF CAPTIVE-REARING AND RELEASE
FOR EDUCATIONAL DISPLAY



Outcome of green turtles released into the wild at the Mauna Lani Bay Hotel
N = 102

Circumstances of recoveries
N = 18

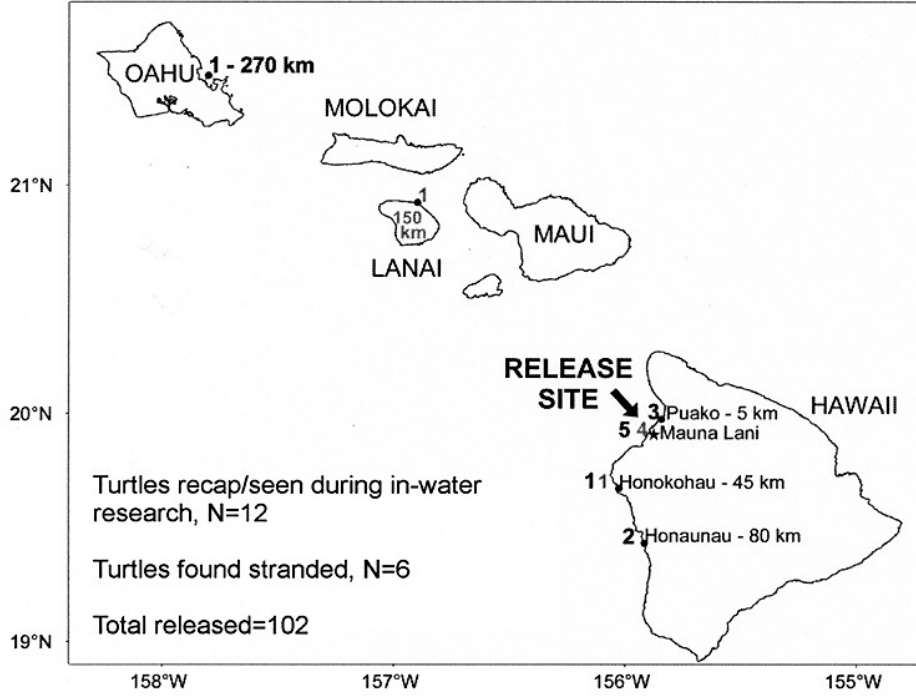


Figure 3. The main Hawaiian Islands. Recapture locations and distances from the Mauna Lani release site.

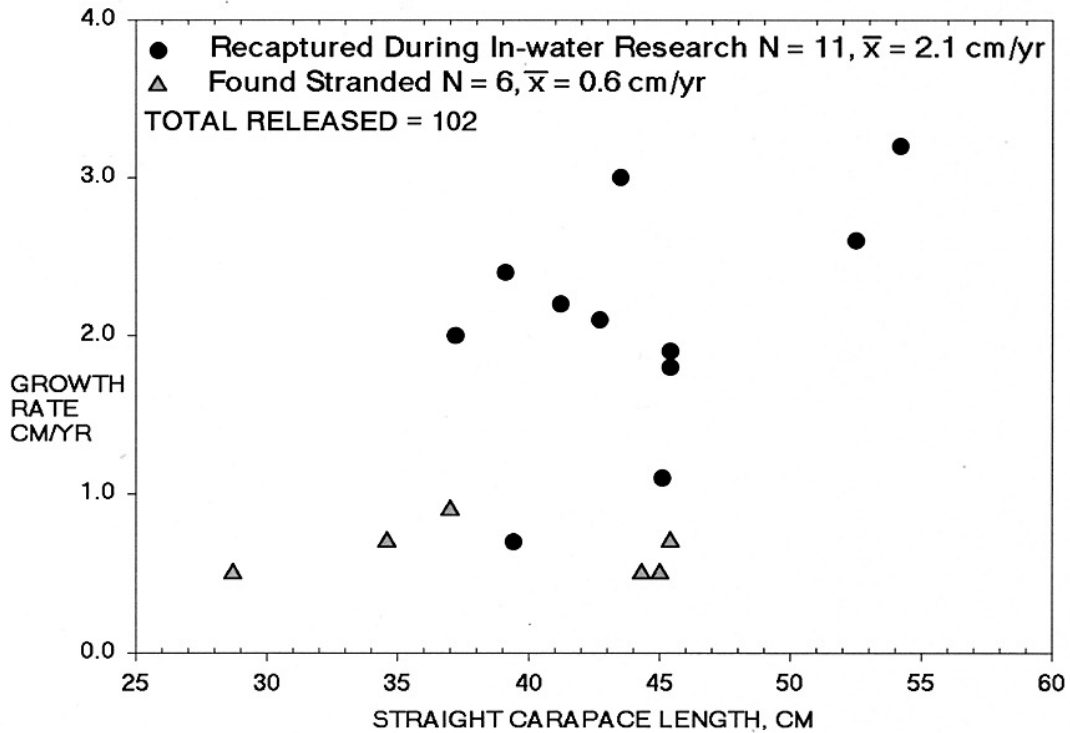


Figure 4. Growth rates in the wild of recaptured turtles released at Mauna Lani.