

No. 23 November 2003

News

Newsletter of the Re-introduction
Specialist Group of IUCN's
Species Survival Commission (SSC)

ISSN 1560-3709

RE-INTRODUCTION



Head-starting of sea turtles: is it a viable conservation and management tool?

Populations of all sea turtle species in the world have decreased in recent years, and studies for their conservation have been launched all over their distribution range. Conservationists have implemented a number of recovery plans for threatened turtle populations, including experimental "head-start" (rearing) programs. Head-starting involves the captive rearing of hatchlings for several months to help them avoid high mortality in their first year. After reaching a prescribed age or size the head-started turtles are released back into the wild where they are assumed to survive and grow like wild turtles.

Head-starting programs

Head-started programs have been initiated on an experimental basis for several endangered sea turtle species (Heppell & Crowder, 1996). A program for green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) sea turtle rearing has been on-going for 30 years since 1960 in Florida (Huff,

1989). Similarly, in an attempt to speed up the recovery of declining populations of Kemp's Ridley sea turtle (*Lepidochelys kempii*), U S Fish and Wildlife Service initiated a head-start program in 1978. The hatchlings were raised on a high protein diet, then tagged and released. Later, the expense of the program and apparent lack of nesting by head-started turtles led to controversy over the value of head-starting and permit to egg collection and rearing were denied. In 1999, head-starting of hawksbills were tried by the Old Hegg Turtle Sanctuary at Park Bay on Bequia, West Indies. Questions were raised about this program – "do the advantages of raising public awareness and possibility of increasing the raised sea turtles' population outweigh the potential risk of introducing disease to the wild stocks?"

Almost at the same time, in 1999, a head-starting program for hawksbills was initiated in the Emirate of Abu Dhabi, United Arab Emirates (UAE). While conservation efforts are

underway to protect the nesting beaches in the UAE, rearing of hatchlings for conservation was thought as supplementary to increase the sea turtle population in the wild. This article discusses the head-starting program in the UAE and attempts to evaluate the program as a tool for conservation of sea turtles in general. In the Arabian Gulf, the most common and principal species of concern are the hawksbill turtle (*Eretmochelys imbricata*) and green turtle (*Chelonia mydas*) which are also focus of considerable conservation efforts by the IUCN's Marine Turtle Conservation Program. These two species extensively use UAE waters for foraging and the hawksbill nest in the sandy beaches of several offshore islands of the country. The hawksbill turtle (*Eretmochelys imbricata*) is listed as endangered by the IUCN since 1970 and its status has not improved. Sea turtles are affected by numerous anthropogenic factors such as degradation and loss of nesting habitats, water pollution and impact on hatching success. These threats notwithstanding, the mortality of turtles during early stages of their life history is also relatively high. The hawksbill sea turtle rearing and release (head-starting) program at Jarnain Island off the coast of Abu Dhabi, UAE is an attempt at enhancing wild hawksbill turtle populations in the area.

The scope of this experimental program is to:

- ◆ to develop methods of rearing hawksbill hatchlings in captivity with minimum mortality, and,
- ◆ to undertake rearing and release of a small proportion of wild sea turtle hatchlings with the objective of enhancing sea turtle populations in the wild.

Approach

A rearing unit was established at Jarnain, an island 140 km NW of Abu Dhabi in the Arabian Gulf. The unit is covered by a thick mesh net to protect tanks from direct sunlight and a small proportion of hatchlings from natural nests of the island were collected for rearing. Tanks are in two sizes - small (0.60 m in diameter and 20 in number) and large (4.85 m in diameter and 10 in number) and they are placed in a linear fashion to facilitate easy inflow and out flow of seawater through underground pipes. Hatchlings are fed 2% of the

body weight with high protein diets (floating 2mm pellets, 35% protein - TILAPIA 40 CP, ARASCO,

A total of 2,460 healthy reared hatchlings including 48 tagged yearlings were released to the sea during the last four years and no tag recovery has been reported till date.

Riyadh, KSA). Hawksbills are aggressive in captivity and bite on soft body parts, at times causing serious injuries to conspecifics which are then isolated in nursery tanks until they recover. Once the hatchlings reach a certain age (2, 4, 6 and 12 months) and weight (100 g, 250 g, 400 g and 600 g), they are released, preferably during the late evening at the same beach from where they were collected. A small percentage of hatchlings (5%) were reared for over 1 year (yearlings) and tagged before release.

Results

A total of 2,460 healthy reared hatchlings including 48 tagged yearlings were released to the sea during the last four years and no tag recovery has been reported till date. Behavior and



Hawksbill sea turtle (*Eretmochelys imbricata*)

growth of hatchlings in captivity has been documented and procedures to minimize mortality during the experiment have been developed and standardized. Since the main objective of this experiment was to increase the sea turtle population in the wild, hatchlings (hawksbills) were retained for a maximum period of one year. However most (> 80%) of the hatchlings were released at the end of 6 months.

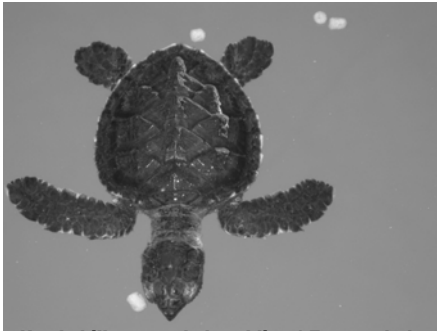
Discussion

Most populations of hawksbills are known to be severely depleted and moderate population levels appear to persist around the Torres Straits Islands, northern Australia, in the Red Sea and Gulf of Aden, Palau group and Arabian Gulf islands, Oman, parts of Seychelles, possibly the Maldives and Madagascar. Hawksbill hatchlings are difficult to maintain under captive conditions because they are aggressive and bite each other causing injuries and infections. However, hawksbill is the right species for experimental head-starting as they sexually mature early (8 years) than other species of sea turtles (green sea turtle 25 years). Hence, the result of head-start will be obtained early on. No tag has been recovered till date from the turtles released at Jarnain and there is a plan to satellite tag a few yearlings to understand the post-release migration pattern of reared turtles. At this point we need to look into some vital questions raised by sea turtle biologists and conservationists (Ehrenfeld, 1982). The primary question that is raised most often is *does the possibility of increasing the endangered sea turtles population out-weigh the potential risk of introducing disease to wild stocks?* The second important question is *whether hatchlings raised in captivity have the capacity to become reproductive members of the wild population?* Many conservationists feel head-starting is not the answer to restoring local population especially when their foraging and nesting habitats are not protected.

The value of captive rearing of sea turtles is a matter disputed between culturists and conservationists (Ross, 1999). Supporters for rearing say that the young hatchlings have a low survival rate in the wild and that it is more effective for conservation to feed and care for the young ones before releasing. On the other hand, researchers from other schools of thought question if such cultivation is a meaningful conservation method for sea turtles. Sufficient data to settle this difference of opinion have not yet been obtained. There have been no reports of turtles laying eggs after being released artificially. Besides, doubt remains as to whether turtles that spend the first months of their lives in captivity will have conditions of their natal beaches adequately imprinted in their adult behavior. Thus, the opponents assert that it is more important to preserve nesting beaches to ensure the protection of turtles.

In order to be a successful management tool, head starting must increase population growth significantly. Heppell and

Crowder (1996) carried out a stage based matrix model and hypothesized that the head-starting is unlikely to work as a management tool for most long lived turtles for two reasons.



Hawksbill sea turtle hatchling (*Eretmochelys imbricata*) at Jernain Island, UAE with floating feed pellets visible

1. First, in a slow maturing species an increase in first year survival is unlikely to prevent population declines that are caused by reductions in the annual survival rates of the adult turtles. This is particularly true in sea turtles, which may take decades to mature and are subject to incidental harvest in the adult and sub adult stages.
2. Second, except in extremely small populations, it is unfeasible to head start enough hatchlings to have an impact on overall survival rate of a cohort.

The Jernain experiment in the UAE has been a successful program as far as rearing is concerned but until we do not receive tag returns the objective is not achieved. It is difficult to conclude that the reared turtles have survived well in the wild and have become part of the reproductive population in the region. Hunting of sea turtles in the Arabian Gulf does not exist and the ban of drift net fishing has minimized the suffocation related death in turtles. Hence, direct pressure on species is minimal in UAE waters. However, the foraging and nesting habitats of sea turtles in the UAE are under natural and anthropogenic pressure. Survey and monitoring of sea turtle nesting and foraging habitats in UAE waters is underway according to a conservation action plan that is being implemented. If the habitats are protected, with the existing "no-direct-pressure" on species, we should have a very healthy wild population of sea turtles in this region. By releasing head-started hawksbills to the wild in larger numbers, we may create a situation where imbalances in natural resources arise and pressure on critical marine

habitats, coral reef and seagrass beds is increased. This kind of natural imbalance may result in various problems pertaining to resource sharing among marine wildlife and habitat. Under this dilemma, results from tag return from the released stocks will provide vital information on head-starting as a conservation tool for hawksbills and other species of sea turtles.

Acknowledgements

This program of rearing and release of hawksbills is supervised and administered by the Marine Environment Research Center of the Environmental Research and Wildlife Development Agency (ERWDA) on behalf of the private office of His Highness Sheikh Hamdan Bin Zayed Al-Nahyan, Deputy Chairman, ERWDA at Jernain island, Abu Dhabi, UAE. The author is grateful to ERWDA for the financial support of the project and ERWDA's management for their support and interest in this study.

References

- Ehrenfeld, D. 1982. Options and limitations in the conservation of sea turtles, p 457-463. In: K. A. Bjorndal (Editor) *Biology and Conservation of sea turtles*, Smithsonian Institution Press, Washington DC.
- Heppel, S. S. and Crowder, L. B. 1996. Models to evaluate head-starting as a management tool for long lived turtles. *Ecological Application* 6(2), pp 556-565.
- Huff, J. A. 1989. Florida, US terminates head-start program. *Marine Turtle Newsletter* 46:1-2.
- Ross, J. P. 1999. Ranching and Captive breeding Sea turtles: Evaluation as a Conservation strategy. In: "Research and Management Techniques for the conservation of sea turtles", K. L. Eckert et al. (Editors), IUCN/SSC MTSG, publication No. 4.

Contributed By Himansu S Das, Associate Scientist, Marine Environment Research Centre, ERWDA, Abu Dhabi, UAE, e-mail: hsdas@erwda.gov.ae