ACCOMPLISHMENTS OF THE KEMP'S RIDLEY HEAD START EXPERIMENT

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Kemp's ridley sea turtle (*Lepidochelys kempi*) head starting is a reintroduction experiment initiated in 1977 as a subsidiary part of a recovery program carried out by the Kemp's Ridley Working Group. The Working Group includes representatives of Mexico's Instituto Nacional de la Pesca (**INP**), U.S. Fish and Wildlife Service (**FWS**), National Park Service (**NPS**), Texas Parks and Wildlife Department and National Marine Fisheries Service (**NMFS**). Purposes of head starting ridleys are to (1) increase their survival during the first year of life, (2) release healthy survivors into the known breeding range of the species, and (3) establish a nesting colony at the Padre Island National Seashore near Corpus Christi, TX, thus supplementing the species' nesting capacity. One working hypothesis of head starting is that Kemp's ridleys imprint to the beach to which they are exposed as eggs, hatchlings or both, so they will return there to reproduce when they mature. Another is that survival of captive-reared ridleys after release is as good as that of their wild counterparts of similar age or size.

The **NMFS** Galveston Laboratory developed successful methods for captive-rearing, tagging and releasing large numbers of ridleys. **INP**, **FWS**, Gladys Porter Zoo and **NPS** provided hatchlings "imprinted" at Rancho Nuevo or Padre Island. Of 21,682 live hatchlings of the 1978-1990 year-classes received alive by **NMFS**, 18,690 (86 %) healthy survivors were released into the Gulf of Mexico or adjacent estuaries, most (15,490 or 83 %) at an age of 9-11 months. The experiment also provided animals and opportunities for research on reproductive physiology and behavior, sex determination, temperature-sex relationship, captive-propagation, and physiology of exercise, physical fitness and submergence in trawls.

All head started ridleys were tagged with external flipper tags. Like other sea turtles, many probably lose such tags within a few years. Notable exceptions occur, as shown by a ridley that retained its flipper tag almost 9 yr after release. Beginning with the 1984 year-class, some head started ridleys were also tagged with living tags (mark formed by tissue graft from plastron to carapace) and internal magnetic tags. Still fewer have been tagged with passive integrated transducer (PIT) tags in recent years.

Mark-recapture experiments on marine animals usually are conducted on species legally exploited by commercial or recreational fisheries, in which cases the investigators either control or are able to assess the amounts of effort allocated to recapturing tagged animals. This could not be done with head started ridleys, so sources such as the Sea Turtle Stranding and Salvage Network, fishermen and the public were relied on for reporting tag returns. Not surprisingly, strandings (51 %) and incidental capture in shrimp trawls (25 %) dominated the tag returns for which a method of recovery was reported. Therefore, caution must be exercised in interpreting tag returns which could be biased. For example, were it not the vagaries of reporting and the loss of tags, survival rates of head started ridleys might be estimated from tag recoveries in a series of consecutive years.

The primary purpose of tagging the turtles was to provide a means of identifying them as head started when found on nesting beaches, but flipper tag recoveries also made it possible to monitor their growth and distribution. Tag recoveries showed that head started Kemp's ridleys adapt, grow and survive in the wild. Head started Kemp's ridleys have been found throughout the natural range of the species, and in habitats where wild Kemp's ridleys occur.

Age to maturity is unknown for wild Kemp's ridleys, but has been estimated to be as young as 6 yr and as old as 15 yr or more. The younger age to maturity was estimated from growth in tagged wild Kemp's ridleys in the

Gulf of Mexico, and the older on skeletochronological studies of wild Kemp's ridleys in the Atlantic. The Von Bertalanffy growth curve fitted to size at age based on Gulf of Mexico tag recoveries of head started Kemp's ridleys from standard releases (those made in consecutive year 1; i.e., year-class + 1) ascended to 60 cm by age 7 yr. Head started ridleys grew slower in the Atlantic than in the Gulf, so Kemp's ridleys probably take longer to reach 60 cm in the Atlantic than in the Gulf. Regardless, there is no evidence that Kemp's ridleys in the Atlantic return to the Gulf.

Success of the head start experiment depends on corroborated evidence that significant numbers of head started Kemp's ridleys reproduce in the wild. Success with regard to the imprinting hypothesis requires proof that the turtles return to the beach to which they were exposed as eggs, hatchlings, or both. Neither criterion has been met so far. Assuming that survival of male Kemp's ridleys is not greater than that of females, fewer head started females than males would be expected to have survived to maturity from male-dominated year-classes 1978-1984 (33 % female). Female-dominated year-classes from 1985 on (89 % female) have not been at large long enough to have matured. If head started Kemp's ridleys have nested, chances are remote that anyone saw the turtles or recognized them as head started. The direct observation of any Kemp's ridley nesting is a rare event. Even at Rancho Nuevo, beach patrollers frequently locate nests without observing the turtles that laid them. It takes less than an hour for a Kemp's ridley to leave the water and return after nesting, so the time for observing a nester is short. If seen nesting by a casual observer, a head started turtle with flipper tag intact may not be reported. Trained observers at Rancho Nuevo probably are more likely to assume that Kemp's ridley nesters found there with a flipper tag scar but no tag are wild rather than head started. All these factors work against documentation of nesting in head started Kemp's ridleys.

Though no nestings of head started Kemp's ridleys in the wild have been documented to date, observations of nestings and occurrence of hatchlings in the surf have increased at the National Seashore since 1979. However, no evidence has been provided to link such events with head started Kemp's ridleys.

Head starting was planned as a 10-yr experiment, but in 1989 the **NMFS** Southeast Regional Office selected a panel of sea turtle experts who reviewed the Galveston Laboratory's head start experiment, examined its facilities, staff expertise, and methods, and evaluated its results and accomplishments. The panel concluded that head started Kemp's ridleys adapt and grow in the wild, but mortality rate at sea is so high that few head started or wild Kemp's ridleys can be expected to reach maturity. Because the major human cause of sea turtle mortality is shrimp trawling, the panel recommended that head starting be continued, but not expanded, for an additional 10 yr after installation of turtle excluder devices (TEDs) on all shrimping vessels in U.S. Gulf and Atlantic waters.

Quality of habitat and control of limiting factors are prerequisites to successful reintroductions. Head started ridleys apparently experience the same kinds of at-sea mortality to which wild sea turtles are exposed. Therefore, we agree with the review panel that experimental head starting of Kemp's ridleys should continue under conditions in which TEDs are required in shrimp trawls. In the interim, additional steps should be taken to improve survivability of head started Kemp's ridleys; e.g., by exposing them to semi-wild conditions for a month or so prior to release.

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