Marine Turtle Newsletter

Number 77 April 1997

DISTINGUISHING CAPTIVE-REARED FROM WILD KEMP'S RIDLEYS

In 1996, the U. S. National Marine Fisheries Service's (NMFS) Galveston Laboratory, Gladys Porter Zoo (GPZ, Brownsville, Texas USA) and Instituto Nacional de la Pesca (INP) of Mexico initiated tagging of hatchling Kemp's ridleys (Lepidochelys kempii) at Rancho Nuevo, Tamaulipas, Mexico. NMFS, GPZ and INP personnel tagged 3,336 hatchlings with non-magnetized wire tags (Patrick Burchfield, GPZ, pers. comm., January 1997). The tags (manufactured by Northwest Marine Technology, Shaw Island, Washington USA) were injected into the *right* foreflipper. Plans are to wire-tag up to 10,000 more hatchlings in the *left* foreflipper in 1997, thus distinguishing them from the 1996 year-class.

The purpose of this paper is to alert the sea turtle research community to this tagging program, to provide background information concerning how and why it came about, and to provide criteria for distinguishing captive-reared from wild Kemp's ridleys.

Background

In 1992, Eckert et al. (1994) conducted a peer review of the Kemp's ridley head-start experiment, clarified its objectives, developed testable hypotheses and made recommendations for improvements (see also Wibbels, 1989 and Donnelly, 1994). They stated explicitly that head-started turtles were the experimental group and wild turtles were the control group. However, a direct comparison between head-started and wild year-classes was not possible, because ages of the wild turtles were unknown. There had been no tagging program for known-age wild turtles (see recommendations of Byles et al., 1996) comparable in magnitude to that for known-age, head-started turtles.

To provide a control, Eckert et al. (1994) recommended tagging as large a sample of wild hatchlings as possible in each of two consecutive seasons at Rancho Nuevo, using archival type tags (either internal wire or PIT, passive integrated transponder). The Galveston Laboratory is conducting PIT-tagging experiments on loggerhead (Caretta caretta) hatchlings, but use of this tag on large numbers of hatchlings released into the wild is cost-prohibitive, especially when the rate of tag returns is expected to be low. Eckert et al. (1994) recognized there were biases in using wild hatchlings as a control. Most head-started year-classes were released during years in which turtle excluder devices (TEDs) were not required in shrimp trawls, whereas the

tagged wild turtles will be exposed to trawling with mandatory TEDs. The wild turtles are being tagged and released as hatchlings, but the captive-reared turtles were seven months old or older when released (Caillouet et al., 1995).

At its October 1993 meeting in North Padre Island, Texas (USA), the Kemp's Ridley Working Group (KRWG) requested laboratory tests of wire-tagging hatchlings, using loggerheads followed by Kemp's ridleys. The KRWG also expressed concern that magnetized wire tags might interfere with magnetic orientation and navigation of hatchlings (see also Eckert et al., 1994), and requested only non-magnetized wire tags be applied to large numbers of hatchlings at Rancho Nuevo. These non-magnetized tags cannot be detected using magnetometers unless they are first magnetized (see Fontaine et al., 1993 for details). However, wire tags can be detected by X-ray.

Galveston Laboratory experiments comparing non-tagged to two wire-tagged (non-magnetized and magnetized) groups of hatchlings were conducted on loggerheads of the 1993 year-class, and repeated on Kemp's ridleys of the 1994 and 1995 year-classes (see Table 1). Tagging was done at Rancho Nuevo to simulate on a small scale the situation that would occur in a large scale wire-tagging operation. There were no significant differences in survival, growth or tag retention rates among groups in either species, and tag retention (as confirmed by magnetometer and X-ray) was near 100%. For both year-classes of Kemp's ridleys, the three groups all had magnetized wire tags when released (Table 1). At its November 1995 meeting in College Station, Texas USA, the KRWG cautioned against wire-tagging more than 5,000 hatchlings in 1996, because this method had never been attempted on large numbers of hatchlings under field conditions.

Experimental Group

We consider head-started turtles to be the 22,205 "yearlings" of the 1978-1992 year-classes obtained as hatchlings from Padre Island National Seashore (PINS) near Corpus Christi, Texas USA or from Rancho Nuevo, captive-reared by the Galveston Laboratory for 7-15 months, tagged and released into the Gulf of Mexico (Table 1). Hatchlings from PINS were produced from eggs collected at Rancho Nuevo. Additional Kemp's ridleys were captive-reared for longer periods (e.g., to develop a captive brood stock during the early years of the head-start experiment). Some of these so-called "super-head-started" turtles (Phillips, 1989:103) were eventually released. We do not consider them typical of head-started turtles, because extended rearing may have habituated them to artificial conditions and predisposed them to exhibit aberrant behavior when released (Caillouet et al., 1995). Any Kemp's ridleys of the 1978-1992 year-classes that may have been captive-reared by other organizations are not considered head-started. Finally, those of the 1993 and later year-classes captive-reared by the Galveston Laboratory are not considered head-started. Regardless, we have included in Table 1 all captive-reared Kemp's ridleys released by the Galveston Laboratory or transferred to other organizations which released them. The Galveston Laboratory maintains tag-release records for these turtles, and therefore is the clearing house for their tag returns.

Distinguishing Groups

Tags applied to captive-reared turtles (Table 1) are the keys to distinguishing them from wild ones, whether tagged or not. Researchers at Galveston Laboratory applied external, metal, foreflipper tags to every turtle released, and applied additional types of tags to most of them (Fontaine et al., 1985; Caillouet et al., 1986; Manzella et al., 1988; Fontaine et al., 1988, 1989a, 1989b; Phillips 1989; Fontaine et al., 1993; Caillouet et al., 1995). In 1996, the first documentation of head-started Kemp's ridley nestings (one each from 1983 and 1986 year-

Table 1. Numbers of captive-reared Kemp's ridleys tagged with various types of tags and then released into the wild (includes head-started, "super-head-started" and other captive-reared turtles). "Internal-tagged" refers to turtles wire-tagged in either the left or right foreflipper. "External-tagged" refers to yearling turtles receiving external metal foreflipper tags.

Year-class	Internal-tagged (left)	Internal-tagged (right)	Living-tagged	PIT-tagged	External-tagged	Total
1978	9		1	8	2018	2028
1979					1363	1370
1980			180		1723	1723
1981					1639	1639
1982	12	12	436	12	1324	1336
1983			183		190	190
1984		1041	1041	23	1017	1041
1985	1533		1533		1533[a]	1533
1986	1726		1492	97	1629[b]	1726
1987	1280		1265	5	1230	1280
1988	910		870	102	808	910
1989	1914		1447	69	1845[c]	1914
1990	1979		1979	1979	1979	1979
1991	1944		1944	1944	1944[d]	1944
1992	1963		1963	1963	1963	1963
1993	188		188	188	187	188
1994		170	142	170	170	170
1995		168	160	168	168	168
Total	13458	1391	14824	6728	22730[e]	23102

[a] Correction of the 1,534 reported by Caillouet et al. (1995).

[b] Correction of the 1,630 reported by Caillouet et al. (1995).

[c] Correction of the 1,894 reported by Caillouet et al. (1995).

[d] Correction of the 1,943 reported by Caillouet et al. (1995).

[e] Only the 22,205 from the 1978-1992 year-classes are considered head-started; correction of the 22,255 reported by Caillouet et al., 1995).

classes) relied on more than one type of tag (Shaver, 1996a, b). Despite being tagged with one to four types of tags, captive-reared turtles can still be misidentified as wild if tags are (a) lost, (b) retained but not detected by persons unfamiliar with the tags or who lack appropriate detection equipment and training or (c) detected but not correctly reported.

One or more of the following criteria are necessary to distinguish captive-reared from wild turtles:

1. Captive-reared turtles tagged with magnetized wire tags totaled 14,837 (Table 1), but wire tags in wild hatchlings released at Rancho Nuevo were non-magnetized. Distinguishing

captive-reared from wild turtles based on this difference will require retention of magnetism by the magnetized tags, and the non-magnetized tags remaining non-magnetized in the wild. Under these conditions, wire tags in the captive-reared turtles should be detectable with a magnetometer, and those in the wild will have to be magnetized with a magnet before they can be detected with a magnetometer (Fontaine et al., 1993).

2. All captive-reared Kemp's ridleys of the 1978-1995 year-classes (23,102 turtles) were tagged with Hasco Style 681, external, metal, foreflipper tags bearing unique individual codes (manufactured by National Band and Tag Company, Newport, Kentucky USA). However, these tags are not permanent. When lost, they leave scars, but the scars sometimes heal and are not recognizable. As long as they are retained, these tags distinguish captive-reared from wild turtles by their unique codes. No other tags are needed to identify a captive-reared turtle when the external, foreflipper tag is retained, observed, correctly read and reported.

3. Most (14,824 turtles) captive-reared Kemp's ridleys were tagged with "living tags" (formed by grafting a small, light-colored piece of plastron tissue to the darker carapace). "Living tags" were placed on different scutes to distinguish year-classes (Caillouet et al., 1986; Fontaine et al., 1988). To our knowledge, no wild Kemp's ridleys have been "living tagged" and released. However, even trained observers sometimes fail to observe "living tags" (Fontaine et al., 1993). It is essential that observers scrub the carapace to remove adhering algae, mud or other debris before examining it carefully for a "living tag."

4. PIT tags (400 kHz; Biosonics, Inc., Seattle, Washington USA) bearing unique individual codes were placed in 6,728 captive-reared Kemp's ridleys. Captive-reared turtles should be distinguishable from wild nesters and other PIT-tagged wild turtles by these codes, assuming they are detected, correctly read and reported.

5. No captive-reared Kemp's ridleys of year-classes 1979-1981 and 1983 were wire-tagged. Only nine of the 1978 year-class and 12 of the 1982 year-class (see Table 2 in Fontaine et al., 1985) that were "super-head-started" and eventually released were wire-tagged.

6. All captive-reared Kemp's ridleys should be larger than the wild turtles tagged as hatchlings at Rancho Nuevo in 1996. Captive-reared turtles of the 1996 year-class have not yet been released.

We expect the wire-tagged wild turtles of the 1996 year-class to enter the neritic habitat following 1-2 years in the pelagic stage (see Ogren, 1989; Byles et al., 1996). There they may be encountered by "in-water" researchers, or be found stranded by the Sea Turtle Stranding and Salvage Network (STSSN). It may take more than a decade before any appear on nesting beaches (Byles et al., 1996). On the other hand, we expect captive-reared Kemp's ridleys to be reported for many years hence. Eckert et al. (1994) recommended that nesting beach coverage efforts be increased to examine all nesters and that all field teams be outfitted to detect head-started turtles (Pritchard, 1990; Byles, 1993; Williams, 1993). We urge participants in the STSSN, "in-water" research and nesting beach operations to examine all Kemp's ridleys they encounter, using criteria presented herein (see also Fontaine et al., 1993).

Byles, R. 1993. Head-start experiment no longer rearing Kemp's ridleys. Marine Turtle Newsletter 63:1-2.

Byles, R., C. Caillouet, D. Crouse, L. Crowder, S. Epperly, W. Gabriel, B. Gallaway, M. Harris, T. Henwood, S. Heppell, R. Marquez, S. Murphy, W. Teas, N. Thompson and B. Witherington. 1996. A report of the Turtle Expert Working Group: results of a series of

deliberations held in Miami, Florida, June 1995-June 1996. NOAA/NMFS/SEFSC, Miami, Florida. Unpubl. rept.

Caillouet, C. W., Jr., C. T. Fontaine, S. A. Manzella, T. D. Williams and D. B. Revera. 1986. Scutes reserved for living tags. Marine Turtle Newsletter 36:5-6.

Caillouet, C. W., Jr., C. T. Fontaine, S. A. Manzella-Tirpak and D. J. Shaver. 1995. Survival of head-started Kemp's ridley sea turtles (Lepidochelys kempii) released into the Gulf of Mexico or adjacent bays. Chelonian Conservation and Biology 1(4):285-292.

Donnelly, M. 1994. Sea Turtle Mariculture: A Review of Relevant Information for Conservation and Commerce. The Center for Marine Conservation, Washington, D.C. 113 pp.

Eckert, S. A., D. Crouse, L. B. Crowder, M. Maceina and A. Shah. 1994. Review of the Kemp's ridley sea turtle headstart program. NOAA Tech. Memo. NMFS-OPR-3, 10 pp. U. S. Dept. Commerce.

Fontaine, C. T., S. A. Manzella, T. D. Williams, R. M. Harris and W. J. Browning. 1989a. Distribution, growth and survival of head started, tagged and released Kemp's ridley sea turtles (Lepidochelys kempi) from year-classes 1978-1983, p.124-144. In: C. W. Caillouet, Jr. and A. M. Landry, Jr. (Editors), Proc. First International Symposium on Kemp's Ridley Sea Turtle Biology, Conservation and Management, Texas A&M University, Sea Grant College Program, TAMU-SG-89-105, vi + 260 pp.

Fontaine, C. T., K. T. Marvin, T. D. Williams, W. J. Browning, R. M. Harris, K. L. W. Indelicato, G. A. Shattuck and R. A. Sadler. 1985. The husbandry of hatchling to yearling Kemp's ridley sea turtles (Lepidochelys kempi). NOAA Tech. Memo. NMFS-SEFC-158, iv + 34 pp., 10 Tables, 22 Figures, 2 Append. U. S. Dept. Commerce.

Fontaine, C. T., D. B. Revera, T. D. Williams and C. W. Caillouet, Jr. 1993. Detection, verification and decoding of tags and marks in head started Kemp's ridley sea turtles, Lepidochelys kempii. NOAA Tech. Memo. NMFS-SEFC-334, iii + 40 pp. U. S. Dept. Commerce.

Fontaine, C. T., T. D. Williams and C. W. Caillouet, Jr. 1988. Scutes reserved for living tags: an update. Marine Turtle Newsletter 43:8-9.

Fontaine, C. T., T. D. Williams, S. A. Manzella and C. W. Caillouet, Jr. 1989b. Kemp's ridley sea turtle head start operations of the NMFS SEFC Galveston Laboratory, p.96- 110. In: C. W. Caillouet, Jr. and A. M. Landry, Jr. (Editors), Proc. First International Symposium on Kemp's Ridley Sea Turtle Biology, Conservation and Management, Texas A&M University, Sea Grant College Program, TAMU-SG-89-105, vi + 260 pp.

Manzella, S. A., C. W. Caillouet, Jr. and C. T. Fontaine. 1988. Kemp's ridley, Lepidochelys kempi, sea turtle head start tag recoveries: distribution, habitat, and method of recovery. Marine Fisheries Review 50(3):24-32.

Phillips, P. 1989. The Great Ridley Rescue. Mountain Press Publishing Company, Missoula, Montana. 180 pp.

Ogren, L. H. 1989. Distribution of juvenile and subadult Kemp's ridley turtles: preliminary results from the 1984-1987 surveys, p.116-123. In: C. W. Caillouet, Jr. and A. M.

Landry, Jr. (Editors), Proc. First International Symposium on Kemp's Ridley Sea Turtle Biology, Conservation and Management, Texas A&M University, Sea Grant College Program, TAMU-SG-89-105, 260 pp.

Pritchard, P. C. H. 1990. Kemp's ridleys are rarer than we thought. Marine Turtle Newsletter 49:1-3.

Shaver, D. J. 1996a. A note about Kemp's ridleys nesting in Texas. Marine Turtle Newsletter 75:25-26.

Shaver, D. J. 1996b. Head-started Kemp's ridley turtles nest in Texas. Marine Turtle Newsletter 74:5-7.

Wibbels, T., N. Frazer, M. Grassman, J. Hendrickson and P. Pritchard. 1989. Blue ribbon panel review of the National Marine Fisheries Service Kemp's ridley headstart program. Report to the NMFS Southeast Regional Office, St. Petersburg, Florida. 11 pp.

Williams, P. 1993. NMFS to concentrate on measuring survivorship, fecundity of head-started Kemp's ridleys in the wild. Marine Turtle Newsletter 63:3-4.

CHARLES W. CAILLOUET, JR., BRADLEY A. ROBERTSON, CLARK T. FONTAINE, THEODORE D. WILLIAMS, BENJAMIN M. HIGGINS and DICKIE B. REVERA, NOAA National Marine Fisheries Service, Southeast Fisheries Science Center, Galveston Laboratory, 4700 Avenue U, Galveston, Texas 77551 USA.

RANGE EXTENSION: NESTING BY DERMOCHELYS AND CARETTA IN SOUTHERN BRAZIL

Nesting by sea turtles has been reported along the south Atlantic coast of Brazil as far south as the Biological Reserve of Comboios (19°45'S, 39°55'W), Espírito Santo (Marcovaldi and Albuquerque, 1982; Marcovaldi and Marcovaldi, 1987). This report describes the first evidence of nesting further south. Loggerhead turtles (Caretta caretta) and leatherback turtles (Dermochelys coriacea) are involved (Table 1). Collected material was deposited in the Museu Oceanográfico do Vale do Itajaí (MOVI).

N°	Species	Date/ Hour	Lat. /Long.	State	N° eggs	Ø eggs	Grain size	N° Birth	Mat. Col.	Code
1	*C. caretta*	Dec. 29 1994 02:00	26°45'55"S 048°38'22"W	Santa Catarina	120	42 mm	0,840mm (0.25Ø)	70	Neonates, embryos, eggs and photos	MOVI 04466-74 05419
2	*D. coriacea*	Jan. 01 1995 00:40	29°26'01"S 049°47'55"W	Rio Grande do Sul	---	55 mm	0,180mm (2,50Ø)	36	Egg and photos	MOVI 04605
3	*D. coriacea*	Jan. 10 1995 07:00	28°51'32"S 049°16'07"W	Santa Catarina	104	56 mm	0,180mm (2,50Ø)	0	Egg and photos	MOVI 05420
4	*C. caretta*	Nov. 13 1995 23:00	26°46'31"S 048°35'30"W	Santa Catarina	88	41 mm	0,840mm (0.25Ø)	0	Eggs and photos	MOVI 05455-66

Table 1. First records of sea turtle nesting in Brazil south of 26°S.

Complementary Data

1. Nesting occurred at Quilombo Beach, City of Penha. Onlookers witnessed the event, which lasted about two hours. Biometric data were not collected. Grain size analysis revealed a predominance of coarse sand. Hatching took place the night of 28 February 1995 after 62 days of incubation. A newborn (catalogued photos MOVI-05419), 46 x 35 mm straight-line carapace length x width, was kept in captivity and fed a carnivorous diet of Sardinella sp. (Clupeidae), Callinectes sp., Xiphopenaeus sp. (Decapoda) and Illex sp. (Cephalopoda). At the end of one month, its dimensions were 71 x 58.5 mm straight-line carapace length x width.

2. Nesting occurred at Paraíso Beach, City of Torres, and was reported by onlookers. Bio-metric data were not collected. Grain size analysis revealed a predominance of fine sand. The beach has a gradual slope, which led the animal to distance itself about 90 m from the sea, passing two small dunes and laying its eggs next to a pile of trash. Hatching took place on 5 March 1995 after 64 days of incubation. For two days post-hatching, the nest attracted the interest of two specimens of Didelphis albiventris (Mammalia, Marsupialia), but no plundering was observed. Four days after the primary emergence, more hatchling tracks were observed. However, since the nest could not be precisely located, it was impossible to prove that these hatchlings were from the same nest.

3. Nesting occurred at Plataforma Entremares, Rincao Beach, City of Içara. Onlookers witnessed the event (emergence from the sea, nest preparation, egg-laying, return to the sea), which lasted about three hours. Biometric data were not collected. Grain size analysis revealed a predominance of fine sand. After 60 days of incubation, the nest was exhumed. None of the 104 eggs showed any embryonic development.

4. Nesting occurred at Grande Beach, City of Penha. Grain size analysis revealed a predominance of coarse sand. The female was seen returning to the sea after egg-laying. Seven days later, the eggs were collected by beachgoers. The eggs were examined by museum specialists who confirmed that they had been developing until their intrusive removal from the nest. Eighty-eight eggs were counted; 50 (56.81%) had conjoined shells (Siamese, or "dumbbell shape").

We will add to this record a female (curved carapace length of 151 cm) found dead on 21 November 1991, a victim of a fishing incident. She was carrying dozens of developing eggs, whose shells had not yet calcified. Photographs were catalogued (MOVI-00574).

Acknowledgements: We are grateful for the assistance of Marco A. Baylon (CEPSUL / IBAMA) for information on the nesting at Quilombo Beach; Linoberto M. da Rosa for information on the nesting at Paraíso Beach; Joao L. Betiol for information on the nesting at Rincao Beach; Fernando C. Luz for information on the nesting at Grande Beach; and Armand H. Amin Jr. (LOG / UNIVALI) for grain size analyses.

Marcovaldi, G. G. D. and J. C. B. Albuquerque. 1982. Projeto Tartaruga Marinha. Bol. FBCN 17:70-74.

Marcovaldi, M. A. D. and G. G. D. Marcovaldi. 1987. Projeto Tartaruga Marinha. Areas de desova, épocas de reproduçao, técnicas de conservaçao. Bol. FBCN 22:95-104.

JULES M. R. SOTO, RODRIGO C. P. BEHEREGARAY and ROBERTO A. R. de P. REBELLO, Universidade do Vale do Itajaí - UNIVALI, Faculdade de Ciências do Mar - FACIMAR, Museu Oceanográfico do Vale do Itajaí - MOVI, Cx. P. 360 CEP 88302-202 Itajaí, SC, BRAZIL.