ARTICLES

Chelonian Conservation and Biology, 2005, 4(4):761–766

Status of the Kemp's Ridley Sea Turtle, *Lepidochelys kempii*

RENÉ MÁRQUEZ-M.[1], PATRICK M. BURCHFIELD[2], JUAN DÍAZ-F.[3], MANUEL SÁNCHEZ-P.[4], MIGUEL CARRASCO-A.[3], CARMEN JIMÉNEZ-Q.[3], ALMA LEO-P.[5], RAFAEL BRAVO-G.[6], AND JAIME PEÑA-V.[2]

[1]*Convención Interamericana para Protección y Conservación de las Tortugas Marinas, Comité Científico (México), A.P. 695, Manzanillo, Colima, 28217 México [E-mail: rmarquez@bay.net.mx];*
[2]*Gladys Porter Zoo, 500 Ringgold St., Brownsville, Texas 78520 USA [E-mail: ridley@gpz.org];*
[3]*Instituto Nacional de la Pesca, Centro Regional de Investigación Pesquera, A.P. 591, Manzanillo, Colima, 28200 México [E-mail: tormar@bay.net.mx];*
[4]*Deceased;*
[5]*Instituto Nacional de la Pesca, Centro Regional de Investigación Pesquera, A.P. 144, Tampico, Tamaulipas, México [E-mail: almaleo57@hotmail.com];*
[6]*SEMARNAT, Dirección General de Vida Silvestre, Veracruz, Veracruz, México [E-mail: rabraga@hotmail.com]*

ABSTRACT. – **The primary nesting beach of the critically endangered Kemp's ridley sea turtle (*Lepidochelys kempii*) at Rancho Nuevo, Tamaulipas, Mexico, was not recorded until 1947 and not known to science until 1961. Conservation work started there in 1966; during the second half of the 1960s nestings of over 2000 turtles per season were recorded, but in spite of several years of protection, between 1985 and 1987 nesting abundance reached the lowest point, with an annual average of 824 nests per year. After 1988 nesting started to increase and by 2003 had reached 5373 nests per year. With Rancho Nuevo nesting females estimated at 40,000 in 1947 and recorded at a low of 343 in 1985–87 with a gradual increase to 2339 in 2003, the nesting population had a decrease of about 99% over 40 years and has now begun to recover, but is still decreased by about 94% compared to historical levels. Until 1977 daily beach patrols covered only 27 km of beach, since then the protected area has increased slowly to over 230 km, including beaches in the state of Veracruz. Between 1966 and 1977 the average number of hatchlings released annually in Rancho Nuevo was around 23,000; since 1978 this number has increased gradually – in 2003 over 470,000 hatchlings were released. Head-start and imprinting efforts as well as *ex-situ* captive breeding have also been undertaken. The Rancho Nuevo beach was designated a "Natural Reserve" in 1977, covering 20 km of coastline and 4 km wide. The species has also been recorded to nest on some beaches in Veracruz in Mexico and on Padre Island in Texas, USA.**

KEY WORDS. – **Reptilia; Testudines; Cheloniidae; *Lepidochelys kempii*; sea turtle; nesting beach; abundance; population trends; conservation; endangered species; head-starting; imprinting; Mexico**

Due to the severe population reductions of the Kemp's ridley (*Lepidochelys kempii*) the species is considered to be the most critically endangered of the sea turtles (TEWG, 1998, 2000). Based on a 16 mm film recorded 18 June 1947 by Andres Herrera, it was roughly estimated by Hildebrand (1963) and Carr (1963) that around 40,000 Kemp's ridley turtles nested that day in a 2 km section of beach, north of the San Vicente outlet, in Rancho Nuevo, Tamaulipas, México (Hildebrand, 1963). The methods of estimation of that nesting density have recently come into question (TEWG, 1998). Also the estimation corresponds only to one day of nesting, making it more difficult to know the actual size of the population at that time; however, during the last half of 1960s there were occasional *arribazones* or *arribadas* (mass nestings) that easily surpassed 2000 turtles (Pritchard and Márquez-M., 1973; Márquez-M., 1994; Márquez-M. et al., 1999), similar to that shown in Fig. 1.

As a result of concerns about the conservation status of the species, the National Fisheries Institute (INP) designed an intensive monitoring program for the Kemp's ridley nesting habitat and associated conservation efforts on Mexican beaches. It started in 1966 (Chavez et al., 1967) with the installation of the first Turtle Camp in Barra de Calabazas, Rancho Nuevo, Tamaulipas, México (Fig. 2). This site was the central area for beaches with the species' highest nesting densities. To provide greater protection, in 1977 a segment of this beach (Barra de Brasil to Barra del Aparejo, see Fig. 2) was declared a "Natural Reserve" (DOF, 1977). In addition to the total prohibition on any use of the species, the decree incorporated a protected area of 15 km of coastline and a 4 km offshore zone which was closed to commercial fisheries during the sea turtle breeding season (April to July).

Prior to 1978, daily beach patrolling for nest counts, translocation of eggs to corrals, tagging turtles, and collection of biological data was limited to around 26.7 km of beach in Rancho Nuevo (Table 1 and Fig. 2). In 1978 a binational program, between the U.S. Fish and Wildlife Service and the Mexican INP was initiated. Since then, with the

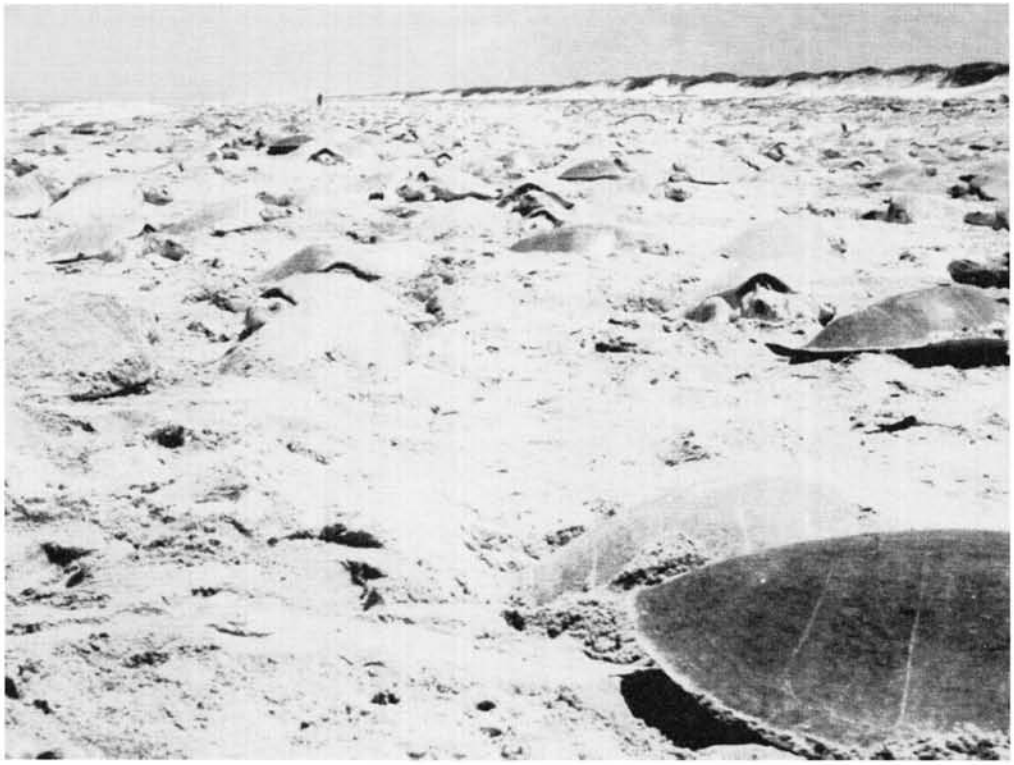

Figure 1. An *arribazón* (mass nesting event) of Kemp's ridley sea turtles, taking place in Rancho Nuevo on 23 May 1968, when over 2000 turtles nested in a single day. Photograph by A. Montoya (from Márquez-M., 1994).

use of all-terrain vehicles, the work intensified and the patrolled area was extended, resulting in a significant increase in the proportion of nests recorded and protected. In 1990 the project continued to expand through the establishment of a new conservation camp at Barra de Tepehuajes. In 1991 the beach south of Barra del Tordo was also included in the project. Since then, the patrolled area has continued to expand through the addition of several smaller camps. Beginning in 1996 other nesting beaches in Veracruz were also included in this program, but in fact the work there had already started several years earlier (Bravo, 1999), increasing the total protected beach areas to over 230 km (Table 1).

At a number of secondary sites, small yet significant numbers of Kemp's ridley nests have been recorded from 1998 onwards: at Altamira, La Pesca, and Miramar in Tamaulipas (Burchfield et al., 1998, 1999), and at Lechuguillas, with sectors of Los Coyoles, El Llano, and El Laurel in Veracruz (Bravo, 1999), as noted in Table 2. There have also been scattered nesting in places such as Cabo Rojo and Tecolutla in Veracruz, Isla Aguada in Campeche (Márquez-M., 1994; Márquez-M. et al., 1999) and Padre Island, in south Texas (Shaver, 1999) and Florida (U.S.-Mexican Project, 2002).

Population Trends

Considering 2.4 nests per female per season (n/f/s) (TEWG, 1998, 2000) as an average from the estimates of 1.78 n/f/s obtained at the beach by tag/recovery data (Márquez-M., 1994) and 3.07 n/f/s obtained by laparoscopy (Rostal, 1991) and knowing the total number of nests laid annually at each nesting beach, we can derive an approximation for the total number of reproductively active females nesting at each beach any year (Table 2).

Based on the period of lowest abundance at Rancho Nuevo only, between 1985 and 1987 when an average of 824 nests were laid, we estimate as few as 343 nesting females. Using the same procedure, by 2003 there were 2239 (6.5 times more) females nesting at this segment of beach. But considering that more than 40,000 female turtles were nesting in 1947, this means that the breeding population just in Rancho Nuevo was reduced by about 99% over 40 years (Table 2) and although now beginning to recover, is still reduced by 94% compared to historical levels.

Despite two decades of conservation efforts, the Kemp's ridley population continued to decline until 1985–87, when the annual number of nests registered along the 38.3 km at Rancho Nuevo (from Barra del Tordo to Barra de Ostionales, Table 1) reached the lowest numbers on record — 740, 752, and 742 protected nests (or 791, 811, and 871 registered nests; mean, 824), respectively, each of those three years. Beginning in 1988 the annual number of nests slowly started to increase (Fig. 3) until 2003 when 5373 nests were registered in Rancho Nuevo and 8533 on all beaches of Tamaulipas (Table 2). A similar positive trend was also observed in 2003 at Barra del Tordo (695 nests) and Barra de Tepehuajes (1520 nests) (Table 2 and Fig. 4) and Veracruz (400 nests) (Table 2).

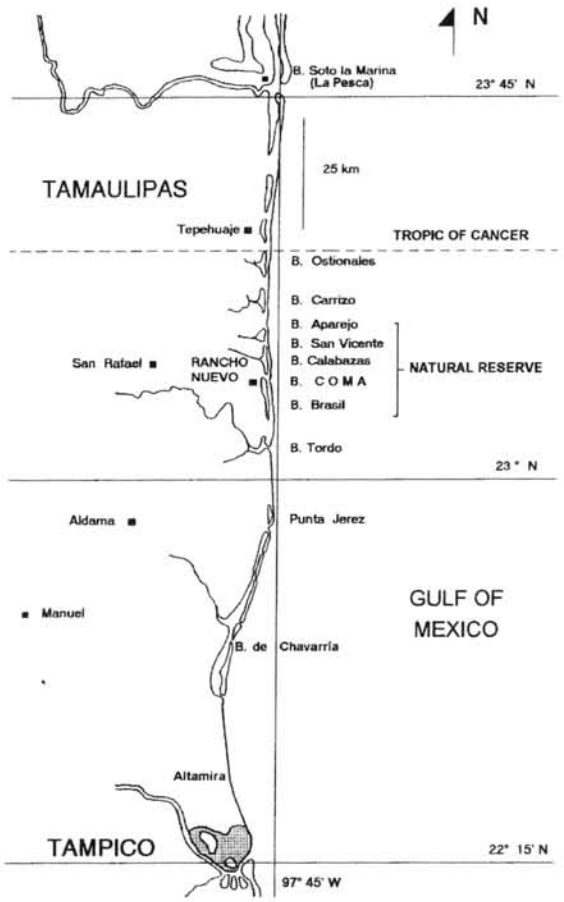

Figure 2. Kemp's ridley sea turtle nesting sites on the coast of Tamaulipas, México (from Márquez-M., 1994).

Between 1985–87 and 2003 the mean annual increase in nests laid at the Rancho Nuevo segment (#1, 2, and 3 in Table 1) of the nesting beaches alone was over 11%. However, when all three of the most important sections are considered (Rancho Nuevo, Tepehuajes, and south of Barra del Tordo, #1, 2, 3, 4, and 5 in Table 1 and Fig. 2) for this same period, the value is over 17%, derived from survival rates (Table 3 in Márquez-M., in press).

The gradual increase in nesting abundance that appears to have begun in the early 1990s is likely to be the result of a combination of actions that addressed known threats. These include enhanced hatchling recruitment as a result of beach and nest protection at Rancho Nuevo and neighboring camps by Mexican government agencies beginning in 1966 and later by the bi-national program in 1978, which also incorporated improvements in education of rural communities in the region. The most important mortality source for sea turtles, particularly for the large immature and adult stages of the Kemp's ridley is considered to be by-catch in shrimp bottom trawls (TEWG, 1998, 2000) both in Mexican and U.S. coastal habitats. Significant improvement in ridley survival was accomplished through the introduction of Turtle Excluder Devices (TEDs) for the shrimp fishery in offshore waters through Federal regulations in the U.S. since 1987 (TEWG, 1998, 2000), although use of TEDs remained sporadic for several years, with year-around use beginning in May 1991. The Mexican shrimp fleet has been required to use TEDs in trawling operations in the Gulf of México and Caribbean Sea since February 1993 (DOF, 1993). Additionally, pressure on the population was further reduced from the decrease of U.S. shrimp fishing effort in Mexican waters since the late 1970s, the steady decline of the Mexican shrimp fleet since 1979 (Iversen et al., 1993; TEWG, 1998) and the Total Ban on sea turtle use in México established in 1990 (DOF, 1990). In 1995, Mexican waters of the Gulf were closed to shrimp trawling in concert with the special Texas closure, from 15 May through 15 July, resulting in a further reduction in turtle by-catch mortality.

Head-Start and Imprinting

Within the framework of the MEXUS-GULF Program, it was decided in 1978 to start a joint U.S.-Mexican program, focused on the Kemp's ridley recovery, consisting primarily of enhancing beach research and protection of the species' remaining nesting beaches. The goal of this project was to "ensure the nesting population of 10,000 turtles per year before considering up-grading the status of the species, from Endangered to Threatened under the Endangered Species Act" (TEWG, 2000). Included in the program was the development of an experimental "Head-start and Imprinting Project" based on annual donations of 20 nests, including about 2000 Kemp's ridley freshly-laid eggs, to the U.S. where hatchlings were artificially "imprinted" on sand of former ridley nesting beaches (e.g., South Padre Island).

To identify the captive reared turtles into the future, before release into the wild all have been marked or tagged in one or more ways: 1) external metal foreflipper tag, 2) external living tag, 3) internal magnetized code wire tag, and 4) internal passive integrated transponder (Fontaine et al., 1993).

In 1992, after internal discussions among U.S. collaborators/leaders, it was decided to halt the "head-start and imprinting" phase of the program, based on the argument that incubating and rearing such large numbers of embryos and hatchlings was too expensive and that positive results had not yet been observed at Padre Island (TEWG, 1998, 2000). A modified plan beginning in 1993 included instead

Table 1. Progression of the length of Kemp's ridley nesting beaches patrolled and protected from 1966 to the present. Segments 1-8 and 10 are in Tamaulipas; +Km = distance of work added each period.

#	Period	From:	To:	+Km	Total
1	1966-67	Barra de Brasil	B. San Vicente	13.4	13.4
2	1968-77	Barra del Tordo	B. Aparejo	13.3	26.7
3	1978-88	Barra del Aparejo	B. Ostionales	11.6	38.3
4	1989-90	Barra de Ostionales	B. Tepehuajes	9.6	47.9
5	1990-91	Barra de Tepehuajes	La Pesca	29.4	77.3
6	1991-on	Barra del Tordo	B. Chavarría	42.1	119.4
7	1996-on	La Pesca	Enramadas	51.0	170.4
8	1996-on	Altamira	Tourist Beach	18.0	188.4
9	1996-on	Veracruz State	3 Beaches	33.0	221.4
10	2000-on	Miramar/Tampico	Tourist Beach	10.0	231.4

Table 2. Number of nests laid by nesting beach during selected nesting seasons and preliminary estimates of annual Kemp's ridley breeding female abundance. Estimated through number of nests per female per season of F = 2.4 (after TEWG, 1998). * includes the other beaches described in Table 1 (La Pesca, Altamira, and Miramar/Tampico).

		1947		1978		1988		1998		2003	
Locality	Length	Nests	Fem.	Nests	Fem.	Nests	Fem.	Nests	Fem.	Nests	Fem.
Rancho Nuevo	47.9 km	40000	40000	1012	422	843	353	2409	1004	5373	2239
Tepehuajes	29.4 km	?	?	0	0	0	0	642	268	1520	633
B. del Tordo	42.1 km	?	?	0	0	3	1	431	180	695	290
Tamaulipas*	79.0 km	?	?	?	?	?	?	261	109	565	235
Veracruz	33.0 km	?	?	?	?	?	?	124	52	400	167
Totals	231.4 km	40000+	40000+	1012	422	846	354	3867	1613	8553	3564

the donation of 180 hatchlings per year to the NMFS Galveston Laboratory for experimental purposes and eventual release into the wild.

Between 1978 and 1988 a total of 23,157 eggs were donated that produced 18,612 hatchlings; from 1989 to 2002 only 9844 hatchlings were donated. The total number of hatchlings included in the head-start project between1978 and 2002 was 28,456. During captivity the annual survival was approximately between 85 and 95% and those surviving at the end of nine to ten months of captivity were released into the sea.

By 1998, after 21 years of donating eggs and hatchlings to the U.S. to this project, 13 Kemp's ridley nests were documented along the south Texas coast or on Padre Island. Biologists were able to examine six of the females at the time of nesting, three of which were 1984-, 1986-, and 1987- year class head-started and imprinted turtles (Shaver, 1999). Apparently as a result of the many years of releasing head-started and imprinted Kemp's ridleys turtles, nesting has been re-established at Padre Island, Texas, with levels showing a slow but steady increase. Moreover, a head-started turtle from the 1986-class (released in 1987) was observed nesting on 3 May 1998 at Rancho Nuevo. It had both magnetic and living tags which permitted verification (Burchfield et al., 1998). By 1999, a total of 16 confirmed Kemp's ridley nests had been registered at Padre Island (Shaver, 2000) and during 2002, 38 Kemp's ridley nests were documented on the Texas coast (D. Shaver in U.S.-Mexican Project, 2002).

Captive Breeding

Because in the early 1980s the species was considered menaced by extinction, in July 1980 the Cayman Turtle Farm, Ltd. in Grand Cayman Island and the National Fisheries Institute of México decided to form a reserve stock, and started a successful captive breeding program with the transfer to the turtle farm of 100 juveniles reared from Rancho Nuevo eggs at the NMFS Laboratory in Galveston, Texas, and 100 hatchlings sent directly from Rancho Nuevo;

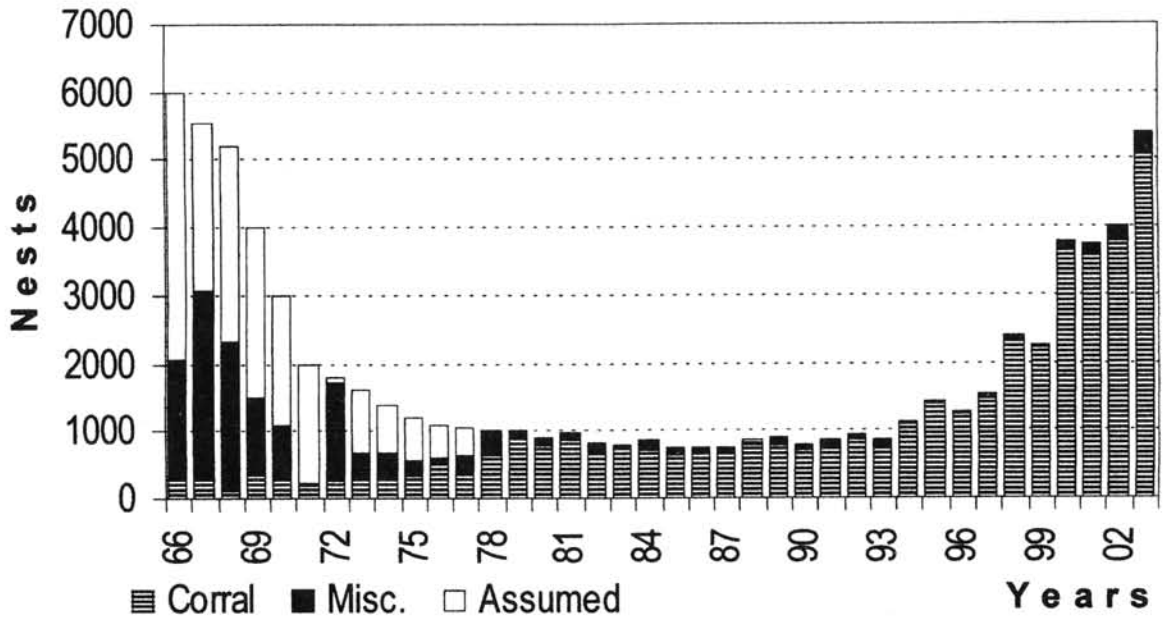

Figure 3. Annual nesting abundance of Kemp's ridley sea turtles at Rancho Nuevo beach (from Barra del Tordo to Barra de Ostionales), Tamaulipas, México, from 1966 to 2003. Bar shading indicates fate of clutches: Corral = nests incubated in beach hatchery; Misc. = nests incubated *in-situ* or in styrofoam boxes, and nests poached or predated; Assumed = all other nests which were laid and observed but for which the final fate is unknown.

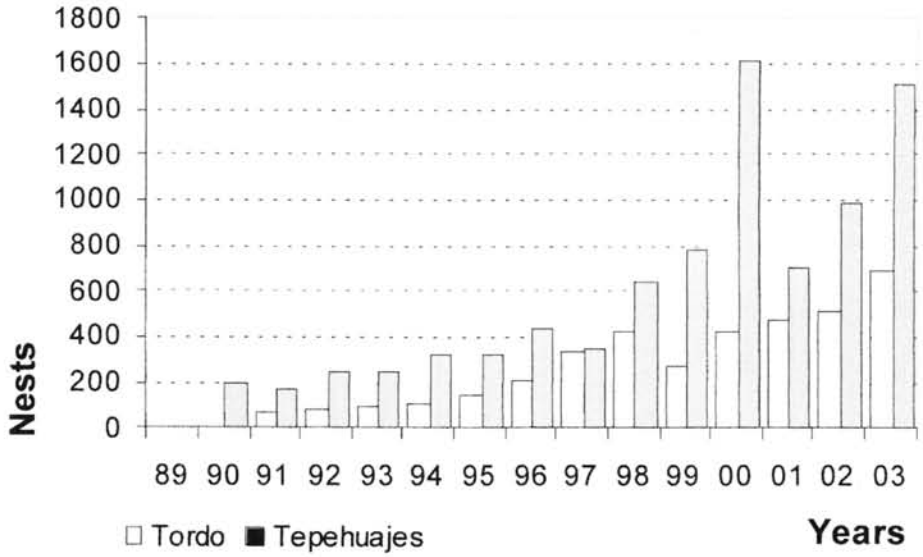

Figure 4. Annual nesting abundance for Kemp's ridley in Tepehuajes (from Barra de Ostionales to La Pesca) and Barra del Tordo (from Barra del Tordo to Barra de Chavarría) segments of the Tamaulipas coast of México, from 1990 to 2003.

two juveniles and just over 30% of the hatchlings died during the transfer. Adapted to captivity, by the age of five years (in 1984), two females started to lay eggs; this number increased in subsequent years (7 females in 1987). These females initially produced few eggs with low survival rates during incubation (Márquez-M., 1994). The number of breeders and egg production increased with time as did the survival of hatchlings to the extent that the colony by 1994 had 476 turtles of different ages (30 of them breeding females of 14 years).

In 1996 it was decided that the objectives had been met and the wild stock showed sings of recovery, so captive breeding was suspended and México was asked to repatriate the turtles. Arrangements were made and the Eco-Archaeological Park of X'caret, in Cancun, Quintana Roo, created new facilities to maintain the turtles. In April 1999, 110 turtles (57 females and 53 males) were transferred. These re-adapted turtles are now starting to breed and a few hatchlings are produced every season. It is necessary to plan carefully for the future of these turtles, because their value as recruits is controversial, including the possibility of introducing health problems to the wild population if they are released.

New Initiatives

In 1999 the Kemp's ridley sex ratio study, using temperature data-loggers in hatchery and *in-situ* nests, and including hatchling blood samples for hormonal sex determination, was started in three camps. As a preliminary result of the sex-ratio study it was established that a major proportion of the turtles produced at all the beaches are females. In the 2001 season, 21 nests were analyzed; 12 were predicted to produce 100% females, 8 were clearly biased to produce females, and only one predicted to produce males (Geis et al., 2003). The high production of females is considered to help in more rapid recovery of the Kemp's population.

With the goal of learning more about the early life history, particularly age at first maturity, dispersion, natal fidelity, mortality, recruitment, etc. of Kemp's ridleys, in 1995 it was decided by the bi-national committee that over a several year period several thousand hatchlings would be tagged in the front flippers with magnetized wire metal tags. From 1996 through 2000 a total of 43,885 hatchlings have been tagged. It is assumed that starting sometime after 2005, some of these juveniles may be recaptured and help us clear up many of the mysteries of these early life stages (Márquez-M., 2001, in press).

Acknowledgments

The long-term development of this Mexican project has involved many former and current researchers from the staff of the Marine Turtle Program based in the National Fisheries Institute up to 2001, when transferred to the Wildlife Directorate in the Ministry of Environmental and Natural Resources. Deserving special mention are Humberto Chavez, Martin Contreras, Aristóteles Villanueva, and Manuel Sánchez, pioneers of this research as well as many students and voluntary workers. Institutions such as the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the National Parks Service, the National Fisheries Institute, the Gladys Porter Zoo of Brownsville and the U.S. and Mexican Associations from the Shrimp Industry have been important to the program, Mexican Universities of Tamaulipas and Veracruz States, Fisheries Inspectors, Mexican Navy, NGO's, National Institute of Ecology, Rancho Nuevo community, Scouts, have all contributed to the enhancement of this species.

LITERATURE CITED

BRAVO, R. 1999. Proyecto "Aspectos en la anidación de tortugas marinas en Lechuguillas, Veracruz, Temporada 1998". CRIP-Veracruz, Inf. Tec. Anual, 33 pp.

BURCHFIELD, P., MARQUEZ-M., R., SANCHEZ, M., AND CASTRO, R. 1998. Report on the México/United States of America population restoration project for the Kemp's ridley sea turtle, *Lepidochelys kempi*, on the coast of Tamaulipas and Veracruz, México. U.S. Fish and Wildlife Service, SEMARNAP, Inst. Nal. de Pesca, Gladys Porter Zoo, 75 pp.

BURCHFIELD, P., MARQUEZ-M., R., SANCHEZ, M., CASTRO, R. AND LUEVANO, P. 1999. Report on the México/United States of America population restoration project for the Kemp's ridley sea turtle, *Lepidochelys kempi*, on the coast of Tamaulipas and Veracruz, México. U.S. Fish and Wildlife Service, SEMARNAP, Inst. Nal. de Pesca. Gladys Porter Zoo, 32 pp.

CARR, A. 1963. Panspecific reproductive convergence in *Lepidochelys kempi*. Ergebnisse der Biologie 26:298-303.

CHAVEZ, H., CONTRERAS, M., AND HERNANDEZ, E. 1967. Aspectos biológicos y protección de la Tortuga Lora *Lepidochelys kempi* (Garman), en la costa de Tamaulipas, México. Pub. Instituto Nacional de Investigaciones Biológico Pesqueras 17:1-40.

DIARIO OFICIAL DE LA FEDERACIÓN (DOF). 1977. Acuerdo que establece la Zona de Refugio y Veda para la protección de la Tortuga Lora. Departamento de Pesca. México (4 Julio 1977):1-5.

DIARIO OFICIAL DE LA FEDERACIÓN (DOF). 1990. Acuerdo por el que se establece veda para todas las especies y subespecies de tortuga marinas en aguas de jurisdicción nacional de los litorales del Océano Pacífico, Golfo de México y Mar Caribe. México (31 Mayo 1990):21-22.

DIARIO OFICIAL DE LA FEDERACIÓN (DOF). 1993. Norma Oficial Mexicana de Emergencia: La que establece el uso obligatorio de dispositivos excluidores de tortuga marina en el Golfo de México y Mar Caribe. NOM-002-PESC-1993. México (24 Febrero 1993), 3 pp.

FONTAINE, C.T., REVERA, D.B., WILLIAMS, T.D., AND CAILLOUET, C.W. 1993. Detection, verification and decoding of tags and marks in head-started Kemp's ridley sea turtle *Lepidochelys kempii*. NOAA Technical Memorandum NMFS-SEFSC-334, 40 pp.

GEIS, A., WIBBELS, T., MÁRQUEZ-M., R., GARDUÑO-D., M., BURCHFIELD, P., PENA-V., J., SCHROEDER, B., QUINTERO, A.S., ORTIZ, J., AND MOLINA, G.H. 2003. Evaluation of sex ratios in egg corral and in situ nests during the 2001 Kemp's ridley nesting season. In: Seminoff, J.A. (Compiler). Proceedings of the Twenty-Second Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-503, pp. 188-189.

HILDEBRAND, H. 1963. Hallazgo del area de anidación de la tortuga "lora" *Lepidochelys kempii* (Garman), en la costa occidental del Golfo de México (Rept, Chel.). Ciencia, Mex., 22(4):105-112.

IVERSEN, J.E.S., ALLEN, D.M., AND HIGMAN, J.B. 1993. Shrimp capture and culture fisheries of the United States. Halsted Press, New York, 247 pp.

MÁRQUEZ-M., R. 1994. Sinopsis de datos biológicos sobre la tortuga lora, *Lepidochelys kempi* (Garman, 1880). Instituto Nacional de la Pesca, México/FAO Sinopsis. SAST-Tortuga Lora 5.31(07)016.02, INP/S152, 141 pp.

MÁRQUEZ-M., R. 2001. Las tortugas marinas de México. Las tortugas marinas en Campeche–Colectiva. Ecología. Campeche, pp. 33-49.

MÁRQUEZ-M., R. In press. The kemp's ridley sea turtle *Lepidochelys kempii* (Garman, 1880) as an example of international cooperation. Memories of the First Macronesian Sea Turtles Workshop and Modern Applicable Technologies. Pajara-Fuerteventura, Canarias, 2-3 December 2002, pp. 153-174.

MÁRQUEZ-M., R., DIAZ, J., SANCHEZ, M., BURCHFIELD, P., LEO, A., CARRASCO, M., PENA, J., JIMENEZ, C., AND BRAVO, R. 1999. Results of the Kemp's ridley nesting beach conservation efforts in Mexico. Marine Turtle Newsletter 85:2-4.

MÁRQUEZ-M., R., BURCHFIELD, P., CARRASCO, M., JIMENEZ, C., DIAZ, J., SANCHEZ, M., GARDUNO, M., LEO, A., PENA, J., BRAVO, R., AND GONZALEZ, E. 2001. Update on the Kemp's ridley turtle nesting in México. Marine Turtle Newsletter 92:2-4.

PRITCHARD, P.C.H. AND MÁRQUEZ-M., R. 1973. Kemp's ridley turtle or Atlantic ridley, *Lepidochelys kempi*. IUCN Monograph, Marine Turtle Series, No. 2, 30 pp.

ROSTAL, D.C. 1991. The reproductive behavior and physiology of the Kemp's ridley sea turtle, *Lepidochelys kempii* (Garman, 1880). Ph.D. Thesis, Texas A & M University, College Station, Texas.

SHAVER, D.J. 1999. Padre Island National Seashore Kemp's ridley sea turtle project and Texas sea turtle stranding. 1998 Report. Dept. of the Interior, U.S. Geological Survey, Padre Island National Seashore, 58 pp.

SHAVER, D.J. 2000. Padre Island National Seashore Kemp's ridley sea turtle project and Texas sea turtle nesting and stranding. 2000 Report. Dept. of the Interior, U.S. Geological Survey, Padre Island National Seashore, 59 pp.

TURTLE EXPERT WORKING GROUP (TEWG). 1998. An Assessment of the Kemp's Ridley (*Lepidochelys kempii*) and Loggerhead (*Caretta caretta*) Sea Turtle Populations in the Western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-409, 96 pp.

TURTLE EXPERT WORKING GROUP (TEWG). 2000. Assessment Update for the Kemp's Ridley and Loggerhead Sea Turtle Populations in the Western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-444, 115 pp.

U.S.-MEXICAN PROJECT. 2002. Report on the Mexico/United States of America population restoration project for the Kemp's ridley sea turtle, *Lepidochelys kempii*, on the coast of Tamaulipas and Veracruz, Mexico. U.S. Fish and Wildlife Service, Gladys Porter Zoo, SEMARNAP, Inst. Nal. de Ecología, Gob. Edo. Tamaulipas, 40 pp.

Received: 7 February 2002
Revised and Accepted: 30 September 2004