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A Historical Perspective of the Biology and Conservation of the Kemp's Ridley Sea Turtle

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The history of the critically endangered Kemp's ridley sea turtle (*Lepidochelys kempii*) has presented scientists and conservationists with a variety of questions and challenges originating in part from the species' limited distribution and single primary nesting beach. Although the species was initially brought to the attention of the scientific community in 1880 by Richard Kemp, more than 80 yr passed before Henry Hildebrand revealed the location of its primary nesting beach at Rancho Nuevo, Mexico in the western Gulf of Mexico. By the time scientists began estimating the number of females nesting at Rancho Nuevo, it appeared that the species had declined when compared with the relatively large mass nesting (a.k.a. arribada) filmed by Andres Herrera in 1947. This decline appeared to be due to historic exploitation of turtles and their eggs on the nesting beach and accidental capture in the Gulf of Mexico shrimp fishery. Despite the implementation of conservation measures at Rancho Nuevo, the species continued to decline until the mid-1980s. The continued protection of females and nests on the nesting beach, the decline in shrimping effort in the Gulf of Mexico, and the implementation of turtle excluder devices resulted in a significant increase in the number of females nesting during the 1990s, and an exponential recovery rate. Since 2010, the recovery rate has unexpectedly deviated from its exponential trend and sharp declines have been documented in some years. The underlying cause(s) of the recent decline is unclear.

The history of the Kemp's ridley sea turtle (*Lepidochelys kempii*) is a story that has included multiple challenges for scientists and conservationists. The Kemp's ridley evaded scientists until the late 1800s when it was first described (Garman, 1880). Because no Kemp's ridley nesting beaches had been discovered, scientists questioned if the species reproduced until the mid-1900s (Werler, 1951; Hildebrand, 1963). Archie Carr, the historic dean of sea turtle conservation, spent decades studying what he called "the riddle of the ridley," trying to determine if and where the species nested (Carr, 1956). Just as this biological riddle was solved in the early 1960s by Hildebrand (1963), scientists realized that the species was rapidly heading toward extinction (Chavez et al., 1968a;b). Intense conservation efforts in Mexico and the United States during the 1970s, 1980s, and 1990s prevented its extinction and placed the Kemp's ridley on the path to recovery (Heppell et al., 2007). An unexpected decline in the number of nesting turtles since 2009 is currently baffling scientists and drawing attention back to the Kemp's ridley (Caillouet, 2014) and uncertainties about its future.

The recorded history of the Kemp's ridley starts in the late 1800s in Key West, Florida. Most of the world's sea turtles had already been identified and named, but because of its limited geographical range (Gulf of Mexico and Atlantic Seaboard of the United States) the Kemp's ridley had evaded scientists. Richard Kemp was a businessman and avid naturalist. He had grown up on a small island in the Bahamas (Green Turtle Cay), and sea turtles were a part of his everyday life. His family's move to Key West in 1837 put him at the epicenter of the sea turtle industry in the United States, with sea turtles being landed on a daily basis just a few blocks from his home (Rebel, 1974). He became fascinated by a "peculiar" species of sea turtle that did not occur in Bahamian waters, but was abundant in the Florida Keys (Garman, 1880). He eventually began sending descriptions of the turtle to a leading herpetologist and ichthyologist at the Harvard Museum of Comparative Zoology, Samuel Garman. He even shipped preserved specimens to Harvard. It was clearly a new and yet-to-be-named species. In 1880, Garman named the species in honor of Richard Kemp because of "the great interest Mr. Kemp takes in the matters pertaining to natural history. The species now had a name, but the mystery of its biology was just beginning to draw attention. Kemp notes that it is commonly called the "bastard" turtle and it is thought to be a hybrid between green and loggerhead sea turtles. That is where the Kemp's ridley story stood as of the late 1800s, and where it would stand for the next 58 years, until this peculiar turtle caught the attention of the person who would later become one of the leading sea turtle biologists in the world, Archie Carr.

Archie Carr had just finished his Ph.D. studying the biology of reptiles in Florida when he was contacted by one of his colleagues (Stew Springer) who ran a shark-fishing business in the Florida Keys. He reported that there was an "evil natured" sea turtle that was flat and gray with a big head, and it would tear up their fishing nets if it was captured (Carr, 1956). He was told that the locals called it the "ridley" but, despite some efforts, Springer was never able to find the origin of the name (Dundee, 1992). Springer invited Carr down to the Keys to see the turtle first hand in 1938, and Carr saw his first Kemp's ridley while out with a local turtle fisherman from Matacumbe Key, Jonah Thompson. Thompson told Carr "we don't know where they lay…Some say these ridleys is crossbreeds…they are made when a loggerhead pairs with a green." He also mentioned that "ridleys is always mad…you can't keep a ridley on its back…they're crazy, they break their hearts" (Carr, 1956). As Carr notes in his 1956 book *The Windward Road*, "That is how I got to know the Atlantic ridley…. That is how the great ridley mystery started for me."

By 1938, the biology of the Kemp's ridley was still based on folklore, suggesting that the ridley was a hybrid. But as a scientist, Carr was reluctant to blindly accept the hybrid hypothesis. Over the next 2 decades, Carr unsuccessfully searched for Kemp's ridley nesting beaches in Florida, the northern Gulf of Mexico, and the Caribbean. After this exhaustive search, he had no logical explanation for an abundant turtle that was not known to breed or nest. Through his scientific approach and his eloquent writing skills, Archie Carr clearly developed and documented this riddle of the ridley. He considered the ridley one of the most mysterious animals in North America and had set the scene for others who would contribute to the ridley story (Carr, 1956).

One area that Archie Carr did not have a chance to search was the western Gulf of Mexico, although he did note in the book *The Windward Road,* "At the Mexico border, our information peters out." In his book *Tales from the Thebaide*, Peter Pritchard, a former student of Archie Carr, notes that Carr pondered the possibility that the mystery of the location of the Kemp's ridley nesting beach might end not with a bang, but with a series of widespread and scattered nesting reports (Pritchard, 2006). However, this would not be the case because of the unique and extraordinary biology of the Kemp's ridley. Solving this riddle required two other individuals. The first was Andres Herrera, a rancher and businessman from Tampico, Mexico. He was an outdoorsman who enjoyed fishing and hunting. His hobbies also included being a pilot and a photographer. He often enjoyed flying to areas along the Gulf Coast, and on trips to Barra del Tordo (located approximately 100 km north of Tampico, Mexico) he was repeatedly told that on certain days in the spring sea turtles nest by the thousands during the daytime just to the north of this location (Hildebrand, 1963; Phillips, 1989; E. Herrera, pers. comm.). To Herrera, the mass nesting of sea turtles represented a unique biological phenomenon and he became dedicated to documenting this event on film (E. Herrera, pers. comm.). Using his own airplane, fuel, and time, Herrera proceeded to fly a total of 33 aerial surveys over a 2-yr period in an effort to observe and film a mass nesting on the beaches north of Tampico. On 18 June 1947, his dedicated efforts paid off as he came upon a mass nesting, or "arribada," just north of the town of Rancho Nuevo near Barra Calabazas. He landed his plane on the beach and filmed the arribada, resulting in the famous "Herrera film" (Hildebrand, 1963). This film not only provided the earliest documentation of the location of the Kemp's ridley nesting beach, but also represented the first documentation of mass nesting in sea turtles. The Kemp's ridley nesting beach had evaded scientists for decades because of its remote location and the unique nesting behavior.

Herrera comprehended the importance of the film as documentation of a unique biological phenomenon, but he did not yet realize its importance to Archie Carr's riddle of the ridley. Despite Herrera's extensive efforts over several years to market the film to newspapers, magazines, and movie studios (including Life Magazine, Disney Studios, MGM Studios, 20th Century Fox, and RKO), he was unsuccessful (E. Herrera, pers. comm.). Although the answer to Carr's riddle of the ridley had been documented, it remained undiscovered by the scientific community. Connecting the pieces of this puzzle would require another major contributor to the ridley story, Henry Hildebrand.

Henry Hildebrand was a classically trained fisheries biologist at Corpus Christi University in

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south-central Texas. He was an expert on the Gulf of Mexico, had traveled widely on fisheries-related field trips, including many trips to Mexico, and he was fluent in Spanish. His forte was gaining information directly from local fishermen with first-hand knowledge of fisheries (SGCP, 2002, 2003). In addition to learning about the commercial fisheries, he was also trying to document the abundance of sea turtles in the western Gulf of Mexico. Further, Hildebrand had read Archie Carr's books and articles and he was fully aware of Carr's riddle of the ridley. During a field trip to Mexico in 1958, Hildebrand visited a fishing camp named Campo San Andres near Barra del Tordo and first heard of sea turtles nesting in the area. The owner of the fishing camp, Francis MacDonald, told him that sea turtles nested at Barra del Tordo, and that larger numbers of turtles nested on the beaches north of Barra del Tordo near Rancho Nuevo. At that point, Hildebrand did not know that the turtles nesting near Rancho Nuevo were ridleys, but he was suspicious of the possibility, because he was also told that they nested during the day, and the other sea turtle species in the Gulf of Mexico nested at night. Hildebrand's suspicion that the nesting turtles near Barra del Tordo were ridleys was supported by a carapace that he obtained from a nesting turtle during 1960. In 1961, MacDonald informed Hildebrand that Andres Herrera from Tampico had filmed a mass nesting near Rancho Nuevo. Hildebrand immediately wrote a letter to Herrera explaining what was known about sea turtles in the Gulf of Mexico and asked if he could view the film. Andres Herrera was elated that the significance of his film may finally be realized. He immediately sent the film to Corpus Christi. The film arrived and Hildebrand watched it in amazement, realizing that it documented the Kemp's ridley nesting beach, and an extraordinary biological phenomenon, the arribada (Hildebrand, 1963, unpubl. data).

Hildebrand immediately wrote Herrera to obtain permission to show the film at the 1961 meeting of the American Society of Ichthyologists and Herpetologists at the University of Texas. He also wrote to Archie Carr to tell him about the Herrera film and that he would be presenting the film at the meeting (Pritchard, 2006). He showed the film, which captivated the scientific audience, including Archie Carr, who had flown from Florida to Texas specifically to see the film. To quote Henry Hildebrand's interpretation of Archie Carr's reaction to the film, "he was quite flabbergasted I'd say for sure" [H. Hildebrand, pers. comm., interview in *The Heartbreak Turtle,* KUHT, Houston, TX, M. Korshak (producer), 1981]. The questions that Archie Carr had been asking for decades were finally answered. Hildebrand, as well as Archie Carr, later suggested that the arribada shown in the Herrera film represented approximately 40,000 turtles nesting in a single day (Carr, 1963; Hildebrand, 1963).

Hildebrand obtained permission to make several copies of the film, including one for Archie Carr. Peter Pritchard later recounted that Archie considered the film inspirational, would frequently show the film to students and visitors, and that "Archie would point out the highlights of the epic production with unfailing enthusiasm" (Pritchard, 2006).

The riddle of the location of the ridley nesting beach was solved for the scientific community with Hildebrand's 1963 publication, but the Kemp's ridley story was about to witness the biggest challenge that this species had faced in its approximate 3 to 4 million years of existence (Bowen, 1991; Bowen and Karl, 1997, 2007): trying to avoid extinction. While the scientific community was consumed with the search for the nesting beach, the Kemp's ridley was quickly becoming the most endangered sea turtle in the world and was rapidly heading toward extinction (Chavez et al., 1968a;b; Pritchard and Marquez, 1973; Marquez, 1994). This species' limited distribution and single primary nesting beach made it the most vulnerable species of sea turtle in the world. Local exploitation of eggs at Rancho Nuevo had grown exponentially during the 1950s and early 1960s because of commercialized harvesting (Hildebrand, 1963; Adams, 1966; Chavez et al., 1968a;b; Marquez, 1994). Hildebrand provided anecdotes of 40 to 50 donkeys hauling large bags full of eggs from Rancho Nuevo to Tampico, and up to 80,000 eggs per truck being hauled to market from a 1961 arribada (Hildebrand, 1963). This was occurring at the same time that the shrimping industry was expanding in the Gulf of Mexico (Nance, 1992), resulting in the increased incidental capture of juvenile and adult Kemp's ridleys (NRC, 1990). These factors were in addition to the high level of natural predation of nests and hatchlings at Rancho Nuevo (Hildebrand, 1963; Carr, 1967), all of which contributed to the precipitous decline of this species.

Fortunately, the Herrera film drew attention to the Rancho Nuevo nesting beach, and as scientists and conservationists visited the beach in the early 1960s, they no longer witnessed massive arribadas like the one shown in the Herrera film, but they did witness the egg harvesting (Hildebrand, 1963; Adams, 1966). Hildebrand visited the beach in 1961 and recognized the need for conservation and he discussed it with other sea turtle scientists such as Archie Carr, as well as with U.S. and Mexican government officials (Hildebrand, 1963; Carr, 1967; Hildebrand, 1987; Pritchard, 2006). The situation at the nesting beach in the mid-1960s was also reported by Dearl Adams. Adams was an avid outdoorsman from Brownsville, TX, and had seen the Herrera film at a 1962 Valley Sportsman's Club meeting (Adams, 1966). He then organized and spearheaded yearly caravans of vehicles that traveled down to Rancho Nuevo from 1964 through 1968 with the intention of observing an arribada, and collecting eggs and bringing them to Padre Island, TX to hatch in hopes of generating a nesting colony of ridleys in Texas (Adams, 1966). Although some of the eggs did produce hatchlings on Padre Island, Dearl Adams' most significant impact may have been raising awareness of the plight of the ridley, including encouraging the Rancho Nuevo town officials to write letters to the Mexican government indicating the need for conservation.

By 1966, the Mexican government was acutely aware of the situation at Rancho Nuevo and sent in a team of biologists headed by Humberto Chavez and accompanied by Mexican marines who could enforce the conservation measures of protecting eggs and nesting females (Chavez et al., 1968a, 1968b). By the time these efforts began at Rancho Nuevo, the number of nesting Kemp's ridleys had declined precipitously. During 1966, the largest recorded arribada was only 1,317 turtles (Chavez et al., 1968), a mere fraction of the 40,000 estimated by Hildebrand on the basis on the Herrera film. The survival of the Kemp's ridley was clearly in jeopardy. Chavez was followed by Rene Marquez, who directed the conservation program at Rancho Nuevo starting in 1968, and provided guidance and continuity for over 3 decades of conservation at Rancho Nuevo. The Mexican government fully supported the protection of Kemp's ridleys; however, resources for beach conservation activities (e.g., vehicles and personnel) were limited. For example, when Peter Pritchard first visited Rancho Nuevo in 1968 his Land Rover was an essential asset for expanding beach protection by moving biologists and marines to areas that were previously too distant for normal patrols (Pritchard, 2006).

Although the Mexican government was providing protection at the nesting beach, the number of nests continued to decline in the late 1960s and through the 1970s, with the number of recorded nests dropping below 1,000 by 1978 (USFWS and NMFS, 1992; Heppell et al., 2007). The continuing decline was drawing intense concern in Mexico and the United States. On the basis of suggestions and advice from Henry Hildebrand, Robert Whistler, the chief naturalist for the National Park Service (NPS) at Padre Island National Seashore (PAIS), proposed a plan to the regional NPS office to develop PAIS as a location for establishing a second major nesting beach for Kemp's ridleys (Caillouet et al., 2015b; D. Shaver, pers. comm.; R. Wauer, pers. comm.). This idea was supported by Ro Wauer in the NPS regional office, who initiated a feasibility study in 1977 in collaboration with "Duke" Campbell in the research division of the U.S. Fish and Wildlife Service (USFWS) (R. Wauer, pers. comm.). The idea was to transplant a certain number of nests each year from Rancho Nuevo to Padre Island in hopes that the hatchlings would imprint and return there to nest as adults. The plan was further extended to include a head-start program conducted by the National Marine Fisheries Service (NMFS) Galveston Laboratory, TX, to raise approximately 1,000 to 2,000 hatchings per year for 9 mo before release and circumvent the high mortality associated with that life-history stage (reviewed in detail by Shaver and Wibbels, 2007; Caillouet et al., 2015b; Shaver and Caillouet, 2015). During the feasibility study, Duke Campbell contacted Jack Woody, the USFWS's endangered species specialist for the southwest United States. To quote Jack Woody, "upon being contacted about the Padre Island project, I snuck down to Rancho Nuevo in 1977 without telling any of the federal agencies in order to get a first-hand assessment of the situation" (J. Woody, pers. comm.). Woody later indicated that he realized that establishing a nesting colony on PAIS, as well as the head-start program, was an experiment that could be beneficial, but he also understood that the top priority should be protecting the primary nesting beach at Rancho Nuevo (J. Woody, pers. comm.). He envisioned a binational plan in which Mexico would provide the United States with 10 to 20 nests each year

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for PAIS. In exchange, the United States would provide support for Rancho Nuevo in the form of vehicles, supplies, and student workers who would work hand in hand with Mexican biologists in a true binational effort to save the ridley (J. Woody, pers.comm.).

In a remarkable achievement, multiple U.S. government agencies (USFWS, NPS, NMFS, and Texas Parks and Wildlife) and the Mexican federal fisheries agency [Instituto Nacional de Pesca (INP)] all verbally agreed to contribute to the project (Woody, 1989). Additional scientific expertise was provided by a science advisory board that included Archie Carr (University of Florida), Henry Hildebrand (Corpus Christi State University), Peter Pritchard (Florida Audubon), and Rene Marquez (INP) (Caillouet et al, 2015b; R. Wauer, pers. comm.; R. Marquez, pers. comm.). The plan was initiated in 1978, with U.S. biologists traveling to Rancho Nuevo to assist the Mexican biologists on the beach. Rene Marquez (INP) was directing the Rancho Nuevo project, with Jack Woody coordinating U.S. support to Rancho Nuevo. For the initial 2 yr of the binational project, Peter Pritchard led the U.S. team, and later Patrick Burchfield of Gladys Porter Zoo, Brownsville, TX, coordinated the U.S. team from 1980 to the present. In the United States, the NPS coordinated the egg incubation and experimental imprinting of up to approximately 2,000 hatchlings at the PAIS (Morreale et al., 2007; Shaver and Caillouet, 2015), then transferred the hatchlings to NMFS in Galveston for head-starting and eventual release (Klima and McVey, 1982; Caillouet et al., 1993; Shaver and Wibbels, 2007; Caillouet et al., 2015b). Of major importance, the binational effort provided more extensive coverage of the Rancho Nuevo nesting beach than ever before, and virtually every nest on approximately 30 km of the primary nesting beach was translocated to hatcheries (a.k.a. corrals) and protected, and the hatchlings were subsequently released into the surf (Marquez, 1994). By the early 1980s, the binational conservation program at the nesting beach was protecting almost all nests and efficiently producing hatchlings. There was cautious optimism by many biologists in the U.S. and Mexican agencies that these efforts would initiate a rebound of the Kemp's ridley. However, the initial data suggested that this was not the case and the number of nests continued to decline. By 1985 only 702 nests were recorded at Rancho Nuevo. Considering that a typical female ridley may nest approximately two to three times a nesting season (Pritchard and Marquez, 1973; Rostal et al., 1990, 1997; Marquez, 1994), that means that the number of nesting females per year was down to approximately 300 females or fewer (Woody, 1985; USFWS and NMFS, 1992).

At that point, there was concern that the Kemp's ridley may be biologically extinct, and that it could not rebound from such low numbers of nesting females (J. Woody, pers. comm.). However, from 1985 through 1990, the decline abated and the annual number of nests appeared to stabilize, although at extremely low levels (hovering between 702 and 839, depending on the year). The protection of nests and females on the nesting beach was an obvious factor that may have helped stabilize nesting numbers, but other factors may also have been involved. The impact of shrimping effort on Kemp's ridleys may have decreased during the late 1970s and 1980s. In response to the Magnuson–Stevens Act during the late 1970s, the relatively large U.S. shrimping fleet was prohibited from trawling in a major portion of the Kemp's ridley migratory corridor in Mexican waters, which could have significantly lessened the impact of this fishery on the Kemp's ridley (B. Gallaway, pers. comm.). Additionally, although the shrimping effort was relatively constant throughout most of the 1980s in the Gulf of Mexico, it declined at the end of this decade (Caillouet et al., 2008; Nance et al., 2010). The combination of protection at the nesting beach and decreased shrimping effort may have been major factors in tipping the scale in favor of the ridley's survival. Despite the slight increase in nesting numbers in the late 1980s, a major rebound was not evident. A major factor preventing a strong rebound was incidental capture of ridleys in shrimp trawls. Although in-water mortality of sea turtles can result from a variety of natural and human-induced causes, evidence was mounting that the shrimping effort in the Gulf of Mexico (Nance, 1992) was still taking a heavy toll on juvenile and adult sea turtles (NRC, 1990). The near-shore waters of the entire Gulf of Mexico and Atlantic Coast of the United States represent the foraging grounds, developmental habitat, and migratory corridors for Kemp's ridley (Hildebrand, 1982; Ogren and McVea, 1982; Ogren, 1989; Shaver et al., 2013), and those areas also represent prime shrimping grounds. Shrimping effort in U.S. waters of the Gulf of Mexico had been increasing from 1960 through the late 1980s (Nance, 1992). NMFS was acutely aware of the problem, and estimated that thousands of juvenile and adult sea turtles were captured each year in trawls (TEWG, 2000). They had also been developing and testing a solution, the turtle excluder device, or TED, a device that diverted captured turtles out of the shrimp nets (Donnelly, 1989). To conservationists, the TED was a practical and effective solution to a major problem. However, to the shrimping industry it represented an unnecessary government-mandated regulation that would burden an industry that was already faced with declining catches, decreasing shrimp prices, and increasing fuel costs (Donnelly, 1989). What ensued was a long and exhaustive political battle between conservationists and industry (Weber, 1995), in the balance of which lay the survival and recovery of the Kemp's ridley.

Jack Woody, who assumed the position of U.S. Sea Turtle Coordinator for USFWS, and non-governmental organizations, in particular Mike Weber with the Center for Marine Conservation, led the charge for sea turtle conservationists. They met strong and well-organized opposition from the shrimp industry, which also had the backing of many powerful political figures in U.S. Congress and in the state governments bordering the Gulf of Mexico (Donnelly, 1989; Weber et al, 1995). The conservationist's main trump card was the Endangered Species Act of 1973, and without TED implementation the recovery of the Kemp's ridley was in jeopardy. It was an exhaustive battle taking upward of 7 yr, but the conservation lobby persevered and eventually forced the implementation of TED regulations in 1989. The Kemp's ridley was used as the driving force for implementing TEDs, but the TEDs did not discriminate, they immediately benefitted all sea turtle species in U.S. waters (Lewison et al., 2003).

In addition to the implementation of TEDs, there was a significant reduction in shrimping effort in the U.S. waters of the Gulf of Mexico during the 1990s. These were two major factors that contributed to the strong rebound, going from approximately 1,000 nests in the mid-1990s to over 21,000 nests in the State of Tamaulipas in 2009 (Caillouet, 2006; Heppell et al., 2007; Crowder and Heppell, 2011; Gallaway et al., 2013; P. Burchfield, pers. comm.). The Kemp's ridley story was shaping up to be a prime example of how effective conservation can bring a species back from the brink of extinction. The species appeared to be on the path to recovery, and not just at Rancho Nuevo. Donna Shaver of the NPS at PAIS had developed a comprehensive monitoring and nest incubation program over several decades in Texas and their nesting numbers had steadily increased, reaching 197 nests in 2009. Nesting had also increased at Tecolutla in the Mexican State of Veracruz, reaching 671 nests that year (TTPP, 2012; D. Shaver, pers. comm.). Considering that the number of nesting females still appeared to be a fraction of the historic levels estimated by Hildebrand for a single arribada in the 1947 Herrera film, the population models were predicting continued exponential growth of the Kemp's ridley (NMFS et al., 2011).

In 2009 the Kemp's ridley's future appeared bright, but then in 2010 the ridley story was confronted with a new riddle. The number of nests dropped precipitously to 13,302 nests in Tamaulipas, a 37% decrease from 2009, in a species that had been on an exponential recovery trend (P. Burchfield, pers. comm.). The most obvious potential factors were the Deepwater Horizon (DWH) oil spill in 2010 (Caillouet, 2014) and the major cold stunning in 2010 spanning from Florida to Tamaulipas. The DWH oil spill released an estimated 210 million gallons of oil (NRT, 2011), and resulted in the subsequent use of 1.84 million gallons of dispersant (NCBPDHOSOD, 2010) in the northern Gulf of Mexico, which is a well-documented migratory corridor, foraging ground, and developmental habitat for ridleys (Shaver and Rubio, 2008; Shaver et al., 2013). In 2011 and 2012, the number of Kemp's ridley nests in Tamaulipas rebounded to approximately 21,000 nests, suggesting that the species might regain its exponential growth. Unfortunately, the number of nests per season then exhibited a distinct downward trend, dropping to approximately 16,000 in 2013 and then to approximately 12,000 in 2014. Had the number of nests stayed on the exponential trajectory exhibited before 2010, it was predicted to reach 40,000 nests or more by 2014, a far cry from the observed number of nests (NMFS et al., 2011; Caillouet, 2014; Caillouet et al., 2015a). Although the DWH oil spill (Caillouet, 2011) and the cold stunning of 2010 stand out as potential factors, the causal basis for the decline is currently speculative. Other factors could be involved in the decline. For example, there was a significant increase in the number of dead stranded ridleys recorded in the northern Gulf of Mexico during 2010, as might be expected in

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response to the oil spill, but the increased level of strandings has remained relatively high in the years after the oil spill (W. Teas, pers. comm.). Additionally, shrimping effort has increased in some fisheries in recent years (Hart 2012a, b, c). All of these are examples of factors that could lead to significant impacts on various age classes of the population. It has also been suggested that the recent decline in the number of nests may simply represent a natural fluctuation in the population, or that the ridley population may be reaching the carrying capacity of the Gulf of Mexico (Gallaway et. al., 2016). These latter hypotheses are difficult to reconcile considering Hildebrand's estimated 40,000 nests in a single day on the basis of the 1947 Herrera film, which suggests that the Gulf of Mexico historically was capable of supporting a relatively large population of Kemp's ridleys. In response to the nesting decline, these subjects have been intensely discussed at recent Kemp's ridley meetings and scientists are mobilizing to obtain data that may explain the current situation. But in the meantime, it is clear that the recovery of the Kemp's ridley has taken an unexpected turn that has biologists searching for clues. Thus, the ridley story continues with yet another riddle, one that could simply be a bump in the road on its way back to exponential growth, or alternatively, it could represent a fundamental change in the Gulf of Mexico ecosystem and its ability to support the relatively large population of Kemp's ridleys suggested by the arribada in the 1947 Herrera film (Hildebrand, 1963).

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