Publication supported in part by an Institutional Grant (NA14OAR4170102) to the Texas Sea Grant College Program from the National Sea Grant Office, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

Welcome to Brownsville, Texas and the Second International Kemp's Ridley Sea Turtle Symposium, co-hosted by Texas Sea Grant and the Gladys Porter Zoo. This Symposium will provide a timely forum for the presentation and discussion of the many recent advances in the science, conservation and management of this endangered species, and how these advances impact our understanding of its biology and conservation. Furthermore, the Symposium will provide an opportunity to highlight the people, programs and organizations that saved a species on the verge of extinction.

The Kemp's ridley sea turtle is an enduring symbol for restoration and recovery of the Gulf of Mexico that illustrates how two countries with a common vision can work cooperatively to save a shared resource.

Warm regards,

Pamela Plotkin and Luis Jaime Peña, Co-organizers

Steering Committee
Charles Caillouet, Peggy Foster, Benny Gallaway, Luis Jaime Peña, Pamela Plotkin, Kimberly Reich, Donna Shaver

Program Committee
Donna Shaver, Chair; Charles Caillouet, Luis Jaime Peña, Kimberly Reich, Cynthia Rubio, Jennifer Shelby Walker

Symposium Proceedings
Kimberly Reich

Volunteers
We have many volunteers working behind the scenes and on-site to make this Symposium one that you will remember. We thank all of them for their hard work and support of this event. Please join us in thanking them as you meet them and interact with them during the Symposium.

Peggy Foster, Coordinator; Tiffany Anderson, Larissa Arteaga, Daniel Atta, Oralia Berlanga, Francisco Illescas, Hector Chenge, Heather DeElena, Andrea DiGuardi, Jesus A. Enriquez, Christine Figgener, Daniel Gomez, Dimitra Guerrero, Lucia Guillen, Melania Lopez-Castro, Javier Montaño, Rosanna Nuñez, Ashley Ortega, Jaime Ortiz, Rhonda Patterson, Sandra T. Peña, Giovanna K. Peña, Sergio Perez, Federico Reyna, Rosalie Rossi, Cynthia Rubio, Valdo Saldierna, Patty Scanlan, Jenny Scanlan, Jennifer Shelby Walker, Toni Torres, Esther Uribe, Alison N. Watts

Registration

There will be a registration table inside the front entrance to the Brownsville Events Center. Registration will begin Tuesday, November 18 at 7:30 AM. People who registered and paid can pick up their packets and name tags at the table. Anyone who registered but did not pay will be able to make a payment in cash or with a credit card at the registration table. Only Visa and MasterCard credit cards will be accepted. People who have not registered will have to register on-site.

Name tags will be required during the Symposium for access to the oral presentations, meals and social events. The Gladys Porter Zoo is offering anyone with a Symposium name tag free admission to the zoo from November 18-22, 2014.

Meals

Breakfast will be provided on November 18 and 19. Breakfast will be buffet-style. Two sit-down lunches will also be provided. There will be food and beverages at the special panel session on November 18th, and during the social event at the Gladys Porter Zoo on November 19th.

Translation Services

There will be translators on-site providing simultaneous translation of all Symposium oral presentations from English to Spanish or Spanish to English. Presenters have the option to speak in English or Spanish. Headsets will be available to Symposium attendees.

Travel within Brownsville/Bus Schedule

Free bus transportation will be provided on the mornings of November 18 and 19 from the hotels to the Brownsville Events Center in the morning and from the Brownsville Events Center back to the hotels on the evening of November 18. Bus transportation will also be provided from the Brownsville Events Center to the Gladys Porter Zoo at 5:00 pm on November 19 and from the Gladys Porter Zoo to the hotels after the social event.

Bus pick-up is available only from the following Brownsville hotels:

- Comfort Suites
- Courtyard by Marriott
- Hampton Inn and Suites
- Holiday Inn
- Homewood Suites by Hilton
- Residence Inn by Marriott

A printed bus schedule will be available for pick up at your hotel registration desk on November 17th.

If travel is required between the Brownsville Events Center and the hotel, outside of the times the bus is scheduled, there will be volunteers available to assist with limited transportation needs.

Special Session Panel

A special panel session will be convened at the Brownsville Events Center on Tuesday, November 18 from 5:00 pm to 7:00 pm. During this session there will be an informal, moderated round-table discussion to highlight the conservation history and successes of the species, the people and organizations that worked together to save the species from extinction, and present challenges to Kemps' ridley sea turtle recovery. Food and beverages will be provided.

The special panel includes Andrew Guthrie, Moderator; Carole Allen, Tony Amos, Patrick Burchfield, Heberto Cavazos Lliteras, Gary Graham, Les Hodgson, Rene Marquez M., Jaime Ortiz, Peter Pritchard, Adriana Laura Sarti Martinez, Donna Shaver and Thane Wibbels.

Symposium Social and Silent Auction

The social event and silent auction will be held at the Gladys Porter Zoo on Wednesday, November 19 from 5:30 pm – 10:00 pm. There will be food, music and special presentations during this event. The silent auction will begin at 5:30 pm and end at 8:00 pm. Funds raised in the auction will go to support the Kemp's ridley program in Mexico. Payment for auction items can be made in cash or with credit card on site. Visa, MasterCard, American Express, and Discover credit cards will be accepted.

Bus transportation will be provided from the Brownsville Events Center to the Gladys Porter Zoo and from the Gladys Porter Zoo to the hotels at the end of the evening.

Guidance for Oral Presenters

Speakers should provide their power point presentations on a jump drive/stick as soon as they arrive at the Symposium. There will be a desk and volunteers there to collect these presentations. There will be a sign posted at the desk to identify its location in the Brownsville Events Center.

There will be a practice room available for any presenter who would like to view their presentation and/or practice before they are scheduled to speak. There will be a sign posted outside the practice room to identify its location in the Brownsville Events Center.

Registro

Habrá una mesa de registro en el interior de la entrada principal del Brownsville Events Center. El registro iniciará el martes 18 de noviembre a las 7:30 AM. Las personas que se registraron y pagaron podrán obtener sus paquetes y gafetes en la mesa. Todo aquel que se registró pero no pagó, podrá hacer el pago ya sea en efectivo o con una tarjeta de crédito en la mesa de registro. Solo se aceptarán Visa y MasterCard. Las personas que no se hayan registrado, podrán hacerlo ahí mismo.

Los gafetes serán requeridos durante el Simposio para tener accesos a las presentaciones orales, comidas y eventos sociales. El Zoológico Gladys Porter está ofreciendo a todo aquel con un gafete del Simposio entrada gratis al Zoológico de 18 al 22 de Noviembre del 2014.

Alimentos

Se proporcionará desayuno los días 18 y 19 de Noviembre. El desayuno será tipo buffet. Las dos comidas también serán proporcionadas. Habrá comida y bebidas en el panel de la sesión especial el 18 de Noviembre, y durante el evento social en el Zoológico Gladys Porter el 19 de Noviembre.

Servicios de Traducción

Habrá traductores proporcionando traducción simultánea de todas las presentaciones orales de inglés a español o de español a inglés. Los presentadores tendrán la opción de dar su plática en inglés o en español. Se proporcionarán auriculares a los asistentes.

Transporte en Brownsville/Itinerario de Autobús

Se proporcionará transporte gratis durante las mañanas del 18 y 19 de Noviembre de los hoteles al Brownsville Events Center y del Brownsville Events Center a los hoteles en la tarde del 18 de Noviembre. También se proporcionará transporte del Brownsville Events Center al Zoológico Gladys Porter a las 5:00 PM el 19 de Noviembre y del Zoológico Gladys Porter a los hoteles al terminar el evento social.

Los siguientes hoteles son los que ofrecen transporte de cortesía:

- Comfort Suites
- Courtyard by Marriott
- Hampton Inn and Suites
- Holiday Inn
- Homewood Suites by Hilton
- Residence Inn by Marriott

El itinerario impreso del autobús estará disponible en el área de registro de su hotel a partir del 17 de Noviembre.

Si se requiere transporte no incluido en el itinerario del Brownsville Events Center a los hoteles, habrá voluntarios disponibles para asistir con servicio limitado de transporte.

Panel de la Sesión Especial

Una sesión especial se llevará a cabo en el Brownsville Events Center el martes 18 de Noviembre de las 5:00 pm a las 7:00 pm. Durante esta sesión habrá una discusión informal moderada tipo mesa redonda para destacar la historia y las historias de la conservación de la tortuga lora, las personas y las organizaciones que trabajaron en conjunto para salvar a la especie de la extinción, y los retos actuales para su recuperación. Se proporcionará comida y bebidas.

El panel incluirá a Andrew Guthrie como Moderador; Carole Allen, Tony Amos, Patrick Burchfield, Heberto Cavazos Lliteras, Gary Graham, Les Hodgson, Rene Marquez M., Jaime Ortiz, Peter Pritchard, Adriana Laura Sarti Martinez, Donna Shaver y Thane Wibbels.

Evento Social del Simposio y Subasta Silenciosa

El evento social y la subasta silenciosa se llevarán a cabo en el Zoológico Gladys Porter el miércoles 19 de Noviembre de 5:30 pm a 10:00 pm. Habrá comida, música, y presentaciones especiales durante el evento. La subasta silenciosa comenzará a las 5:30 pm y concluirá a las 8:00 pm. Los fondos recaudados en la subasta apoyarán el Programa de la Tortuga Lora en México. El pago de los artículos de la subasta puede ser en efectivo o con tarjeta de crédito. Se aceptará Visa, Mastercard, American Express y Discover.

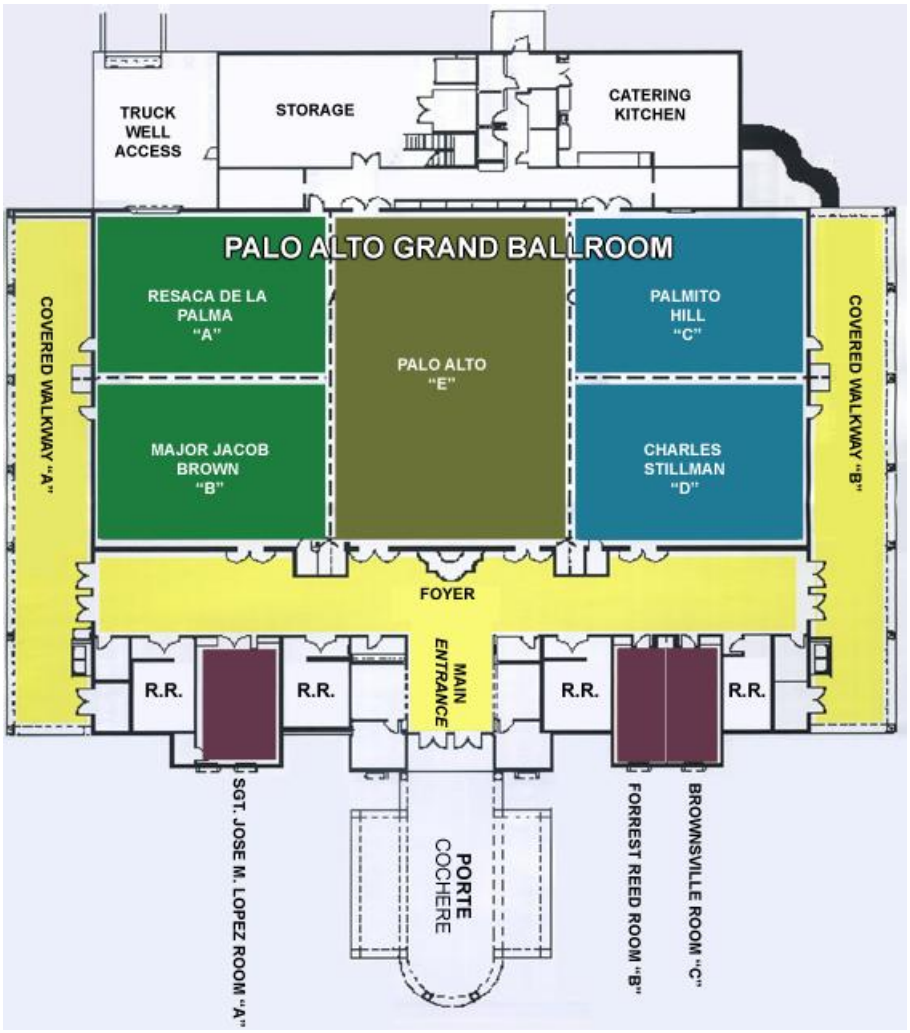
Se proporcionará transporte del Brownsville Events Center al Zoológico Gladys Porter, del Zoológico Gladys Porter a los hoteles al término del evento.

Asistencia a los Presentadores

Los presentadores deberán proporcionar sus presentaciones en PowerPoint en una memoria USB tan pronto lleguen al Simposio, habrá un escritorio y voluntarios para colectar estas presentaciones. Habrá señalamientos identificando la ubicación de este escritorio en el Brownsville Events Center.

Habrá un cuarto disponible a los presentadores para preparar, ver, y/o practicar las presentaciones antes de su hora programada para presentar. Habrá señalamientos identificando la ubicación de este cuarto en el Brownsville Events Center.

Brownsville Events Center Floor Plan



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Recovering an Endangered Species: The Kemp's Ridley Project and Mexico's Instituto Nacional De La Pesca

Tuesday, 18th November 9.15 - KN-1.01 - Oral

***Marquez-M. Rene* (CIATM, Comite Cientifico)**

Mexico's Instituto Nacional de Investigaciones Biológico-Pesqueras, (today Instituto Nacional de la Pesca - INP) was created in 1962 and began surveys to evaluate the presence of sea turtles in the Mexican coastline's commercial capture zones - taking actions to regulate fisheries, like temporary bans and prohibiting egg commercialization. Mexico's Sea Turtle Program was started in 1964 when INP realized that it was necessary to implement conservation measures by creating "turtle camps". The first of these camps was established at Rancho Nuevo in 1966 to protect the Kemp's ridley sea turtle. That same year, other camps were established in the Pacific Coast. Activities included beach patrols, metal tag-recapture study, nest collecting and translocation to corrals, and hatchling releases.

Notwithstanding these activities, including declaring a total ban on the species' capture in 1972, the population decreased from several thousands in 1966 to less than a thousand in 1976. Even though the efforts at Rancho Nuevo considerably restricted egg trafficking, the decrease didn't show signs of stopping.

Other factors were then considered, including incidental and directed capture in both the US and Mexico. In order to deal with this problem, it was decided in the 1977 MEX-US Gulf Meeting to create a Binational Collaborative Program between INP, NMFS, NPS and FWS to recover the Kemp's ridley population by enhancing the conservation efforts at the nesting beaches and instituting a head-start program at the NMFS Galveston Lab. In 1978, the Kemp's Ridley Binational Sea Turtle Conservation Program is created.

In 1980, as a preventive measure, 100 juvenile specimens from the Galveston Lab and a little over 200 hatchlings from Rancho Nuevo were transported to the Sea Turtle Farm at the Grand Cayman Islands. Captive rearing was successful and the stock grew quickly. In 1989, the wild population started showing the first signs of recovery. The captive rearing at Grand Cayman was suspended in 1998 and it was decided to transport back to Mexico the majority of those captive-reared turtles. 110 specimens (males and females), were relocated to Quintana Roo's Xcaret Eco-Archeological Park in 1999.

From 1966 to 1977, beach coverage went from Barra del Tordo to Barra San Vicente, at first covering 13 kilometers and then extending to 26 kilometers in 1969. Including some beaches in Veracruz, coverage would reach 231 kilometers in 2000.

Beach patrols and nest relocations were made by foot until 1977. In 1978, the US Contingent provided ATVs, as well as many volunteers (mostly students), a scientific coordinator, and a camp administrator.

Over the years, in addition to the conservation efforts, many other projects have been undertaken such as mass tagging, satellite telemetry, and sex ratio studies; environmental education and awareness programs; and reproductive biology and stranding training workshops

As mentioned above, 10 years after the start of the Binational Project, the population showed signs of recovery with the number of nests stabilizing as well as increasing on an annual basis reaching over 5,000 nests in 2001 (3,741 in Rancho Nuevo). Today, over 10,000 or more nests are registered annually.

Searching for the "Heartbreak Turtle": How the Efforts of a Diverse Group of Historic Personalities Coalesced to Save the Kemp's Ridley Sea Turtle

Tuesday, 18th November 10.00 - OS-1.01 - Oral

***Thane Wibbels** (University of Alabama at Birmingham), Luis Jaime Pena (Gladys Porter Zoo), Javier Montaño (CDEN), Hector Raul Chenge (Gladys Porter Zoo/CDEN), Francisco Illescas (CDEN), Elizabeth Bevan (University of Alabama at Birmingham)*

The history, biology, and conservation of the Kemp's ridley sea turtle represents a remarkable story from a variety of viewpoints. The Kemp's ridley was once considered one of the most mysterious animals in North America. It was found throughout the Gulf of Mexico and along the Atlantic coast of the U.S., but it was not known to breed or nest. By the time the nesting beach was finally revealed to the scientific community, the species was in decline and it became the most endangered sea turtle in the world, nearing the brink of extinction by the mid 1980's. The discovery of the nesting beach and the initiation of conservation efforts was facilitated by the efforts of a diverse group of individuals from a wide variety of backgounds. The Kemp's ridley history exemplifies the logistical and political hurdles associated with the recovery of an endangered species.

Kemp's Ridley Nesting on the Texas Coast

Tuesday, 18th November 10.00 - OS-1.02 - Oral

***Donna J. Shaver** (National Park Service, Padre Island National Seashore), Cynthia Rubio (National Park Service, Padre Island National Seashore), J. Shelby Walker Walker (National Park Service, Padre Island National Seashore), Jeffrey George (Sea Turtle Inc.), Anthony F. Tony Amos (University of Texas), Kimberly Reich (Texas A&M University at Galveston), Curtis Jones (U.S. Fish and Wildlife Service), Tom Shearer (U.S. Fish and Wildlife Service)*

Background

Kemp's ridley (Lepidochelys kempii) is the world's most endangered sea turtle species. After decades of bi-national conservation efforts, the Kemp's ridley population increased exponentially, but most recently nesting in Texas and Mexico has decreased.

Methods

From 1978–1988, 22,507 Kemp's ridley eggs were collected at the primary nesting beach in Rancho Nuevo (RN) for experimental imprinting to Padre Island National Seashore (PAIS), Texas and from these 15,875 hatchlings were transported to the NOAA Laboratory in Galveston, Texas for head-starting. It was hoped that these "Padre Island imprinted head-starts" would return to PAIS to nest, to form a secondary nesting colony there. Additionally, from 1978–2000, more than 10,000 hatchlings that emerged from nests incubated in a corral at Rancho Nuevo (RN), Mexico were transported to the NOAA Laboratory for head-starting, with the objective that these "RN imprinted head-starts" would return to Mexico to nest. Systematic efforts to detect and protect nesting Kemp's ridley turtles and their eggs on the Texas coast began on North Padre Island (including PAIS) in 1986 and expanded to Boca Chica Beach in 1999 and to South Padre Island in 2000. By 2005, patrols were conducted on all Texas Gulf of Mexico beaches to some extent during the nesting season. Nesting turtles found were documented in a saturation tagging program. Eggs were protected during incubation and hatchlings during release.

Results

From 1979–2014, 1,666 Kemp's ridley nests were documented in Texas. Overall, the annual number of nests confirmed on the Texas coast increased from 1995–2009 and record numbers of nests were recorded during six consecutive years from 2004–2009. Although record numbers of nests were also found during 2011 (n=199) and 2012 (n=209), these were only slight increases from the 197 nests found during 2009, and many fewer nests were recorded during 2010, 2013, and 2014. The best fit to the annual number of nests found on the Texas coast from 2000–2014 standardized for patrol effort was a 3rd order polynomial curve, r2 = 0.903. Of the 1,666 nests confirmed in Texas from 1979-2014, 1,017 were on North Padre Island, 385 on South Padre Island/Boca Chica Beach, 133 on the upper Texas coast, 55 on Mustang Island, 44 on Matagorda Island, 17 on Matagorda Peninsula, 14 on San Jose Island, and one on Corpus Christi Bay beach. More nests were located at PAIS than at any other location in the USA. The nesting turtles were examined for tags at 916 of the 1,666 nests. Of these, 785 were from wild, 68 from Padre Island imprinted head-start, 57 from RN imprinted head-start, and six from uncertain wild or head-start turtles.

Conclusions

Recovery efforts for this species were showing promising signs of success through 2009. Nesting and the numbers of turtles comprising nesting aggregations were increasing in Mexico and Texas. However, recent decreases underscore the vital importance of continued protection efforts on the nesting beaches and in the marine environment.

Historical Participation of the State Government of Tamaulipas in the Binational Kemp's Ridley Recovery Program

Tuesday, 18th November 10.00 - OS-1.03 - Oral (15 minute)

***Heberto Cavazos Lliteras* (GOBIERNO DE TAMAULIPAS/SEDUMA)**

The sea turtle conservation efforts of the State Government of Tamaulipas started with the establishment of a sea turtle camp in Barra de Ostiones, Municipality of Soto La Marina, in 1989. Barra de Ostiones is located 21 kilometers north of the Rancho Nuevo sea turtle camp, located at Barra Coma.

The first protection efforts yielded a little over 170 nests, registering a tendency of annual increases in the number of registered nests and released hatchlings in the 90s. This tendency resulted in relocating the Barra de Ostiones camp to Tepehuajes in 1996 and establishing another sea turtle camp at La Pesca, also in the Municipality of Soto La Marina, that same year.

The camps at Tepehuajes and La Pesca are administered by the State Government's environmental agency, SEDUMA. The State Government of Tamaulipas recognizes the importance of these conservation efforts and continues providing resources, vehicles, and personnel towards these efforts, as well as establishing an ongoing interagency collaborative agreement between SEDUMA and the Gladys Porter Zoo of Brownsville, Texas to facilitate the logistics of operating both camps.

2014 Kemp's Ridley Nesting in Tamaulipas, Mexico - Tepehuajes and La Pesca

Tuesday, 18th November 10.00 - OS-1.04 - Oral (15 minute)

Heberto Cavazos Lliteras (GOBIERNO DE TAMAULIPAS/SEDUMA), Luis Gerardo Cardenas (GOBIERNO DE TAMAULIPAS/SEDUMA)

Background

The State Government of Tamaulipas, in cooperation with the Federal Government and the US Support Group, represented by the Gladys Porter Zoo, works toward the conservation of the Kemp's ridley sea turtle (Lepidochelys kempii), a species endemic to the Gulf of Mexico, by protecting the species' nesting beaches located at La Pesca and Tepehuajes, in the Municipality of Soto La Marina, Tamaulipas.

Since 1989, the State Government of Tamaulipas has been actively participating in the Kemp's Ridley Binational Conservation Program with actions that would help in recovering and increasing the population of the species. Prior to 2010, a favorable tendency towards the recovery of this sea turtle was observed. However, starting in 2010, there has been a decrease in the nesting numbers registered in Tamaulipas. Working tables are needed in order to analyze these nesting trends, as well as share any statistical or scientific information that may allow us to better understand the Kemp's ridley's current situation.

Methods:

Protection efforts consist mainly of patrolling the beaches on ATVs in order to locate, collect and transport clutches to protective corrals. Patrols are done three times a day throughout the season and the corrals are under constant monitoring in order to effectively manage the clutches and release the hatchlings into the Gulf of Mexico from the La Pesca and Tepehuajes beaches.

Results

During the 2014 Season, the State Government of Tamaulipas operated the camps located at La Pesca and Tepehuajes registering 1,509 nests - 1,370 protected in corrals, 111 left in situ, 27 taken by predators, and 1 stolen. With an emergence rate of 73% at both turtle camps, a total of 91,415 hatchlings were released.

Conclusions

While there was a slight increase in the number of registered nests at Tepehuajes, a significant decrease was observed at La Pesca. While the exact cause for this is not known, it is important to mention two factors that may have affected the level of nesting at this beach: low temperatures, and an excessive amount of sargassum . Nesting females at La Pesca, not being able to nest there, may have moved southward, looking for more favorable nesting conditions.

2014 Kemp's Ridley Nesting in Tamaulipas, Mexico - Rancho Nuevo, Barra del Tordo, Altamira, and Ciudad Madero

Tuesday, 18th November 10.00 - OS-1.05 - Oral

***Laura Sarti** (COMISIÓN NACIONAL DE ÁREAS NATURALES PROTEGIDAS), Marco Martinez (CONANP), Blanca Zapata (COMISIÓN NACIONAL DE ÁREAS NATURALES PROTEGIDAS), Luis Gerardo Cardenas (GOBIERNO DE TAMAULIPAS/SEDUMA)*

Background

The Kemp's ridley sea turtle, Lepidochelys kempii, is a Gulf of Mexico endemic species with its main nesting sites located in the coasts of Tamaulipas, specifically the Playa Rancho Nuevo Sanctuary. Since 1978, the governments of Mexico and the US have made great efforts towards the recovery of this species, including the protection of nests in order to maximize the number of released hatchlings into the marine environment. Starting in 1990, the results of these efforts showed a general increment tendency, with small variations, and even some decreases. This tendency was maintained from 2005 up until 2010 when a 42% decrease from what was registered in 2009 was observed. Decreases were also observed in 2013 and 2014.

Methods

The beach is patrolled at least 3 times a day. If there is a turtle nesting, the clutch is picked up when returning and transplanted into a protective corral. In case of an arribada, the nests are marked with sticks so that the clutches can be picked up later and transported to the corral. This is done within a maximum period of 4 hours in order to avoid predation. Priority is given to the clutches that are at risk: high tides, nests located inside a sand bar, or nests laid where there is invasive vegetation.

A significant number of clutches are left in situ and protected from predators by placing wire mesh on top of them in lower nest density areas, as well as constant patrols to scare predators away. Once the hatchlings emerge, both from corral and in situ nests, the nests are excavated to clean them and evaluate the incubation process.

Results

During 2014, six beaches were operated in the state through the Binational Kemp's Ridley Recovery Program: Altamira, Miramar, Barra del Tordo, Playa Rancho Nuevo Sanctuary, Tepehuajes and La Pesca. 11,682 nests were registered. Of these, 9,162 were protected in corrals and 6 in Styrofoam™ boxes. A total of 1,266 finished their incubation in situ. 11 nests were registered as stolen, the majority in the beaches that are near the more populated areas: Miramar and Barra del Tordo. 1,237 clutches were taken by predators. Although some nests have not hatched, results to date show that 573,631 hatchlings were released into the sea from the protected clutches. The survival hatch rates fluctuate between 62 and 80%.

Conclusions

The registered nests in 2014 represent a 46% decrease from the highest recorded number of registered nests since 1965: 21,792 in 2012. Although the causes are unknown, these results show that the Kemp's ridley, endemic to the Gulf of Mexico, even though it showed substantial increases starting in 1990, can still be very vulnerable to any change - environmental or biological. The number of registered nests is the index used to determine the population status. It is because of this situation that it is imperative that protection efforts are not minimized and more is found out about the causes of the low nest numbers in these last two seasons.

The Partnership

Tuesday, 18th November 12.00 - LS-1.01 - Oral

Larry Hodgson (Marco Sales, Inc.)

This is the story about two countries that have worked together to recover a severely endangered species. More than that, it is the story of a partnership of many individuals, businesses, organizations, and government entities.

In 1995 we met with Dr. Pat Burchfield at the local Applebee's restaurant to hear the story of the Kemp's Ridley Binational Project and to offer our help. Pat told us that his goal was to recover the species, and that he would accept help from anyone who was interested in helping to reach that goal. At that time, Les was president of the National Fisheries Institute, and was able to obtain a ten thousand dollar grant of unrestricted funds for the Project.

Over the next nineteen years the donations have been large and small - some have been funds, others have been equipment, time and effort. All were given freely and without expectation of credit. None who have been asked for help have said no.

The Partnership has grown throughout the years – and now includes, but is not limited to, the following organizations, agencies, and individuals: Marco Sales, Inc., Campeche Seafoods (Ivo Goga), Penguin Frozen Foods (Jon Applebaum), Eastern Fish Co. (Bill Bloom), Red Lobster, Ocean Garden Products (John Filosi), American Honda Motors, HEB, Rich Products, Texas Pack, Inc., Bubba Gump Shrimp Co., Texas Parks and Wildlife (Larry McKinney, Scott Boruff, Mike Ray, Gene McCarty and Robbin Reichers), the Gulf States Marine Fisheries Commission (Larry Simpson, Steve Vanderkooy, Corkey Perett), Texas Shrimp Association (Wilma Anderson, Andrea Hance), Southern Shrimp Alliance, Camara Nacional de la Industria Pesquera (Rafael Ruiz, Silverio DiCostanzo, Beto de Pau), Texas Sea Grant (Gary Graham, Mike Habey, Russ Miget, Tony Reisinger), Ocean Trust (Thor Lassen), Sea Turtle, Inc. (Ila Loetscher, Jeff George and many others), Seafood Business Magazine (John Fiorillo), and the offices of many Senators and Representatives - especially Senator Kay Bailey Hutchison of Texas, and State Senator Eddie Lucio.

In addition, many countless individuals have done their share beginning with those who have worked on the beaches and are too numerous to mention individually, but who have done the brunt of the work under the most difficult conditions. Efforts of Vicente Mongrel and Arturo Caso in Mexico as well as Jim and Mary Carswell, Randy McCormick, Dr. Benny Gallaway, and Gary Graham must be included. Scott Boruff deserves a special mention - after his retirement from TPWD, he has held an annual fundraiser for the project in the name of his departed son, Jeff, who had been a volunteer at Rancho Nuevo.

Finally, and coming full circle, we must mention Ernie Hacker and Bob Hessling who helped to build the facilities at Tepehuajes and who had been among the group of fishermen joining Dearl Adams as the pioneers of Kemp's ridley conservation.

Above all, the members of this partnership must thank Dr. Patrick Burchfield and Luis Jaime Peña for the success of the project and for including us in this magnificent effort.

The Kemp's Ridley Project: A Historical Perspective

Tuesday, 18th November 12.00 - LS-1.02 - Oral

***Patrick Burchfield* (Gladys Porter Zoo)**

Of the eight species of sea turtles in the world, the Kemp's ridley, Lepidochelys kempii, is the most vulnerable and endangered. One of the key elements in its critically endangered status is that over 90% of this species' population nests within one 78 mile stretch of beach in Mexico. Should any disaster, manmade or natural, befall that epicenter, the entire species could be lost. Other species, such as the leatherback sea turtle, which is also critically endangered, especially in the Pacific, have the advantage of being worldwide in their nesting distribution. It is the smallest sea turtle and the only species which nests primarily during the daytime. Because of its critically low numbers, the Kemp's ridley, called "tortuga lora" in Spanish, is also considered to be a conservation dependant species.

Sea turtle research and conservation in Mexico was formalized in 1962 with Instituto Nacional de la Pesca (INP) then named Instituto Nacional de Investigaciones Biologico-Pesqueras (INIBP) being the lead agency. Conservation efforts for the Kemp's ridley were initiated in 1966; the project began on the beach near the ranching community of Rancho Nuevo, in the municipality of Aldama, Tamaulipas. This locale is the only one in the world where massive nesting aggregations, "arribadas", of this sea turtle were and are known to occur. Because of it being the only known major nesting beach for the "tortuga lora", this beach was declared the first National Reserve for the Management and Conservation of Sea Turtles in Mexico on July 4, 1977. In 1978, a collaborative bi-national program between Mexico and the United States was developed to try and restore this species' population to a self sustainable level; and in 1981, the U. S. Fish and Wildlife Service requested the Gladys Porter Zoo to administer the United States' field portion of the joint US/Mexico effort to protect and increase the production of Kemp's ridley sea turtles at their natal beaches located in the State of Tamaulipas, Mexico.

Conservation efforts on the primary nesting beaches in Mexico and the required TED-use in the U.S. and Mexico are the likely reasons for the population's steady increase from its all time low of 702 nests in 1985 to over 21,000 nests in 2009. However, nesting has failed to exhibit any signs of long-term increase in the past five years. This means that the population remains highly endangered, maybe even more so than before. The highest priority goal of the Kemp's ridley Binational Project is to maintain and reinforce habitat protection efforts on the nesting beaches, protect nesting females, and maintain hatchling production levels.

To achieve this goal, we must maintain the participation and cooperation of the three levels of government in Mexico and the United States, as well as the work done by NGOs, the shrimping industry and the Universities. This level of cooperation has made the Kemp's Ridley Binational Project one of the longest existing endangered species recovery programs in the world.

The Fragility of Recovery: Implications of the Dramatic Reduction of the Kemp's Ridley Population Growth Rate Since 2010

Tuesday, 18th November 13.20 - OS-2.01 - Oral

***Selina Heppell** (Oregon State University)*

In the years since 2010, our once rebounding population has taken a dramatic turn, from a 15-18% per year increase to a 5% decrease. The nest number dropped more dramatically in 2010 than had ever been recorded, but the population was expected to rebound quickly. Instead, the nest number has become much more variable, with another decrease in 2014. The probability of reaching our initial goal of 25,000 nests, which should have been reached this year, is currently zero. While there are many factors that may have contributed to a reduction in the rate of recovery, a sudden reversal of the population growth rate is unexpected due to "population momentum", where the number of nests should continue to be fueled by large cohorts of hatchlings produced in the early 2000s. Even if carrying capacity has been reduced since the 1940s, when population estimates were much greater, it is unlikely that a long-lived species would experience such dramatic and rapid changes in population growth and variability in response to density. However, because only the number of nests and hatchlings are monitored thoroughly, it is difficult to determine if the change is due to an increase in mortality and/or a decrease in the reproductive rate, where the latter could be a reduction in nesting frequency or nests per female. There is a desperate need to measure the annual survival rate of adult turtles and recruitment to the nesting population through tagging and monitoring on the nesting beaches. Likewise, better estimates of growth and mortality of juvenile turtles over time could help us diagnose changes in population recovery when they occur. For now, funding should be re-instated for the bi-national recovery project, with an emphasis on vital rate research and nest protection throughout the species' range.

The 2013 Kemp's Ridley Stock Assessment: Shrimp Trawls and Oil Spills

Tuesday, 18th November 13.20 - OS-2.02 - Oral

Gallaway Benny (LGL Ecological Research Associates, Inc.), Charles W. Caillouet Jr. (Marine Fisheries Scientist-Conservation Volunteer)

Background:

In response to a request from Gulf States Marine Fisheries Commission, a stock assessment was conducted for the Kemp's ridley sea turtle (Lepidochelys kempii) in the Gulf of Mexico. The stock assessment was conducted in a Workshop Format led by LGL Ecological Research Associates, Inc., Texas Sea Grant, and Charles W. Caillouet Jr, and was attended by 22 scientists and 6 observers. The primary objectives were to examine Kemp's ridley population status, trends and temporal-spatial distribution in the Gulf of Mexico; estimate fishing mortality from shrimp trawls; and estimate total mortality. Shrimp trawl mortality was identified in 1990 as the greatest threat to post-pelagic life stages at sea. Widespread utilization of Turtle Excluder Devices (TEDs) began in 1990 or shortly thereafter. The assessment also considered other factors (e.g. the Deepwater Horizon Oil Spill) that may have had significant influence on the population.

Methods:

The Kemp's ridley demographic model developed by the Turtle Expert Working Group (TEWG) in 1998 and 2000 was modified for use as our base model,using AD Model Builder. The TEWG model uses indices of annual nests at Rancho Nuevo, Tepehuajes, and Barra del Tordo-Playa Dos, in Tamaulipas, Mexico and hatchling recruitment to predict nests based on a series of assumptions regarding age and maturity, remigration interval, sex ratios, nests per female, juvenile mortality and a "TED-effect" multiplier. The latter was necessary to fit the annual nests observed after 1990. To this model, we added the effects of instantaneous shrimping-related mortality. We also added a 2010 nest-reduction multiplier that was necessary to fit the data for 2010 and beyond. We changed the starting year for the TED effect multiplier to 1990 (i.e., post-1989) and estimated growth using a combination of mark-recapture and strandings data. Lastly, we included an empirical-basis for estimating natural mortality, based upon a Lorenzen mortality curve and growth estimates.

Results:

Based upon data beginning in 1966, the annual hatchling inputs slowed, then stopped the decline in annual nests by 1986, after which the number of nests increased exponentially through 2009 when 19,163 nests were observed at the primary nesting beaches in Mexico. In 2010, the observed numbers of nests plummeted to 12,377, a 35% reduction from 2009. In 2010, total annual mortality was estimated to be on the order of 65,505 Kemp's ridleys of which only 1,884 were estimated to have been killed in shrimp trawls. However in 2011 nesting "bounced back" to 19,368, and then increased slightly in 2012 to 20,197 nests.

Conclusions:

As of 2012, nesting appeared to have "bounced back" from the 2010 decline and model projections suggested that the population would resume a trend of increase and attain the Bi-national Recovery Plan's downlisting goal within a few years. Unfortunately, this prediction was not realized.

The 2014 Kemp's Ridley Stock Assessment: Reduced Nesting or Reduced Nesters?

Tuesday, 18th November 13.20 - OS-2.03 - Oral

***Benny Gallaway** (LGL Ecological Research Associates, Inc.), William J. Gazey (W. J. Gazey Research)*

Background:

Coincident with the 2010 Deep Water Horizon oil spill, unprecedented levels of Kemp's ridley sea turtles stranded on northern Gulf of Mexico beaches, and nesting on the primary nesting beaches plummeted far below expected levels. High levels of strandings have continued since 2010 but nesting recovered to approximately 2009 levels in 2011, and improved slightly in 2012. A stock assessment was conducted which indicated that a large mortality event occurred in 2010, but that the population should once more exhibit a trend of increase from 2013 and beyond. That has not happened, rather the population declined sharply in 2013.

Methods:

A new stock assessment was conducted under the auspices of the Gulf of Mexico Fishery Management Council, drawing upon the Kemp's ridley stock assessment model developed in 2013. This model is a population dynamics synthesis model which integrates historical Kemp's ridley data from multiple sources, including shrimp trawl effort to provide estimates of shrimp trawl mortality. The new assessment evaluated additional scenarios, including 1) three stock-recruitment options; 2) the potential that a new source of ongoing mortality is present; and 3) the potential that the number of nests-per-adult-female is dependent on the size of the benthic population.

Results:

The latter model provided the best fit to the data. Further, the preliminary estimate of actual nesting in 2014 is consistent with model projections.

Conclusion:

The implication is that a large population, in combination with reduced prey levels, has increased the remigration interval. On average, it may take longer for turtles to reach a body condition threshold enabling migration and nesting than has been the case in the recent past. If this explanation is correct, nesting may be highly variable in the future dependent on feeding conditions on the foraging grounds.

Integrating Ocean Circulation and Demographic Data to Estimate the Number of Oceanic-Stage Kemp's Ridley Turtles at the 2010 Deepwater Horizon Oil Spill

Tuesday, 18th November 13.20 - OS-2.04 - Oral

***Nathan Putman** (NOAA Southeast Fisheries Science Center), Alberto Abreu-Grobois (Unidad Academica Mazatlan), Iñaky Iturbe-Darkistade (Unidad Academica Mazatlan), Paul M. Richards (NOAA Southeast Fisheries Science Center), Philippe Verley (Institut de Recherche pour le Développement)*

Due to litigation surrounding the 2010 Deewater Horizon oil spill, limited information is available to the public regarding the spill's impacts on marine life. Here, we use a modeling approach to estimate the population sources and the number of oceanic-stage (≤2 years old) Kemp's ridley sea turtles that were in the immediate vicinity of the spill site. We released virtual particles within an ocean circulation model to determine the probability of transport from nesting beaches to the spill site. To estimate numbers of turtles present we multiplied transport probabilities by estimates of the number of nests laid at each site, clutch size, clutch survival, and oceanic-stage survival. Furthermore, we identified the proportion of each cohort (2008, 2009, and 2010) from each of the main nesting areas (south Texas, Tamaulipas, Veracruz, and Campeche) that were likely present. Our estimates of ocean-stage juvenile Kemp's ridley at the spill site are considerably higher than the publicly available count of all age classes of Kemp's ridley in the area. These findings, combined with our estimates for loggerhead and green turtles at the spill site, suggest that the number of (1) individual turtles present, (2) turtle populations affected, and (3) stakeholders involved in discussions of restoration may dramatically exceed prior expectations.

Migratory Corridors of Adult Female Kemp's Ridley Turtles in the Gulf of Mexico

Tuesday, 18th November 13.20 - OS-2.05 - Oral

***Donna J. Shaver** (National Park Service, Padre Island National Seashore), Kristen Hart (U.S. Geological Survey, Southeast Ecological Service Center), Ikuko Fujisaki (University of Florida, Ft. Lauderdale Research and Education Center), Cynthia Rubio (National Park Service, Padre Island National Seashore), Autumn Sartain (Cherokee Nation Technology Solutions, contracted to the U.S. Geological Survey), Luis Jaime Pena (Gladys Porter Zoo), Patrick Burchfield (Gladys Porter Zoo), Daniel Gomez (Gladys Porter Zoo), Raul de Jesus (Acuario de Veracruz), Hector J. Martinez (Gladys Porter Zoo), Jaime Ortiz (Gladys Porter Zoo)*

Background

Kemp's ridley (Lepidochelys kempii) is the most endangered sea turtle species in the world and has been the focus of bi-national conservation efforts since 1978. Prior to 2010, the bi-national restoration project documented promising signs of success, and population models projected continued increases in the number of nests at 12-18% per year through 2029 assuming continued high egg survival. However, since 2010, the growth rate in the number of nests both in Mexico and in Texas has declined to near zero although egg survival has remained high. Understanding at-sea habitat-use is vital to investigating possible causes of this troubling and unexpected population trend. In addition, knowing locations of important at-sea foraging habitat and migratory corridors may reveal locations where protection should be concentrated. Although several publications detail results of earlier Kemp's ridley tracking work (see Shaver and Rubio 2008), more sophisticated analytical and modeling tools are now available. In particular, when switching state-space modeling (SSM; Jonsen et al. 2005) is used with satellite-tracking data, the results can reveal when and where turtles are in 'migration' versus 'foraging' behavioral mode. Subsequently, data summaries using SSM output can reveal locations of key foraging sites (see Hart et al. 2012, Shaver et al. 2013) and migration corridors (Jonsen et al. 2006).

Methods

In this study, 136 Kemp's ridley turtles were outfitted with satellite transmitters after nesting in Padre Island National Seashore, Texas, USA; Rancho Nuevo, Tamaulipas, Mexico; and Veracruz, Mexico between 1997 and 2014. Rancho Nuevo is the epicenter of nesting for the Kemp's ridley population; Padre Island National Seashore is near the northern extent of the documented historic nesting range, and Veracruz is the southern extent of the historical nesting range. Tracking data were analyzed using SSM and outputs were used to identify migration corridors for adult females.

Results

Most females tracked for more than a few months migrated away from the nesting beach after the nesting season was over. Post-nesting turtles exhibited coastal movements in Gulf of Mexico waters less than 68 m deep. Most migrated to waters off upper Texas, Louisiana, Mississippi, and Alabama. Some nesters migrated to Florida, including a few Texas nesters that migrated as far as the Florida Keys. In the southern Gulf of Mexico, a few nesters migrated as far as the Yucatan Peninsula. A larger portion of the Mexico nesters migrated to the southern Gulf of Mexico than did the Texas nesters.

Conclusions

This data set represents the longest-term (18 year) and most comprehensive (n=136 transmitters) for this species. The migratory corridors documented were repeatedly used over time. Combined with tracking results for adult females in Texas (Seney and Landry 2008, Shaver and Rubio 2008, Shaver et al. 2013), these findings document that near-shore waters of the entire Gulf of Mexico coastline, in the U.S. and Mexico, must be considered important migratory and foraging habitat for this species. Furthermore, they underscore the vital importance of northern Gulf of Mexico waters to adult female Kemp's ridley turtles, and thus to conservation of the entire population.

Shared Foraging Areas in the Gulf of Mexico for Two Imperiled Species: Kemp's Ridley and Loggerhead Sea Turtles

Tuesday, 18th November 13.20 - OS-2.06 - Oral

Kristen Hart (U.S. Geological Survey, Southeast Ecological Service Center), Donna J. Shaver, Ph.d. (NATIONAL PARK SERVICE/PADRE ISLAND NS), Autumn Sartain (Cherokee Nation Technology Solutions, contracted to the U.S. Geological Survey), Ikuko Fujisaki (University of Florida, Ft. Lauderdale Research and Education Center), Margaret Lamont (U.S. Geological Survey, Southeast Ecological Service Center), Cynthia Rubio (National Park Service, Padre Island National Seashore), Luis Jaime Pena (Gladys Porter Zoo), Patrick Burchfield (Gladys Porter Zoo), Daniel Gomez (Gladys Porter Zoo), Raul de Jesus (Acuario de Veracruz), Hector J. Martinez (Gladys Porter Zoo), Jaime Ortiz (Gladys Porter Zoo)

Background

The Gulf of Mexico (GoM) is an important life-history area for Kemp's ridleys and two of five subpopulations of loggerheads. It also presents a high level of anthropogenic threats; The Census of Marine Life lists the GoM as having the second highest threat level of all marine areas reviewed across the world, with overfishing, habitat loss and pollution the primary threats. Specific hazards for marine turtles can include interactions with fisheries (shrimp trawling and long-lining), reduced invertebrate abundance (as a result of trawling), shipping channels, oil spills, dead zones and low dissolved oxygen, and direct harvest. Kemp's ridleys are listed as endangered and loggerheads as threatened, and loggerheads foraging in the GoM are part of the two smallest subpopulations: the Dry Tortugas with an estimated 258-496 females and the Northern Gulf of Mexico, with an estimated 323-634 females. Foraging areas are an important part of an animal's home range and determining the extent and characteristics of foraging areas is critical in conservation efforts, especially for species at risk. The hazards in the GoM make it critical to delineate important foraging grounds for these species and areas that are used by both species may provide an enhanced conservation opportunity.

Methods

We use previously published and newly calculated kernel density estimates along with switching state space modeling to determine foraging locations for Kemp's ridley and loggerhead sea turtles within the Gulf of Mexico. Satellite tracking data spanned 15 years for Kemp's ridleys (1998-2013) and 5 years for loggerheads (2008-2013). Using grids, we show where foraging areas for these two imperiled species overlap. We then characterize these areas by depth, distance to shore, and other habitat features.

Results

From 1998 to 2013, we obtained foraging areas for 129 turtles (55 loggerheads and 74 Kemp's ridleys). In total, we calculated 117 KDEs (72 for Kemp's ridleys and 45 for loggerheads) for 92 turtles (49 Kemp's ridleys and 43 loggerheads). All of the foraging periods used for KDEs showed site fidelity. Mean values for core-use areas (50% KDEs) were almost ten times larger for Kemp's ridleys (mean 889.7 km2) than for loggerheads (mean 90.5 km2). The home ranges (95% KDEs) followed a similar pattern, with Kemp's ridley home ranges (95% KDE mean 3901.7 km2) almost nine times larger than loggerhead home ranges (95% KDE mean 454.6 km2). Home ranges for both species intersected in areas throughout the GoM, including off the Texas, Louisiana, Alabama and Florida coasts, as well as on the western shore of the Yucatan Peninsula.

Conclusions

Adult loggerheads average about two to three times larger than Kemp's ridleys in weight yet the two species have similar habitat needs for foraging. Both species are shallow water feeders, feeding primarily on benthic invertebrates and both forage within neritic waters of the Gulf. These shared foraging areas can assist in future conservation habitat modeling, providing managers with key spatial information on areas with high conservation value.

Use of Stable Isotopes to Discriminate Kemp's Ridley (Lepidochelys kempii) Turtles Foraging in Areas Affected by Deepwater Horizon from Foraging Areas Outside the Impacted Zone

Tuesday, 18th November 13.20 - OS-2.07 - Oral

***Kimberly Reich** (Texas A&M University at Galveston, Dept. of Marine Biology), Donna Shaver (National Park Service, Padre Island National Seashore), Kristin Hart (U.S. Geological Survey, Southeast Ecological Service Center), Claire Iseton (Texas A&M University at Galveston), Melania Lopez-Castro (Texas A&M University at Galveston), Christopher Schmitt (U. S. Geological Survey, Columbia Environmental Research Center), Michael J. Hooper (U. S. Geological Survey, Columbia Environmental Research Center)*

Background

On April 20th 2010 the largest oil spill on record for the Northern Gulf of Mexico began with an explosion at the Deepwater Horizon well site. The most endangered species of sea turtle, the Kemp's ridley (Lepidochelys kempii) has a long established record of using the spill vicinity as primary foraging grounds. Negative impacts on their foraging area have the potential to induce changes in the health and fitness of a large portion of the Kemp's ridley population in the Gulf of Mexico.

Methods

Satellite transmitter data from tagged turtles in 2010, 2011 and 2012 allowed us to divide the turtles into three groups based on home range centroid proximity to the oil spill area (ERMA; cumulative TCNNA SAR composite) defined as: outside, adjacent, inside. With the carbon and nitrogen isotope values of these three groups, we conducted a "leave-one-out" cross validation test to evaluate the accuracy of the classification and determine the posterior probabilities of the known groups using a linear discriminant analysis. We conducted a second discriminant analysis using the posterior probabilities of the known groups to classify 23 turtles from which no satellite data were available.

Results

The discriminant analysis of the proximity to the oil spill area of the 23 Kemp's ridley turtles without satellite data, assigned 13 of them to the outside group and 10 to the inside group. The probability of correct classification varied from 0.455 to 0.994 with 8 out of the 23 turtles with probabilities of correct classification higher than 0.75. The distinctive isotope values of the oiled group allowed identifying turtles that were inside the oil spill area even when satellite data were not available.

Conclusion

The integration of satellite telemetry and data from stable isotope analyses allowed us to determine which turtles were inside the oil spill area. With the stable isotope values we were able to determine if the turtles with no satellite data available were inside, adjacent to, or outside the oil spill area. This information will allow us to determine what percentage of the nesting females foraged inside the oil spill area and get a better estimate of the extent of potential sea turtle injury caused by the oil spill.

Changes in the Foraging Strategy of Kemp's ridley (Lepidochelys kempii) Sea Turtle Populations in the Northen Gulf of Mexico Post Deepwater Horizon Spill

Tuesday, 18th November 13.20 - OS-2.08 - Oral

***Kimberly Reich** (Texas A&M University at Galveston), Donna J. Shaver (National Park Service, Padre Island National Seashore), Claire Iseton (Texas A&M University at Galveston), Melania Lopez-Castro (Texas A&M University at Galveston), Christopher Schmitt (U. S. Geological Survey, Columbia Environmental Research Center), Michael J. Hooper (U. S. Geological Survey, Columbia Environmental Research Center)*

Background

The Kemp's ridley sea turtle is the most endangered species of sea turtle in the world. Our understanding of Kemp's ridley ecology depends in part on our ability to identify geographic regions used by animals for foraging. In the field of ecology, stable isotope analyses in conjunction with satellite tagging are being used increasingly to investigate feeding habits. These techniques are especially useful when applied to migratory species that are difficult to study using conventional methods. Here we use these methods with scute samples to assess changes in foraging strategies from Kemp's ridley sampled in 2010 (the Deepwater Horizon Spill year) and the two subsequent post-spill years.

Methods

Scute samples were collected between 2010 and 2012 from two regions. Samples were obtained from 44 Kemp's ridley sea turtles nesting at a long-term study site on the lower Texas Coast (Padre Island National Seashore) and on the upper Texas Coast (Galveston Island to Surfside Beach). No Kemp's ridley turtles included in this study were sampled more than once. We used a 6mm (dia.) sterile biopsy punch to remove each scute sample from the dorsal surface (oldest scute) to the origin (newest scute). Two samples were obtained from the posterior and anterior ends of the second lateral scute. Tissues were stored in 70% ethanol until preparation for stable isotope analysis.

Results

Statistical analyses (confidence intervals) of δ13C values indicated differences between the oldest posterior layers of turtles sampled in 2010 and the three newest anterior layers of turtles sampled in 2011 and 2012. ANOVA confirmed the significance of these differences ($F_{3,96}=4.76$, $p=0.004$). There was not a difference between the oldest posterior and the newest anterior layers in 2010.

The post hoc pairwise comparison t-tests showed that the δ13C values of the oldest posterior layers sampled in 2010 differed significantly from the newest anterior layers of 2011 and 2012. Within the newest layers, δ13C values were significantly different between 2010 and 2011 and between 2010 and 2012 anterior layers. There was not a significant difference between the newest anterior layers of 2011 and 2012.

The confidence intervals did not indicate differences in δ15N values between the oldest posterior layer of 2010 and the newest anterior layers of 2010, 2011 or 2012. ANOVA confirmed that differences between these groups were not significant ($F_{3,96}=0.18$, $p=0.910$).

Conclusion

There was a substantial decrease in δ13C values in scutes obtained from 2011 and 2012 Kemp's ridley turtles and indicative of post-oil spill foraging, compared to those from 2010 which are indicative of foraging the year of the spill. This difference indicates that the turtles changed foraging habitat from 2010 to 2011 and 2012. The lack of significant differences in the δ15N isotope values between these years suggests no appreciable change in trophic feeding level.

Cytochrome P-450 Enzymatic Activity in the Kemp's Ridley Chorioallantoic Membrane and Embryonic Liver

Tuesday, 18th November 13.20 - OS-2.09 - Oral

***Kimberly D. Smelker** (Texas Tech University), Rebecca J. Pezdek (Texas Tech University), Donna J. Shaver, Ph.d. (US National Park Service, Division of Sea Turtle Science and Recovery, Padre Island National Seashore), Michael J. Hooper (USGS Columbia Environmental Research Center), Janet E. Yacabucci (Texas Tech University), J. Shelby Walker Walker (US National Park Service, Division of Sea Turtle Science and Recovery, Padre Island National Seashore), Shauna C. Ertolacci (US National Park Service, Division of Sea Turtle Science and Recovery, Padre Island National Seashore), Robin L. Tillit (USGS Columbia Environmental Research Center), Céline A. J. Godard-Codding (Texas Tech University)*

The chorioallantoic membrane (CAM) in oviparous species acts as a depot for metabolic waste products, and remains inside the eggshell or in the nest area after hatching. The CAM can be collected without interaction with the animal thus providing an avenue for non-invasive toxicology research. Here we report on the quantification of cytochrome P450 (CYP) enzymatic activity in CAM and liver tissue from embryonic Kemp's ridleys. These enzymes are known to metabolize and/or be inducible by chemicals such as PAHs, PCBs, dioxins, and furans. It is unknown which resorufin dealkylation enzymatic activity is more relevant to CYP induced by these compounds in sea turtles, therefore we conducted four different alkoxyresorufin-O-dealkylation (AROD) assays.

Kemp's ridley CAM and liver tissues were collected in May - August in 2010 and 2011 at Padre Island National Seashore in Corpus Christi, TX. Tissues were collected one to four days after hatching. Four different AROD activities [7-ethoxyresorufin O-dealkylation (EROD), 7-pentoxyresorufin O-dealkylation (PROD), 7-benzyloxyresorufin O-dealkylation (BROD), and 7-methoxyresorufin O-dealkylation (MROD)] were analyzed using a kinetic assay that measures the production of resorufin. The detection limit of the assay was 0.005 pmol resorufin/µg of S9 protein. Activity was considered present if fluorescence over time exhibited a positive linear slope with an R2 value of greater than 0.47.

Liver and CAM tissues were assayed for 39 individual embryos (liver-CAM pairs), and 30 additional embryos had either liver or CAM tissue assayed, but not both. All tissues were analyzed for all four AROD activities. AROD activity did not seem to differ between tissue types. Higher enzymatic activity was measured in the EROD and MROD assays compared to the BROD and PROD assays. MROD activity values for liver were statistically greater compared to those for CAM ($p < 0.05$), but there were no statistical differences in MROD activity between years for liver nor CAM. PROD, EROD, and BROD activity values for liver and CAM tissue were not different, and there were no significant differences in PROD or EROD activity between years for liver nor CAM. However, there was a slight statistically significant difference in BROD activity between years for CAM tissue ($X2= 4.145$, $p = 0.042$).

Our results indicate that AROD activities in CAM tissue are not different from those measured in liver tissue from embryonic Kemp's ridley sea turtles. We found that higher enzymatic activity was detected in EROD and MROD assays compared to PROD and BROD assays. However, the overall enzymatic activity measured in all assays was relatively low, therefore more analyses are needed before we can confidently determine which AROD assay is most suitable for quantifying enzymatic activity in embryonic sea turtle tissue. Additionally, we recognize the possibility that enzymatic activity may decline over time therefore we plan to examine the stability of CYP expression in sea turtle CAMs collected at several time points after hatching.

Rehabilitation and Ecology of Juvenile Kemp's Ridley Sea Turtles (Lepidochelys kempii) in the Northern Gulf of Mexico

Wednesday, 19th November 9.00 - OS-3.01 - Oral

***Andrew T. Coleman** (Institute for Marine Mammal Studies), Jonathan L. Pitchford (Institute for Marine Mammal Studies), Wendy Hatchett (Institute for Marine Mammal Studies), Alicia Carron (Institute for Marine Mammal Studies), Andrew Heaton (Institute for Marine Mammal Studies), Eric Pulis (Institute for Marine Mammal Studies), Delphine Shannon (Institute for Marine Mammal Studies), Helen Bailey (University of Maryland Center for Environmental Science), Melissa Cook (National Marine Fisheries Service Pascagoula Lab), Moby Solangi (Institute for Marine Mammal Studies)*

Background

Concomitant with the increased number of juvenile Kemp's ridley strandings reported in the northern Gulf of Mexico (nGOM) since 2010, over 750 turtles were incidentally captured by recreational fishermen at public piers in Mississippi. Most of these turtles were juvenile Kemp's ridleys and were transported to the IMMS rehabilitation facility. Sea turtle bycatch resulting from recreational fishery interactions have been previously reported in other areas but not at these high numbers. The rehabilitation of these turtles offered opportunities to study aspects of juvenile Kemp's ridley ecology in a historically understudied region.

Methods

Incidentally captured turtles received a full veterinary exam at the IMMS rehabilitation facility, where their hook(s) was removed if present. In-take blood samples were collected, and a suite of hematology and plasma biochemistry parameters were analyzed. Standard morphological measurements and weights were also recorded. When the turtles were cleared for release, they were flipper and PIT tagged, and thirty-one juvenile Kemp's ridleys were fitted with satellite transmitters so their seasonal movements could be studied. Sirtrack Kiwisat 202 platform terminal transmitters (PTTs) were attached via the methodology outlined in Seney et al. (2010). PTTs were programmed with a duty cycle of 6 h on:6 h off, and location messages were processed by CLS America's Argos System and filtered with Seaturtle.org's Satellite Tracking and Analysis Tool (STAT) (Coyne and Godley 2005). Data were analyzed using switching state-space models (SSMs) and kernel density estimation. Only locations identified in SSMs as foraging locations were included in the kernel density analyses to evaluate seasonal 50% core use areas.

Results

Over 400 turtles have been tagged and released since 2010, and over 125 recapture events have been reported from 2012-2014. The number of reported incidental captures increased in 2012 from the previous two years partly due to informational signs placed at public piers by IMMS staff. The average straight-line carapace length for the incidentally captured Kemp's ridleys was 30.06 cm (SD = ± 3.59 cm, range = 19.2 – 47.5 cm). Blood values obtained from the juvenile Kemp's ridleys were similar to values reported from other areas (Carminati et al. 1994; Anderson et al. 2011). The general pattern observed in the seasonal movements of satellite tagged turtles was strong site fidelity to the Mississippi Sound from early spring to late fall followed by migrations to coastal habitats of central and western Louisiana during winter months.

Conclusions

The issue of sea turtle bycatch in the nGOM recreational fishery has garnered more focus in recent years due to numbers reported from coastal Mississippi. Although considered a "take", 97% of turtles treated at the IMMS rehabilitation facility have been successfully released. Investigating the ecology of immature Kemp's ridleys has stressed the importance of the Mississippi Sound to the development of these turtles.

Surface-Pelagic (Oceanic) Juvenile Kemp's Ridleys in the Gulf of Mexico: Behavior, Habitat Associations, Diet, and Somatic Growth

Wednesday, 19th November 9.00 - OS-3.02 - Oral

***Blair Witherington** (Archie Carr Center for Sea Turtle Research, University of Florida, and Disney's Animals, Science & Environment), Shigetomo Hirama (Florida Fish and Wildlife Research Institute), Robert Hardy (Florida Fish and Wildlife Research Institute)*

Background

Kemp's ridley hatchlings disperse away from land in the western Gulf of Mexico (GoM) and are rarely observed as young juveniles. We present empirical evidence describing the ecology of juveniles on the open sea prior to recruitment into coastal waters. Our information comes from juvenile (SCL ~ 17–35 cm) and young-of-the-year (post-hatchling SCL < 7 cm) ridleys captured from oceanic frontal zones traced by pelagic sargassum and other drift material.

Methods

We sampled surface-pelagic drift material offshore from three ports in the eastern GoM (Key West, Marco Island & Sarasota, FL), three ports in the northern GoM (Apalachicola & Pensacola, FL, and Venice, LA), and one port in the western GoM (Pt Aransas, TX). We used distance transect sampling to estimate detectability and to model observation densities. At sighting, behavior and proximity to other objects were recorded. Turtles were captured with a dipnet, measured, weighed, and given esophageal lavage. Feces were collected opportunistically. Eleven juveniles were tagged with 9.5 g solar PTTs, which provided tracks we analyzed relative to surface currents and frontal evidence from surface temperature and chlorophyll.

Results and Conclusions

Our data comprise a sample of 39 Kemp's ridley juveniles and 8 post-hatchlings. Behavior and object proximity at capture suggest the turtles have a strong association with floating material, especially pelagic sargassum. Our data from post-hatchling ridleys is new, and suggests sargassum habitat-use differences in comparison to young loggerheads. Diet samples from esophageal lavage and feces of juveniles show varied, principally surface-distributed animals. Notable diet items were pelagic sargassum associates such as hydroids, gastropods, crabs, and serpulid polychaetes. Insects were also common, as was synthetic debris in the form of photo-degraded plastic shards. Our size distributions suggested two age classes comprising post-hatchlings, and juveniles ~ two years old. Assuming a single year class for juveniles, these turtles grew approximately 8 cm SCL over our five-month sampling period (May-September). Transmittered juveniles exhibited two general movement strategies which we characterized as periods of directed travel and apparent surface drift. One juvenile made directed movements toward coastal waters and its transmissions ended within known neritic ridley habitat in western Florida.

Movements of an Adult Male Kemp's Ridley Sea Turtle (Lepidochelys kempii) Following Stranding and Rehabilitation on the Texas Coast

Wednesday, 19th November 9.00 - OS-3.03 - Oral

***Christi Hughes* (South Carolina Aquarium), Andre Landry (Texas A&M University at Galveston)**

BACKGROUND

The ongoing recovery of the critically endangered Kemp's ridley sea turtle (Lepidochelys kempii) is being measured in terms of reproductive success, yet insufficient quantitative data exist in regard to reproductive behaviors and associated environmental requirements of a crucial contributor: adult males. Identification of spatially- and temporally-defined areas frequented by adult male ridleys for breeding, migrating, and/or foraging purposes is necessary to accomplish a Priority 1 Recovery Task in the Kemp's Ridley Recovery Plan mandating protection and management of important marine habitats.

METHODS

A rehabilitated adult male Kemp's ridley (SCLmax: 66.3 cm; herein YYN955) was outfitted with a platform terminal transmitter and released 23 July 2009 on Mustang Island, Texas. A multi-step filtering algorithm was utilized to refine geographic location data derived from CLS America's Argos Service prior to importation into Esri's ArcGIS 9.3 for spatial analyses. Home Range Tools for ArcGIS was employed to generate migratory routes to, and kernel density estimates (KDE) for, each foraging ground with ≥34 daily locations.

RESULTS

Geolocation data broadcast for 1468 d indicated YYN955 utilized neritic western Gulf of Mexico waters extending from Mustang Island, Texas, northeast to offshore waters due south of Atchafalaya Bay, Louisiana. Eight distinct migrations, ranging in duration from 6-113 d, were made by YYN955 in transitioning to or among foraging sites. Migratory routes were situated a mean distance of 46.2 km from shore (SD ± 39.1) in waters averaging 22.6 m deep (SD ± 13.8) and 23.3ºC SST (SD ± 5.7). Mean speed of movement was 0.5 km h-1 (SD ± 0.5). YYN955's mean residency interval on six discrete foraging grounds was 79.7 d (SD ± 63.3). Feeding sites were situated a mean distance of 71.3 km from shore (SD ± 28.7) in waters averaging 31.0 m deep (SD ± 12.6) and 24.5°C SST (SD ± 4.3). Mean speed of movement was 0.4 km h-1 (SD ± 0.4). Mean core activity area (50% KDE; n=5) was 992.7 km2 (SD ± 536.3), while utilization distributions (90% KDE) averaged 3318.1 km2 (SD ± 1912.1). Seasonal transitions occurred on two sets of adjacent feeding sites; waters closer to shore were utilized during warmer months while offshore areas were inhabited during cooler periods.

CONCLUSIONS

Data derived from YYN955's movements over 1468 d help elucidate the poorly understood ecological niche of adult male Kemp's ridleys. YYN955 extensively utilized two adjacent foraging areas offshore Louisiana concurrent with those frequented by post-nesting female conspecifics from Mexico and Texas; such long-term fidelity may indicate asynchronous and opportunistic breeding occurred on foraging grounds. Recurrent latitudinal transitions between these sites occurred biannually in March and October; an offshore migration during October was also documented between two adjacent feeding grounds in Texas waters. These represent the first seasonal migrations documented for an adult male Kemp's ridley. Two prolonged residency periods near recently established upper Texas coast rookeries during March–July were potentially indicative of archetypal breeding activity. Analyses of YYN955's long-term movements may contribute to development and implementation of inclusive conservation strategies for the Kemp's ridley sea turtle.

Trends in Kemp's Ridley (Lepidochelys kempii) Abundance, Distribution, and Size Composition in Nearshore Waters of the Northwestern Gulf of Mexico

Wednesday, 19th November 9.00 - OS-3.04 - Oral

***Tasha Metz** (Texas A&M University at Galveston)*

Background:
Long-term monitoring of in-water life history stages is essential for the management of the critically endangered Kemp's ridley sea turtle (Lepidochelys kempii) because it generates information on this species' at-sea abundance, size composition, distribution, and habitat requirements. These data are necessary for evaluating population status and detecting changes in abundance and structure that can impact future population growth and reproductive success. In order to address in-water data voids, trends in Kemp's ridley size, abundance and distribution were documented via entanglement netting surveys at nearshore and inshore locations adjacent to tidal passes in the northwestern Gulf of Mexico during intermittent sampling periods from 1993-2013.

Methods:
Sea turtle capture was accomplished during daytime sets of 2-6 entanglement nets (91.4-m long, 2.7 or 3.7 m deep with 17.7-cm bar-mesh of #9 twisted nylon) deployed during April-October of varying years at multiple locations along the Texas and Louisiana coast. All turtles were measured for straight carapace length (SCL, cm), and relative abundance of ridleys (expressed as catch-per-unit-effort or CPUE) was calculated as number of turtles per km-hour of netting effort.

Results:
A total of 667 Kemp's ridley sea turtles was captured at sampling locations in the northwestern Gulf of Mexico during 1993-2013. Straight carapace length (cm) of Kemp's ridleys captured across all study locations and all years ranged from 19.5 to 66.3 cm, with a mean of 35.0 cm SCL. A significant decline in ridley CPUE was observed at Sabine Pass from 1993-2002, but with peaks in 1994 and 1997. Catch rates at Calcasieu Pass remained relatively stable over the same time period, with the exception of a large peak in CPUE in 1999. Although a significant increasing trend in Kemp's ridley CPUE was observed at Lavaca-Matagorda Bay since 1996, the peak CPUE value seen in 2013 was similar to or slightly lower than the peak CPUE values observed at Sabine and Calcasieu during the 1990s. There was no statistically significant relationship between Kemp's ridley annual mean CPUE and number of hatchlings released from Rancho Nuevo, Mexico during 1991-2000 (plotted with a 2-yr lag to account for the pelagic stage and estimated age of most turtles encountered).

Conclusions:
Dominance of juvenile life history stages in nearshore waters in the NW Gulf suggests this region is an important developmental foraging ground for the Kemp's ridley. Characterization of Kemp's ridley long-term relative abundance reveals a relatively stable trend in CPUE across all study areas combined. Based on the increasing trend in number of hatchlings released from Rancho Nuevo since the early 1990s, the lack of a corresponding increase in juvenile abundance at nearshore sampling locations is puzzling. This result may be an artifact of the sampling design, but could also indicate shifts in ridley recruitment away from this region or possibly elevated pelagic/post-pelagic mortality rates in the NW Gulf. While conservation efforts have contributed to this population's overall growth since the 1980s, recent declines in the rate of increase are a concern and call for a more comprehensive approach to managing Kemp's ridley recovery efforts.

Kemp's Ridley Abundance Monitoring in Pelagic and Neritic Habitats in the Eastern Gulf Of Mexico

Wednesday, 19th November 9.00 - OS-3.05 - Oral

***Ryan Welsh** (Inwater Research Group), Michael Bresette (Inwater Research Group), Jonathan Gorham (Inwater Research Group), Cody Mott (Inwater Research Group), Jeff Guertin (Inwater Research Group)*

Background:
Since 2012, Inwater Research Group has conducted surveys and capture efforts to assess abundance of Kemp's ridley sea turtles in two distinct habitats in the Gulf of Mexico (GOM): sargassum mats in the pelagic zone off of Venice, Louisiana, and shallow seagrass flats in the Big Bend region of Florida. Both of these sites serve as important developmental habitat for different life stages of Kemp's ridley sea turtles.

Methods:
Quantitative data on sea turtle abundance were gathered using the HUNT (Haphazard Unmarked Nonlinear Transect) method. This vessel based method uses experienced observers on an elevated tower to record sea turtle observations. During transect searches vessel speed was kept between 8-10 km/hr. We used GPS start and end waypoints to delineate transect lengths and record sea turtle observations. All recorded sea turtle sightings included identification of species, life stage, distance from transect line, and behavioral observations. This method produces sightings per unit effort for sea turtle abundance expressed as observations per kilometer of transect. In addition to visual surveys, captures of Kemp's ridleys were conducted using the dip net or rodeo methods. All captured turtles were flipper and/or PIT tagged, measured, weighed, and photographed before being released.

Results:
Since 2012, 191 kilometers of transects have been performed in the pelagic zone off Venice, Louisiana and at least 231 kilometers of transects have been performed in the Big Bend sites. In both sites Kemp's ridleys were the second most commonly observed species, 22.9% and 26.5% respectively. Abundance estimates and size class distributions for each site will be presented.

Conclusions:
Kemp's ridley turtles observed during this study ranged from neonate stage juveniles in the pelagic GOM to juvenile and sub-adult stage turtles found in neritic habitat in the Big Bend region of the GOM. Any meaningful assessment of population trends for the Kemp's ridley in the GOM should include monitoring of in-water populations in developmental habitats. The methods employed during this study are capable of generating considerable quantitative data with a reasonable level of effort. This study could serve as a model for a comprehensive, long term index monitoring program with the inclusion of additional sites and a commitment to long term monitoring.

Insights on Kemp's Ridleys in Florida from Stranding Data

Wednesday, 19th November 9.00 - OS-3.06 - Oral

***Morgan Young** (Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute), Allen Foley (Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute), Karrie Minch (Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute), Sue Schaf (Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute), Rhonda Bailey (Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute), David Jones (Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute)*

Background

The Sea Turtle Stranding and Salvage Network (STSSN) documents dead, sick or injured (i.e. stranded) sea turtles in 18 states along the U.S. coasts of the Atlantic Ocean and the Gulf of Mexico. In Florida, the STSSN is coordinated by the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute. Data collected from stranded turtles include date, location, species, morphometrics, and anomalies. These data are used to document mortality, identify mortality factors, and detect unusual mortality events.

Methods

Data from the STSSN database were used to determine the spatial and temporal trends of mortality and potential mortality factors for Kemp's ridleys in Florida over the past 34 years. Records used in analyses did not include those of posthatchlings (< 10 cm straight carapace length), incidentally captured individuals, or turtles found during cold-stunning events.

Results

During 1980–2013, 2563 stranded Kemp's ridleys were documented in Florida. There has been a general increase in the annual numbers of stranded Kemp's ridleys, with 2013 having the most recorded over the period (N = 223). About 75% of stranded Kemp's ridleys in Florida were found along the Gulf coast and almost all of those found along the Atlantic coast of Florida were found in the northeast (north of Brevard County). Numbers of stranded Kemp's ridleys peaked in the 30–40 cm size class (immature individuals). Adult females were regularly found (N > 150) but only three adult males were documented. Stranding data indicated that summer-winter movements of Kemp's ridleys in the Gulf were inshore to offshore, whereas in the Atlantic, they were north to south. Among the identified mortality factors, vessel-strike injuries and brevetoxicosis (the latter from exposure to red tides) were found to account for the greatest numbers of stranded Kemp's ridleys (30–40%). Shark bites, entanglement in fishing line, and disease could have accounted for another 10–15% of the mortality. A mortality factor could not be associated with about half of the stranded Kemp's ridleys. More Kemp's ridleys were documented as hook and line captures by recreational fishermen in Florida (N = 136) than any other sea turtle species.

Conclusions

Because the increase in stranded Kemp's ridleys has occurred throughout Florida and because the relative magnitude of identified mortality factors has not increased noticeably, we believe the recent increase in strandings is largely attributable to increasing numbers of Kemp's ridleys in Florida. Before 1995, prior to the Florida Net Ban and widespread TED requirements, numbers of stranded Kemp's ridleys along the Gulf coast of Florida were correlated with commercial shrimping effort. Some recent mortality is also likely due to commercial fishing, but more detailed study of stranded Kemp's ridleys is needed to determine this, especially among those with no other indication of a potential mortality factor. The interactions between recreational fishermen and Kemp's ridleys are likely well under-represented in our database and could play a significant role in overall mortality.

Kemp's Ridley Stranding Summary, 1980-2014

Wednesday, 19th November 9.00 - OS-3.07 - Oral

***Wendy G. Teas* (NOAA Southeast Fisheries Science Center), Lisa C. Belskis (NOAA Southeast Fisheries Science Center), Paul M. Richards (NOAA Southeast Fisheries Science Center)**

Background:
The Sea Turtle Stranding and Salvage Network (STSSN) was established in 1980 to document strandings of marine turtles along the U.S. Atlantic and Gulf coasts. Stranding survey effort has varied temporally and spatially, ranging from systematic surveys in some areas to only opportunistic reporting in other areas.

Methods:
STSSN participants complete a standardized stranding report form for each animal documented. Data collection fields include date, species, location, measurements, and notation of any observed anomalies. Stranding reports were first submitted to a state coordinator in the state where the stranding was found. Data were then sent to the national database maintained at the NOAA Southeast Fisheries Science Center. Regional and zone level strandings were examined for patterns and trends.

Results:
Kemp's ridley strandings have shown a generally increasing trend over the entire historical time series of data collected by the STSSN, from a low of 49 reported in 1980 to more than 1170 reported in 2013. Recent years have had much higher stranding levels, especially in the Gulf of Mexico and the Atlantic Ocean off the southeastern U.S. Elevated strandings in specific zones and times of year appear to account for much of the observed overall increase in these areas.

Conclusions:
Areas and times of elevated Kemp's ridley strandings, or "hotspots" are identified and possible causal factors are considered.

Loggerhead Marinelife Center's Responsible Pier Initiative

Wednesday, 19th November 9.00 - OS-3.08 - Oral

***Demi Fox* (Loggerhead Marinelife Center)**

Background

Each year, more than 250,000 sea turtles are accidentally captured, injured, or killed by U.S. fishermen, many while migrating through fishing areas. To mitigate these effects and better conserve sea turtles, Loggerhead Marinelife Center, a non-profit organization in Juno Beach, Florida, implemented the Responsible Pier Initiative (RPI) as a pilot program at the Juno Beach Fishing Pier in 2011. The RPI has since expanded to 13 piers in Florida and six piers in Virginia.

Methods

The Initiative is designed to provide fishermen with the appropriate action steps to follow in the event a sea turtle is accidentally hooked or entangled on or around a fishing pier. The RPI consists of the following three key components:

(1) "First-responder" educational signage displayed on fishing piers

(2) Educational workshops conducted for fishing piers' first-responders and management

(3) Underwater cleaning of the pier and surrounding areas on a regular basis (when possible)

Results

Since its establishment, the RPI has facilitated the successful rescue of multiple sea turtles and the removal of thousands of pounds of debris from areas surrounding the recognized piers.

Conclusions

With the critical need for conservation measures for Kemp's ridley sea turtles, Loggerhead Marinelife Center believes that implementation of the RPI on Texas and surrounding Gulf of Mexico piers would be a great benefit for the region and sea turtle conservation.

Incidental Captures of Kemp's Ridleys on the Upper Texas Coast

Wednesday, 19th November 9.00 - OS-3.09 - Oral

***Lyndsey Howell** (NOAA Southeast Fisheries Science Center Galveston Laboratory)*

Background

The continued population recovery of Kemp's ridley sea turtles Lepidochelys kempii requires the evaluation of marine fishery related interactions thus ensuring that each fishery is properly managed to reduce these potential interactions. Historical reports have demonstrated recreational hook and line captures with Kemp's ridleys on the upper Texas coast (UTC), with 62 individuals documented from 1980-1992. The UTC has recently been identified as a primary foraging ground for this species thereby necessitating that the recreational fisheries be accurately evaluated for sea turtle bycatch.

Methods

Data were obtained from NOAA Fisheries SEFSC Galveston Laboratory databases, which consisted of reports from the public, government agency employees, university affiliates and veterinarians. In this study the UTC was defined as the coastal area from the mouth of the Brazos River East to the Texas state border; shrimp statistical zones 17 (partial), 18 (whole), and 19 (partial.) Interactions were characterized by size of the turtle, capture location, hook type and hooking location.

Results

Along the UTC from 2003-2014, 149 recreational hook and line capture reports were documented with the NOAA Fisheries Galveston Laboratory. Capture locations for these reported individuals included pier (58.3 %), shoreline (36.2 %), jetty/dike (2.6 %) and vessel (1.3 %). Pier captures occurred most frequently (66.6%) at the Galveston Island fishing pier on 91st street and Seawall Blvd. The size range of turtles caught was 24.7 – 55.1 cm straight carapace length (SCL) with a mean size of 35.5 cm SCL. More than 52% of captures were with a "j" hook; additional principal hook types included circle and treble. Overall, primary hook set locations included the mouth (43.0 %), esophagus (39.0 %), flipper (13.0%) and neck (4.0 %). Circle hooks that were swallowed required surgical removal more frequently than other hook styles therefore resulting in longer rehabilitation time. A total of 15 individuals were captured more than once throughout the time frame.

Conclusion

An ongoing interaction with juvenile Kemp's ridleys and the recreational fisheries on the UTC was illuminated in this analysis. The high number of pier capture reports may reflect the predilection for turtles to gather at these structures scattered with discarded bait; cut fish was the most frequently consumed (58.1%) bait by these incidentally caught turtles. Educational outreach material on sea turtles available at the piers likely supports public reports. It is critical to evaluate the common hook style utilized by the UTC recreational fishery in contrast to the frequently observed hook type in this study to effectively assess the fishery. Accordingly a hook style could be standardized and enforced in the fishery to minimize sea turtle interactions.

The Role of Non-Government Organizations in the Protection and Conservation of the Kemp's Ridley Sea Turtle

Wednesday, 19th November 12.00 - LS-2.01 - Oral

***Francisco Illescas* (CDEN)**

Background

Conservación y Desarrollo de Espacios Naturales (CDEN), is an NGO created on October 19, 2011. A cooperative agreement with the Gladys Porter Zoo (GPZ) signed on October 5, 2012, has facilitated the logistics for the implementation of all conservation, education and research activities related to the Kemp's Ridley Sea Turtle Binational Project in Tamaulipas, Mexico. Benefiting from this agreement are government agencies including Fish and Wildlife Service, National Marine Fisheries Service, National Park Service and the Texas Parks and Wildlife Department; NGOs such as LGL Ecological Research Associates; and Universities like the University of Alabama at Birmingham.

Methods

Through the agreement with GPZ and with resources obtained from various agencies and organizations, CDEN acts as the on-site managing institution for the US Contingent of the Kemp's Ridley Project travelling year-round to and from Brownsville, Texas and the six sea turtle conservations camps in Tamaulipas (La Pesca, Tepehuajes, Rancho Nuevo, Playa Dos, Playa Tesoro, and Playa Miramar), providing these camps with personnel, supplies, ATVs, fuel, materials, equipment, tools, and other resources that may be needed to carry out conservation activities, research projects, and education programs. CDEN coordinates and supervises up to 30 GPZ field technicians and vehicle-wise, takes care of the management and maintenance of 12 ATVs, 2 MUVs, 3 pick-up trucks, 1 Jeep and two trailers.

All activities are performed with authorization and permits (Permit Numbers SGPA/DGVS 01707 and 01708), granted by Mexico's lead environmental government agency, the Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT).

Results

In 2014, over 10,000 Kemp's ridley nests were protected, and close to 575,000 hatchlings released into the Gulf of Mexico. The Tamaulipas Sea Turtle Stranding Network activities started in 2001 continued throughout 2014.

From April to August, field technicians checked for tags and recorded morphometric data on 915 nesting females. A little over 90% of these turtles didn't present tags or tagging scars and were tagged with both Inconel and PIT tags. The Inconel tag series used was GPZ14.

Dr. Thane Wibbels' sex ratio study that started in 1998 in Rancho Nuevo continued in 2014. 49 temperature data loggers were placed in corral nests and 9 in in situ nests. 9 data loggers were used to evaluate temperatures in the main corral and 3 data loggers per corral in both the north and south corral. A total of 17 beach transects were examined using 34 data loggers from Barra del Tordo to Barra Carrizo. Additionally, 65 data loggers were used to monitor beach temperatures at the other five camps.
Dr. Wibbels' Rancho Nuevo predator study also continued in 2014. Night vision cameras were set up at seven locations, 3 to the south and four to the north.

In conjunction with the National Park Service, 10 females were outfitted with satellite transmitters after nesting. As of October 1st, 4 of these turtles continue transmitting.

Conclusion

Over 90% of the Kemp's ridley population nests in Tamaulipas. In order to recover this endangered species, cooperation between NGOs and government agencies from both countries is crucial.

Herrera Family Presentation

Wednesday, 19th November 12.00 - LS-2.02 - Oral

***Thane Wibbels** (University of Alabama at Birmingham), Luis Jaime Pena (Gladys Porter Zoo)*

As part of the IUCN (International Union for Conservation of Nature) Red List Assessment (RLA) for the Kemp's ridley sea turtle, the Andres Herrera family was contacted to inquire about information regarding the 1947 Herrera film. The Herrera family graciously hosted a visit by the RLA team and the Gladys Porter Zoo team in Tampico, Mexico, and provided us with a significant amount of background information which is imperative to gaining a full understanding of the Herrera film and the events associated with the film. The sea turtle community is truly indebted to Andres Herrera and the Herrera family for their significant contribution to the history and conservation of the Kemp's ridley.

Comparing Fishery-independent Catch Rates and Temporal Trends for Kemp's Ridley Sea Turtles in Two Long-term Bottom Trawl Surveys of the Southeast United States

Wednesday, 19th November 13.20 - OS-4.01 - Oral

***Jeffrey Schwenter* (South Carolina Department of Natural Resources, Marine Resources Division), Michael Arendt (South Carolina Department of Natural Resources, Marine Resources Division), R. Pearse Webster (South Carolina Department of Natural Resources, Marine Resources Division), Lindsey Parker (University of Georgia, Marine Extension Service), David Owens (College of Charleston, Grice Marine Lab)**

Background

Fishery-independent monitoring of the endangered Kemp's ridley sea turtle has necessarily lagged management efforts for species recovery. Moreover, stranding data and non-random or fishery-dependent captures have to-date been vital in assessing recovery of juvenile life stages, given logistical and economic constraints associated with fishery-independent data collection. However, along the U.S. Eastern Seaboard, two long-term fishery-independent data sets do exist for monitoring catch rate and demographic trends for this and other sea turtle species.

Methods

The South Carolina Department of Natural Resources manages two bottom trawl surveys, funded by the National Marine Fisheries Service, that provide catch rate and demographic data for sea turtles captured along the southeast Atlantic coast of the United States. Kemp's ridley captures in a randomized survey of sea turtle abundance (2000-2003, 2008-2009, 2011-2013; Winyah Bay, South Carolina to St. Augustine, Florida) were compared with captures in the Southeastern Area Monitoring and Assessment Program-South Atlantic (SEAMAP-SA) Coastal Survey, an annual (1989-2013) survey of inner continental shelf waters between Cape Hatteras, North Carolina and Cape Canaveral, Florida. Kemp's ridley catch per trawling event for each survey was fit to separate generalized linear models (GLM) to examine temporal and spatial catch trends. Additionally, straight carapace length (SCLmin) measurements and radioimmunoassay (RIA) determination of sex ratios (excludes SEAMAP survey) were used to assess temporal changes in Kemp's ridley demographics.

Results

Research trawls captured 329 Kemp's ridley and positive catches comprised 2.5% (n = 290) of all trawls. Positive catches overwhelmingly consisted of a single turtle (89% of positive events) and were heavily skewed toward recent sampling years (58% of captures occurred during 2010-2013). Annual mean (± 95%CI) model-adjusted catch rates (Kemp's ridley per linear kilometer) were significantly different by year for both surveys ($P \leq 0.015$) and were greater in the turtle (0.012 ± 0.001 to 0.122 ± 0.015) than the SEAMAP-SA (0.003 ± 0.0002 to 0.071 ± 0.004) survey. Catch rates for both surveys were greatest (and most similar) between Savannah, Georgia and St. Augustine, Florida and decreased along a northerly gradient through North Carolina. Individuals ranged in size from 22.4 cm to 70.7 cm SCLmin (mean = 42.1 cm) and were predominantly juveniles (97% < 60 cm SCLmin). Turtles occupying size classes between 30.1 cm and 50.0 cm SCLmin represented 77% of captures; however, a shift toward capture of smaller individuals was evident in some years, primarily since 2008. Where sex could be assigned based on RIA, individuals were predominantly (71%) female. Significant female:male bias (2:1 to 7:1) was also maintained with increased catch in later sampling years.

Conclusions

Nesting Kemp's ridley are inherently linked to the Gulf of Mexico. However, increased catch rates, with a concurrent change in proportion of smaller juveniles, in two trawl surveys suggest the species' tenuous recovery is mirrored in waters of the southeast Atlantic. Nonetheless, catch rates remain low and catch rate increases lagged the onset of Gulf of Mexico nesting increases. We therefore suggest continued monitoring of fishery-independent catch rates remains critical to aid in understanding current population dynamics.

Fishery Improvement Projects: Minimizing Fishery Impacts with the Help of the Seafood Supply Chain

Wednesday, 19th November 13.20 - OS-4.02 - Oral

***Megan Westmeyer* (Sustainable Fisheries Partnership)**

Background:
Since 2006 Sustainable Fisheries Partnership (SFP) has been working with the seafood supply chain to implement fishery improvement projects (FIPs), a pragmatic, stepwise approach to enhancing the sustainability of a fishery, encouraging harvesting to continue while improvements are achieved. FIPs differ from traditional sustainable seafood initiatives by not advising buyers to avoid purchasing products with sustainability issues, but instead advising them to encourage their suppliers to develop and implement solutions to those sustainability issues.

Methods:
There are two key components that differentiate a FIP from other types of conservation campaigns and fishing industry activities. First, a FIP must have explicit participation of the fishing industry or supply chain. Second, a FIP must have public reporting describing the planned and completed fishery improvement activities. These two aspects ensure that the project is industry driven but also transparent, helping buyers to make informed purchasing decisions. Some FIP activities are designed to address problems with the target stock, while others are designed to reduce impacts on the ecosystem, such as interactions with protected and endangered species such as sea turtles. Three SFP-led FIPs in the Gulf of Mexico have specifically targeted reductions in impacts of the shrimp fishery on sea turtles, including the endangered Kemp's ridley turtle (Lepidochelys kempii).

Results:
These three shrimp FIPs, located in Texas, Louisiana, and Florida, have each evolved in different ways due to the participation of different seafood supply chains, but all are beginning to demonstrate success. In both Texas and Florida, shrimp buyers have begun to encourage their suppliers to conduct proactive gear evaluations to ensure their turtle excluder devices are properly installed and operating at peak performance. Initial evaluations in both locations have revealed a small number of severe TED violations, a large number of minor violations, and an even greater number of minor improvements that could be made to enhance shrimp retention. These TED violations are believed to be unintentional, merely reflecting a lack of understanding of proper TED installation methods. In Louisiana, the seafood supply chain has motivated the state government to develop and implement fishery management plan, and is also working to gather support for a repeal of the state law prohibiting the enforcement of federal TED regulations by state law enforcement agents.

Conclusions:
By working with the seafood supply chain, these FIPs have been able to implement both change in policy and change in fishing behavior, both of which will eventually lead to changes in the water. These FIPs clearly demonstrate that the seafood industry itself is the most powerful force for improvement in fisheries, and can act as models for improvement efforts in other locations.

An Update on the Diet of Kemp's Ridley Sea Turtles in Virginia, USA

Wednesday, 19th November 13.20 - OS-4.03 - Oral

Erin E. Seney (Erin Seney Consulting, LLC), Lacheryl A. Ball (Virginia-Maryland Regional College of Veterinary Medicine), Shannon J. Davis (Contractor with the Virginia Aquarium and Marine Science Center Foundation), Susan G. Barco (Virginia Aquarium and Marine Science Center Foundation)

Background

The Chesapeake Bay and Atlantic Ocean waters of Virginia, USA are important, seasonal developmental and migratory areas for the Kemp's ridley sea turtle (Lepidochelys kempii). The species historically comprised about 10% of Virginia's annual sea turtle strandings, but that proportion has recently risen to approximately 20-30%. Kemp's ridleys, primarily immature individuals, are most often encountered in Virginia between May and October. Within Virginia, the species has shown a preference for foraging in relatively shallow habitats and on blue crabs (Callinectes sapidus) and other decapod crustaceans.

Methods

Whole and partial gastrointestinal (GI) tract samples were collected from dead stranded Kemp's ridleys by the Virginia Aquarium and partners during 2010-2013. These gut samples were subsequently sieved, sorted, and identified to the lowest possible taxonomic level, with estimated prey counts and dry weights recorded for whole samples. Percent occurrence (%F) was calculated for food items in all samples, whereas percent number (%N), dry weight (%W), and index of relative importance (%IRI) were calculated for whole samples.

Results

Four-two whole and 39 partial GI samples were examined, comprising 45% of ridleys stranding in Virginia during 2010-2013. About two-thirds of the samples originated from Chesapeake Bay-facing stranding locations, with the rest collected along Virginia's Atlantic coast. Sampled turtles averaged 38.3 cm straight carapace length (19.0-64.9 cm, SD=9.9 cm). Eighty-five percent of samples contained decapod crustaceans, with 77% of sampled turtles having consumed blue crabs and/or congeners (Callinectes spp.). Additionally, 28%, 25%, 23%, and 7%, of samples contained mud snails (Nassarius and Ilyanassa spp.), horseshoe crabs (Limulus polyphemus), bony fishes, and insects, respectively. Eight samples (10%) contained anthropogenic items including plastic wrappers, glass, and twine. Among whole samples, Callinectes spp. constituted the highest %N (19%), %W (29%), and %IRI (50%). The next five highest %IRI values were for mud snails (20%), spider crabs (Libinia spp., 14%), bony fishes (5%), hermit crabs (Pagurus spp., 4%), and horseshoe crabs (3%). The high mud snail %IRI value was driven by the %F and %N values for these small, presumably incidentally consumed, scavengers. Horseshoe crabs and fishes were typically found as partial animals, resulting in low %W and %IRI values.

Conclusions

The primary components of 2010-2013 Kemp's ridley diet were similar to 2000-2002 and historical (1983-1994) Virginia diet (Seney and Musick 2005), with two notable exceptions: insects were recorded for the first time in 2010-2013, whereas horseshoe crab was consumed more frequently compared to previous years. Fish, which was not recorded in Virginia ridley diet until 2000, remains an important diet component. Increased consumption of horseshoe crab may be indicative of that species' increasing populations, whereas continued fish consumption is of concern, given its probable connection to feeding in nets or on discarded catch or bait. Continued consumption of mud snails may indicate that ridleys are feeding dead animals, including both fishes and crustaceans. These trends will be examined further, as data are collected from additional archived samples. Diet data should continue to be utilized to complement stranding examinations and to inform conservation decisions for this protected, conservation-dependent species.

A Review of Kemp's Ridley Turtle Rehabilitation at New England Aquarium: 964 Cases, 1994-2013

Wednesday, 19th November 13.20 - OS-4.04 -

***Charles Innis** (New England Aquarium)*

The northwestern Atlantic has been recognized as important seasonal habitat for juveniles of several sea turtle species, including Kemp's ridley turtle. Turtles that fail to leave these northern waters in autumn are susceptible to cold-stunning as environmental temperatures rapidly drop.

Annual stranding events due to cold-stunning have been reported in the northeastern United States for many years. In Massachusetts, volunteers and staff of the Massachusetts Audubon Society Wellfeet Bay Sanctuary patrol beaches to recover cold stunned turtles, which are then transported to the New England Aquarium (NEA) for medical care and rehabilitation. Between 1994 and 2013, 964 live cold-stunned Kemp's ridley turtles were hospitalized at NEA, and 697 were successfully rehabilitated and released to the wild. Excluding turtles that died within the first three days of hospitalization, the annual release rate was 85-90%. Cold-stunned Kemp's ridley turtles in Massachusetts are typically in the range of 25 cm SCL, and 2.5 kg weight. They are thought to be less than five years of age based on known-aged, coded-wire-tagged individuals recovered during stranding events. Cold-stunned turtles in northern zones are often more severely affected than transiently cold-stunned turtles in more temperate zones. As such, they are often affected by significant secondary conditions (e.g. severe metabolic and cardiorespiratory disorders, pneumonia, sepsis, osteomyelitis) that require intensive management and months of rehabilitation.

In the past ten years, NEA has produced 13 peer-reviewed publications on the veterinary management of cold-stunned Kemp's ridley turtles, including descriptions of serial metabolic and respiratory status, hematology, plasma biochemistry, toxicology, pharmacology, radiography, scintigraphy, bacteriology, endocrinology, renal function, therapeutics, PIT tagging complications, and mortality prediction indices. Ongoing investigations include endocrine responses to stranding, rehabilitation and transport; molecular characterization of bacterial pathogens; histopathologic evaluation of renal disorders; and characterization of pathogenic fungi.

While the allocation of substantial resources to rehabilitation is sometimes considered less appropriate than other conservation measures, it is likely that the return of nearly 700 juvenile turtles to a depleted population represents a meaningful contribution to the recovery of wild stocks. These juveniles have survived the egg, hatchling, and pelagic stages, and may have a reasonable chance of surviving to reproductive age. In addition, the cumulative veterinary knowledge that has been gained from managing this caseload provides a substantial contribution to wildlife medicine and our general understanding of sea turtle clinical care. The annual stranding and release events provide numerous opportunities to educate the public about Kemp's ridley turtles and their conservation status.

Long-term follow up for released turtles is challenging, as it may take a decade or more before released female turtles might once again be encountered on nesting beaches, and released males may never be seen again at all. Nonetheless, limited satellite telemetry data for twelve released individuals has shown months of apparently robust movement in the western Atlantic. One turtle that stranded in Massachusetts in 1999 and rehabilitated at several facilities for nearly five years prior to release was confirmed nesting twice on South Padre Island, Texas ten years after stranding.

Conservation Genetics of the Kemp's Ridley (Lepidochelys kempii)

Wednesday, 19th November 13.20 - OS-4.05 - Oral

Xochitl de La Rosa (Texas A&M University), Luis Hurtado (Texas A&M University)

Background

Very little is known about the genetics of the Kemp's Ridley sea turtle (Lepidochelys kempii), which is important for the conservation of this species. Herein, we report our advances on the implementation of molecular techniques to evaluate different genetic aspects of the Kemp's ridley population, such as genetic diversity, genetic structure, effective population size, and signatures of bottlenecks, in individuals collected in Tamaulipas, Mexico, where >90% of nesting of this species occurs.

Methods

We collected tissue samples of adult females and hatchlings in Tamaulipas, Mexico, in the summer of 2014. For some adult females, we collected 4 ml of blood in vials with heparin, which were preserved at 4°C. For other adult females, we collected skin tissue from hind flippers through a biopsy punch, and tissue was preserved in a solution of 90% ethanol. For dead hatchlings, ~10 g of hind flippers were collected, which were preserved in a solution of 90% ethanol. For DNA extraction, blood tissue was separated in phases and DNA was extracted from leucocytes. For skin tissue, 25 mg of tissue were used for DNA extraction. The GenElute Genomic DNA kit (Sigma, USA) was used for all DNA extractions. We will genotype ten microsatellites and use the Double Digest Restriction Associated DNA (ddRAD-seq) method to obtain information on genetic diversity, genetic structure, effective population size, and signatures of bottlenecks. For the ddRAD-seq method, samples will be sequenced pair-end, in one lane of an Illumina GAIIX sequencer, at the Texas A&M Agrilife Genomics & Bioinformatics Services.

Results

We have collected a total of 87 blood samples and 3 hind flipper samples. From hatchlings, however, we will continue collecting tissues until the eclosion season finishes. Currently, we are working in the optimization of molecular methods.

Conclusions

We are establishing all procedures for sampling, DNA extraction, genotyping, and ddRAD-seq for the Kemp's ridley sea turtle.

An Update on Kemp's Ridley Nesting and Genetic Diversity in Tecolutla, Mexico

Wednesday, 19th November 13.20 - OS-4.06 - Oral

***Mark A. Roberts** (University of South Carolina), Fernando Manzano (Vida Milenaria, A.C.), Irma Galván (Vida Milenaria, A.C.), Andrew T. Coleman (Institute for Marine Mammal Studies), Lazaro Hererra (Vida Milenaria, A.C.), Laura Kiehner (Tecolutla Turtle Preservation Project), Emma J. de Neef (University of South Carolina), Katrina C. Hounchell (University of South Carolina)*

Background:

Promising upward trends in Kemp's ridley nesting at both Rancho Nuevo, Tamaulipas, Mexico and Padre Island, Texas, United States over most of the last two decades have been viewed as evidence of recovery as well as hope for eventual downlisting of the species to threatened status. Unfortunately, the reality of recovery is much more complex, and not nearly as certain, as it might seem. Over the last two years nesting numbers have decreased, in some cases drastically, for both Rancho Nuevo and Padre Island. In addition, the vast majority of international recovery efforts have focused primarily on these two beaches. Historic population bottlenecks at both beaches have been severe. As such, both populations are likely genetically depauperate, and offer the hope of only relatively limited genetic diversity.

However, there is some limited historical evidence suggesting that the Kemp's ridley's nesting range was more widespread at one time, potentially having significant nesting numbers in the southern Gulf of Mexico. Currently, the largest nesting area outside of the Rancho Nuevo area beaches is found in the southern Gulf of Mexico in Tecolutla, Veracruz, Mexico. Here we present updated Tecolulta nesting data and preliminary analyses of genetic diversity.

Methods:

Since 1974, sea turtle nesting at Tecolutla has been monitored by a small group of volunteers. During the nesting season, a 34km stretch of beach surrounding Rio Tecolutla is monitored for nesting activity. Because of high levels of poaching and predation, nests are immediately relocated to several small hatcheries along the beach. This past summer, a tagging program was initiated and basic morphometric data were collected. In addition, genetic tissue samples were obtained from 13 individuals. An 800bp fragment of the mtDNA control region was amplified from each to assess genetic diversity.

Results:

Numbers of nesting females at Tecolutla was considerably lower this year than in previous years - a total of 690 nests. Successful amplification products were obtained from all individuals.

Conclusions:

Long-term nesting in Tecolutla mirrors the trends found in the northern Gulf, suggesting that both recovery efforts as well as anthropogenic impacts have effects beyond the primary nesting beaches. In addition, southern Gulf of Mexico beaches potentially have reduced connectivity to northern beaches presenting the opportunity for population differentiation (north Gulf vs south Gulf) and unique genetic lineages. We present preliminary genetic data addressing the genetic diversity of the nesting population at Tecolutla and its contribution to the overall biodiversity of the species. These data are presented in the context of understanding population structure and genetic diversity as a crucial component of informed management.

An Assessment of Body Size, Flipper Area, and Crawl Speeds of Lepidochelys kempii Hatchlings

Wednesday, 19th November 13.20 - OS-4.07 - Oral

***Theresa Madrigal** (Sea Turtle Inc.)*

Background:

Temperatures and incubation times have been found to influence both body size and condition of sea turtle hatchlings. Higher temperatures increase mortality and skew sex ratios of nests. Optimal temperatures and incubation times increase the size and viability of these hatchlings. These attributes can influence their likelihood of survival. This study focused on how incubation times and location within a corral affected the body size, flipper area, and crawl speeds of Lepidochelys kempii hatchlings. Hatchlings analyzed were collected from a corral managed by Sea Turtle, Inc. on South Padre Island, TX.

Methods:

A sample of 10 or 20 Lepidochelys kempii hatchlings that were in a frenzied state was taken from 17 nests. These hatchlings were weighed to the nearest 0.1g and measured for SCL and SCW to the nearest 0.01mm. A sample of these hatchlings equivalent to 10% of the emergence success was analyzed for right front and right rear flipper surface area. Flipper areas were traced on 5mm grid paper and analyzed using ImageJ. Additionally these hatchlings were placed in an artificial track made of PVC guttering lined on the bottom with sand. This track was kept on level ground (0° incline). A white light was placed at the end to attract them to the end of the 1m track and crawl speeds were determined in cm/s. Hatchlings were released immediately afterwards.

Results:

In general, nests central within the corral incubated at faster rates. 49-50 days produced the largest hatchlings by weight, SCL, and SCW. Flipper areas for hatchlings incubated for 49-50 days were the largest. Hatchlings that incubated for 53 days had the fastest crawl speeds.

Conclusions:

Assessing Lepidochelys kempii for their size and condition on hatching provides insight into their ability to survive the first few days of their lives. Larger and faster hatchlings are more likely to survive since they will spend less time crawling on the beach and at risk of predation. Correlating these findings to their incubation times would enable further research in corral management to produce more viable hatchlings.

Implication of Tire Ruts on Frenzied Dispersal of Kemp's Ridley (Lepidochelys kempii) Hatchlings

Wednesday, 19th November 13.20 - OS-4.08 - Oral

Hilary Frandsen (Sea Turtle Inc.)

Background:
Heavy vehicular traffic on sandy beaches utilized by sea turtle nesting colonies poses a threat to the success of both nesting activity and later emergence of hatchlings. Off-road traffic increases the risk of collision with nesting females, and leaves tire ruts that impede the progress of hatchlings during their movement towards the ocean. For both adult and hatchling sea turtles, longer periods of exposure on the beach is associated with more energy expenditure and a lower chance for survival. The survival of the Kemp's Ridley (Lepidochelys kempii) is of particular significance given the recent decline in nesting numbers along the northern Mexico and Texas coast.

Methods:
To determine the effect of vehicular traffic on hatchling energetics, this study recorded the time taken for 285 Kemp's Ridley hatchlings recently emerged on South Padre Island to navigate a series of three consecutive artificial tire ruts, tested in two types of sand consistency. The rut depths were consistent within each trial, but were deepened until the depth at which the hatchlings failed to complete the series was quantified. A control track of smoothed, leveled sand was tested at the start of each trial, then experimental shallow ruts ranging 1-8 cm in depth or deep ruts 10+ cm in depth were tested. Hatchlings were tried in groups of three and either upon completion of the rut series, or at a maximum time of ten minutes, were immediately removed from the experiment and taken close to the surf for release.

Results:
Hatchlings took an average of 46.6 seconds longer to complete the 3 m control track in soft versus hard sand, and an average of 61 seconds longer to complete the shallow rut depths in the softer sand. While on average 57% of hatchlings made it out of the first 10 cm rut and 39% out of the first 11 cm rut, 100% of hatchlings were unable to complete the entire series at depths of 10 and 11 cm in soft sand.

Conclusions:
At the time of the experiment, tire ruts surveyed on South Padre Island's beach ranged between 0-19 cm in depth and spanned 0-6 consecutive parallel ruts. Ruts of this depth are present throughout the 51.5 km stretch open to vehicular traffic, posing a major obstacle for naturally emerged hatchlings. Beach vehicular traffic is concentrated during May-August, correlating with both the peak nesting and hatching season for the Kemp's Ridleys. Traffic levels are elevated around mid-day, and are continuous through the night and into the early morning. The Kemp's Ridleys' daytime nesting strategy raises the risk of interaction with this traffic, and emergence of hatchlings between 12-6 AM would still be at risk from vehicles. If conservation programs in the future decide to cease transportation of egg clutches to corrals, it will be important to consider the ability of the hatchlings to overcome the anthropogenically modified beach landscape, and to determine whether the current traffic levels are sustainable for continued Kemp's Ridley management.

The Kemp's Ridley - Past, Present and Future

Wednesday, 19th November 13.20 - OS-4.09 - Oral

***Carole Allen* (Turtle Island Restoration Network)**

Background

The Kemp's ridley sea turtle (Lepidochelys kempii) is unusual in many ways including nesting during the day and joining large numbers of other females as part of an "arribada." In 1947, a video documented a Kemp's ridley arribada near Rancho Nuevo, Mexico when over 40,000 Kemp's ridleys nested during that single day! The video also showed villagers collecting eggs. This video has also served to measure the species' collapse. In the late 1960s, the largest arribada measured was just 5,000 individuals. Between the years of 1978 and 1991, only 200 Kemp's ridleys nested annually. When the United States (US) and Mexico began to work together to save the Kemp's ridley from extinction, no one knew much about the species. As part of the recovery plan, hundreds of them were raised by National Marine Fisheries Service (NMFS) at Galveston, but in the beginning few people knew about the Kemp's ridley.

Methods

In order to keep federal budget money flowing to the sea turtle project, people needed to be educated. Carole Allen, a Houston resident, encouraged her daughter's elementary school to take a field trip to the NMFS sea turtle facility and learn the plight of the Kemp's ridley. The children decided to buy turtle food and formed an organization called HEART (Help Endangered Animals-Ridley Turtles) which spread quickly to other schools. Nickels and dimes not only bought turtle food but supplies for the Mexican nesting beaches and nearby schools.

Results

HEART brought hundreds of people to the Galveston sea turtle facility to see the rare hatchlings . They learned that thousands of Kemp's ridleys were being drowned in shrimp trawls in the Gulf of Mexico. A campaign began to encourage Mexico to protect nesting beaches and to have Turtle Excluder Devices (TEDs) placed on shrimp trawls in U.S. waters. As a result of strong public support, the regulations became law as part of the Endangered Species Act. Today, coastal states implement the TED regulations except for Louisiana whose shrimpers break the law with no TED enforcement in state waters. The Turtle Island Restoration Project has begun a nationwide Red Listing Campaign to convince Louisiana that US consumers will not eat shrimp when sea turtles have drowned in the same trawl.

Conclusions

HEART taught many important lessons. Public awareness and support is necessary if funding is to be found. The Kemp's Ridley Recovery Plan should not be ignored, especially the partnership between the US and Mexico including funding. The plan recommends education and community support which could be increased with expanded nesting areas to allow thousands more people to watch hatchling releases. Current closures in South Texas waters which benefit fish, shrimp and sea turtles should be expanded to the entire Texas coast. Detailed plans are needed for clinics to handle oiled and injured sea turtles when future oil spills occur. Thousands of children across the country who joined HEART in the 80s were promised the Kemp's ridley would not become extinct. Are we keeping our promises?

Impacts of Climate Change on Reproduction in a Thermally-Sensitive Species, Lepidochelys kempii, in the Gulf of Mexico

Wednesday, 19th November 13.20 - OS-4.10 - Oral

***Elizabeth Bevan** (University of Alabama at Birmingham), Thane Wibbels (University of Alabama at Birmingham), Marco Martinez (CONANP), Francisco Illescas (CDEN), Luis Jaime Pena (Gladys Porter Zoo), Patrick Burchfield (Gladys Porter Zoo), Amy Bonka (University of Alabama at Birmingham)*

The Kemp's ridley sea turtle was nearly eliminated from its primary nesting beach at Rancho Nuevo, Tamaulipas, Mexico in the mid 1980's, and was once considered the world's most endangered sea turtle. Due to this critically endangered status, the majority of Kemp's ridley nests have been moved to egg hatcheries for protection for more than three decades as part of the Kemp's Ridley Recovery Program. The Kemp's ridley sea turtle is one of many reptiles that exhibit temperature-dependent sex determination in which the incubation temperature of the egg determines the sex of the embryo. As part of the Recovery Program for this species, we have been generating a long-term database for hatchling sex ratios using nest and beach temperatures gathered to facilitate conservation measures. The results indicate that a significant female bias has been produced from the egg hatcheries used by the Kemp's Ridley Recovery Program, which may have accelerated the recovery of this species. This study also indicates that the natural sex ratio produced from the primary nesting beach for the Kemp's ridley would also be female biased, but to a lesser extent. Additionally, this long-term database provides insight on the species-level impact of climate change on hatchling sex ratios and nesting phenology for this thermally-sensitive species in the Gulf of Mexico.

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