FIRST INTERNATIONAL SYMPOSIUM ON KEMP'S RIDLEY SEA TURTLE BIOLOGY, CONSERVATION AND MANAGEMENT

TEXAS A&M UNIVERSITY AT GALVESTON
MITCHELL CAMPUS, GALVESTON, TEXAS

1-4 OCTOBER 1985

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National Marine Fisheries Service
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Texas A&M University at Galveston

PROGRAM FOR THE

FIRST INTERNATIONAL SYMPOSIUM ON KEMP'S RIDLEY SEA TURTLE BIOLOGY,

CONSERVATION AND MANAGEMENT

1-4 OCTOBER 1985

TEXAS A&M UNIVERSITY AT GALVESTON

MITCHELL CAMPUS

GALVESTON, TX

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DEPARTMENT OF MARINE BIOLOGY

TEXAS A&M UNIVERSITY AT GALVESTON

MITCHELL CAMPUS

GALVESTON, TX

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SYMPOSIUM COMMITTEES

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Andre M. Landry, Jr.

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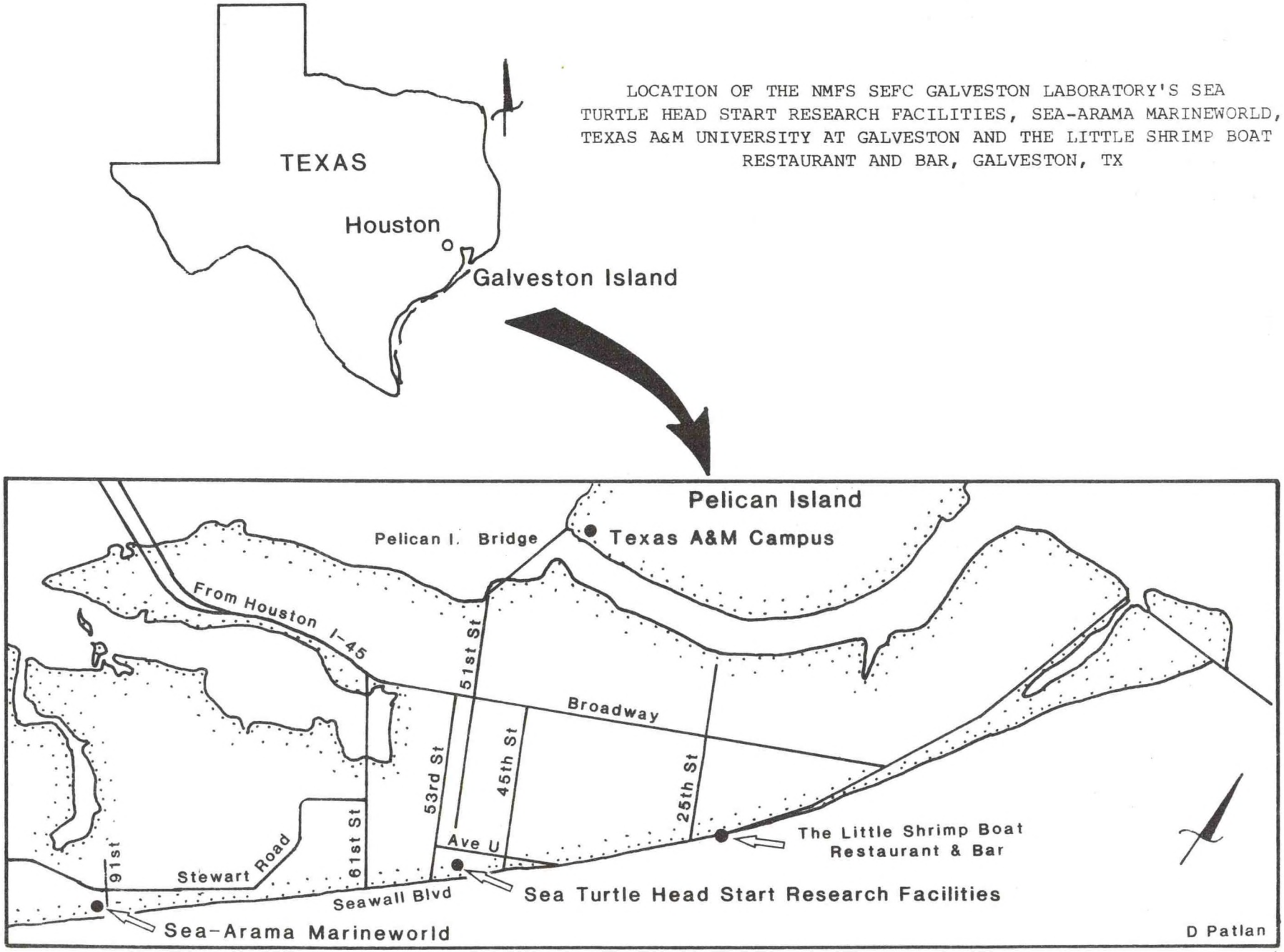
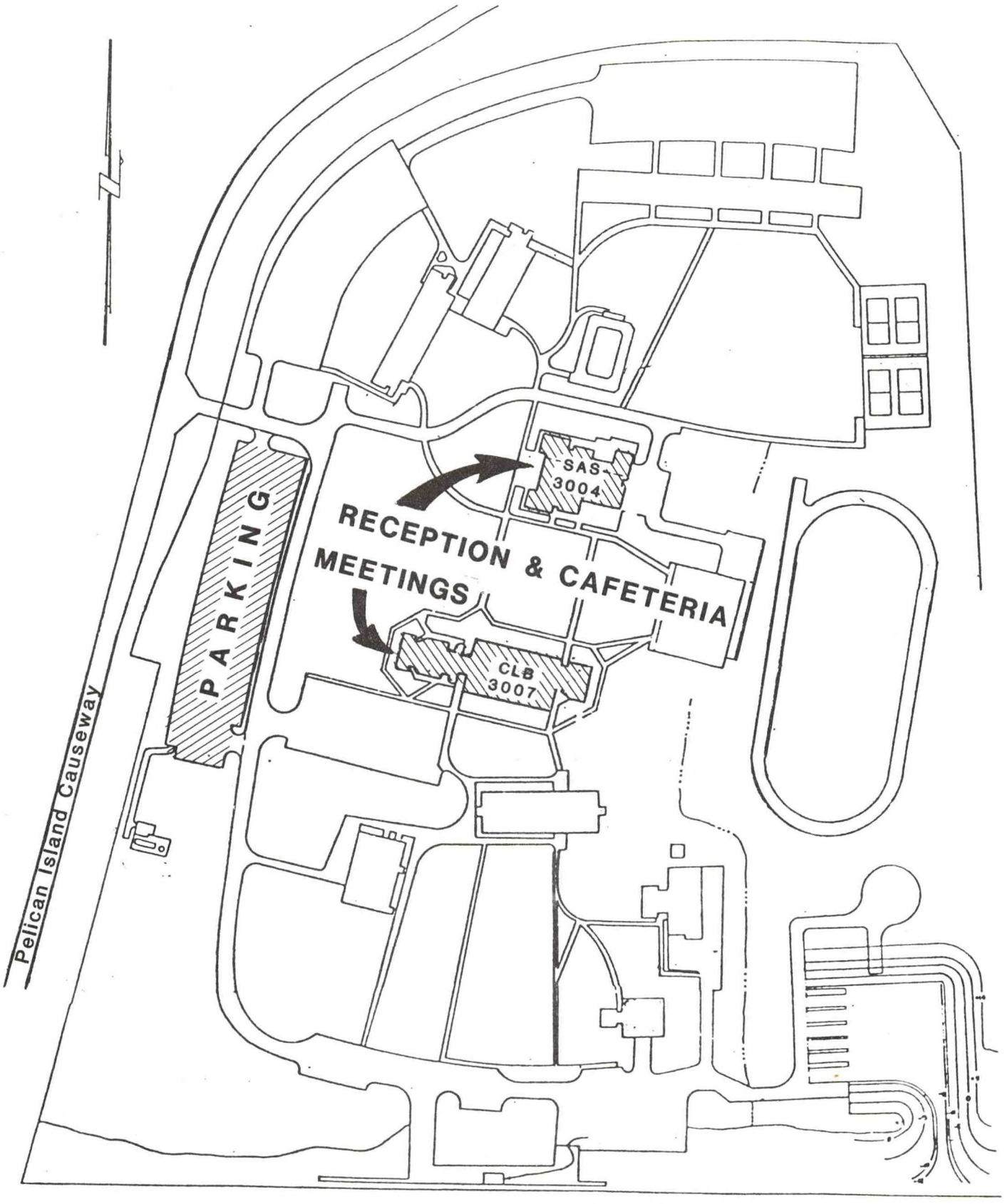
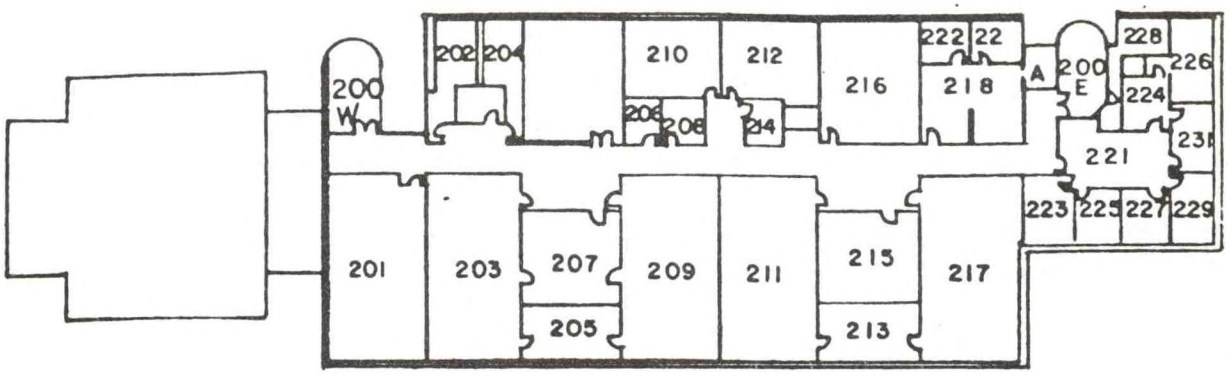


LOCATION OF THE NMFS SEFC GALVESTON LABORATORY'S SEA TURTLE HEAD START RESEARCH FACILITIES, SEA-ARAMA MARINEWORLD, TEXAS A&M UNIVERSITY AT GALVESTON AND THE LITTLE SHRIMP BOAT RESTAURANT AND BAR, GALVESTON, TX

LOCATION OF THE CLASSROOM-LABORATORY BUILDING, MARY MOODY NORTHERN STUDENT CENTER AND SYMPOSIUM PARKING AT TEXAS A&M UNIVERSITY AT GALVESTON, MITCHELL CAMPUS, GALVESTON, TX





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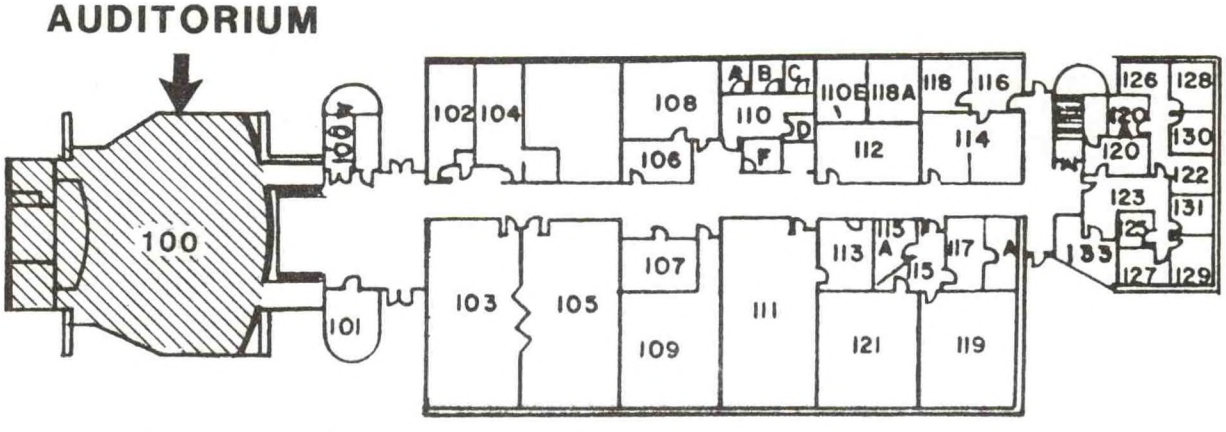

1st FLOOR

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MITCHELL CAMPUS – PELICAN ISLAND

CLASSROOM–LABORATORY BUILDING 3007

TUESDAY, 1 OCTOBER 1985

REGISTRATION: 1:00-5:00 p.m., Auditorium Foyer, Classroom-Laboratory Building
Registration Fee $35

TOUR: 1:00-4:00 p.m., Auditorium Foyer
Assemble for Round Trips to NMFS SEFC Galveston Laboratory's Sea Turtle Head Start Research Facilities

VIDEO PRESENTATION: ~~7:00-8:00~~ 7:30-8:30 p.m., Auditorium - Room 100
"Heartbreak Turtle"

RECEPTION: ~~8:00-10:00~~ 6-7:30 p.m., Lobby, Mary Moody Northern Student Center
Beverages and Snacks
Sponsored by Mrs. Ila Loetscher, Director
Sea Turtle Incorporated
5805 Gulf Boulevard
Box 2575
South Padre Island, TX 78597

WEDNESDAY, 2 OCTOBER 1985
Auditorium - Room 100

REGISTRATION 8:00 a.m.-5:00 p.m., Auditorium Foyer

INTRODUCTIONS AND ANNOUNCEMENTS 8:30-8:35 a.m.

CHARLES W. CAILLOUET, JR., Program Co-Chairman
National Marine Fisheries Service
Southeast Fisheries Center
Galveston Laboratory
4700 Avenue U
Galveston, TX 77550

ANDRE M. LANDRY, JR., Program Co-Chairman
Department of Marine Biology
Texas A&M University at Galveston
Mitchell Campus
Galveston, TX 77553

WELCOMES 8:35-8:50 a.m.

JANICE R. COGGESHALL, Mayor of Galveston
City Hall
823 Rosenberg
Galveston, TX 77550

WILLIAM H. CLAYTON, President
Texas A&M University at Galveston
Mitchell Campus
Galveston, TX 77553

EDWARD F. KLIMA, Director
National Marine Fisheries Service
Southeast Fisheries Center
Galveston Laboratory
4700 Avenue U
Galveston, TX 77550

WEDNESDAY, 2 OCTOBER 1985
Auditorium - Room 100

SESSION I. 8:50-10:20 a.m.

HISTORICAL PERSPECTIVE, TRENDS AND OPPORTUNITIES IN KEMP'S RIDLEY SEA TURTLE CONSERVATION AND MANAGEMENT

CONVENER: EDWARD F. KLIMA
Director
National Marine Fisheries Service
Southeast Fisheries Center
Galveston Laboratory
4700 Avenue U
Galveston, TX 77550

1. International Efforts in the Conservation and Management of Kemp's Ridley Sea Turtle (Lepidochelys kempi). JACK B. WOODY, National Sea Turtle Coordinator, U.S. Department of the Interior, Fish and Wildlife Service, Box 1306, Albuquerque, NM 87103

2. Mexico's Contribution to Kemp's Ridley Sea Turtle Recovery. RENE MARQUEZ MILLAN, Jefe del Programa Nacional de Investigacion y Conservacion de Tortugas Marinas, Instituto Nacional de la Pesca, A. P. 591, Manzanillo, Colima 28200 Mexico, DANIEL RIOS OLMEDA, Biologist, Instituto Nacional de la Pesca, Mazetlan, Sinaloa 82000 Mexico, JOSE MANUEL SANCHEZ P. and JUAN DIAZ, Recursos Riberenos Trabajo-Tortugas Marinas, Instituto Nacional de la Pesca, Londres 259 Esq. Sevilla, Col. Juarez C. P. 06600 Mexico D.F.

3. The National Park Service's Role in the Introduction of Kemp's Ridley Sea Turtle. MILFORD R. FLETCHER, Chief, Division of Natural Resources Management, U.S. Department of the Interior, National Park Service, Southwest Region, Box 728, Santa Fe, NM 87501

4. The National Marine Fisheries Service's Kemp's Ridley Sea Turtle Management Plan: Progress and Needs. CHARLES A. ORAVETZ, National Marine Fisheries Service, Southeast Regional Office, 9450 Koger Boulevard, St. Petersburg, FL 33702

5. The National Marine Fisheries Service's Kemp's Ridley Sea Turtle Research Plan: Progress and Needs. FREDERICK H. BERRY, Protected Species Program Manager, National Marine Fisheries Service, Southeast Fisheries Center, 75 Virginia Beach Drive, Miami, FL 33149

BREAK 10:20-10:50 a.m., Auditorium Foyer
Beverages and Pastries
Sponsored by HEART (Help Endangered Animals - Ridley Turtles)
A Special Committee of the Piney Woods Wildlife Society
North Harris County College
Box 681231
Houston, TX 77268

WEDNESDAY, 2 OCTOBER 1985
Auditorium - Room 100

SESSION II. 10:50-11:30 a.m.

STATUS OF KEMP'S RIDLEY SEA TURTLE POPULATION

CONVENER: JACK B. WOODY
National Sea Turtle Coordinator
U.S. Department of the Interior
Fish and Wildlife Service
Box 1306
Albuquerque, NM 87103

1. Nesting Population and Production of Hatchlings of Kemp's Ridley Sea Turtle at Rancho Nuevo, Tamaulipas, Mexico. RENE MARQUEZ MILLAN, Jefe del Programa Nacional de Investigacion y Conservacion de Tortugas Marinas, and ARISTOTELES VILLANUEVA, Biologist, Instituto Nacional de la Pesca, A. P. 591, Manzanillo, Colima 28200 Mexico, and PATRICK M. BURCHFIELD, General Curator, Gladys Porter Zoo, 500 Ringgold Street, Brownsville, TX 78520

2. Discussion

LUNCH 11:30 a.m.-1:15 p.m., Cafeteria or on your own

WEDNESDAY, 2 OCTOBER 1985
Auditorium - Room 100

SESSION III. 1:15-3:00 p.m.

PUBLIC AND PRIVATE PARTICIPATION IN KEMP'S RIDLEY SEA TURTLE CONSERVATION

CONVENER: CHARLES A. ORAVETZ
National Marine Fisheries Service
Southeast Regional Office
9450 Koger Boulevard
St. Petersburg, FL 33702

1. Promoting Conservation of Kemp's Ridley Sea Turtle Through Public Education. CAROLE H. ALLEN, Chairman, and ALBERT L. BARR, Vice-Chairman, HEART (Help Endangered Animals - Ridley Turtles), A Special Committee of the Piney Woods Wildlife Society, North Harris County College, Box 681231, Houston, TX 77268

2. The Role of Sea Turtle Incorporated in Kemp's Ridley Sea Turtle Conservation and Public Awareness. ILA M. LOETSCHER, Director, Sea Turtle Incorporated, 5805 Gulf Boulevard, Box 2575, South Padre Island, TX 78597

3. Fishing Industry Perspective on Conservation and Management of Sea Turtles. RALPH RAYBURN, Executive Director, The Texas Shrimp Association, 403 Vaughn Building, Austin, TX 78701

4. TED-Trawling Efficiency Device (Turtle Excluder Device): Promoting Its Use. WILBER R. SEIDEL, National Marine Fisheries Service, Southeast Fisheries Center, Mississippi Laboratories, Pascagoula, MS 39567 and CHARLES A. ORAVETZ, National Marine Fisheries Service, Southeast Regional Office, 9450 Koger Boulevard, St. Petersburg, FL 33702

5. Turtle Excluder Device (Trawling Efficiency Device): Acceptance and Use by Louisiana Commercial Shrimpers. PAUL D. COREIL, Associate Area Agent (Fisheries and Wildlife; Cameron and Calcasieu Parishes), Louisiana Cooperative Extension Service, Drawer H, Cameron, LA 70631

6. Sea-Arama Marineworld and Kemp's Ridley Sea Turtle: A Look Into the Future. JOHN M. KERIVAN, Curator, Sea-Arama Marineworld, 9100 Seawall Boulevard, Galveston, TX 77551

BREAK 3:00-3:20 p.m., Auditorium Foyer
Beverages
Sponsored by HEART, Houston, TX

WEDNESDAY, 2 OCTOBER 1985
Auditorium - Room 100

SESSION IV. 3:20-4:50 p.m.

HAZARDS TO AND STRANDINGS OF KEMP'S RIDLEY SEA TURTLE

CONVENER: FRANK W. JUDD
Department of Biology
Pan American University
Edinburg, TX 78539

1. Trash, Debris and Human Activities: Potential Hazards at Sea and Obstacles to Kemp's Ridley Sea Turtle Nesting. ANTHONY F. AMOS, Research Associate, The University of Texas at Austin, Marine Science Institute, Port Aransas, TX 78373

2. Kemp's Ridley Sea Turtle Strandings Along the Texas Coast, 1983-1985. ROBERT G. WHISTLER, Chief Naturalist, Department of the Interior, National Park Service, Padre Island National Seashore, 9405 South Padre Island Drive, Corpus Christi, TX 78418

3. Recent Strandings of Sea Turtles, Cetaceans and Birds in the Vicinity of Mustang Island, Texas. ANTHONY F. AMOS, Research Associate, The University of Texas at Austin, Marine Science Institute, Port Aransas, TX 78373

4. The Effects of Petroleum on Sea Turtles: Applicability to Kemp's Ridley. PETER L. LUTZ and MOLLY LUTCAVAGE, Division of Biology and Living Resources, University of Miami, Rosenstiel School of Marine and Atmospheric Science, 4600 Rickenbacker Causeway, Miami, FL 33149

5. A Review of the Corpus Christi Bay Landmass Project: NMFS' Role in Protecting Marine Turtles Via Section 7 of the Endangered Species Act. PAUL W. RAYMOND, National Marine Fisheries Service, Southeast Regional Office, 9450 Koger Boulevard, St. Petersburg, FL 33702

ADJOURN 4:50 p.m.

TEXAS STYLE BARBECUE 5:45 p.m.-Closing, Auditorium Foyer
Assemble by 5:45 p.m. for Round-Trip to Sea-Arama Marineworld
Sponsored by Sea-Arama Marineworld
9100 Seawall Boulevard
Galveston, TX 77550

THURSDAY, 3 OCTOBER 1985
Auditorium - Room 100

SESSION V. 8:30-10:20 a.m.

KEMP'S RIDLEY SEA TURTLE HEAD START RESEARCH

CONVENER: PETER C. H. PRITCHARD
Co-Leader
NMFS Sea Turtle Recovery Team
Vice President of Science and Research
Florida Audubon Society
1101 Audubon Way
Maitland, FL 32751

1. Standard Operating Procedures for Collecting Kemp's Ridley Sea Turtle Eggs for the Head Start Project. PATRICK M. BURCHFIELD, General Curator, Gladys Porter Zoo, 500 Ringgold Street, Brownsville, TX 78520, and F. JAMES FOLEY, Potentials, Inc., 1704 Hydro Drive, Round Rock, TX 78664

2. Beach Temperature Profile Versus Styrofoam Box Incubation of Kemp's Ridley Sea Turtle Eggs. ROBERT E. KING, Department of the Interior, National Park Service, Padre Island National Seashore, 9405 South Padre Island Drive, Corpus Christi, TX 78418

3. Predicted Sex Ratios from the International Kemp's Ridley Recovery Program. THANE R. WIBBELS, Department of Biology, Texas A&M University, College Station, TX 77843, YUKI A. MORRIS, Department of Zoology, The University of Texas at Austin, Austin, TX 78712, DAVID W. OWENS, GAYLE A. DIENBERG, and JULIA NOELL, Department of Biology, Texas A&M University, College Station, TX 77843, JORGE K. LEONG, U.S. Army, Dugway Proving Ground, Environmental and Life Science Division, Dugway, UT 84022, ROBERT E. KING, Department of the Interior, National Park Service, Padre Island National Seashore, 9405 South Padre Island Drive, Corpus Christi, TX 78418, and RENE MARQUEZ MILLAN, Jefe del Programa Nacional de Investigacion y Conservacion de Tortugas Marinas, Instituto Nacional de la Pesca, A. P. 591, Manzanillo, Colima 28200 Mexico

4. Results from an Examination of Unhatched Kemp's Ridley Sea Turtle Eggs. DONNA J. SHAVER, Department of Biology, Texas A&I University, Campus Box 158, Kingsville, TX 78363

PINS NPS DOI

↑ ALLAN CHANEY

5. Studies of Imprinting in Kemp's Ridley and Green Sea Turtles. MARK A. GRASSMAN, Department of Zoology, The University of Texas at Austin, Austin, TX 78712, and DAVID W. OWENS, Department of Biology, Texas A&M University, College Station, TX 77843

6. Kemp's Ridley Sea Turtle Head Start Operations of the NMFS SEFC Galveston Laboratory. CLARK T. FONTAINE, THEODORE D. WILLIAMS, SHARON A. MANZELLA, MARTY G. TYREE and CHARLES W. CAILLOUET, JR., National Marine Fisheries Service, Southeast Fisheries Center, Galveston Laboratory, 4700 Avenue U, Galveston, TX 77550

BREAK 10:20-10:40 a.m., Auditorium Foyer
Beverages and Pastries
Sponsored by HEART, Houston, TX

THURSDAY, 3 OCTOBER 1985
Auditorium - Room 100

SESSION VI. 10:40 a.m.-12:10 p.m.

TAGGING, TRACKING AND DISTRIBUTION OF KEMP'S RIDLEY SEA TURTLE

CONVENER: DAVID B. BOWMAN
Department of the Interior
Fish and Wildlife Service
Box 1306
Albuquerque, NM 87103

1. Status of Satellite Tracking of Kemp's Ridley Sea Turtle. JOHN MYSING, National Marine Fisheries Service, Southeast Fisheries Center, Mississippi Laboratories, Bay St. Louis, MS 39529

2. Overview of Distribution of Juvenile and Sub-Adult Kemp's Ridley Sea Turtle: Preliminary Results from the 1984-1985 Survey. LARRY H. OGREN, National Marine Fisheries Service, Southeast Fisheries Center, Panama City Laboratory, 3500 Delwood Beach Road, Panama City, FL 32407

3. Observations on Distribution, Growth and Survival of Captive-Reared, Tagged and Released Kemp's Ridley Sea Turtle (Lepidochelys kempi) from Year-Classes 1978-1983. CLARK T. FONTAINE, National Marine Fisheries Service, Southeast Fisheries Center, Galveston Laboratory, 4700 Avenue U, Galveston, TX 77550, RICHARD M. HARRIS, 3404 Nineth Avenue North, Apartment 208, Texas City, TX 77590, WILLIAM J. BROWNING, The University of Texas Medical Branch, Marine Biomedical Institute, Galveston, TX 77550, and THEODORE D. WILLIAMS, National Marine Fisheries Service, Southeast Fisheries Center, Galveston Laboratory, 4700 Avenue U, Galveston, TX 77550

4. Distribution and Abundance of Kemp's Ridley Sea Turtle, Lepidochelys kempi, in Chesapeake Bay and Nearby Coastal Waters. RICHARD A. BYLES, Research Assistant, College of William and Mary, School of Marine Science, Virginia Institute of Marine Science, Gloucester Point, VA 23062

5. Dermatoglyphic Patterns on Kemp's Ridley Sea Turtle Flippers: Can They Be Used to Identify Individuals? CHARLES W. CAILLOUET, JR., DICKIE B. REVERA and MARCEL J. DURONSLET, National Marine Fisheries Service, Southeast Fisheries Center, Galveston Laboratory, 4700 Avenue U, Galveston, TX 77550, and JOHN BRUCKS, National Marine Fisheries Service, Southeast Fisheries Center, Mississippi Laboratories, Bay St. Louis, MS 39529

LUNCH 12:10-1:55 p.m., Cafeteria or on your own

THURSDAY, 3 OCTOBER 1985
Auditorium - Room 100

SESSION VII. 1:55-2:30 p.m.

KEMP'S RIDLEY SEA TURTLE DATA BASE MANAGEMENT

CONVENER: STEVEN C. RABALAIS
Louisiana Universities Marine Consortium
Marine Laboratory
Star Route
Box 541
Chauvin, LA 70344

1. Captive-Reared Kemp's Ridley Sea Turtle Data Base Management. DENNIS B. KOI, National Marine Fisheries Service, Southeast Fisheries Center, Galveston Laboratory, 4700 Avenue U, Galveston, TX 77550

2. Sea Turtle Data Base Management: Application to Kemp's Ridley Sea Turtle. BARBARA A. SCHROEDER, National Marine Fisheries Service, Southeast Fisheries Center, Miami Laboratory, 75 Virginia Beach Drive, Miami, FL 33149

THURSDAY, 3 OCTOBER 1985
Auditorium - Room 100

SESSION VIII. 2:30-3:45 p.m.

BIOLOGICAL INVESTIGATIONS AND CAPTIVE BREEDING OF KEMP'S RIDLEY SEA TURTLE

CONVENER: ROSS WITHAM
Florida Department of Natural Resources
Marine Research Laboratory Field Station
Box 941
Jensen Beach, FL 33457

1. Evolutionary Relationships, Osteology, Morphology and Zoogeography of Kemp's Ridley Sea Turtle. PETER C. H. PRITCHARD, Co-Leader, NMFS Sea Turtle Recovery Team, Vice President of Science and Research, Florida Audubon Society, 1101 Audubon Way, Maitland, FL 32751

2. Growth and Survival of the 1984 Year-Class of Kemp's Ridley Sea Turtle in Captivity. CHARLES W. CAILLOUET, JR., DENNIS B. KOI, CLARK T. FONTAINE, THEODORE D. WILLIAMS, SHARON A. MANZELLA and MARTY G. TYREE, National Marine Fisheries Service, Southeast Fisheries Center, Galveston Laboratory, 4700 Avenue U, Galveston, TX 77550

3. Health Care and Diseases of Captive-Reared Loggerhead and Kemp's Ridley Sea Turtles. JORGE K. LEONG, U.S. Army, Dugway Proving Ground, Environmental and Life Science Division, Dugway, UT 84022, DAVID L. SMITH and DICKIE B. REVERA, National Marine Fisheries Service, Southeast Fisheries Center, Galveston Laboratory, 4700 Avenue U, Galveston, TX 77550, LT. JOHN C. CLARY III, NOAA Ship CHAPMAN, National Marine Fisheries Service, Southeast Fisheries Center, Mississippi Laboratories, Drawer 1207, Pascagoula, MS 39567, DONALD H. LEWIS, Department of Veterinary Microbiology and Parasitology, Texas A&M University, College Station, TX 77843, JANIS L. SCOTT, Box 2608, Victoria, TX 77902, and ANTHONY R. DINUZZO, Department of Pathology, The University of Texas Medical Branch at Galveston, 301 University Boulevard, Galveston, TX 77550

4. Carapacial Scute Pattern Variations in Hatchlings of Kemp's Ridley Sea Turtle (Lepidochelys kempi). RODERICK B. MAST, World Wildlife Fund-U.S., 1601 Connecticut Avenue, N.W., Washington, D.C. 20009 and JOHN L. CARR, Department of Zoology, Southern Illinois University, Carbondale, IL 62901

BREAK 3:45-4:05 p.m.
Beverages
Sponsored by HEART, Houston, TX

THURSDAY, 3 OCTOBER 1985
Auditorium - Room 100

SESSION VIII (continued). 4:05-5:20 p.m.

5. Morphometry of Captive-Reared Kemp's Ridley Sea Turtle. ANDRE M. LANDRY, JR., Department of Marine Biology, Texas A&M University at Galveston, Mitchell Campus, Galveston, TX 77553

6. A Report on Attempts to Breed Kemp's Ridley Sea Turtle, Lepidochelys kempi, in Captivity. STEVEN R. RABALAIS, Louisiana Universities Marine Consortium, Marine Laboratory, Star Route, Box 541, Chauvin, LA 70344, DAVID W. OWENS, Department of Biology, Texas A&M University, College Station, TX 77843, and PETER THOMAS, The University of Texas at Austin, Marine Science Institute, Port Aransas, TX 78373

7. Attempts at Breeding Kemp's Ridley Sea Turtle at Miami Seaquarium. TIMOTHY B. BENTLEY, Division of Biology and Living Resources, University of Miami, Rosenstiel School of Marine and Atmospheric Science, 4600 Rickenbacker Causeway, Miami, FL 33149

8. Captive Rearing and Breeding Kemp's Ridley Sea Turtle at Cayman Turtle Farm (1983) Ltd. JAMES R. WOOD and FERN E. WOOD, Cayman Turtle Farm (1983) Ltd., Box 645, Grand Cayman, British West Indies

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ADJOURN 5:20 p.m.

SOCIAL EVENT 5:45-7:30 p.m., Auditorium Foyer
Assemble by 5:45 p.m. for Round-Trip to The Little Shrimp Boat Restaurant and Bar
Sponsored by Mr. Earl Wayne Israel
The Little Shrimp Boat Restaurant and Bar
2227 Seawall Boulevard
Galveston, TX 77550

FRIDAY, 4 OCTOBER 1985
Auditorium - Room 100

SESSION IX. 8:30-10:30 a.m.

THE FUTURE FOR KEMP'S RIDLEY SEA TURTLE: PANEL DISCUSSION

CONVENER: EDWARD F. KLIMA
Director
National Marine Fisheries Service
Southeast Fisheries Center
Galveston Laboratory
4700 Avenue U
Galveston, TX 77550

PANEL MEMBERS:

RENE MARQUEZ MILLAN, Jefe del Programa Nacional de Investigacion y Conservacion de Tortugas Marinas, Instituto Nacional de la Pesca, A. P. 591, Manzanillo, Colima 28200 Mexico

JACK B. WOODY, National Sea Turtle Coordinator, U.S. Department of the Interior, Fish and Wildlife Service, Box 1306, Albuquerque, NM 87103

MILFORD R. FLETCHER, Chief, Division of Natural Resources Management, U.S. Department of the Interior, National Park Service, Southwest Region, Box 728, Santa Fe, NM 87501

CAROLE H. ALLEN, Chairman, HEART (Help Endangered Animals - Ridley Turtles), Piney Woods Wildlife Society, North Harris County College, Box 681231, Houston, TX 77268

PETER C. H. PRITCHARD, Co-Leader, NMFS Sea Turtle Recovery Team, Vice President of Science and Research, Florida Audubon Society, 1101 Audubon Way, Maitland, FL 32751

FRED H. BERRY, Protected Species Program Manager, National Marine Fisheries Service, Southeast Fisheries Center, 75 Virginia Beach Drive, Miami, FL 33149

ANNOUNCEMENTS 10:30-10:45 a.m.

ADJOURN SYMPOSIUM 10:45 a.m.

ABSTRACTS

FIRST INTERNATIONAL SYMPOSIUM ON KEMP'S RIDLEY SEA TURTLE BIOLOGY, CONSERVATION AND MANAGEMENT

I.1. International Efforts in the Conservation and Management of Kemp's Ridley Sea Turtle (Lepidochelys kempi).

by

JACK B. WOODY
National Sea Turtle Coordinator
U.S. Department of the Interior
Fish and Wildlife Service
Box 1306
Albuquerque, NM 87103

The Kemp's ridley international recovery effort is now in its eighth year. This unique effort between government agencies of Mexico and the United States, as well as a number of private individuals and organizations, is attempting to reverse the decline of this species.

Until 1985, it appeared that the nesting population had stabilized; however, a decrease in numbers of turtles nesting at the beach near Rancho Nuevo, Mexico, during the 1985 season may indicate that the effort has not been fully successful.

The author believes that until a much greater degree of cooperation is received from the Gulf of Mexico shrimp trawling industries of both Mexico and the United States, this species' status will not improve and, in fact, the species may continue to decline.

I.2. Mexico's Contribution to Kemp's Ridley Sea Turtle Recovery.

by

RENE MARQUEZ MILLAN
Jefe del Programa Nacional de Investigacion y
Conservacion de Tortugas Marinas
Instituto Nacional de la Pesca
A. P. 591
Manzanillo, Colima 28200 Mexico

DANIEL RIOS OLMEDA
Biologist
Instituto Nacional de la Pesca
Mazetlan, Sinaloa 82000 Mexico

JOSE MANUEL SANCHEZ P. and JUAN DIAZ
Recursos Riberenos Trabajo-Tortugas Marinas
Instituto Nacional de la Pesca
Londres 259 Esq. Sevilla
Col. Juarez C. P. 06600 Mexico D. F.

The Kemp's ridley nesting beach near Rancho Nuevo, Mexico, was discovered by the scientific world a long time after the traffikers overexploited the eggs. Between March and August, the nesting season, donkey trains were loaded with thousands of eggs, and there were both commercial and incidental catches of turtles off the nesting beach, on the Campeche bank, in Florida Bay and in coastal waters of Texas, Mississippi and Alabama.

The location of the nesting beach was published by Hildebrand (1963) and Carr (1963) after they became aware of the film made by Mr. Andres Herrera, a sport fisherman from Tampico, Mexico. Herrera's film showed an arribada (Spanish for arrival) of forty thousand females nesting on the beach of Barra Coma on 18 July 1947. When the first turtle camp was established in 1966 by fisheries investigators of the Secretariate of Commerce, the nesting population was around 10% of the original arribada. By the 1980s this fell to about 2% of the original arribada.

From 1966 until 1977, the Mexicans translocated nests to beach corrals, protected and tagged adult females, and released an average of 21,000 hatchlings annually. In 1963, a total prohibition of commercial trade of the eggs was declared, and the same was done for the turtles in the 1970s. In 1977, Rancho Nuevo was declared as a Natural Reserve, and by 1978 a definitive Turtle Station was under construction. Also in 1978, the U.S. Fish and Wildlife Service joined efforts with the Departamento de Pesca, and the program, "Restoration and Enhancement of the Kemp's Ridley in the Gulf of Mexico," was implemented. From then on, every year more than 50,000 hatchlings were released on the beach, and hatchlings obtained from 2,000 eggs donated annually by the Mexican government were "imprinted" and head started.

The decline in the population seems to have been stopped, but any catastrophic problem that affects the habitat or part of the population will increase the danger of extinction of this species.

I.3. The National Park Service's Role in the Introduction of Kemp's Ridley Sea Turtle.

by

MILFORD R. FLETCHER
Chief
Division of Natural Resources Management
U.S. Department of the Interior
National Park Service
Southwest Region
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Since 1978, the National Park Service has been involved in a multi-agency effort to establish a nesting population of Kemp's ridley sea turtle at Padre Island National Seashore near Corpus Christi, Texas. The procedures call for turtle eggs to be transported from Rancho Nuevo in Mexico to Padre Island, where the eggs are hatched in Styrofoam boxes. The hatchlings are then released on the beach to make their way to the surf. The exposure to the beach and surf is assumed to "imprint" the hatchlings to Padre Island as their natal beach. Upon entering the surf, the hatchlings are captured and transferred to the National Marine Fisheries Service's Laboratory in Galveston, Texas.

Imprinting is a phenomenon which has best been documented in birds and fish, but the process is hypothesized to be among the mechanisms responsible for sea turtles returning to nest at natal beaches. This is the eighth year of the recovery program, and slightly more than 10,500 hatchling turtles have been imprinted at Padre Island to date. At this writing, there have been no documented returns of imprinted and tagged turtles to Padre Island National Seashore.

I.4. The National Marine Fisheries Service's Kemp's Ridley Sea Turtle Management Plan: Progress and Needs.

by

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The National Marine Fisheries Service's (NMFS) Kemp's Ridley Sea Turtle Management Plan was prepared largely because of a recommendation made by a constituent review panel at a NMFS sea turtle program review in Miami May 3-4, 1984. Five plan components relating to Kemp's ridley are performed by the NMFS Southeast Regional Office:

1. Information and Education - A broad range of independent and cooperative activities inform and educate the general public and fishermen of the need to conserve Kemp's ridley. These activities include development and distribution of posters, video tapes, brochures and other means of communication.

2. TED Technology Transfer - TED is an acronym for Trawling Efficiency Device, or Turtle Excluder Device. The TED was developed principally to allow escapement of sea turtles from shrimp trawls, thereby enhancing conservation of all sea turtles including Kemp's ridley. Use of the TED provides benefits to shrimpers such as reductions of trash and finfish by-catch. The NMFS is encouraging the voluntary use of the TED and is transferring the technology of the TED to shrimpers.

3. Incidental Catch - Incidental catch information can be used for management purposes and to increase conservation through awareness. Amendments to the Endangered Species Act (ESA) allow reporting of the incidental take of the endangered Kemp's ridley. An incidental catch reporting scheme is being explored with the Texas Shrimp Association.

4. Sea Turtle Recovery Plan - A plan for the recovery of six species of marine turtles was completed in September, 1984. This plan defines recovery actions for Kemp's ridley. Recovery actions such as head starting, captive breeding, and at-sea monitoring are being implemented.

5. Section 7 Consultations - Section 7 of the ESA requires that all federal agencies conserve endangered species and consult with the Fish and Wildlife Service and/or the NMFS to make sure that they do not jeopardize the existence of any listed species. Section 7 consultations are used to mitigate adverse impacts to Kemp's ridley.

I.5. The National Marine Fisheries Service's Kemp's Ridley Sea Turtle Research Plan: Progress and Needs.

by

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An emphasis was placed on the Protected Species Program of the Southeast Fisheries Center to conduct more extensive research on Kemp's ridley sea turtle so that its endangered status could be more realistically evaluated and methods for its planned recovery better insured. The research plan was developed and distributed between April and November 1984. The plan focuses on three major recovery efforts: 1) reducing mortality, 2) enhancing recruitment, and 3) determining and monitoring status and trends of the stock. The plan was largely implemented between October 1984 and September 1985.

Progress has been made on 10 of 11 planned research projects. The Stock and Habitat Search Project was implemented, primarily in the U.S. Gulf of Mexico, but extending to Massachusetts; a search and report network was established and numerous records were obtained that were previously unavailable. The Hatchling Tracking off Rancho Nuevo Project was conducted. The Head Start Research Project was continued at the Galveston Laboratory for its eighth year. The Captive Brood Stock Research Project was modestly expanded. The Biological Synopsis Project was implemented. The Kemp's ridley Data Base was expanded. The Stock Assessment Project produced a new preliminary stock assessment. The Satellite Tracking Project deployed two transmitters on post-nesting females at Rancho Nuevo. The Turtle Excluder Device Project began design and development of a Trawling Efficiency Device (TED) for smaller shrimp trawlers operating in the Gulf of Mexico and adjacent inshore waters. The Sea Survey off Tamaulipas Project had to be postponed until about May 1986.

At this time, the major needs for research on Kemp's ridley are to determine the causes and extent of mortalities other than natural mortality, and to develop and implement methods of reducing these mortalities. For prudent and effective managment (protection and recovery), research must determine reasonable answers to two related questions: How many Kemp's ridley sea turtles do we have? How many Kemp's ridley sea turtles do we need?

II.1. Nesting Population and Production of Hatchlings of Kemp's Ridley Sea Turtle at Rancho Nuevo, Tamaulipas, Mexico.

by

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and

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Nearly all of the mature females in the population of Kemp's ridley sea turtle nest at Rancho Nuevo, located between Barra del Tordo (23°3.5'N and 97°45.3'W) and Ostionales (23°24.6'N and 97°45.7'W), in Tamaulipas state. Also there are small groups that nest in several locations such as Playa Washington and south of Barra del Tordo in Tamaulipas and Tecolutla in Veracruz, as well as solitary nestings at Padre Island, Texas, Cabo Rojo, Veracruz, and Isla Aguada, Campeche. Nevertheless, outside of Rancho Nuevo, the annual number usually is less than 50 nests.

The annual nesting population at Rancho Nuevo has shown a great decline since the discovery in 1947 of an arribada of more than 40,000. Nowadays there are fewer than 600 females nesting annually. The total nesting population can be assessed through life cycle characteristics and fecundity; however, the sex ratio at sea is unknown.

The quantity of hatchlings produced has varied annually, and is related not only to the number of females that nest every year but also to the intensity of the biological work and natural meteorological disturbances such as storms or floods. Between 1966 and 1985, around 664,000 hatchlings were released from the Rancho Nuevo beach, and from 1978 to 1985 around 13,000 hatchlings emerged from eggs incubated at Padre Island, and were "imprinted" there then head started for 10 to 11 months in Galveston. Head started survivors were released into the Gulf of Mexico as yearlings or younger from sites off the coasts of south and west Florida, Texas and Mexico.

III.1. Promoting Conservation of Kemp's Ridley Sea Turtle Through Public Education.

by

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HEART (Help Endangered Animals-Ridley Turtles), a non-profit organization, is a special committee of the Piney Woods Wildlife Society, North Harris County College, Houston, Texas. A brief history of HEART is given, beginning in 1982 with discussions between the senior author and Dr. Edward Klima, Director of the National Marine Fisheries Service Laboratory in Galveston, Texas.

Some of the accomplishments and contributions of HEART are outlined, as well as the activities of HEART committee members, including presentations to student groups, scout troops, nature clubs and other organizations.

Goals of HEART are discussed, including (1) financial support to head starting operations at the NMFS Galveston Laboratory and to the beach operations at Rancho Nuevo, Mexico, (2) education of the general public emphasizing the need to continue the Kemp's ridley recovery program, and (3) encouraging contacts with state and federal legislators to provide funding for all segments of the recovery program.

III.2. The Role of Sea Turtle Incorporated in Kemp's Ridley Sea Turtle Conservation and Public Awareness.

by

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After the relocation of the program to establish a new nesting population for Kemp's ridley sea turtle to the Padre Island National Seashore in the mid-1970s, Sea Turtle Incorporated (STI) was able to put greater emphasis on its public awareness programs while continuing to assist in conservation measures to protect and propagate the critically endangered Kemp's ridley. Beginning in 1980, this non-profit corporation initiated a breeding program for captive ridleys using its female, Little Fox.

Bi-weekly shows plus shows by reservation are given to acquaint the private sector with the problems and needs of Kemp's ridley and other sea turtles of the western Gulf of Mexico. Brochures are published by STI, and slide presentations have been produced for school grades 1-12 and for adult audiences. A demonstration of the turtle show will be given.

Our work has received vast international and national coverage by the media, by regularly published magazines and by professional publications.

Attendance records at the shows and expressed public attitudes have demonstrated an overwhelmingly supportive response. This in turn has allowed STI to channel funds, when needed, toward the support of on-going studies by Dr. David Owens and Dr. Henry Hildebrand, and to support experimental breeding programs.

III.3. Fishing Industry Perspective on Conservation and Management of Sea Turtles.

by

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Shrimp vessels on the horizon and stranded sea turtles on the beach have provided the ingredients for a conflict equal to the major historical disputes between commercial and environmental interests. Fortunately, through rational discussion and mutual cooperation between both interest groups, a program has been undertaken which will provide greater protection of the threatened and endangered sea turtles.

The key elements in this successful effort were education of crewmen, incorporation of the Trawling Efficiency Device (TED; also called the Turtle Excluder Device) into many fishing areas, and incorporation of turtle protection into the Fishery Management Plan for the Shrimp Fishery of the Gulf of Mexico.

III.4. TED-Trawling Efficiency Device (Turtle Excluder Device): Promoting Its Use.

by

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A Trawling Efficiency Device (TED), or Turtle Excluder Device, has been developed to release captured sea turtles from shrimp trawls. Sea turtle takes are reduced by more than 97% and their mortality in shrimp trawls is essentially eliminated.

Besides conserving endangered and threatened sea turtles, the TED also provides benefits to shrimp fishermen. Unwanted by-catch is decreased considerably, thus reducing sorting labor and improving the quality of the shrimp catch. Cannonball jellyfish, which sometimes occur in such large numbers that they clog shrimp trawls and decrease towing time, are eliminated so that longer duration tows can be made. Finfish in the by-catch are released at rates exceeding 50% at night and 60% during daytime shrimping. Overall, the reduction of by-catch usually results in a slight increase in shrimp catch. Because of its ability to improve shrimp catch quality and increase efficiency in addition to conserving sea turtles, the TED is now more appropriately described as the Trawling Efficiency Device.

The National Marine Fisheries Service is conducting a technology transfer program to educate and demonstrate to shrimp fishermen the benefits they can realize by using the TED. This promotional activity has introduced TEDs to shrimp fishermen in all the shrimping states on the U.S.'s Atlantic and Gulf of Mexico coasts in an effort to achieve voluntary use of the TED. The TED also has been demonstrated in several foreign countries. Development work is being conducted on a smaller TED for shrimp nets normally used in inshore waters. If it is effective, the small TED could play a significant role in protecting juvenile Kemp's ridleys in inshore waters.

III.5. Turtle Excluder Device (Trawling Efficiency Device): Acceptance and Use by Louisiana Commercial Shrimpers.

by

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Commercial shrimpers have always attempted to develop techniques and devices that would allow exclusion of non-target species in trawl catches. By-catch species most encountered include finfish, jellyfish, blue crabs, and, to a lesser extent, sea turtles.

Prior to 1978, many Louisiana fishermen utilized an excluder device, constructed of plastic (PVC) pipe, which deflected unwanted by-catch out of the trawl through a top opening cut in the trawl "throat."

From 1978 to 1983, NMFS developed a turtle excluder device (TED) with an iron, top-escape, hinged door. Fishermen found this TED to be a little cumbersome and heavy, but exclusion performance was good. During this period, Louisiana shrimpers also modified the PVC excluder considerably, and developed an aluminium excluder device which allowed by-catch elimination through a cut in the throat of the trawl along the top attachment point of the webbing (no hinged door was used). The weight of the Cameron Aluminum Excluder (CAE) was considerably less than that of the NMFS TED. The CAE was determined by NMFS to provide good turtle exclusion and was well accepted in Louisiana.

The NMFS collapsible TED, introduced in 1984, also has been very well accepted in Louisiana due to (1) the fish exclusion option available with this TED, and (2) the light weight and collapsibility of this device.

Use of the NMFS collapsible TED and the CAE throughout Louisiana is growing tremendously with many ports showing as much as 75-80 percent usage.

III.6. Sea-Arama Marineworld and Kemp's Ridley Sea Turtle: A Look Into the Future.

by

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A brief history is given of Sea-Arama Marineworld's involvement in the Kemp's ridley sea turtle head start research project. Sea-Arama Marineworld has maintained a captive stock of Kemp's ridley sea turtle since 1979. Some methods of health care and husbandry are discussed.

Sea-Arama Marineworld's plans for expansion are discussed, including development of an international sea turtle research institution and an environmental education center, with a main goal of captive propagation of Kemp's ridley sea turtle.

IV.1. Trash, Debris and Human Activities: Potential Hazards at Sea and Obstacles to Kemp's Ridley Sea Turtle Nesting.

by

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Considerable quantities of trash and debris impact Gulf of Mexico waters and beaches of South Texas. Much of these materials comes from offshore oil and gas and merchant-marine operations, and from commercial and sport-fishing activities. Sea-going observations have been made on cruises of opportunity. A beach survey is now in its eighth year, and 1,200 separate observations of a 12-km long transect on Mustang Island have been completed.

At sea, assemblages of natural and man-made debris and tar-balls often concentrate in windrows along with planktonic food organisms that attract birds, fish, and probably juvenile sea turtles. Beached Kemp's ridley sea turtle juveniles frequently have tar and occasionally small plastic and fiber particles in their mouths and throats. Sea turtle entanglement with plastic has been observed.

On the beach, trash and debris accumulations have been recorded in notes and photographically, and for the past two years an attempt has been made to quantify this material within various frequently seen categories. Offshore debris includes drums of chemicals and oils, often unmarked and leaking and sometimes containing toxic materials. In addition, Mustang Island's beach-goers leave large quantities of litter on the beach. Peak times for offshore debris are spring and fall. "Beach-going" litter peaks in the summer, as does the number of people.

People, dogs and cars are an increasing disturbance to wildlife on once-remote beaches. The survey documents the rapid increase in beachfront condominiums and the numbers of people using the beach.

Kemp's ridley sea turtle may find obstacles on or near Mustang and Padre Islands at several stages of its life-cycle: (1) when females come ashore to nest, (2) during the already hazardous dash to the sea by the hatchlings, and (3) at sea during the "lost year(s)".

IV.2. Kemp's Ridley Sea Turtle Strandings Along the Texas Coast, 1983-1985.

by

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The Marine Mammal and Sea Turtle Stranding and Salvage Network is a program that was envisioned at the International Sea Turtle Conference held at the U.S. State Department in Washington, D.C., in 1978. At that time, I was asked to head a state volunteer group to document sea turtle strandings along the Texas coast. This has continued as a viable program since that time. In 1981, the National Marine Fisheries Service developed standardized forms and procedures to be used by all persons assigned to report strandings. Prior to 1981, my staff and others used various forms which we developed to collect and report the data. Prior to this time (starting in 1978), my staff at Padre Island National Seashore handled all strandings along the beaches and recorded the data on Padre Island National Seashore stranding forms back to 1975. All forms completed on turtle strandings since 1975 have been retained in copy form in my files.

Steven Rabalais has written several articles for professional journals which describe strandings for the periods of 1976 through 1979, and from 1980 through 1982. Therefore, this paper will deal with the Kemp's Ridley strandings since 1983, and will include: month noted, location of stranding, number stranded, influences, and environmental factors. The results of this stranding study will be interpreted, conclusions will be drawn, and potential trends will be presented.

It is to be noted that strandings and reports of strandings have increased dramatically during the last few years. The publicity provided by the Kemp's ridley sea turtle restoration and enhancement program, posters I have distributed along the south Texas area, the interest of citizens and the various media, all have helped promote this reporting system. As a result, we are now getting types of data which we were not acquiring earlier in the program. Therefore, this new information will be an important factor in the consideration of the strandings and in their interpretation.

IV.3. Recent Strandings of Sea Turtles, Cetaceans and Birds in the Vicinity of Mustang Island, Texas.

by

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Strandings of sea turtles, small cetaceans and birds are common events along South Texas beaches bordering the Gulf of Mexico. In recent years, the incidence of such strandings has been recorded formally as part of a long-term study of bird populations utilizing Mustang Island beach. Data have been submitted to the Marine Mammal and Sea Turtle Stranding and Salvage Network and to the Atlantic & Gulf Coast Beached Bird Survey.

One-hundred twenty sea turtles of five species have been reported stranded since 1983. In order of abundance they are Loggerhead, Kemp's ridley, Hawksbill, Green and Leatherback. Kemp's ridleys were found most frequently following the offshore releases of head started yearlings; several found alive were later re-released. The occurrence of 12 juvenile Hawksbills, most of them alive, is notable as this species has been virtually unreported for Texas waters. Peak abundance for Loggerheads, almost always found dead, is in March and April and appears to coincide with shrimping activities offshore.

Thirty-five small cetaceans have been reported stranded in the same period. Nine of these have been live strandings of uncommon to rare pelagic species (Pygmy Killer and Dwarf Sperm whales; Spinner, Short-Snouted Spinner, and Striped Dolphins). Live strandings have occurred in October, December, April and May.

Fifteen-hundred birds have washed ashore dead since 1980. Laughing Gull (the most commonly found dead bird) mortality peaks dramatically following the opening of the gulf to shrimping in July. Over 4,000 oiled birds have been observed and a periodicity in the frequency of oiling (Spring and Fall) discovered. The relationship between these events and Kemp's ridley sea turtle is discussed.

IV.4. The Effects of Petroleum on Sea Turtles: Applicability to Kemp's Ridley.

by

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Contact with petroleum is likely to be harmful to all sea turtles. Yet, because of reduced population size and restricted nesting distribution, the Kemp's ridley may be especially vulnerable to damage from accidental spills. In behavioral studies with green and loggerhead sea turtles there was no evidence that sea turtles detect and avoid oil slicks or distinguish tar balls from food items. Loggerheads chronically exposed to crude oil in our laboratory showed cell abnormalities of the skin, alteration of respiratory patterns and blood cell dysfunctions. During exposure, sea turtles ingested oil incidentally, and oil sometimes appeared in the feces. Salt secretion and minor ion regulation by the salt gland were reduced or delayed. At sea, failure of osmoregulatory systems could prove fatal. These physiological and clinicopathological data confirm that sea turtles are highly sensitive to oil. Particularly for the Kemp's ridley, management options for mitigating the damage of accidental oil spills must be considered.

IV.5. A Review of the Corpus Christi Bay Landmass Project: NMFS's Role in Protecting Marine Turtles Via Section 7 of the Endangered Species Act.

by

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Section 7 of the Endangered Species Act requires federal agencies to insure that their actions (whether performed, funded or permitted by the agencies) are not likely to jeopardize the continued existence of threatened or endangered species. The National Marine Fisheries Service (NMFS) conducts Section 7 consultations with various Federal agencies for listed marine mammals, fish, and sea turtles occurring in the marine environment. The often-misunderstood types, components, and procedures for Section 7 consultations are discussed. Biological assessments and opinions on proposed construction activities and their potential effects on threatened and endangered species should be based on the best scientific and commercial data available. Often these data are scarce and additional research is warranted. An example of the consultation process can be demonstrated by reviewing the dredge and fill project in Corpus Christi Bay known as the "Landmass Plan Project." The Corpus Christi/Nueces Bay system has historically supported a large population of green sea turtles (Chelonia mydas), and recent findings indicate the presence of Kemp's ridley sea turtles (Lepidochelys kempi). Most of the ridleys reported have been released by the Kemp's ridley head start research project. Potential direct impacts of the Corpus Christi Bay development on sea turtles include dredge-related mortalities and loss of foraging habitat. Indirect effects are often more difficult to identify and assess.

V.1. Standard Operating Procedures for Collecting Kemp's Ridley Sea Turtle Eggs for the Head Start Project.

by

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A summary of Kemp's ridley sea turtle (Lepidochelys kempi) conservation efforts at Rancho Nuevo, Tamaulipas, Mexico, during the years 1978 through 1985 inclusive is presented. Artificial egg hatchery techniques in Styrofoam boxes and facsimile nests on the beach are described.

The egg collection techniques and the initial incubation of eggs ear-marked for further incubation and "imprinting" at the National Park Service's Padre Island National Seashore (to supply hatchlings to the National Marine Fisheries Service's Galveston Laboratory for head starting) are described. Experiments for the 1984 and 1985 nesting seasons will be presented.

Beach temperatures at Rancho Nuevo are monitored at a thermal transect of the beach profile using a Bailey BAT-12 digital read-out thermometer. Temperatures are read three times daily. A 24-hour temperature study is done every two weeks in order to re-adjust the temperature reading times to include the daily high and low temperatures throughout the season.

The concrete egg hatchery building is mechanically thermo-regulated to correspond as closely as possible to the temperature regime of the natal beach. The incubation medium is Padre Island sand which is maintained at $\pm$ 15% moisture by saturation within the Styrofoam incubation boxes, each containing one clutch of eggs. Twenty-one sand samples collected in 1983-1984 from actual nest cavities yielded a moisture content range of 7% to 21% of saturation with a mean of 14%. Hatchery incubation temperatures at the Rancho Nuevo hatchery ranged from a low of 26.4^{o} C to a maximum of 37.5^{o} C, once metabolic heating commenced. Of the total of 2,274 eggs incubated at Rancho Nuevo in Styrofoam boxes in 1984, 2,032 (88%) hatched. Those in the boxes sent to the Padre Island National Seashore produced a 90.7% hatch.

V.2. Beach Temperature Profile Versus Styrofoam Box Incubation of Kemp's Ridley Sea Turtle Eggs.

by

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Styrofoam box incubation of sea turtle eggs has and will continue to play an important role in many sea turtle conservation efforts. However, this method removes the eggs from their natural temperature regime and places them in a temperature environment which bears little resemblance to natural nesting beach conditions. The discovery of a "pivotal temperature" for sex determination in many sea turtle species and recent advances in histological and other sexing techniques clearly indicate that clutch sex ratios can be drastically altered by incubation temperature. If Styrofoam box incubation is to remain a viable part of conservation projects, then its relationship to natural nesting beach conditions must be clearly understood.

Twenty-four hour beach temperature profiles were recorded weekly during the summers of 1982 and 1983 at Padre Island National Seashore. Beach temperatures were compared with temperatures recorded from Styrofoam boxes in which Kemp's ridley eggs were incubating during the same time period. From this comparison it is clear that not only are Styrofoam box temperatures lower than those of the natural beach at mean nest depth for Kemp's ridley but that temperature variation in the boxes also is greater by at least two-fold. In addition, there is a temperature phase shift and a significant difference in peak and low temperature duration between the Styrofoam box and the nesting beach. These temperature differences will affect clutch sex ratio and must be considered when choosing Styrofoam box incubation over nesting beach or corral beach incubation during the planning phase of any sea turtle conservation program.

V.3. Predicted Sex Ratios from the International Kemp's Ridley Recovery Program.

by

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Sex ratios have been determined for subsets of turtles from six year-classes (1978, 1979, 1981-1984) of Kemp's ridleys from the joint U.S.-Mexico Kemp's Ridley Recovery Program. The techniques used were gonadal histology, necropsy, laparoscopy, tail length evaluation and serum testosterone assays. Turtles examined from the 1982 (n=92, 2.9 M:1 F), and the 1984 (n=159, 2.5 M:1 F) year-classes were significantly male-biased. The turtles examined from the 1978 and 1979 year-classes were male-biased (n=32, 1.9 M:1 F and n=22, 1.4 M:1 F, respectively), but not significantly so. Ratios from

the 1983 year-class were not biased (n=12, 1 M:1 F), while the four turtles examined from the 1981 year-class were all females.

Analyses of individual clutches from 1984 indicated that clutch sex ratios within a given year-class can significantly differ from one another. These limited pooled data are consistent with the hypothesis that the sex of kemp's ridley is determined environmentally. Because of inadequate sampling, it is important to exercise caution in interpreting these data. However, since both males and females were produced annually, and since males predominated much of the time, we surmise that the average incubation temperature available during the critical sex determining period has been slightly below the natural pivotal temperature for male:female sex induction for the species.

V.4. Results from an Examination of Unhatched Kemp's Ridley Sea Turtle Eggs.

by

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Unhatched Kemp's ridley sea turtle eggs (2,500) from Rancho Nuevo, Tamaulipas, Mexico, were examined for the presence of embryos. Stages of development were recorded and abnormalities noted for eggs containing embryos. Data are presented showing ratios of infertile to fertile eggs for year-classes 1980 and 1982-1985. Embryonic stages are classified and presented, and comparisons are made among clutches as to the stage at which mortality occurred.

V.5. Studies of Imprinting in Kemp's Ridley and Green Sea Turtles.

by

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Attempts to delineate mechanisms associated with the remarkable homing abilities of sea turtles have proven to be elusive endeavors. For example, the olfactory imprinting hypothesis was proposed more than 30 years ago. To date, olfactory imprinting has been neither demonstrated directly nor refuted. The failure to demonstrate whether or not sea turtles imprint is due in part to several difficulties associated with using sea turtles as experimental animals. The most noteworthy of these problems include long periods of time required for the turtles to reach sexual maturity and presumed high predation rates on hatchlings.

Laboratory experiments designed to circumvent these problems were conducted using several sea turtle species including Kemp's ridley. The first experiment involved quantifying the chemosensory choice behavior of juvenile ridleys that had been artificially imprinted to Padre Island, Texas. Ridley turtles exposed to Padre Island seawater preferred this seawater compared to other seawater samples. Based on the assumption that mechanisms subserving this chemosensory choice behavior similarly function to facilitate homing in adults, it was suggested that the turtles were imprinted to Padre Island.

In the first experiment the possibility of a generalized preference for Padre Island seawater independent of imprinting could not be ruled out. However, if the observed choice behavior reflected an underlying imprinting mechanism, turtles "imprinted" to Padre Island and Rancho Nuevo might be expected to prefer cues from their respective natal beaches. A second experiment designed to test this hypothesis revealed no significant preferences for either Padre Island or Rancho Nuevo seawater by either turtle group. However, it is suggested that low turtle activity brings the validity of this result into question.

V.6. Kemp's Ridley Sea Turtle Head Start Operations of the NMFS SEFC Galveston Laboratory.

by

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The Kemp's Ridley Sea Turtle Head Start Research Project is part of the U.S.-Mexico Kemp's Ridley Recovery Program, and has as its goal the establishment of a new nesting colony at the Padre Island National Seashore, near Corpus Christi, Texas. Since 1978, 9,258 tagged Kemp's ridley sea turtle (Lepidochelys kempi) juveniles have been released into the wild after being reared in captivity at the National Marine Fisheries Service (NMFS), Southeast Fisheries Center (SEFC), Galveston Laboratory.

Each year, during the nesting season, approximately 2,000 eggs are collected by the U.S. Fish and Wildlife Service and its contractor, Gladys Porter Zoo, from the Rancho Nuevo beach. These eggs are placed in Padre Island sand within polystyrene foam boxes for incubation. Once all the eggs have been collected, the boxes are flown to the National Seashore where the eggs are further incubated and hatched, and the hatchlings "imprinted" under surveillance by National Park Service personnel.

The "imprinted" hatchlings are transferred to the NMFS SEFC Galveston Laboratory where they are reared, separated from each other in individual buckets, for 10-11 months. Survivors in good condition are tagged, weighed and measured, and released into the Gulf of Mexico, usually off Padre and Mustang Islands.

Feeding, maintenance, and health care of the turtles are the major activities of captive-rearing and are described. Other activities described include: (1) monthly weighings of samples (roughly 25%) of the turtles to obtain average body weight from which feeding ration is determined as a percentage of body weight; (2) tagging by three methods: "living tags", "internal tags" and "flipper tags"; (3) from turtles that die, removal and preservation of kidneys and gonads for sex determination; and (4) final weighing and measuring of each turtle before it is released.

Hatchlings weigh around 14 g when received in July and/or August. By late May or early June of the following year, the captive turtles have increased in average weight to 0.8 kg. Tagged turtles are taken to Port Aransas to be loaded onto the Coast Guard Cutter POINT BAKER or the University of Texas's R/V LONGHORN for release 28-37 km offshore Padre and Mustang Islands.

VI.1. Status of Satellite Tracking of Kemp's Ridley Sea Turtle.

by

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Satellite tracking technology promises to provide world-wide monitoring of sea turtle migrations. Prototype transmitters designed for use with the ARGOS Service, have been procured from two different manufacturers, and packaged for use with sea turtles.

Several adult Kemp's ridley sea turtles were tagged at Rancho Nuevo during the 1984 nesting season using prototype tags. Results from these experiments will be presented, along with a physical description of existing tags and potentially improved models.

VI.2. Overview of Distribution of Juvenile and Sub-Adult Kemp's Ridley Sea Turtle: Preliminary Results from the 1984-1985 Survey.

by

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Juvenile life stages of Kemp's ridley sea turtle are widely distributed throughout the coastal waters of the United States from Texas to New England. For the most part, these individuals could be described as post-pelagic "yearlings" that have left the epi-pelagic, first year habitat, for the nearshore benthic habitat to forage primarily on motile forms of crustaceans such as portunid crabs. Historical records from the turn of the century characterize the ridley as a common inhabitant of North Carolina bays and estuaries. Kemp's ridley was the second most abundant sea turtle caught in the Cedar Key, Florida, turtle fishery, but this may reflect the bias of the fishermen for the green sea turtle.

Following the drastic decline in the size of the Rancho Nuevo, Mexico, rookery over the past several decades, a similar decrease in numbers of juveniles and sub-adults in our coastal waters would be expected. Preliminary surveys conducted in the northern Gulf of Mexico substantiate that this is the case. However, remarkable occurrences of unusual numbers of juvenile ridleys captured in relatively restricted areas have been recently reported in Louisiana, Alabama and, to some extent, in northwest Florida. In two cases, the most significant biological factor associated with these frequent captures was the abundance of portunid crabs. In some cases, cold-stunned individuals were obtained from both coasts of Florida following episodes of severe winter temperatures. All records of ridleys collected or observed, weighed and measured, and tagged and released are presented. Anecdotal information from various informants and miscellaneous observations are summarized. Problems associated with collecting sufficient data to make population estimates are discussed. Capture methods are described and their efficacy rated according to size of turtle captured and habitat zone sampled.

VI.3. Observations on Distribution, Growth and Survival of Captive-Reared, Tagged and Released Kemp's Ridley Sea Turtle (Lepidochelys kempi) from Year-Classes 1978-1983.

by

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Efforts are underway to increase the number of Kemp's ridleys in the wild through "imprinting", captive-rearing, tagging and release in hopes of establishing a new nesting beach on the Padre Island National Seashore near Corpus Christi, Texas. This is the primary goal of the Kemp's Ridley Sea Turtle Head Start Research Project.

During the first six years of the project, 8,241 Kemp's ridleys were head started, tagged and released into the Gulf of Mexico. As of September 1985 there had been 384 reported recoveries distributed from the east coast of Mexico, throughout the U.S. coast of the Gulf of Mexico, along the east coast of the U.S. as far north as New York, and from France and Morocco. Reported information indicates that growth of the tagged-released turtles has been slower than that of those reared in captivity. The recovery data indicate that Kemp's ridleys that leave the gulf and enter the Atlantic Ocean survive and grow. Recovery data are compared with distribution records in the historical literature and with sea turtle stranding data, and a second, "old world" nesting site is re-inferred, as originally proposed by Archie Carr in the 1950's.

VI.4. Distribution and Abundance of Kemp's Ridley Sea Turtle, *Lepidochelys kempi*, in Chesapeake Bay and Nearby Coastal Waters.

by

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Immature Kemp's ridley sea turtles, *Lepidochelys kempi*, are found on the entire Atlantic Coast of the U.S., while adults are conspicuously scarce. Ridleys in the 30-45 cm straight-line carapace length range migrate annually to Chesapeake Bay to forage, primarily on blue crabs, *Callinectes sapidus*. Differences in prey items and habitat effectively partition ridleys from co-occurring immature loggerheads, *Caretta caretta*. Ridleys inhabit extensive grass beds (*Zostera marinus* and *Ruppia maritima*) and shoal areas in the lower bay, while the loggerheads tend to occupy deeper channels and orient toward river mouths. The extent of the grass bed utilization by ridleys throughout the entire bay has not been elucidated. Both species must leave the bay before cold winter temperatures render the bay and nearshore Atlantic waters uninhabitable, and evidence favors overwintering areas south of Cape Hatteras, North Carolina. There is no evidence of hibernation in Chesapeake Bay or the mid-Atlantic Bight, and bottom water temperatures of 1^{o}-4^{o}C seem to preclude successful brumation.

Abundance of Kemp's ridley is difficult to assess by aerial survey due to this species' small size and coloration which blends with the aquatic background. However, abundance can be extrapolated by other means. From 1979 through 1985, among the live and dead sea turtles observed, there were 540 loggerheads and 54 ridleys (10% of the number of loggerheads). Loggerhead abundance in the lower bay is conservatively estimated from aerial surveys to be 2,000-3,000 individuals per summer. It seems prudent to extrapolate to ridleys by applying this 10% multiple to the loggerhead estimate, thus deriving an estimate of 200-300 animals in the ridley population occupying the lower bay per summer.

The paucity of adult records along the Atlantic coast, the apparent good health of the immature specimens captured, and the autumn southern migration lend support to the conjecture that Atlantic coastal ridleys are not waifs and may eventually return to the Gulf of Mexico. In view of the low estimates of the number of adult Kemp's ridley, managers need to be aware of considerable numbers of ridleys that are regularly found on the east coast of the U.S., and we need to determine the contribution these juveniles make to the population. I consider the Atlantic stock of Kemp's ridley a significant portion of the genetic reservoir of the species.

VI.5. Dermatoglyphic Patterns on Kemp's Ridley Sea Turtle Flippers: Can They Be Used to Identify Individuals?

by

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Dermatoglyphics patterns encompass the configurations formed by dermal ridges on the palms, fingers, toes, and soles of all primates. Fingerprints are the most widely known example. As applied to sea turtles, dermatoglyphic patterns are those formed by scales and intervening spaces between them on the tops and bottoms of front and rear flippers. These patterns can be replicated, examined and compared as flipper-prints.

Impressions of flippers of 50 yearling Kemp's ridley sea turtles, Lepidochelys kempi, of the 1984 year-class were made in moist clay, then reproductions (positives) were cast in plastic. The methods and materials used were those of the franchise called "PATTY CAKES", which makes plastic reproductions of hand-prints and foot-prints of human infants. Plans are to photograph these reproductions or to digitize, store and enhance them by computer, so they can be compared. Selected flipper-prints are compared visually.

VII.1. Captive-Reared Kemp's Ridley Sea Turtle Data Base Management.

by

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Effective care of Kemp's ridley sea turtles, Lepidochelys kempi, held in captivity for head starting depends in part on collection and maintenance of complete and accurate records covering many aspects of the turtles' life during that period. Growth, environmental and other data types have been collected and archived since the inception of the head start project and are reviewed. The methods of collection of data have varied with less emphasis placed on data collection in the early years of head starting compared to recent years. This was due to the emphasis in early years on learning about the husbandry of Kemp's ridley.

With increasing opportunities for research, data management by computer has played an esential role in recent years, and the efficiency of collection, management, and subsequent analyses of data has improved dramatically. Due to the dynamic needs of researchers, however, there is no complete system in place to manage all data aspects. Reviewed is the monthly system currently in use that tracks the turtles' status, obtains random samples for purposes of measuring, and manages and presents those data. Frequent review and modification of computer-based data management systems are required until such time as the raising of sea turtles in captivity becomes routine.

Involved in the efforts to save Kemp's ridley sea turtle from extinction are various federal, state, and private organizations, each with its own tasks and data needs. With few exceptions, regular and routine communication and sharing of data among these entities would make the best and widest possible use of the information and data. As each of these entities' is different, the needs for exchanging data may vary. The advantages and disadvantages of "centralized" versus "distributed" data management are discussed.

VII.2. Sea Turtle Data Base Management: Application to Kemp's Ridley Sea Turtle.

by

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The Fishery Analysis Division of the National Marine Fisheries Service, Southeast Fisheries Center, Miami Laboratory is responsible for maintaining and managing several data bases which contain information on marine turtles. Data applicable to Kemp's ridley sea turtle are found in three data bases: (1) tagging/recapture; (2) stranding; and (3) Western Atlantic Turtle Symposium (WATS). The tagging/recapture data base contains release records of tagged turtles and all subsequent reported recaptures. The stranding data base contains records of stranded turtles reported through the Marine Mammal and Sea Turtle Stranding and Salvage Network. Data included in the WATS data base were collected from countries throughout the Caribbean basin and summarized for the WATS symposium held in 1983 in San Jose, Costa Rica. Keeping these three data bases current and maintaining their validity are largely dependent upon receiving timely and accurate records from the many sources which provide data for input. Current status of each data base is discussed.

VIII.1. Evolutionary Relationships, Osteology, Morphology and Zoogeography of Kemp's Ridley Sea Turtle.

by

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Kemp's ridley (Lepidochelys kempi) is a member of the subfamily Carettinae of the family Cheloniidae. The genus includes two species, L. kempi and L. olivacea, and the subfamily also includes Caretta caretta and certain fossil forms. It should probably also include Eretmochelys imbricata. The two species of Lepidochelys are considered distinct at the species level on the basis of meristic differences in scutation, proportional differences in components of the skull and carapace, and no evidence of intergradation despite the presence of both species in the Atlantic system.

Osteologically, L. kempi is of interest in that the carapace is more completely ossified than that of other living cheloniids, with the intercostal fontanelles closing completely with maturity and the plastral fontanelles reduced to a small area around the entoplastron. Furthermore, the peripheral bones near the middle of the series on each side are unusually well-developed and wide, so that the overall carapace shape is almost circular -- in many juveniles, the carapace is actually longer than wide. Zangerl argues that the small adult size, well-ossified carapace, and circular form are primitive characteristics, typical of early sea turtles lacking advanced marine specializations. However, Kemp's ridley is actually a highly migratory species, well adapted for marine life, and the broad and well-ossified shell, far from being primitive, may be widened and reinforced so that the animal can use the sides of the shell for closure of the nest. The vigorous lateral rocking of the female during nest closure is a very conspicuous trait, and one peculiar to Lepidochelys.

Lepidochelys kempi and its congener show more neural bones than any other living turtles. The primitive series of around eight neural elements is increased, usually by transverse division of individual elements, to as many as fifteen. Few fossil turtles show this feature; indeed, it is only known in the extinct cheloniids, Glyptochelone suycherbuyki and Procolpochelys grandaeva, from the Cretaceous and the Miocene, respectively, and conceivably was monophyletically derived in all these forms. The function of this developement, if any, is unknown. Possibly the additional neural elements were introduced to reinforce the vertebral tubercles typical of half-grown Lepidochelys (though absent in adults). Certain fossil toxochelyids (e.g., Prionochelys and Ctenochelys) are known in which the vertebral tubercles were extremely well developed, and each bore an additional, seemingly neomorphic, "epithecal" bone at the tip.

Another unique feature of Lepidochelys is the extraordinary development

of the Rathke's glands, present in the inguinal region of many turtles, but present as a series of glands whose outlets penetrate each of the four inframarginal scutes on each side in Lepidochelys. The function of these glands is still certain, and their product has not been adequately analyzed, but it has been speculated that they may play a role in olfactory detection of conspecific turtles in the area, which in turn may assist in the coming-together of animals in the extraordinary simultaneous nesting assemblages or arribadas for which this genus is famous.

Kemp's ridley only nests in the western Gulf of Mexico, with virtually all nesting occurring in central to southern Tamaulipas. Adults apparently spend their lives in the gulf, but juveniles are not infrequently encountered in US Atlantic waters, and even as waifs in western Europe. However, the species apparently fails to enter the Caribbean. The congeneric L. olivacea, widespread on mainland costs of the Indian and Pacific Oceans, also occurs in West Africa and the Guianas, from where occasional individuals swim as far west as the Lesser Antilles. No major geographic variation has been documented between L. olivacea populations in the three oceans where it occurs, constituting an example of the curious phenomenon that sometimes oceans seem to be more trenchant barriers than continents in sea turtle zoogeography.

VIII.2. Growth and Survival of the 1984 Year-Class of Kemp's Ridley Sea Turtle in Captivity.

by

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Kemp's ridley sea turtles, Lepidochelys kempi, of the 1984 year-class were received as hatchlings from the National Park Service in July 1984, and were reared in captivity at the National Marine Fisheries Service, Southeast Fisheries Center, Galveston Laboratory in Galveston, Texas.

A feeding experiment involving three treatments was conducted between 22 August 1984 and 28 March 1985. The food was a floating, pelleted diet (a modified trout chow). The treatments included two levels of feeding, the higher level maintained at roughly 1.7 times the lower. At the higher level, two feeding frequencies were tested, once-daily vs twice-daily, and at the lower level, only once-daily feeding was tested. For twice-daily feeding, the daily ration was divided into two equal portions, one fed in the morning and the other in the afternoon. For once-daily feeding, the daily ration was fed in the morning. Treatments were tested in a randomized block design, using raceways as replications. The clutch effect was spread over raceways by distributing parts of clutches between two or among three raceways.

Increases in individual weight (W, in g) and in biomass (B, in kg) of turtles with age (T, in days) were used as measures of response to the treatments. Biomass was the multiple of sample average weight and number of surviving turtles.

Responses to treatments were represented by the exponents b and b' of exponential models $W = aT^b$ and $B = a'T^{b'}$, in which parameters a, b, a' and b' were estimated by applying rectilinear regression analyses to logarithmically transformed variables W, B and T. Thus, b and b' were indices of the rates of increse in individual weight and biomass.

Rates of growth and increase in biomass were most rapid at the higher level of feeding combined with twice-daily feeding, intermediate at the higher level of feeding once-daily, and lowest at the lower level of feeding once-daily. Final weights of individuals and biomass of aggregates of turtle were also examined as measures of response to treatments. Gross food conversion ratios (weight of food provided:weight gained) also were examined for each treatment in an attempt to determine the optimum level and frequency of feeding. The sample size required for detecting differences between means of logarithmically transformed weights was determined.

VIII.3. Health Care and Diseases of Captive-Reared Loggerhead and Kemp's Ridley Sea Turtles.

by

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Many of the diseases and injuries observed in captive-reared loggerhead (Caretta caretta) and Kemp's ridley (Lepidochelys kempi) sea turtles were named and classified into 27 major categories. During 1977 to 1983, the turtles were reared for one year or less at the National Marine Fisheries Service, Southeast Fisheries Center, Galveston Laboratory. The categories of ailments were: sudden hatchling death syndrome, papillary dermatitis, emaciation, focal erosive dermatitis, injuries from aggressive

biting, focal dermal granulosis, scolecobasidiosis, white-suture syndrome, yolk-sac mycosis, internal nodular mycosis, hypernecrotic warts, malabsorption of yolk sac, urolithiasis, duodenal ulceration, hemorrhagic bacteriosis, mycobacterial pneumonia, swollen-eye, intussusception, curved-back, soft shell, coelomic edema, lung aplasia, flipper malformation, cross-beak, congenital blindness, intestinal prolapse, and prolapse of the urinary bladder. Each category of ailment is described with respect to etiology, symptomatology, occurrence, and suggested remedy if known. Current levels of our knowledge of diagnosis and control of diseases during captive-rearing of these two species of turtle are discussed. Recommendations are made on perspectives and needs in sea turtle pathology research.

VIII.4. Carapacial Scute Pattern Variations in Hatchlings of Kemp's Ridley Sea Turtle (Lepidochelys kempi).

by

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All genera of cheloniid sea turtles have been shown to possess carapacial scutation patterns which vary from their respective modal conditions. The genus Lepidochelys exhibits the greatest amount of carapacial scute pattern polymorphism of all living turtles.

The authors collected and analyzed scute pattern data from 4,419 living and dead Kemp's ridley sea turtle (Lepidochelys kempi) hatchlings of the 1981 year-class from Rancho Nuevo, Mexico, and 1,507 of the 1980 year-class from those head started at Galveston, Texas. Turtles examined came from nests which had been incubated in situ, in nests replanted to corrals, and from nests replanted to styrofoam boxes. Of the total number of hatchlings analyzed from Mexico, 874 were incubated under special conditions as part of the joint U.S./Mexican effort to establish a nesting colony of Kemp's ridley to the Texas coast.

Variation from the normal scute pattern for Kemp's ridley (i.e., 13 pairs of marginal scutes, 5 pairs of costal scutes, and 5 vertebral scutes), was found in turtles from all incubation environments. The frequency (in percent) of normal scute patterns was dependent upon incubation conditions, and ranged from 41.6% to 60.2% in the live hatchlings, and from 25.9% to 68.2% in the dead hatchlings.

Historic records and observations by the authors indicate a lower frequency of scute anomalies in adult Kemp's ridleys, suggesting that turtles with certain abnormal scute patterns undergo selective mortality prior to reproductive maturity.

Possible sources of variation including temperature, moisture, nest translocation method, egg handling, and heritability will be discussed, as well as the implications of our findings on current Kemp's ridley sea turtle management and conservation techniques.

VIII.5. Morphometry of Captive-Reared Kemp's Ridley Sea Turtle.

by

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Morphometry and growth were characterized for head started Kemp's ridley sea turtles (Lepidochelys kempi) from the 1984 year-class. Straight-line carapace and plastron length and width measurements were taken biweekly from 100 hatchling through yearling turtles from nine clutches from August 1984 through May 1985. Growth rate and anatomical growth pattern were described through analysis of morphometric and weight data. Carapace and plastron dimensions were analyzed by clutch, feeding rate and raceway location. Regression equations were developed for carapace and plastron length-width relationships. Condition factor statistics were determined and compared across time, clutch and feeding rate variables.

VIII.6. A Report on Attempts to Breed Kemp's Ridley Sea Turtle, Lepidochelys kempi, in Captivity.

by

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Four (2 male and 2 female) adult Kemp's ridley sea turtles, Lepidochelys kempi, were kept under controlled laboratory conditions for one year at the University of Texas Marine Science Institute. During this time, the animal serum androgen (testosterone) and estrogen (estradiol) levels and breeding behavior were monitored. A significant increase in serum estradiol was noted in one female, simultaneous to the males' attempts at breeding with this individual. An increase in serum testosterone levels of the males prior to the increase in female serum estradiol levels was noted. The significance of these changes relative to the breeding biology of this species is discussed. The breeding behavior of this species coincides with published accounts of turtles breeding in the wild. A video record of the apparent unsuccessful breeding activity will be presented.

VIII.7. Attempts at Breeding Kemp's Ridley Sea Turtle at Miami Seaquarium.

by

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A breeding program for the Kemp's ridley sea turtle (Lepidochelys kempi), the most highly endangered species of sea turtle, was initiated in order to investigate its breeding behavior and in hopes of inducing successful reproduction of these animals in captivity. A small population of Kemp's ridley (four adults and four subadults) maintained at the Miami Seaquarium, Miami, Florida, was observed from February to August, 1984. Breeding behavior was exhibited by the adult males, but no successful mating occurred during 1984. During 1985, two adult females were held with two-four males, but again no nesting was observed although eggs were found in the water.

VIII.8. Captive Rearing and Breeding Kemp's Ridley Sea Turtle at Cayman Turtle Farm (1983) Ltd.

by

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Cayman Turtle Farm received 96 captive-reared yearling Kemp's ridleys in July 1980. They were fed pelleted rations ranging from 35% to 45% protein. Average weight of the turtles increased from 0.98 to 20.2 kg in 55 months. In 1984, at least three of the five-year-old females became sexually mature. Two of these females nested, and three hatchlings were produced, but survived only 3-4 days.

HOW TO ORDER THE PROCEEDINGS

Plans are to publish the Proceedings in 1986. Additional copies of the Proceedings may be ordered by sending check or money order, made out to the Kemp's Ridley Sea Turtle Symposium, to:

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