Abstracts Captive Rearing for Research and Conservation II

February 1, 2019, ISTS 39, Charleston, South Carolina

Charleston, Marriott------ Emerald 1 Room

Conveners: Jeanette Wyneken and David Owens

Background:

Sea turtle species, with the exception of the leatherback, are not difficult to "keep alive" in captivity. In fact, turtle farms, aquaria and zoos have held sea turtles for decades. Unfortunately, upon careful inspection, these animals are often found to be in very poor health and only just alive. The high cost of maintenance, the need for skilled veterinary care and the challenges of providing a proper diet are all key drawbacks. Questions regarding behavioral alterations due to captivity are also important. These topics and many other considerations will be covered. After years of trial and error, and at a high cost, a few labs are now consistently able to produce very healthy animals that are being used for research and conservation studies. Many successful experiments have now been published supporting this research strategy. Literally hundreds of projects ranging from TSD studies, imprinting, head starting, orientation, captive reproduction, sensory biology, oceanic and coastal migration and many others have documented the value of this research paradigm using captive reared sea turtles. Experienced investigators will discuss what they have learned from captive reared animals, what the current limits are with this type of research and what have been their key problems. Important comparisons between captive and wild research animals will be offered. Each talk will include ample time for questions and discussion.

Expected Outcomes

Rearing sea turtles in captivity should not be undertaken without careful consideration of conservation and research options. We will make this case, document the short comings and show the potential for valuable studies under carefully controlled conditions. For individuals considering such studies or wanting to share their experiences (positive and negative) we think this Workshop will be of value.

0800 Workshop Introduction and Plan

A Brief History and Some Insights on the Use of Captive Reared Sea Turtles for Research and Conservation

David Owens
University of Charleston SC at the College of Charleston

Early turtle research, including US government commercial trials, actually involved the estuarine *Malaclemys terrapin* the Diamondback Terrapin. While somewhat successful, and with several resulting publications, the projects were mostly terminated by 1947. Dr. Carr also reported on early, apparently unsuccessful, attempts at green turtle farming at Union Creek in the Bahamas.

Over several decades of sea turtle research 5 MS and 9 PhD students from our labs have conducted all or part of their research on captive reared animals. In the early years of captive rearing in the US, we did not always have the best of facilities to provide the best care for captive animals. In public aquaria for example, diseases such as steatitis were known to occur due to over feeding of fatty fish. In the 1970s with the advancement of diets and improved veterinary care, many sea turtle culture problems became better understood. In addition, the introduction of federal and state permitting systems and supervisory Animal Care Committees, with legal oversight responsibilities, fostered a large improvement in the welfare of captive animals. The key criteria which must be carefully monitored and controlled are water quality, water temperature and animal nutrition. Many other finer points of husbandry (social, behavioral, photoperiod etc.) are also now better understood and most importantly, are often unique to each of the seven sea turtle species. As an example, the Kemp's ridley has very different physiological and behavioral adaptations compared to green turtles and these need to be considered in their captive maintenance. Unfortunately, these species differences are not well documented in the literature. Finally, we have learned a lot about sea turtles from the study of captive animals including: a great deal about nutrition, sensory biology, reproductive physiology, stress, and sex differentiation. Many of these insights also contribute to our recent successes in the conservation of these species in the wild. Because of the development of captive breeding programs for some sea turtle species and their ease of reintroduction to the wild, it can be argued that these species are unlikely to ever actually go extinct.

An unfortunately negative aspect of raising sea turtles in captivity is that some well-meaning projects or even some projects with a profit motivation are using many harmful procedures and inaccurate educational protocols resulting in no scientific or conservation value. Negative results include strongly skewed sex ratios, poor incubation success, high disease levels in captivity, poor timing and location for animal release, inappropriate human habituation and misinformed observers and tourists. As a consequence of poor planning, many of these projects are of no conservation value and should be discouraged.

0845

Rearing Sea Turtles for Research to Address Key Data Gaps

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Young sea turtles, with the exception of leatherbacks, are not difficult to raise in captivity. Turtle farms, aquaria and zoos have held sea turtles for decades. Yet, the quality of care can vary greatly and sound care is essential to have healthy, normal animals when addressing fundamental questions that cannot be answered with wild turtles. Only healthy animals can exhibit normal behavior and growth. Recognizing normal vs. abnormal growth can be challenging, but a review of at-sea sightings and investigations in museum collections can be helpful. Captive rearing is expensive and requires skilled caretakers, as well as skilled veterinary care, and the challenges of providing species- and life-stage- appropriate diets are fundamental.

Here we present an overview of our approach to raising neonate *Caretta caretta, Chelonia mydas, Natator depressus* and *Dermochelys coriacea*. We discuss the common components to our husbandry and feeding support, and the special changes we made to accommodate species-specific needs.

The context for considering raising turtles for research is now robust. Many successful studies now are possible because of sound husbandry techniques and studies now being published are supporting this research strategy. Literally hundreds of projects, ranging from eco-physiology to TSD studies, morphology, and behavior (such as imprinting, orientation, and sensory biology) are possible because of access to many similar sized animals with known histories. Additionally, testing of novel techniques ranging from tracking oceanic stage turtles to testing fisheries mitigation measures. Head starting and captive reproduction tend to have more restricted applications. Together the procedures and examples document the value of the captive rearing paradigm for research.

0930

Studies of Reproduction in Captive and Wild Kemps Ridley Sea Turtles

David C. Rostal
Georgia Southern University

ABSTRACT. – Captive breeding provided an opportunity to delineate the reproductive cycle of the Kemp's ridley sea turtle (*Lepidochelys kempii*) and provide a better understanding of the wild

population. The reproductive cycle of captive *L. kempii* living under semi-natural conditions was studied at the Cayman Turtle Farm (1987 -1988). Captive male *L. kempii* displayed a prenuptial rise in serum testosterone four to five months prior to the mating period (March) during which testicular recrudesence and spermatogenesis occurs. Male testosterone then declined sharply during the mating period. Captive female testosterone, estradiol, and total calcium rose four to six months prior to the mating period during which ovarian maturation and follicular growth were observed. Female testosterone and estradiol levels then declined during the nesting period (April to July) as ovarian follicles were ovulated and eggs were produced. Female estradiol is involved in stimulating vitellogensis. Total calcium was correlated with the period of vitellogenesis as determined by gel electrophoresis and ultrasonography. Serum thyroxine fluctuated seasonally with elevated levels observed in females associated with the period of vitellogenesis. The wild population of Kemp's ridley sea turtle nesting at Rancho Nuevo was studied from 1988 to 1990. Based on tagging results, *L. kempii* was reported to nest 1.3 to 1.5 times per season. These estimates are significantly less than any other sea turtle species. Serum testosterone levels were observed to decline over the course of the nesting season in a manner similar to that observed in *Chelonia mydas* and *Caretta caretta*. Ultrasonography was used to monitor ovarian condition and correlate reproductive status with plasma testosterone levels. The results of these studies confirmed that *L. kempii* actually nests 3.0 times per season and demonstrates equally high fecundity to other sea turtle species. Nesting in the captive study group corresponded with nesting in the wild population at Rancho Nuevo (April to July). Female endocrine cycles during the nesting period were similar to those observed in the wild population. These results further assisted in understanding the reproductive biology of the closely related olive ridley (*Lepidochelys olivacea*).

1015 Break

1045

Cayman Islands Sea Turtle Conservation and Research Centre

Walter Mustin
Cayman Turtle Centre: Island Wildlife Encounter

In 2018 the Cayman Turtle Conservation & Research Centre marked its 50th anniversary, fifty years that included changes of name, changes in direction, and changes in ownership. What didn't change was a steady stream of meaningful research projects and publications underpinned by initiatives that have proven successful in the conservation of sea turtles.

Those contemplating captive culture of sea turtles need consider the significant long-term capital and human resources required. Site location of adequate elevation, legal permitting, access to high quality water, redundancies in power and pumping systems, skilled full-time labor, Veterinary oversight, quarantine capability, access to appropriate feed, and functional tank layouts insuring bio-security are among the issues involved. Facilities in areas lacking specialized laboratory services can still conduct state of art research provided collaborative institutions are engaged and the CITES restrictions related to the transport of samples are understood and respected. Captive turtle facilities can provide powerful educational outreach that furthers turtle conservation goals.

1115

Tentative title

Captive Rearing: Some Values, Some Needs and Some Future Opportunities

Selina Heppell

Fisheries and Wildlife, Oregon State University**.**

Group discussions

1200 Conclusion