

ALLIANCE OF MARINE MAMMAL PARKS AND AQUARIUMS

Dedicated to Conservation through Public Display, Education and Research

Compilation of Research Projects by Member Facilities

Completed

Edited 2004

418 North Pitt Street
Alexandria, Virginia 22314

Facility Chicago Zoological Society

Project ID AMMPA -1-1

Project Name Systematic Study of Social Relations Among Seven Seas Dolphins

Project description Although there is extensive literature on the social behavior of dolphins, until recently few studies have employed systematic observation techniques. The goals of this study are to:

- * develop systematic techniques for the study of dolphin behavior, and to utilize these techniques to provide quantitative analyses of the form, function, and social context of behavior interactions.
- * monitor social relationships and provide up-to-date information for use in planning and evaluating management procedures.
- * utilize observation techniques to enhance the study and interpretation of the behavior of difficult-to-see dolphins in the wild.
- * investigate relationships between hormones and behavior, and provide essential information for successful breeding.
- * investigate the development, functions and social contexts of signature whistles and whistle mimicry.

Investigators Amy Samuels, Tara Gifford

Institutions Chicago Zoological Society

Start Date

Project Status Completed

Project reports

Facility Dolphin Connection

Project ID AMMPA -2-1

Project Name Tooth aging in dolphins: Possible contributions for captive animals

Project description To assist in understanding and interpreting growth layers in dolphin teeth as a means of determining age, supporting data collected from free-ranging dolphins in Sarasota Bay, Florida

Investigators Aleta Hohn

Institutions NMFS

Start Date 1994

Project Status Completed

Project reports

Facility **Dolphin Connection**

Project ID AMMPA -2-2

Project Name Preliminary study of contaminant levels in the blood and milk of bottlenose dolphins

Project description Collection of preliminary data to help to establish a long-term study to monitor the transfer and buildup of contaminants within the Sarasota dolphin population

Investigators Jocelyn Vedder

Institutions Univ. of California Santa Cruz

Start Date 1994

Project Status Completed

Project reports "Levels of Organochlorine Contaminants in Milk relative to Health of Bottlenose Dolphins (Tursiops truncatus) from Sarasota, Florida", Master of Science thesis, University of California Santa Cruz

Facility **Dolphin Connection**

Project ID AMMPA -2-3

Project Name Signature whistle development in young dolphins

Project description Contributions to a long-term study on the development and the social and behavioral roles of signature whistle development of young dolphins.

Investigators D. Reddish, P. Tyack

Institutions Woods Hole Oceanographic Institution

Start Date 1993

Project Status Completed

Project reports none

Facility **Dolphin Connection**

Project ID AMMPA -2-4

Project Name Effects of stress on the dolphin immune system

Project description Examine comparative stress levels as indicated through blood parameters between non-stress captive animals and free ranging animals with environmental induced stress

Investigators David Ferrick: R. Wells

Institutions Univ. of California, Davis; Chicago Zoological Society

Start Date 1993

Project Status Completed

Project reports none

Facility **Dolphin Connection**

Project ID AMMPA -2-8

Project Name Behavioral parameters in a breeding population of Tursiops truncatus

Project description To determine the presence of alloparental care within a breeding group of bottlenose dolphins

Investigators Cheryl Messinger
Doug Messinger

Institutions Dolphin Connection

Start Date 1992

Project Status Completed

Project reports "Induced lactation in a five-year-old bottlenose dolphin"
International Marine Animal Trainers Association, 1999
Conference

Facility **Dolphin Connection**

Project ID AMMPA -2-10

Project Name Seasonality of reproduction in bottlenose dolphins

Project description Study aimed at identifying the peak birth periods of bottlenose dolphins based on geographic location

Investigators Kim Urian

Institutions Mote Marine Laboratory

Start Date 1995

Project Status Completed

Project reports "Seasonality of Reproduction in Bottlenose Dolphins Tursiops truncatus" K.W. Urian, D.A. Duffield, A.J. Read, R.S. Wells, and E.D. Shell. Journal of Mammalogy, 15 November 1994

Facility **Dolphin Connection**

Project ID AMMPA -2-12

Project Name Thermal profiles of warm water dolphins

Project description To determine the body condition of bottlenose dolphins acclimated to warm water

Investigators Terrie Williams

Institutions Univ. of California, Santa Cruz

Start Date 1993

Project Status Completed

Project reports none

Facility Dolphin Connection

Project ID AMMPA-2-6

Project Name Determination of morphometrics calculations in bottlenose dolphin

Project Description To develop a more accurate means of determining physical data with bottlenose dolphins. The development of a morphometrics calculator that accurately determines body weight of bottlenose dolphins was achieved. The computer program is now available to all facilities that care for bottlenose dolphins via the Internet and is used to compile field data on stranded animals.

Investigators Cheryl Messinger and Doug Messinger

Institutions The Dolphin Connection, Inc. and Outernet Technologies

Start Date 1999

Project Status Complete

Project Reports

- "Determining morphometric accuracy in *Tursiops truncatus*" International Marine Animal Trainers Association, 1999 Conference. The development of a morphometrics calculator that accurately determines body weight of bottlenose dolphins was achieved. The computer program is now available to all facilities that care for bottlenose dolphins via the Internet and is used to compile field data on stranded animals .

Facility Dolphin Connection

Project ID AMMPA-2-9

Project Name Lupron depot suspension trials for contraception in Atlantic bottlenose dolphins

Project Description Development of a reversible contraceptive in male Atlantic bottlenose dolphins. This technique is proven safe and is now widely used to assist in the reproductive management of bottlenose dolphins.

Investigators Mike Briggs; D. Messinger; C. Messinger

Institutions Chicago Zoological Society; Dolphin Connection

Start Date 1995

Project Status Complete

Project Reports

- "Behavioral conditioning of *Tursiops truncatus* for voluntary participation in a reproductive management plan" International Marine Animal Trainers Association, 1995 conference
- "Effects of leuprolide acetate in depot suspension on testosterone levels, testicular size and semen production in male Atlantic bottlenose dolphins," International Association for Aquatic Animal Medicine, 1995 conference
- "Birth control in bottlenose dolphins," Bottlenose Dolphin Reproduction Workshop, San Diego, CA, 1999
- This technique is proven safe and is now widely used to assist in the reproductive management of bottlenose dolphins.

Facility Dolphin Connection

Project ID AMMPA-2-11

Project Name Semen Cryopreservation and reproductive endocrinologic characterization of the bottlenose dolphin

Project Description To development an artificial insemination program with bottlenose dolphins in a public display facility
Investigators Todd Robeck
Institutions SeaWorld Texas
Start Date 1997
Project Status Inactive

Facility Dolphin Connection
Project ID AMMPA-2-13
Project Name Dolphin cerebral hemodynamics with transcranial doppler ultrasound

Project Description Determine if transcranial Doppler ultrasound is capable of measuring blood velocity in the cerebral arteries or rete of the living dolphin. Furthermore, to investigate the differences in cerebral hemodynamics between the in-water and out-of-water state
Investigators Cole Giller; C. Messinger; C. Mesinger
Institutions Univ. of Texas; Dolphin Connection
Start Date 1997
Project Status Inactive

Project Reports

Facility Dolphin Connection
Project ID AMMPA-2-14
Project Name Development of an underwater recording system to document bottlenose dolphin behavior and vocalizations.

Project Description To develop a more accurate means of documenting a possible correlation between bottlenose dolphins physical and vocal behavior displayed in marine mammal facilities and in the wild. The recording system field tested in our facility will be further incorporated into behavioral studies with wild populations of bottlenose dolphins. This project provides a significant contribution to understanding the relationship between physical and vocal behavior in the species.

Investigators John R. Buck, Ph.D., Keenan Ball
Institutions The School of Marine Science and Technology, University of Massachusetts Dartmouth, Dolphin Connection
Start Date 2002
Project Status Complete

Project Reports

- Professional paper to be submitted to The Journal of the Acoustical Society of America. The recording system field tested in our facility will be further incorporated into behavioral studies with wild populations of bottlenose dolphins. This project provides a significant contribution to understanding the relationship between physical and vocal behavior in the species.

Facility The Dolphin Experience
Project ID AMMPA-4-2
Project Name Biomechanics of diving in free-ranging bottlenose dolphins

Project description During a dive marine mammals must balance on-board oxygen reserves with the rate of oxygen utilization. The more efficient a diver, the longer the mammal had available to forage. This project examines behavior strategies used by

dolphins to extend submergence time. Videotaped sequences of dolphins performing sequential dives are analyzed for biomechanical "tricks" such as burst-and-glide swimming, extended glide sequences and buoyancy control.

Investigators Randolph Skrovan, Terrie Williams, Patrick Berry, Patrick Moore, R. Davis

Institutions Univ. of California, Santa Cruz

Start Date 08/96

Project Status Completed

Project reports Skrovan, R. C., T. M. Williams, P. S. Berry, P. W. Moore and R. W. Davis. 1999. The diving physiology of bottlenose dolphins (*Tursiops truncatus*) II. Biomechanics and changes in buoyancy at depth. *J. Experimental Biology* 202:2749-2761

Facility **The Dolphin Experience**

Project ID AMMPA-4-3

Project Name Thermoregulation during swimming and diving in the bottlenose dolphin

Project description Heat transfer from the periphery is an important thermoregulatory response in exercising mammals. However, when marine mammals submerge, peripheral vasoconstriction associated with the dive response may preclude heat dissipation at depth. To determine the effects of exercise and diving on thermoregulation in cetaceans, we measured heat flow and skin temperatures of bottlenose dolphins (*Tursiops truncatus*) trained to follow a boat and to dive to 15m. There is some flexibility in the balance between thermal and diving responses of dolphins. During high heat loads, heat transfer may momentarily increase during submergence. However, the majority of excess heat in dolphins appears to be dissipated upon resurfacing, thereby preserving the oxygen conserving benefits of the dive response.

Investigators D. Noren, T. Williams, P. Berry, E. Butler

Institutions University of California Santa Cruz, The Dolphin Experience

Start Date 8/96

Project Status Completed

Project reports Noren, DR, TM Williams, P Berry and E Butler. 1999. Thermoregulation during swimming and diving in bottlenose dolphins (*Tursiops truncatus*). *J Comparative Physiology Biology* 169:93-99

Facility **The Dolphin Experience**

Project ID AMMPA-4-4

Project Name Thermoregulation during diving in bottlenose dolphins

Project description The diving response of marine mammals is comprised of bradycardia (decreased heart rate) and peripheral vasoconstriction. Although these physiological responses

assist in oxygen conservation, they are in direct conflict with the animals' thermoregulatory responses. To determine how dolphins resolve this conflict, scientists have moved their laboratory underwater to measure the skin temperature and heat flow of dolphins during a dive. The results have demonstrated that dolphins act as "aquatic camels" by waiting to dump excess heat when they surface to breathe. This newly described thermoregulatory mechanism may help to explain how marine mammals in general are able to tolerate increased water temperatures that may occur with the predicted warming of the earth's oceans.

Investigators Terrie Williams, Dawn Noren, P. Berry, J. Estes, C. Allison, J. Kirtland

Institutions Univ. of California, Santa Cruz

Start Date 08/95

Project Status Completed

Project reports Williams, T.M., D. Noren, P. Berry, J. A. Estes, C. A. Allison and J. Kirtland. 1999. The diving physiology of bottlenose dolphins (*Tursiops truncatus*) III. Thermoregulation at depth. *J. Experimental Biology* 202:2762-2764.

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-2

Project Name Determination of pollutant residues and component analysis for *Tursiops* milk over time

Project description Four lactating *Tursiops* at the Dolphin Quest Hawaii facility have been trained to voluntarily provide milk specimens to trainers, utilizing a specially developed milk collecting device. Milk specimens are collected daily for analysis of pollutant residues, as well as fat, protein, and other substantive nutrient components. The information generated in this project is critically important in interpreting the significance of analytical results of one-time milk specimens collected from wild dolphins. Milk composition, as well as pollutant concentrations, vary over the extended duration of lactation in dolphins. This unique opportunity of collecting milk from the first week of lactation provides an extremely valuable link in our base of information about this species.

Investigators Sam H. Ridgway

Institutions NOSC

Start Date

Project Status Completed

Project reports

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-6

Project Name Health assessment of indigenous *Tursiops truncatus* within

the bay systems around Beaufort, NC

Project description This multi-disciplinary team captured, examined, collected medical specimens and released bottlenose dolphins from around the Beaufort, N.C. area, for the purpose of conducting a health assessment of this population. Thirty one animals were made available for extensive medical examinations, making possible a determinative assessment of the health of this population as of July, 1995. It also afforded a comparative evaluation of this population to similarly assessed populations in Sarasota, FL, and Matagorda Bay, TX. By establishing this method of health assessment, it will be possible in the future to critically evaluate similar populations undergoing mortality or morbidity events.

Investigators L. Hansen, R. Wells, J. Sweeney, L. R. Stone

Institutions NMFS, Chicago Zoological Society, Dolphin Quest

Start Date 1995

Project Status Completed

Project reports

Facility Dolphin Quest/Waikoloa Marine Life Fund

Project ID AMMPA -5-8

Project Name Assessment of fetal development and later term gestational calf viability in five *Tursiops truncatus*

Project description Monthly diagnostic ultrasound examinations were performed through five pregnancies at the Dolphin Quest facility on the Big Island of Hawaii. Dolphins were trained for voluntary positioning for the procedures. Fetal growth was charted for both skull and thorax diameter. Cardiac development and function were recorded and fetal viability indices were defined and assessed. The information developed in this study makes possible a simple means of determining the gestational age of a *Tursiops* fetus, with application to population assessment studies in the field. It also provides a means of determining fetal viability in the critical third trimester of development.

Investigators L. Rae Stone

Institutions Dolphin Quest

Start Date 1993

Project Status Completed

Project reports Stone, L. R., Johnson, Sweeney, J., and Lewis. (1999). Fetal Ultrasound in Dolphins with Emphasis on Gestation Aging. In M.E. Fowler and R.E. Miller (Eds), Zoo and Wild Animal Medicine: Current Therapy, 4, Orlando, FL: W.B. Saunders Co.

Facility Dolphin Quest/Waikoloa Marine Life Fund

Project ID AMMPA -5-9

Project Name Changes in body composition during gestation in a bottlenose

dolphin

Project description This study characterizes changes in body composition of a pregnant Tursiops truncatus, as measured by changes in total body water (TBW). Such measurements, utilizing deuterium oxide dilution, allow for the calculation of the proportion of lean mass to fat mass, which should change with the differing nutritional demands of gestation. The characterization of the body composition changes in pregnancy is useful in furthering our understanding of the energy budgets of wild dolphins. Furthermore this study contributes to our knowledge regarding the nutritional needs of this species during pregnancy.

Investigators Shannon Atkinson, Molly Lucas

Institutions University of Hawaii

Start Date

Project Status Completed

Reports

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-10

Project Name Upper Gulf of California/Colorado River Delta Biosphere Reserve

Project description This project will establish a plan for management of the upper Sea of Cortez. It addresses the protection of the endangered Vaquita while providing indigenous peoples with assistance in fishing methods, equipment and enforcement capabilities towards assuring continued productivity of the area. The Vaquita is one of the world's most threatened species. The significance of this project, aside from the intent to provide assistance to this particular animal as well as create an overall resource management plan for the area, is the cooperative nature of the effort. This is a multi-disciplinary cooperative effort between Mexican scientists, U.S. public display institutions, and conservation organizations. There is an enormous potential available collectively when private enterprise organizations, particularly those directly involved in the management of similar species, enter into partnerships with conservation organizations, which have the fund raising and manpower resources to work along side of regional scientists and organizations towards a critical ecological need such as this.

Investigators Conservation International Staff

Institutions Conservation International
Dolphin Quest

Start Date 1992

Project Status Completed

Project reports

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-11

Project Name Monk Seal Prey and Nutrition Study

Project description This project studied the Hawaiian monk seals at the five main breeding islands to see if they were feeding on different prey and also if there was a difference in diet among adult male, adult female, and juvenile seals. Once the prey were identified, the next focus was to understand how well the seals digest them and how many calories, proteins, etc. they provided. This project was conducted to attempt to explain the selective starvation seen in the NWHI.

Investigators Shannon Atkinson, Gwen Lowe

Institutions University of Hawaii
Dolphin Quest

Start Date 1996

Project Status Completed

Project reports Manuscripts In Press or In Review- Goodman-Lowe, G.D., S. Atkinson and J.R. Carpenter. In review. Gross anatomy of the gastrointestinal tract of the Hawaiian monk seal, *Monachus schauinslandi*. Mar. Mamm. Science- Goodman-Lowe, G., Carpenter, J.R. and Atkinson, S. In press. Assimilation efficiency of prey in the Hawaiian monk seal. Canadian Journal of Zoology. Goodman-Lowe, G. D., J. R. Carpenter, S. Atkinson, and H. Ako. In prep. Digestibility of amino acids and fatty acids in the Hawaiian monk seal, *Monachus schauinslandi*. Peer-Reviewed Journal Articles and Book Chapters- Goodman-Lowe, G. D. 1998. The diet of the Hawaiian monk seal, *Monachus schauinslandi*, from the Northwestern Hawaiian Islands during 1991-1994. Mar. Biol. 132:535-546. Goodman-Lowe, G., Atkinson, S. and Carpenter, J.R. 1997. Initial defecation time and rate of passage of digesta in adult Hawaiian monk seals. Canadian Journal of Zoology. 75: 433-438. Goodman-Lowe, G., Carpenter, J.R., Atkinson, S. and Ako, H. 1999. Nutrient, fatty acid, amino acid and mineral analysis of natural prey of the Hawaiian monk seals. Comp. Biochem. Physiol. 123A: 137-146. Conference Abstracts- Goodman-Lowe, Gwen D. 1997. "Species composition of cephalopods found in the diet of the Hawaiian monk seal." American Malacological Union. 63rd Annual Meeting, Santa Barbara, CA. Goodman-Lowe, Gwen D. and F. G. Hochberg. 1997. "Taco tastes better than calamari. The cephalopod diet of the Hawaiian monk seal." Albert L. Tester Memorial Symposium, University of Hawaii. Goodman-Lowe, Gwen D. and F. G. Hochberg. 1996. "Cephalopod diet of the Hawaiian monk seal." Western Society of Naturalists. 77th Annual Meeting, Monterey, CA. Goodman-Lowe, Gwen D. 1995. "Adventures of a scatologist: A study of the diet of the Hawaiian monk seal, *Monachus schauinslandi*." Albert L. Tester Memorial Symposium, University of Hawaii. Goodman-Lowe, Gwen D. 1994. "Dietary studies of the Hawaiian monk seal, *Monachus schauinslandi*: adventures in scatology." Western Society of Naturalists 75th Annual Meeting, Monterey, CA. Goodman-Lowe, G, Atkinson, S, Gilmartin, W, and Carpenter, J. 1995. Diet and rate of passage studies on the Hawaiian monk seal. 11th Biennial Conf. Biol. Mar. Mammals.

Facility Dolphin Quest/Waikoloa Marine Life Fund

Project ID AMMPA -5-12

Project Name The Hawaiian spinner dolphin, *Stenella longirostris*: Effects of human activities

Project description This study assessed the impact of human activity on spinner dolphins frequenting Kealahou Bay on the Island of Hawaii. It is known that spinners inhabit near-shore waters during the day for rest from their deep-water night feeding activities. This study worked on determining if recent purposeful human interaction with wild spinner dolphins has any short-term or long-term effects, such as disruption of "critical natural behaviors": resting rhythms, reproduction, and feeding.

Investigators Anna Forest, Bernd Würsig

Institutions Texas A&M University
Dolphin Quest

Start Date 1996

Project Status Completed

Project reports

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-13

Project Name Pilot Study of Vocalizations and Behaviors of Several Cetacean Species off Kona, Hawaii -

Project description Little is known of spinner, spotted, and bottlenose dolphins, pilot whales, false killer whales, and melon-headed whales. This study utilized towed video and audio instruments to gather behavior and vocalization data for baseline information on these and other near-shore Hawaiian species.

Investigators L. Sayigh, P. Tyack

Institutions Woods Hole Oceanographic Inst.
Dolphin Quest

Start Date 1996

Project Status Completed

Project reports Tyack, P.L. In press. Communication and acoustic behavior of dolphins and whales. In: Hearing by whales and dolphins. (W. Au, A.S. Popper, and R. Fay eds), Springer Handbook of Auditory Research Series, Springer Verlag, New York.

Tyack, P.L. 1999. Communication and Cognition. In: Volume 1, Biology of Marine Mammals (J.E. Reynolds III and John R. Twiss Jr. eds), Smithsonian Press, Washington DC.

Sayigh, L.S., P.L. Tyack, R.S. Wells, A. Solow, M.D. Scott, A. B. Irvine. 1999. Individual recognition in wild bottlenose dolphins: a field test using playback experiments. *Animal Behavior* 57:41-50

Tyack, P. 1998. Acoustic communication under the sea. In: *Animal acoustic communication: recent technical advances.* (S.L. Hopp M.J. Owen, and C.S. Evans, eds.), Springer Verlag, Heidelberg, pp 163-220.

Tyack, P.L. and L.S. Sayigh. 1997. Vocal learning in

cetaceans. In: Social influences on vocal development. (Snowdon, C. and M. Hausberger, eds.) pp. 208-233, Cambridge University Press, Cambridge.

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-14

Project Name Vocal Communication in humpback whales

Project description This project investigated communication, behavior, and distribution of the endangered humpback whale using acoustic localization techniques. A series of sonobuoys anchored off the Big Island enabled researchers to locate, identify, and study singing Humpback whales which may be out of visual range. This innovative research aids in understanding context and functions of humpback songs and social interactions, habitat management, and marine environmental conservation projects.

Investigators L. M. Herman

Institutions Univ. of Hawaii
Dolphin Quest

Start Date 1992

Project Status Completed

Project reports

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-15

Project Name Field Survey of Toxin Producing Algae -

Project description This project examined potential biological toxin production in algae of the Kohala coastal environment and studied the changes in toxin production over time.

Investigators Isabella Abbott

Institutions Univ. of Hawaii -Dolphin Quest

Start Date 1989

Project Status Completed

Project reports

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-16

Project Name Clinical Determination of Immune System Function in Dolphins -

Project description A Radial Immuno-Diffusion (RID) Agar Plate procedure for quantitative determination of immune system health of bottlenose dolphins was developed. This clinical procedure greatly assists veterinarians working to save stranded or

beached dolphins throughout the world.

Investigators Neylan Vedros

Institutions Univ. of California, Berkeley
Dolphin Quest

Start Date 1990

Project Status Completed

Project reports

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-17

Project Name Ciguatera toxins project

Project description The focus of this project was the development of a diagnostic procedure for identifying Ciguatera toxins in the living patient. This procedure determines the presence of Ciguatera toxins in an ailing patient who may have ingested tainted fish. This procedure aids both human and marine mammal health and safety in all tropical waters.

Investigators Y. Hokama

Institutions Univ. of Hawaii
Dolphin Quest

Start Date 1989

Project Status Completed

Project reports

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-18

Project Name Characterization of Non-ciguatera Marine Toxins in Algae and Fishes in Hawaii -

Project description An unidentified toxin, similar to Ciguatera but much more potent (findings suggest that the toxin may be similar to saxitoxin, also called paralytic shellfish poisoning), was seen in Hawaii for the first time in the spring of 1989. This project worked on identifying the specific type and distribution of this lethal toxin.

Investigators Wayne Iwaoka

Institutions University of Hawaii
Dolphin Quest

Start Date 1989

Project Status Completed

Project reports

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-19

Project Name Changes in Body Mass and Total Body Water in Three Species of Odontocetes (Tursiops truncatus, Delphinapterus leucas,

Project description The goal is that one day this comparable model will be able to be used as an assessment tool to determine the metabolic changes in dolphins during pregnancy and learn more about the energetic reproductive strategies of bottlenose dolphins. A better understanding of the pattern of energy partitioning will aid in the management of pregnant animals in controlled settings and will also aid in the management of conservation of wild population.

Investigators Shannon Atkinson and Molly Lucas

Institutions University of Hawaii at Honolulu
Dolphin Quest

Start Date 1994

Project Status Completed

Project reports Lucas, M., Atkinson, S., Krames, B., Krames, J., Ramirez, K., Sweeney, J. C. and Boehm, J. In review. Total body water in three species of odontocetes.

Lucas, M., Atkinson, S., and Sweeney, J.C. 1995. Changes in body composition during gestation in a bottlenose dolphin. 11th Biennial Conference Biol. Mar. Mammals.

West, K.L., Atkinson, S., Sweeney, J.C., Krames, B., Krames, J. and Boehm, J. 1999. Progesterone concentrations associates with parturition in these species of odontocetes. 13th Biennial Conf. Biol. Mar. Mammals.

Facility **Dolphin Quest/Waikoloa Marine Life Fund**

Project ID AMMPA -5-20

Project Name Kula Nai'a Project

Project description This long-term project examined behavior, identification, and communication of the Hawaiian spinner dolphin through the use of a research boat with a revolutionary underwater viewing chamber. For the first time, it was possible to recognize individuals, determine gender and relative age, as well as to document behavior. Although the spinner and spotted dolphin species are protected in Hawaiian waters, they are heavily affected by drift net and purse seine tuna fisheries operations throughout the rest of the Pacific. This project began to provide baseline information about the Hawaiian spinner dolphin that will enable more effective protective measures for dolphins worldwide.

Investigators J. Ostman, A. Driscoll, K. Norris

Institutions Univ. of California, Santa Cruz
Dolphin Quest

Start Date 1991

Project Status Completed

Project reports

Facility Dolphin Quest
Project ID AMMPA-5-1
Project Name Maternal investment strategies in wild bottlenose dolphins

Project Description In Sarasota, Florida, the world's longest running study of bottlenose dolphins (*Tursiops truncatus*) allows for detailed analysis that can be applied to coastal stocks of *Tursiops* spp. worldwide. In Sarasota Bay, the calves of inexperienced female bottlenose dolphins have much lower rates of survivorship than calves of experienced females. This research will examine the potential differences in parental investment strategies among different age classes of females to determine if varying behavioral patterns contribute to differential calf survivorship. Knowledge of maternal behavioral factors affecting calf survival is of importance to management of both wild and captive populations of bottlenose dolphins and may contribute to the understanding of successful community recruitment, which is the basis for many ecological management plans. · To determine if different maternal investment strategies exist among different age classes of wild bottlenose dolphins, which may contribute to the understanding of reproductive success. · To examine the role of learning parental care in dolphin communities. In many mammalian species, it has been hypothesized that females "learn to parent" through allomothering, whereby, experience is gained throughout a female's lifetime. Consequently, older females may be better parents.

Investigators C. Weiss, R Wells
Institutions Univ. of California Santa Cruz; Dolphin Quest; Chicago Zoological Society; Mote Marine Lab; Dolphin Biology Research
Start Date 2000
Project Status Completed
Project Reports

Facility Dolphin Quest
Project ID AMMPA-5-7
Project Name Social functions of signature whistles and whistle imitation in bottlenose dolphins

Project description Each adult bottlenose dolphin produces an individually distinctive whistle called a signature whistle that is thought to promote individual recognition and is involved in social relationships. Dolphins also imitate the signature whistles of those with whom they share close social bonds. The project evaluates vocalizations within the context of immediate behavioral interactions and long term social relationships to determine the functions of signature and imitated whistles. This study is one of the most detailed assessments of social communication in a cetacean species.

Investigators Peter Tyack, Amy Samuels
Institutions Woods Hole Oceanographic Institution; Dolphin Quest Bermuda
Start Date 1996
Project Status Completed
Project reports

- Tyack, P.L. 1997. Development and social functions of signature whistles in bottlenose dolphins, *Tursiops truncatus*. Bioacoustics 8:21-46

Facility Dolphin Research Center

Project ID AMMPA-6-2

Project Name Cognitive improvement of mentally handicapped children in water with and without dolphins

Project description As a follow-up study to that comparing the efficacy of dolphin vs. classroom sessions on the learning ability of handicapped children, this study looked at the effect of water. Sessions were conducted in water with and without dolphins. Those sessions without dolphins were conducted out of sight of the dolphins at a nearby beach and the reinforcement for a

correct response was the child's favorite water toy. Significant improvements in cognitive responses occurred when interaction with dolphins was used as reinforcement compared to improvements made when reinforcement used was a favorite toy. Water work with dolphins evoked a greater number and higher level of responses than water work without dolphins. Published: Anthrozoos, Vol. IV, No. 1, 1993

Investigators D. E. Nathanson, S de Faria

Institutions

Start Date 1993

Project Status Completed

Project reports Anthrozoos 4(1)

Facility **Dolphin Research Center**

Project ID AMMPA-6-5

Project Name Vocal repertoire of the California sea lion (*Zalophus californianus*) in zoological setting

Project description Documented the vocal repertoire by determining the ranges of the structural components of sea lion vocalizations. Data were collected in three contexts categorized as: animal initiated; responses to trained behavior encouraging the sea lion to be vocally innovative' and a specialized vocalization called a 'victory roar'. Data were analysed to determine ranges for duration of individual vocalizations, overall frequency, fundamental frequency levels and number of overtones.

Investigators B. Southall

Institutions Univ. of Montana

Start Date 10/94

Project Status Completed

Project reports internal report

Facility **Dolphin Research Center**

Project ID AMMPA-6-6

Project Name Development of independence in bottlenose dolphin calves

Project description Used interval sampling technique to measure the association between mother and calf, determining a rate at which calves gained independence as they aged. Comparison of these rates indicated that mothering styles are measurably different. Data demonstrated that calves with a lower birth order took longer to achieve the same independence as their later born siblings and that male calves gained their independence more quickly than females.

Investigators J. Feinberg

Institutions Florida Institute of Technology

Start Date 09/98

Project Status Completed

Project reports Feinberg, J. 1999. MS thesis. Florida Institute of Technology

Facility **Dolphin Research Center**

Project ID AMMPA -6-7

Project Name Using Atlantic bottlenose dolphins to increase cognition of mentally retarded children

Project description This study compared rates of memory retention and speech production of six children with mental disabilities ranging from Down Syndrome to hydrocephaly. The children were exposed to alternating sessions with the dolphins and in a typical classroom situation. In both situations, the children were asked to perform tasks involving speech production or memory retention. In both types of sessions, the child was rewarded with praise from the psychologist conducting the session. In sessions with the dolphins, rewards included dolphin interaction including feeding the dolphins, giving signals, getting touches, and swimming with the dolphins. Results indicated the children learned two to ten times faster and with greater retention when working with dolphins.

Investigators David E. Nathanson

Institutions

Start Date 1988

Project Status Completed

Project reports Clinical and Abnormal Psychology 1989

Facility **Dolphin Research Center**

Project ID AMMPA -6-8

Project Name Uncertainty monitoring in the bottlenose dolphin

Project description Metacognition is the ability to know when you are uncertain and to take specific actions based on that knowledge. This study was based on a design used with humans and higher primates to attempt to determine, non-verbally, if a metacognitive sense could be measured in dolphins. Testing produced results comparative to those achieved for humans and higher primates, indicating that dolphins can reflect adaptively on their own state of uncertainty.

Investigators D. J. Smith, J. Schull

Institutions State Univ. of New York Buffalo, Haverford College

Start Date 1991

Project Status Completed

Project reports J. Exper. Psychology (General). 1995

Facility Dolphin Research Center

Project ID AMMPA -6-9

Project Name Energetics in the Atlantic bottlenose dolphin

Project description Various aspects of energetics of the Atlantic bottlenose dolphin were investigated, including the relationship between ventilation rate and behaviors, the structure of the breath, basal metabolic rate, and the cost of echolocation. Ventilation rate was found to vary significantly with behavior, and was used to estimate the relative costs for different behaviors. No evidence was found for elevation of basal metabolic rate above that expected from body mass. Echolocation for a dolphin at rest incurred a significant cost but there was no apparent cost for echolocation when the dolphins were swimming.

Investigators Katharine Cole

Institutions University of Aberdeen, Scotland

Start Date 8/94

Project Status Completed

Project reports Cole, K. 1995. Ph.D. Thesis, University of Aberdeen, Scotland

Facility Dolphin Research Center

Project ID AMMPA -6-10

Project Name Thermal profiles of warm water dolphins

Project description The project investigated thermoregulation to include metabolic responses of dolphins for seasonal variations in water temperature. Heat flow measurements were collected with a sensor laid on different areas of the dolphins' skin. Dolphin blubber thickness was recorded with an ultrasound transducer on six unsubmerged areas of the dolphin. Data was collected in the summer of 1992 with additional sampling in the winter of 1994.

Investigators Terrie Williams

Institutions Univ. of California, Santa Cruz

Start Date 1992

Project Status Completed

Project reports none

Facility Dolphin Research Center

Project ID AMMPA -6-11

Project Name Orthopedic reconstruction of a hinge fracture in a bottlenose dolphin

Project description A young female bottlenose dolphin suffered an accidental

hinge fracture affecting the lower jaw bones. A new technique was developed to stabilize the jaw using a Kirschner device to anchor bolts into the jaw until the fracture healed. The surgery was successful and the dolphin recovered completely.

Investigators Callahan, B. Welch, G. Bossart

Institutions

Start Date 1989

Project Status Completed

Project reports

Facility **Gulf World Marine Park**

Project ID AMMPA-7-2

Project Name Copper/silver purification system

Project description Provided the opportunity for field research for the copper/silver purification system, an inexpensive method of chemically treating water to stop the growth of algae, which allows the reduction of chlorine by over 50% or more.

Investigators staff

Institutions Gulf World Marine Park

Start Date

Project Status Completed

Project reports

Facility **Indianapolis Zoological Society**

Project ID AMMPA-8-2

Project Name Caloric intake vs. weight gain in four Pacific walrus calves

Project description Precise records are kept to document the relationship between caloric intake and weight gain in Pacific walrus

Investigators J. Burns, j. Baker

Institutions Univ of California Santa Cruz, Indianapolis Zoo

Start Date 1998

Project Status Completed

Project reports

Facility **Indianapolis Zoological Society**

Project ID AMMPA -8-5

Project Name Genetic diversity and relatedness of captive bottlenose dolphins

Project description Through the use of microsatellite DNA markers provide insights for informed management of bottlenose dolphins in public display facilities.

Investigators A. P. Rooney, J. N. Derr, D. Merritt

Institutions Texas A&M University, Indianapolis Zoo

Start Date 1993

Project Status Completed

Project reports Journal of Heredity

Facility **Indianapolis Zoological Society**

Project ID AMMPA -8-4

Project Name Tooth and tusk development in Pacific walrus

Project description Regular photos and measurements taken documenting tooth and tusk development.

Investigators G. Willis, J Proudfoot, D. Merritt

Institutions Indiana University School of Dentistry; Indianapolis Zoo

Start Date 1996

Project Status Completed

Project reports

Facility **Indianapolis Zoological Society**

Project ID AMMPA -8-1

Project Name Length, girth and blubber depth ratios in developing Pacific Walrus

Project description Sternal blubber depth (taken via ultrasound), length and girth measurements from our specimens will be compiled to share with field biologists to help determine health of wild populations.

Investigators R. Hermes, J. Burns, D. Merritt, N. Kapustin

Institutions Indianapolis Zoological Society

Start Date 1998

Project Status Completed

Project Reports None

Facility **Indianapolis Zoological Society**

Project ID **8 - 5**

Project Name Pool Depth Selections by Atlantic Bottle-nosed Dolphins at one Zoo Facility

Project Description Data was taken on choice preference when seven dolphins had free choice of four pools of three distinctly different sizes.

Investigators Dr. Melissa Shyan; David Merritt
Institutions Butler University, IZS
Start Date 1998
Project Status Completed
Project Report Submitted to Journal for Applied Animal Welfare Science

Facility **The Living Seas / Disney Wildlife Conservation Fund**

Project ID AMMPA-10-1

Project Name Northern right whale education and monitoring network

Project description A project to network scientists and resource managers with trained citizen volunteers to identify right whales and report sightings along the southeast U.S. coast. By coordinating with state natural resource departments and New England Aquarium scientists, all vessels transversing the area are notified via commercial and military communications systems of the location of whales to reduce the risk of collisions. Data is also contributed to the national scientific database on behavior and movement patterns.

Investigators

Institutions Marine Resources Council of East Florida

Start Date

Project Status No longer funding

Project reports

Facility **The Living Seas / Disney Wildlife Conservation Fund**

Project ID AMMPA-10-2

Project Name Bleaching of coral reefs

Project description During the past 15 years, observers have witnessed a serious decline in coral reef ecosystems caused in part by a phenomenon known as bleaching Earthwatch volunteers collect data on the physical, chemical, and biological correlates of bleaching.

Investigators

Institutions Earthwatch

Start Date

Project Status No longer funding

Project reports

Facility **The Living Seas / Disney Wildlife Conservation Fund**

Project ID AMMPA-10-4

Project Name West African manatee conservation and education

Project description Assessing the effectiveness of a five-year local education program (curricula and community outreach) on manatees and coastal mangrove ecosystems in coastal Cote d'Ivoire communities. Results will be used in planning a buffer zone around the Azagny National Park, a critical area for many wildlife species.

Investigators

Institutions Wildlife Conservation Society

Start Date

Project Status No longer funding

Project reports

Facility **The Living Seas / Disney Wildlife Conservation Fund**

Project ID AMMPA-10-5

Project Name Coral Reef Conservation Leadership Workshop

Project description Intensive workshops to be presented at the American Zoo and Aquarium Association, American Association of Zoo Keepers, and National Science Teacher Association Regional and National Conferences. Targeting 15,000 students, the workshop will offer the opportunity to link learning with in-situ conservation of endangered and threatened habitats through CES's award winning Adopt-a-Reef program.

Investigators

Institutions The Living Seas / DWCF

Start Date

Project Status No longer funding

Project reports

Facility **The Living Seas / The Walt Disney Company**

Project ID AMMPA-10-10

Project Name Dolphins: Echolocation

Project description This recently completed test studied whether one dolphin could determine what object the other dolphin had inspected with his sonar. Scientists worked to record echoes generated as the dolphins inspected objects with their sonar. Using sophisticated computerized analyses, researchers hope to identify some of the object-specific information contained within returning echoes.

Investigators M. Xitco, H. Roitblat, P. Moore

Institutions The Living Seas, Univ. of Hawaii, U.S. Navy

<i>Start Date</i>	07/98
<i>Project Status</i>	Completed
<i>Project reports</i>	Xitco, M. J. Jr., & Roitblat, H. L. (1996). Object recognition through eavesdropping: Passive echolocation in bottlenose dolphins, <i>Animal Learning & Behavior</i> , 24, 355-365.
<i>Facility</i>	The Living Seas / The Walt Disney Company
<i>Project ID</i>	AMMPA -10-11
<i>Project Name</i>	Dolphins: Cooperative mimicry
<i>Project description</i>	This study is designed to use the dolphins' natural talent for mimicry as a means to investigate their social problem-solving abilities. The dolphins were first trained to demonstrate their capacity for imitating one another's behavior in an experimentally controlled situation. The next step was to test the mimicry concept on a larger set of novel behaviors. This study allows researchers to learn what sorts of information the dolphin can make use of to accurately predict what the other dolphin is doing. Predicting the behavior of others is an important social skill that significantly helps these animals to adapt in the wild.
<i>Investigators</i>	C. Johnson, G. Bauer
<i>Institutions</i>	New College, Univ of South Florida
<i>Start Date</i>	
<i>Project Status</i>	Completed
<i>Project reports</i>	Bauer, G.B. & Johnson, C.M. (1994). Trained motor imitation by bottlenose dolphins (<i>Tursiops truncatus</i>). <i>Perceptual and Motor Skills</i> , 79, 1307-1315.
<i>Facility</i>	The Living Seas / The Walt Disney Company
<i>Project ID</i>	AMMPA -10-12
<i>Project Name</i>	Signature whistle perception
<i>Project description</i>	Can dolphins discriminate among signature whistles: If so, do they categorize different exemplars of the same signature whistles together?
<i>Investigators</i>	H. Harley
<i>Institutions</i>	New College - Univ. South Florida
<i>Start Date</i>	
<i>Project Status</i>	Completed
<i>Project reports</i>	
<i>Facility</i>	The Living Seas / The Walt Disney Company

Project ID AMMPA-10-13
Project Name Categorical perception
Project description How do dolphins categorize acoustic, visual, or echoic information that simultaneously varies across multiple dimensions? Within each of these sensory domains, what features or stimulus dimensions are used to make categorical judgments? Which dimensions are most important?
Investigators
Institutions The Living Seas
Start Date
Project Status Completed
Project reports

Facility **Long Marine Laboratory, UCSC**
Project ID AMMPA-11-2
Project Name Sleep apnea in elephant seals
Project description Dr. Castellini, University of Alaska, is affiliated with LML and has a 5-year grant from the National Institutes of Health to study the regulation of sleep apnea of elephant seals.
Investigators M. Castellini
Institutions Univ. of Alaska
Start Date
Project Status Completed
Project reports

Facility **Long Marine Laboratory, UCSC**
Project ID AMMPA-11-6
Project Name Social behavior of Pacific white-sided and spinner dolphins
Project description Two separate projects study the social structure of two species of these highly gregarious cetaceans.
Investigators K. Norris
Institutions Long Marine Lab
Start Date
Project Status Completed

Project reports

Facility Long Marine Laboratory, UCSC

Project ID AMMPA-11-7

Project Name Dolphin cognition research

Project description Studies involve rhythm patterns in sound production of dolphins and how the patterns relate to dolphins' movement.

Investigators K. Norris

Institutions Long Marine Lab

Start Date

Project Status Completed

Project reports

Facility Mystic Aquarium

Project ID AMMPA-14-1

Project Name South Carolina bottlenose dolphin study

Project description The behavioral ecology of coastal resident *Tursiops truncatus* forms the basis for a MMA-supported study. The project seeks to establish patterns of habitat use, extent of interactions with migratory stocks, and feeding strategies utilized by this substock. Information from photo identification is shared through the Atlantic Dolphin Research Group.

Investigators C. Gubbins

Institutions Univ. of Nevada, Reno

Start Date 1994

Project Status Completed

Project reports Gubbins, C.M. and St. Aubin, D.J. 1998. Residency patterns of bottlenose dolphins (*Tursiops truncatus*) in South Carolina. Atlantic Coastal Dolphin Research Conference. Virginia Beach, VA
Gubbins, C.M., Jenkins, S. 1999. Ranging patterns and sitet fidelity of resident and transient Atlantic bottlenose dolphins (*Tursiops truncatus*) in South Carolina. Proc. 13th Biennial Conference of the Society for Marine Mammalogy

Facility Mystic Aquarium

Project ID AMMPA-14-2

Project Name Effects of human disturbance on behavior of bottlenose dolphins in the coastal waters of South Carolina.

Project description A shore-based survey was conducted to examine the effects of boating activity on free-ranging Atlantic bottlenose dolphins in the coastal waters of South Carolina. Significant correlation between the number of boats present and the disturbance level in dolphin groups was observed. Boat speed and type also had significant effects. The study is relevant to those responsible for protecting marine mammals such as dolphins from the steady increase in human activity in their habitats.

Investigators M. Cope, J. Thomas

Institutions Western Illinois University

Start Date 1997

Project Status Completed

Project reports Cope, M., St. Aubin, D., and Thomas, J. 1999. The effect of boat activity on the behavior of bottlenose dolphins (*Tursiops truncatus*) in the nearshore waters of Hilton Head, South Carolina. Proc. 13th Biennial Conference of the Society for Marine Mammalogy

Facility **Mystic Aquarium**

Project ID AMMPA-14-3

Project Name Adrenal hormone secretion in northern fur seals

Project description Hematological and plasma chemical constituents were measured following stimulation by adrenocorticotropic hormone in northern fur seals, *Callorhinus ursinus*. The results were presented at the 1994 annual meeting of the IAAAM.

Investigators D. St. Aubin, T. Lembo

Institutions Mystic Aquarium

Start Date 1994

Project Status Completed

Project reports

Facility **Mystic Aquarium**

Project ID AMMPA-14-4

Project Name Vitamin E kinetics in harbor seals

Project description This study examined the metabolic clearance of vitamin E in harbor seals, *Phoca vitulina*. The findings helped to refine the calculation of the daily requirements of vitamin E in these animals. Results were presented at the annual meeting of the International Association for Aquatic Animal Medicine (IAAAM) held in Mystic, CT, in May 1995.

Investigators L. Mazarro

Institutions Mystic Aquarium
Start Date 1994
Project Status Completed
Project reports Mazzaro, L.M., Helmick, K.E., Dunn, J.L., Furr, H.C. 1995
Vitamin E kinetics in Harbor seals (*Phoca vitulina*). Proceedings
of the 26th Annual Conference of the International
Association for Aquatic Animal Medicine

Facility **Mystic Aquarium**

Project ID AMMPA-14-5

Project Name Investigation of ocular disorders in captive pinnipeds

Project description In collaboration with the University of Pennsylvania, MMA was funded by the Institute for Museum Services to conduct an epidemiological study on the occurrence of ocular disorders in seals and sea lions held in exhibits and research facilities in the U.S. Staff Veterinarian, Dr. J. Lawrence Dunn, was instrumental in assembling the information during the first phase of the investigation.

Investigators J. L. Dunn

Institutions Mystic Aquarium

Start Date 1993

Project Status Completed

Project reports Dunn, J.L., D.A. Abt, N.A. Overstrom and D.J. St. Aubin. 1996.
An epidemiologic survey to determine risk factors associated with corneal and lenticular lesions in captive harbor seals and California sea lions. Proceedings of the 27th Annual Conference of the International Association for Aquatic Animal Medicine.

Facility **Mystic Aquarium**

Project ID AMMPA-114-8

Project Name Vibrissal growth in harbor seals and Steller sea lions

Project description Free-ranging harbor seals and Steller sea lions show a periodicity in natural assimilation of a stable (non-radioactive) isotope of carbon in growing tissues such as whiskers. The cycles coincide with changes in feeding behavior and location, and can be used to reconstruct an animal's foraging patterns over a period of many years. Presently, there is no information available to calibrate the time intervals between these observed natural markers. By providing two pulses of a carbon variant as part of an amino acid necessary for protein synthesis, we created a molecular marker in two locations along the length of the whiskers in seals and sea lions at Mystic Aquarium. The rate of whisker growth could then be determined from the known time interval between the pulses, giving information essential to interpreting data from wild animals.

Investigators D. Schell, A. Hiron

Institutions University of Alaska
Start Date 1995
Project Status Completed
Project reports Hirons, A., Schell, D., St. Aubin, D. 1999. Vibrissae growth rates of harbor seals (*Phoca vitulina*) and Steller sea lions (*Eumetopias jubatus*). Proc. 13th Biennial Conference of the Society for Marine Mammalogy.

Facility **Mystic Aquarium**

Project ID AMMPA-14-9

Project Name Acoustic cardiography in bottlenose dolphins

Project description The dolphins exhibited at the Aquarium have formed part of a novel investigation of the effects of sounds on heart rate. Using a hydrophone and a specially designed suction attachment, Jennifer Miksis, a graduate student at the University of Massachusetts, Dartmouth, and the Woods Hole Oceanographic Institution, has been documenting the instantaneous cardiac responses to familiar and unfamiliar sounds played underwater. The study's unique approach is yielding new information on auditory perception in this species.

Investigators J. Miksis, D. Nowacek, R. Connor

Institutions Woods Hole Oceanographic Institution, University of Massachusetts

Start Date 06/98

Project Status Completed

Project reports Miksis, J.L.; Grund, M.D.; Nowacek, D.P. 2000. Acoustic detection and measurement of heart rate from captive bottlenose dolphins, *Tursiops truncatus* Marine Mammal Science (in press)

Facility **Mystic Aquarium**

Project ID AMMPA-14-10

Project Name Epidemiology of Morbillivirus infection in marine mammals

Project description MMA has contributed significantly to an epidemiological investigation tracking the historic and geographic distribution of morbilliviruses in marine mammals along the northern Atlantic coast. The study has established the widespread prevalence of the organism, and its presence in marine mammals in western Atlantic waters prior to the disease outbreaks in Europe. The findings have been presented at regional meetings of marine mammal stranding networks, at the 1995 annual meeting of the IAAAM, the 1995 biennial meeting of the Society for Marine Mammalogy, and in four publications.

Investigators P. Duignan

Institutions University of Guelph

Start Date 1993

Project Status Completed

Project reports Duignan, P.J., J.T. Saliki, D.J. St. Aubin, G. Early, S. Sadove, J.A. House, M. Cattet, and J.R. Geraci. 1996. Epizootiology of morbillivirus infection in North American harbor seals (*Phoca vitulina*) and gray seals (*Halichoerus grypus*). *J. Wildlife Dis.* 31:491-501.
 Duignan, P.J., C. House, D.K. Odell, R.S. Wells, L.J. Hansen, M.T. Walsh, D.J. St. Aubin, B.K. Rima and J.R. Geraci. 1996. Morbillivirus infection in bottlenose dolphins: evidence for recurrent epizootics in the western Atlantic and Gulf of Mexico. *Marine Mammal Science* 12: 499-515.
 Duignan, P.J., O. Nielsen, C. House, K.M. Kovacs, N. Duffy, G. Early, S. Sadove, D.J. St. Aubin, B. K. Rima, and J.R. Geraci. 1997. Epizootiology of morbillivirus infection in harp, hooded, and ringed seals from the Canadian Arctic and western Atlantic. *J. Wildlife Dis.* 33: 7-19.
 Duignan, P.J.;House, C.;Geraci, J.R.;Early, G.;Copland, H.G.;Walsh, M.T.;Bossart, G.D.;Cray, C.;Sadove, S.;St. Aubin, D.J.;Moore, M. 1995. Morbillivirus infection in two species of pilot whales (*Globicephala* sp.) from the western Atlantic *Marine Mammal Science* 11: 150-162

Facility **Mystic Aquarium**

Project ID AMMPA-14-11

Project Name Antibiotic metabolism in harbor seals

Project description This study investigated the metabolism of enrofloxacin in harbor seals, *Phoca vitulina*. Preliminary results show significant discrepancies from the data available for domestic animals, raising important questions as to the efficacy in marine mammals of dosages recommended for other species.

Investigators J. L. Dunn

Institutions Mystic Aquarium

Start Date 1993

Project Status Completed

Project reports

Facility **Mystic Aquarium**

Project ID AMMPA-14-13

Project Name Audiology of pilot whales and harbor porpoise

Project description To determine the sensitivity of cetaceans to low frequency sound, measurements were made of evoked action potentials in response to auditory stimuli directed through the tissues overlying the angle of the jaw in two pilot whales and one harbor porpoise held at Mystic Aquarium.

Investigators D. Ketten, R. Dolphin

Institutions Harvard University, Woods Hole Oceanographic Institution

<i>Start Date</i>	1999
<i>Project Status</i>	Completed
<i>Project reports</i>	
<i>Facility</i>	Mystic Aquarium
<i>Project ID</i>	AMMPA-14-14
<i>Project Name</i>	Comparison of the beluga whale (<i>Delphinapterus leucas</i>) expressed genes for 5-aminolevulinic synthase with those in other vertebrates.
<i>Project description</i>	Blood samples drawn from beluga whales exhibited at Mystic Aquarium were made available for this comparative study of molecular biology
<i>Investigators</i>	N. W. Cornell, J.A. Kreiling, R. Duncan, M.A.Faggart
<i>Institutions</i>	Woods Hole Oceanographic Institution
<i>Start Date</i>	1998
<i>Project Status</i>	Completed
<i>Project reports</i>	Kreiling, J.A.;Duncan,R.;Faggart,M.A.;Cornell, N.W. 1999. Comparison of the beluga whale (<i>Delphinapterus leucas</i>) expressed genes for 5-aminolevulinic synthase with those in other vertebrates. <i>Comparative Biochemistry and Physiology</i> (in press)
<i>Facility</i>	Mystic Aquarium
<i>Project ID</i>	AMMPA-14-15
<i>Project Name</i>	Investigation of the role of Atrial Natriuretic Peptide in phocid seals
<i>Project description</i>	Atrial natriuretic peptide (ANP), is a short active peptide produced in atrial cardiomyocytes. Plasma ANP rises in parallel with body sodium concentrations in humans, and produces natriuresis through inhibition of the renin-angiotensin-aldosterone system in experimental animals. Phocid seals are not thought to have developed specific adaptations for excreting incidentally-consumed salt, though there have been no functional studies on this recently characterized hormone. We monitored circulating levels of plasma ANP and arginine vasopressin (AVP) in three (2M, 1F) adult harbor seals, <i>Phoca vitulina</i> , during fluid therapy and found no consistent changes. The apparent lack of an ANP response to volumetric expansion in seals may be the consequence of vascular adaptations to diving in these animals.
<i>Investigators</i>	Ellsworth, L.B., St. Aubin, D.J., Dunn, J.L., Zenteno-Savin, T.
<i>Institutions</i>	Mystic Aquarium, University of Alaska Fairbanks
<i>Start Date</i>	1996
<i>Project Status</i>	Completed

Project reports Ellsworth, L.B., St. Aubin, D.J., Dunn, J.L., Zenteno-Savin, T. 1999. Effects of Saline Infusions on Circulating Levels of Plasma Atrial Natriuretic Peptide in Harbor Seals (*Phoca vitulina*). Proc. 13th Biennial Conference of the Society for Marine Mammalogy.

Facility Mystic Aquarium

Project ID AMMPA-14-16

Project Name Vitamin A metabolism in northern fur seals

Project description The absorption, metabolism, and clearance of vitamin A was investigated in northern fur seals, *Callorhinus ursinus*, as an approach to refining dietary requirements for the nutrient in this species. Results were presented at the 1994 annual meeting of the IAAAM and in publications appearing in Marine Mammal Science and the Canadian Journal of Zoology.

Investigators L. Mazarro

Institutions Mystic Aquarium

Start Date 1992

Project Status Completed

Project reports Mazzaro, L.M.;Dunn, J.L.;Furr,H.C.;Clark,R.M. Study of vitamin A supplementation in captive northern fur seals (*Callorhinus ursinus*) and its effect on serum vitamin E Marine Mammal Science 1995 11 545-553
Mazzaro,L.M.;Dunn, J.L.;Furr, H.C.;Clark,R.M. Vitamin A plasma kinetics in northern fur seals (*Callorhinus ursinus*), using vitamin A2 as a tracer Canadian Journal of Zoology 1995 73 10-14

Facility Mystic Aquarium & Institute for Exploration

Project ID Mystic ID # 01011

Project name **Physiologic stress response of long term captive beluga whales**

Project description Blood samples were obtained from each of 3 beluga whales via voluntary fluke presentation at predetermined times throughout the day to establish baseline levels of hematologic and biochemical constituents. Other samples were obtained during the annual physical examinations and before and after mock wading-contact sessions, which represented possible perturbations in the animal's normal daily routines. Cortisol and aldosterone had no discernable diurnal pattern. Significant elevations in endocrin and hematologic parameters were observed during out-of-water physical examinations. Stress response analytes from animals involved in wading-contact sessions did not differ significantly from baseline levels. This is the first report of baseline levels of plasma ACTH in belugas. This study suggests that plasma ACTH is a sensitive indicator and can be used as an additional tool for measuring a stress response. The results also support our impression that well-managed wading contact programs are not stressful to the animals involved.

Investigators	Todd Schmitt, DVM
Institutions	Mystic Aquarium & Institute for Exploration
Start date	September 2001
Funding	In-house
Animals	<i>Delphinapterus leucas</i>
Co-investigator questions	
Project status	Completed
Project reports	
Project reports	<p>Manuscripts In Press or In Review</p> <ul style="list-style-type: none"> • <p><i>Conference Abstracts IAAAM 2002</i></p> <ul style="list-style-type: none"> • <p><i>Theses and Dissertations</i></p> <ul style="list-style-type: none"> • <p>Peer-Reviewed Journal Articles and Book Chapters</p> <ul style="list-style-type: none"> • <p>Popular and Semi-Popular Articles, Book Reviews, Educational Videos</p> <ul style="list-style-type: none"> • <p><i>Contract and Other Reports</i></p> <ul style="list-style-type: none"> • <p>Final Reports</p> <ul style="list-style-type: none"> •

Facility	Mystic Aquarium & Institute for Exploration
Project ID	Mystic ID # 99002
Project name	Body stores of iron in northern fur seals and their relationship to hemochromatosis
Project description	<p>Iron storage disease (hemochromatosis) has been reported in many species of both captive and free-ranging animals. This study relates the occurrence of this disease with concentrations of iron analytes in aquarium-held northern fur seals (<i>Callorhinus ursinus</i>). The sera were analyzed for iron, total iron binding capacity (TIBC), ferritin, ceruloplasmin, and haptoglobin concentrations in a retrospective study that included samples taken over an 18-year period. Animals ranged in age from less than 1 year to an estimated 22 years. Serum ferritin was measured using an enzyme linked immunosorbent assay (ELISA) for canine sera, and these results are the first reported for any pinniped.</p>
Investigators	Lisa Mazza, Ph.D. ¹ , J. Lawrence Dunn, VMD ¹ , David J. St. Aubin, Ph.D. ¹ , Gordon Andrews ² , Sue Chavey ²

Institutions	¹ Mystic Aquarium & Institute for Exploration ² Kansas State Veterinary Medical Center
Start date	April 1999
Funding	In-house
Animals	<i>Callorhinus ursinus</i>
Co-investigator questions	
Project status	Completed
Project reports	
Project reports	<p>Manuscripts In Press or In Review 2 in review (Zoo Biology)</p> <ul style="list-style-type: none"> • <p><i>Conference Abstracts IAAAM 2001 and AZA Nutritional Advisory Group 2001</i></p> <ul style="list-style-type: none"> • <p><i>Theses and Dissertations</i></p> <ul style="list-style-type: none"> • <p>Peer-Reviewed Journal Articles and Book Chapters</p> <ul style="list-style-type: none"> • <p>Popular and Semi-Popular Articles, Book Reviews, Educational Videos</p> <ul style="list-style-type: none"> • <p><i>Contract and Other Reports</i></p> <ul style="list-style-type: none"> • <p>Final Reports</p> <ul style="list-style-type: none"> •

Facility National Aquarium in Baltimore

Project ID AMMPA -15-1

Project Name Surveys of coastal Atlantic bottlenose dolphins

Project description In collaboration with the Marine Science Consortium, NAIB staff conducted surveys of bottlenose dolphins (*Tursiops truncatus*) off Assateague Island and Wallops Island, VA, from May through October 1997. During this period, 201 groups of dolphins were sighted. Data on numbers of individuals, behavior, and environmental conditions were recorded, and dorsal fin images of 18 individuals were collected for the National Marine Fisheries Service's bottlenose dolphin photo-identification catalogue. This information, when added to that gained from other US East Coast studies, will advance knowledge about abundance, distribution, and habitat use of the coastal migratory stock of Atlantic bottlenose dolphins

Investigators D. Schofield

Institutions National Aquarium in Baltimore

Start Date 1997

Project Status Completed

Project reports

Facility **National Aquarium in Baltimore**

Project ID AMMPA-15-2

Project Name Development of a contingency plan for Florida manatee health-related events

Project description The Florida manatee, *Trichechus manatus latirostris*, is an endangered species restricted to an increasingly fragile habitat. While the Fish and Wildlife Service has federal authority for manatee protection, numerous federal, state, and regional agencies and institutions participate in management activities and research. The Florida Department of Environmental Protection (FDEP) has primary responsibility for population monitoring, rescue and salvage operations, and state response to unusual health-related events. Following the red-tide associated manatee die-off in 1996, FDEP contracted the authors to develop a contingency plan for response to future events. Plan development required review of legislation and recovery programs; examination of patterns of manatee distribution and mortality and of factors affecting manatee health; and identification of current and potential resources for investigating and responding to such events. The resulting contingency plan attempts to: 1) work in accordance with federal and state legislation; 2) integrate critical components of federal contingency plans and established FDEP response protocols; 3) provide guidelines for effective recognition, response to, and investigation of unusual events; and 4) promote inter-agency cooperation and effective utilization of resources

Investigators J. Geraci, V. Lounsbury

Institutions National Aquarium in Baltimore

Start Date 1997

Project Status Completed

Project reports Geraci, J.R., and V.J. Lounsbury. 1997. The Florida manatee: Contingency plan for health-related events. Florida Department of Environmental Protection, Florida Marine Research Institute, St. Petersburg, FL. Contract No. MR199.

Facility **National Aquarium in Baltimore**

Project ID AMMPA-15-3

Project Name Melarsomine dihydrochloride treatment of heartworm infection in a harbor seal

Project description Heartworm infection, caused by the filariid worms *Acanthocheilonema spirocauda* (syn. *Dipetalonema spirocauda*) or *Dirofilaria immitis*, is commonly observed in stranded seals. On January 29, 1997, a 21 kg stranded harbor seal, found in critical condition near Ocean City, MD, was taken to the

National Aquarium in Baltimore for treatment. Evaluation included a physical examination, complete blood count, serum chemistries, phocine distemper titer, and blood culture. Microfilaria were observed in fresh blood smears; speciation was inconclusive. Examination of the seal using ultrasonography showed adult worms in the right heart. After three months, the animal's condition was stable, and treatment for Class I heartworm disease was initiated. Melarsome dihydrochloride (2.2 mg/kg) was administered by two intramuscular injections, 24 hours apart, to kill the adult worms. Twenty days later, ivermectin (50 ug/kg) was given subcutaneously to eliminate microfilaria. After 12 weeks, no microfilaria or adult worms were detected. Although further tests are required, results suggest that melarsomine dihydrochloride may provide a safe and easily administered treatment for mild heartworm disease in seals.

<i>Investigators</i>	R. Williams, B. Whitaker, D. Schofield
<i>Institutions</i>	National Aquarium in Baltimore
<i>Start Date</i>	1997
<i>Project Status</i>	Completed
<i>Project reports</i>	Whitaker, B.R., Williams, C.R., Herring, D. 1999. Melarsomine dihydrochloride treatment of heartworm infection in a harbor seal (<i>Phoca vitulina</i>). Northeast Region Stranding Conference, 20-23 May 1999, Baltimore, MD (abstract).
<i>Facility</i>	National Aquarium in Baltimore
<i>Project ID</i>	AMMPA-15-4
<i>Project Name</i>	Dynamic mechanical measurements of marine mammal tissues.
<i>Project description</i>	The use of biological materials as a guide to new synthetic materials requires quantitative knowledge of the biomaterial properties to be imitated. An automated measurement system was used to determine the viscoelastic properties of bottlenose dolphin (<i>Tursiops truncatus</i>) blubber. The blubber samples were obtained from the fresh carcass of a stranded dolphin that died following rescue and transport to the National Aquarium in Baltimore. A 12-volt Mobile Automated Measurement Laboratory (MAML) has been designed to allow field measurements on tissues from stranded marine mammals that die on the beach.
<i>Investigators</i>	E. Fitzgerald, J. Strandberg, B. Whitaker
<i>Institutions</i>	National Aquarium in Baltimore, Johns Hopkins University
<i>Start Date</i>	1994
<i>Project Status</i>	Completed
<i>Project reports</i>	Fitzgerald, E.R., J.D. Strandberg and B.R. Whitaker. 1997. Dynamic mechanical measurements of marine mammal tissues. <i>Journal of the Acoustical Society of America</i> 102(5, Pt. 2): 3163
<i>Facility</i>	National Aquarium in Baltimore
<i>Project ID</i>	AMMPA-15-5

Project Name Environmental enrichment in a colony of harbor and grey seals

Project description A study was initiated in May 1997 to determine the effects of enrichment on the behavior of the seven harbor seals and two grey seals housed in the National Aquarium of Baltimore's (NAIB) outdoor seal exhibit. The authors expected that enrichment would change the amount of time the seals engaged in specific behaviors; stereotypic behaviors were expected to decrease, while exploratory behavior and activity levels were expected to increase. The behaviors recorded included: resting in water, resting hauled out, maintenance, breeding display, breeding behavior, aggression, pattern swimming, random swimming, and exploration. The frequency and duration of behaviors were documented for 90 hours in both the control phase (without enrichment) and the experimental phase (with enrichment). The data have yet to be published but were consistent with project expectations. As a result of this study, enrichment has become a routine component of the NAIB's captive seal management program

Investigators S. Hunter, M. Bay, M. Martin, J. Hatfield

Institutions National Aquarium in Baltimore, Patuxent Wildlife Research Center

Start Date 1997

Project Status Completed

Project reports

Facility **National Aquarium in Baltimore**

Project ID AMMPA-15-7

Project Name Group G Streptococcus infection in dolphins

Project description Streptococcus G, which caused the near death of one of the NAIB's colony cetaceans, has not been previously identified as a pathogen of dolphins. Clinical observations, response to therapy, and general pathogenesis of disease were studied.

Investigators B. Whitaker, R. Williams, J. Geraci

Institutions National Aquarium in Baltimore

Start Date 1996

Project Status Completed

Project reports

Facility **New York Aquarium- Wildlife Conservation Society**

Project ID AMMPA-16-2

Project Name Contact calls of bottlenose dolphins: "signature information" in a shared call.

Project description A study of whistle use by juvenile and adult bottlenose dolphins during contexts of temporary isolation or separation

from conspecifics. The goal of this study is to help resolve the current debate on dolphin whistle structure, organization and the role of signature whistles. To further clarify the types of calls used in contexts of social isolation, we replicated the visual inspection approach used in previous studies reporting signature whistles. The whistles of 12 individual dolphins from different social groups and in different facilities were recorded during contexts of temporary social isolation, medical procedures and physical transport. Classification of a total of 793 whistles indicated that in contexts of isolation, dolphins use one predominant and shared contact call rather than individually different signature whistles. Individual variability in the production of a common call, as reported for other taxa, may account for individual recognition and provide 'signature information'.

Investigators Diana Reiss, Brenda McCowan
Institutions New York Aquarium, Six Flags Marine World
Start Date 01/98
Project Status Completed
Project reports McCowan, B. and Reiss, D. 1999. Contact calls of bottlenose dolphins: signature information in a shared call. Abstract, 13th Biennial Conference on the Biology of Marine Mammals, Maui, Hawaii

Facility **New York Aquarium - Wildlife Conservation Society**

Project ID AMMPA-16-3

Project Name Nursing behavior in beluga whales

Project description A study of nursing behavior in captive-born beluga whales

Investigators J. Nightingale, J. Russell

Institutions New York Aquarium

Start Date

Project Status Completed

Project reports Nightingale, J. and Russell, J. 1997. Nursing behavior of beluga whales born in captivity. Zoo Biology, 16:247-262.

Facility **New York Aquarium - Wildlife Conservation Society**

Project ID AMMPA-16-5

Project Name A behavioral study of California sea otters being treated with testosterone-suppressing hormone implants

Project description The behavior of three male California sea otters treated with deslorelin, a testosterone-reducing hormone implant, was monitored for two years to determine the impact of treatment on social interaction as well as to examine changes in activity patterns in response to other variables. The deslorelin treatment was administered in an effort to control unacceptable levels of aggression that had arisen, resulting in stress-related behaviors such as unwillingness to attend feeds and avoidance of intraspecific contact. Within three

months of receiving the deslorelin implants, all animals could be housed together without previously observed levels of social stress. This study demonstrates the utility of behavioral research to address captive management concerns and to improve animal care through a better understanding of the daily husbandry needs of the species.

Investigators C Alfano, J. Basinger, P. Calle, V. Mansukhani and M. Hall

Institutions New York Aquarium, Wildlife Health Sciences, Wildlife Conservation Society

Start Date 4/96

Project Status Completed

Project reports Alfano, C., Basinger, J., Calle, P., Mansukhani, V. and Hall, M. 1999. A behavioral study of California sea otters being treated with testosterone-suppressing hormone implants at the New York Aquarium

Facility **New York Aquarium - Wildlife Conservation Society**

Project ID AMMPA-16-7

Project Name Infectious disease serology of free-ranging Alaskan walrus (*Odobenus rosmarus divergens*) in Alaska

Project description This study investigated the infectious disease exposure status of adult, free-ranging Pacific walrus (*Odobenus rosmarus divergens*) in Alaska

Investigators P. Calle, D. Seagers, C. McClave, D. Senne, C. House, J. House

Institutions Wildlife Conservation Society, USFWS, National Veterinary Services Laboratories (USDA)

Start Date 5/94

Project Status Completed

Project reports Calle, P., Seagers, D., McClave, C., Senne, D., House, C., and House, J. 1998. Infectious disease serology of free-ranging Alaskan walrus (*Odobenus rosmarus divergens*). Abstract, Proceedings American Association of Zoo Veterinarians and American Association of Wildlife Veterinarians, joint conference.

Facility **New York Aquarium - Wildlife Conservation Society**

Project ID AMMPA-16-9

Project Name Use of depot leuprolide acetate to control undesirable male associated behaviors in the California sea lion (*Zalophus*)

Project description In this study intramuscular administration of leuprolide acetate in a one month depot suspension successfully controlled undesirable male associated behaviors in California sea lions and California sea otters

Investigators P. Calle, M. Stetter, B. Raphael, R. Cook, C. McClave, J. Basinger, H. Walters and K. Walsh

Institutions Wildlife Conservation Society

Start Date 4/96

Project Status Completed

Project reports Calle, P., Stetter, M., Raphael, B., Cook, R., McClave, C., Basinger, J., Walters, H. and Walsh, K. 1997. Use of depot leuprolide acetate to control undesirable male associated behaviors in California sea lion (*Zalophus californianus*) and California sea otter (*Enhydra lutris*). Abstract, Proceedings, International Association for Aquatic Animal Medicine, 28.

Facility **Ocean Park Conservation Foundation**

Project ID AMMPA-17-1

Project Name River dolphins of the Indian subcontinent

Project description River Dolphins of the Indian Subcontinent (with People's Trust for Endangered Species; Whale and Dolphin Conservation Society)

Investigators Dr. Sinha, staff

Institutions Ocean Park Conservation Foundation, People's Trust for Endangered Species, Whale and Dolphin Conservation Society

Start Date 1995

Project Status Completed

Project reports In partnership with the Whale and Dolphin Conservation Society and the IUCN Cetacean Specialist Group, OPCF supported Dr. Sinha not only in his scientific efforts but also in promoting protection policies and seeking to educate the public about the dolphin's value as a symbol of ecosystem health in the Ganges.

OPCF considered it critically important to build local expertise and to encourage initiatives by local people in developing their own approaches to conservation. Dr. Sinha took the lead in establishing the Vikramshila Gangetic Dolphin Sanctuary in Bihar state.

Facility **Ocean Park Conservation Foundation**

Project ID AMMPA-17-2

Project Name Asian river dolphin committee

Project description Asian River Dolphin Committee (with Greenpeace Environmental Trust; Whale and Dolphin Conservation Society)

Investigators staff

Institutions Ocean Park Conservation Foundation, Greenpeace Environmental Trust, Whale and Dolphin Conservation Society

Start Date 1994

Project Status Completed

Project reports With the support of OPCF and the Whales and Dolphin Conservation Society, the first official meeting for the Asian River Dolphin Committee (ARDC) was held at Ocean Park. The report of that meeting,

published and distributed by OPCF, established the committee's rules of procedure and made a series of recommendations for research and conservation action.

The ARDC provided an opportunity for scientists from China, Bangladesh, India, Nepal and Pakistan to share common concerns, learn from one another, standardize methods and coordinate efforts. Involvement of outside experts from Japan, Canada, the United Kingdom and the United States allowed for the introduction of fresh approaches and new technology.

<i>Facility</i>	Ocean Park Conservation Foundation
<i>Project ID</i>	AMMPA-17-3
<i>Project Name</i>	Yangtze River dolphins (baiji and finless porpoise)
<i>Project description</i>	<p>The Ocean Park Conservation Foundation (OPCF) co-sponsored and participated in population surveys the entire middle and Lower Yangtze River. These surveys resulted in the first ever river-wide estimates of numbers and served as basis for the Chinese Academy of Sciences' renegotiated conservation plan. (Chinese Department of Agriculture, Chinese Academy of Sciences)</p> <p>OPCF co-sponsored 1995-96 expeditions to attempt to capture Baiji and translocate them into the Shishou Seminatural Reserve. We have raised all, non-Chinese-Government funds and in-kind support for this project. (Institute of Hydrobiology, Wuhan)</p> <p>OPCF provided extensive support for Shishou Seminatural Reserve, which is operated by the Institute of Hydrobiology, Chinese Academy of Sciences. Shishou is the best place to conserve the remaining Baiji. (Chinese Academy of Sciences, Department of Agriculture)</p> <p>OPCF provided Ocean Park staff to train staff at the Institute of Hydrobiology, Wuhan, in animal training and care and hosted scientists from Wuhan to view and discuss our breeding programs at Ocean Park.</p>
<i>Investigators</i>	Stephen Leatherwood
<i>Institutions</i>	Ocean Park Conservation Foundation, Chinese Academy of Sciences, Chinese Department of Agriculture, Institute of Hydrobiology, Wuhan.
<i>Start Date</i>	1995-1996
<i>Project Status</i>	Completed
<i>Project reports</i>	<p>The international conservation community reviewed conservation options. Accordingly, OPCF shifted its support for Baiji conservation to a few specific activities:</p> <ol style="list-style-type: none">1. Documenting the recent history of the decline of the baiji.2. Assisting with the removal of finless porpoises from Shishou semi-natural reserve so that they do not compete with baiji placed there.3. Assisting with the transfer and acclimation to the reserve of the only baiji currently in captivity.4. Assisting with capture from the river and translocation to the reserve of as many as possible of the remaining baiji

<i>Facility</i>	Ocean Park Conservation Foundation
<i>Project ID</i>	AMMPA-17-4
<i>Project Name</i>	Conservation status of humpbacked dolphins and Chinese white dolphins
<i>Project description</i>	Conservation Status of Humpbacked Dolphins or Chinese White Dolphins (with Hong Kong Agriculture and Fisheries Department and Provisional Airport Authority and Agriculture and Fisheries Department)
<i>Investigators</i>	Dr. Tom Jefferson, staff
<i>Institutions</i>	Ocean Park Conservation Foundation, Hong Kong Agriculture and Fisheries Department, Provisional Airport Authority,
<i>Start Date</i>	1995-1998

Project Status

Completed

Project reports

Surveys using line transect and photo-identification techniques were proving very informative, and a stranding recovery programme was providing useful information on rates and causes of mortality. The study shown that there were more of these dolphins in Hong Kong than first thought, so the population would be viable in the long term. Ensuring their future, however, would require a strong commitment to environmental protection by the Hong Kong people and government.

Facility Ocean Park Conservation Foundation, Hong Kong

Project ID AMMPA-17-5

Project Name Finless porpoise

Project description OPCF has commissioned the development of a report on the status of the species, the conservation problems it faces and the best actions to secure its conservation. (Whale and Dolphin Conservation Society)

Investigators staff

Institutions Whale and Dolphin Conservation Society

Start Date 07-1998 to 12-2000

Project Status Completed

Project reports Base on the findings of this study, a series of recommendations for management and further research are proposed. General Management recommendations were based on the seven principles for the conservation of the wild living resources originating from a U.S. Marine Mammal Commission workshop in 1994. Seven specific management recommendations are also made, the most salient of which are to improve water quality, include finless porpoise in all future EIAs that potentially impact this species, and establish additional protected areas of important habitat. Finally nine recommendations for future research are made. These include further studies on stock structure, acoustics, and pathology/pollutant effects; a tagging and tracking study; extension of some studies into waters outside Hong Kong; documenting fisheries bycatch; and the continuation of line transect population monitoring and stranding recovery to document trends in abundance and population status. If the recommendations of this report are followed, the Hong Kong finless porpoise population should be able to survive in the long term.

Facility Ocean Park, Hong Kong

Project ID AMMPA-17-6

Project Name Digital imaging of bottlenose dolphin anatomy

Project description A program in collaboration with Chinese University and Hong Kong Polytechnic University, which is using imaging plates for computed radiography to create baseline radiographs of bottlenose dolphin anatomy.

Investigators Dr. N. Rourke, Dr. R. Kinoshita, Dr. C. Rayner, Dr. Fiona Brook, P. Chan, L. Cheung, C. Metreweli

Institutions Chinese University, Hong Kong Polytechnic University, Fujifilm

Start Date 1996 to 2000

Project Status Completed

Project reports Computed radiography (CR) is now replacing conventional screen/film systems in general medical radiography. The digital radiography generates latent analogue images, which can then be electronically transmitted or printed on film. Digital image processing techniques, such as edge enhancement, may then be applied to improve specific diagnostic performances. The imagine plates have a wider exposure latitude which compensates for exposure errors and produces final images of very good quality, even under poor conditions. When applied to cetacean thorax images, the results indicate this is an significant improvement over plain radiography diagnostics.

Facility Sea Life Park

Project ID AMMPA -18-1

Project Name Plasma progesterone concentrations in two species of captive small whales (Psuedorca crassidens and Grampus griseus)

Project description

Investigators C. Combellas, S. Atkinson, M. Breese. P. Nachtigall, J. Pawloski

Institutions Hawaii Institute of Marine Biology, Sea Life Park

Start Date

Project Status Completed

Project reports

Facility Sea Life Park

Project ID AMMPA -18-2

Project Name Concept formation in dolphins

Project description Visual discrimination of asymmetrical versus symmetrical 3-D objects placed underwater

Investigators L. von Fersen

Institutions

Start Date

Project Status Completed

Project reports

Facility Sea Life Park

Project ID AMMPA -18-3

Project Name Effects of a GnRH agonist on semen quality in male Hawaiian monk seals

Project description

Investigators S. Atkinson, W. G. Gilmartin

Institutions

Start Date

Project Status Completed

Project reports

Facility **Sea Life Park**
Project ID AMMPA-18-4
Project Name Effects of a GnRH agonist on sociosexual and aggressive behaviors in male Hawaiian monk seals

Project description

Investigators S. Atkinson, W.G. Gilmartin

Institutions

Start Date

Project Status Completed

Project reports

Facility **Sea Life Park**
Project ID AMMPA-18-5
Project Name Hormonal monitoring of reproduction using urine and feces in female Hawaiian monk seals

Project description

Investigators S. Atkinson, R. Arakaki

Institutions University of Hawaii

Start Date

Project Status Completed

Project reports

Facility **Sea Life Park**
Project ID AMMPA-18-6
Project Name Immunization of Hawaiian monk seals against canine distemper virus

Project description

Investigators W.G. Gilmartin, A. Osterhaus

Institutions

Start Date

Project Status Completed

Project reports

Facility Sea Life Park
Project ID AMMPA -18-7
Project Name Determination of seasonal testosterone pattern in male Hawaiian monk seals
Project description
Investigators W. G. Gilmartin, S. Atkinson
Institutions
Start Date
Project Status Completed
Project reports 1992. J. Reproduction and Fertility

Facility Sea Life Park
Project ID AMMPA -18-8
Project Name Investigation into the visual cognition of the California sea lion
Project description
Investigators G. LeBlanc, S. Vlachos
Institutions
Start Date
Project Status Completed
Project reports

Facility Sea Life Park
Project ID AMMPA -18-9
Project Name Use of salivary and plasma hormone concentration to monitor reproduction in captive false killer whales
Project description
Investigators S. Atkinson, M. Breese, C. Combelles
Institutions Sea Life Park, University of Hawaii
Start Date
Project Status Completed
Project reports

Facility Sea Life Park
Project ID AMMPA -18-10
Project Name Use of gonadotrophin releasing hormone (GnRH) agonist to suppress testosterone production in male Hawaiian monk
Project description
Investigators S. Atkinson, W.G. Gilmartin
Institutions
Start Date
Project Status Completed
Project reports 1993. J. Reproduction and Fertility, 97:35-38

Facility Sea Life Park
Project ID AMMPA -18-11
Project Name Psychoacoustic examination of masked hearing capabilities in a *Tursiops truncatus*
Project description
Investigators D. Lemonds. W. Au, S. Vlachos
Institutions Hawaii Institute of Marine Biology
Start Date
Project Status Completed
Project reports

Facility Sea Life Park
Project ID AMMPA -18-13
Project Name Validation of bioelectric impedance analysis using deuterium oxide dilution in juvenile Hawaiian monk seals of varying body
Project description
Investigators S. Atkinson, K. Pawlowski
Institutions University of Hawaii
Start Date
Project Status Completed
Project reports

Facility SeaWorld Parks
Project ID AMMPA -20-3

Project Name Bottlenose dolphin stock identification

Project description The objective of this study is to use one or more forms of DNA extracted from bottlenose dolphin skin to identify different populations or stocks of bottlenose dolphins around the world. Stock identification is critical to stock assessment and management.
The objective of this study is to use one or more forms of DNA extracted from bottlenose dolphin skin to identify different populations or stocks of bottlenose dolphins around the world. Stock identification is critical to stock assessment and management.

Investigators B. Curry

Institutions Texas A&M University, NMFS

Start Date

Project Status Completed

Project reports PhD dissertation, Texas A&M University

Facility **SeaWorld Parks**

Project ID AMMPA -20-4

Project Name Response of marine mammals to novel objects and novel sounds

Project description It is well known that marine mammals become entangled in a variety of fishing gear, especially monofilament gillnets. The purpose of the project is to document the behavioral responses of naive dolphins, seals, and sea lions to objects (ropes, nets, and floats) and sounds that they have never experienced and to use these observations to develop gear modifications and other techniques to help the animals avoid entanglement.

Investigators A. Bowles and staff

Institutions Hubbs-SeaWorld Research Institute, NMFS

Start Date

Project Status Completed

Project reports Anderson, R.C., A.E. Bowles, L.F. Wolski, and H.L. Stinson. 1998. Behavioral responses and habituation of captive harbor seals, California sea lions and Commerson's dolphins to nets with and without pingers. Abstract, 12th Biennial Conf. Biology of Marine Mammals, Monaco

Facility **SeaWorld Parks**

Project ID AMMPA -20-6

Project Name Photogrammetry and blubber depth in phocid seals

Project description Development of remote sensing methods for assessing body

condition in seals.

Investigators G.A.J Worthy and K. McFadden

Institutions Texas A&M University

Start Date

Project Status Completed

Project reports none

Facility **SeaWorld Parks**

Project ID AMMPA -20-7

Project Name Studies on a gray whale calf

Project description The successful rescue and rehabilitation of a gray whale calf in early 1997 has provided a unique opportunity for many investigators to apply modern investigative techniques to the study of gray whale biology. Collaborating institutions are listed above. Studies include hearing and acoustics, energetics, temperature regulation, genetics, and blood chemistry. Upon release, the whale will be tracked via satellite linked transmitters and dive patterns will be documented.

Investigators staff

Institutions SeaWorld, U.S. Navy, HSWRI, NMFS, Moss Landing Marine Lab, Smithsonian Institutionm, LA Co. Museum of Natural

Start Date 1997

Project Status Completed

Project reports Antrim, J., J. F. McBain, and D. Parham 1998. Rehabilitation and release of a gray whale calf. *Endangered Species Update.*, 15(5):84-89.

Facility **SeaWorld Parks**

Project ID AMMPA -20-14

Project Name Composition of marine mammal bile

Project description An ongoing study of the chemical composition of cetacean, pinniped, and sirenian bile. Inferences about the phylogenetic relationships of some species have been made based on similarities of bile acids.

Investigators L. Hagey, D. Odell

Institutions University of California San Diego, SeaWorld

Start Date 1987

Project Status Completed

Project reports Kuroki, S., et al. 1988. Bile salts of the West Indian manatee: Novel bile alcohol sulfates and absence of bile salts. *J. Lipid Research*, 29: 509-522.

Facility John G. Shedd Aquarium

Project ID AMMPA -21-1

Project Name Use of Beluga Whale Milk to Determine Reproductive Hormones and Compositional Changes throughout Lactation.

Project description This study will monitor reproductive hormone concentrations in the beluga whale through lactation. This will allow for characterization of the reproductive cycling in this species. In addition, analysis of milk composition will provide data on energetic requirements of beluga calves. Significance: This study will allow for the greater understanding of reproductive physiology of belugas – increasing the ability to manage controlled populations for reproduction. In addition, it will increase our knowledge of neonatal nutrition, allowing for greater care of orphaned neonates, with applications to stranded animals as well as those in public display facilities.

Investigators Kristi West, Mark Carmichael and Shannon Atkinson

Institutions Univ. of Hawaii

Start Date 1998

Project Status Completed

Project reports West, Kristi et al. 1999. Progesterone concentrations associated with parturition in three species of odontocetes. In Proceedings of the 13th Biennial Conference on the Biology of Marine Mammals. P. 199

Facility John G. Shedd Aquarium

Project ID AMMPA -21-3

Project Name Sea otter conservation endocrinology

Project description A study to develop non-invasive techniques for studying reproduction endocrinology in sea otters. A partner in this study coordinated through the Seattle Aquarium.

Investigators K. Ramirez, J. Boehm

Institutions John G. Shedd Aquarium

Start Date

Project Status Completed

Project reports

Facility John G. Shedd Aquarium
Project ID AMMPA -21-4
Project Name Population studies of Pacific white-sided dolphins
Project description A study to facilitate the development of a non-invasive tool (dorsal pack) to secure satellite tags to dolphins during population and diving physiology studies. A partner in this study coordinated by the University of California at Santa Cruz.
Investigators J. Boehm, K. Ramirez
Institutions John G. Shedd Aquarium
Start Date
Project Status Completed
Project reports

Facility John G. Shedd Aquarium
Project ID AMMPA -21-5
Project Name Acoustic analysis of Pacific white-sided dolphins
Project description
Investigators M. Fahner, J. T. Thomas, K. Ramirez
Institutions Western Illinois University, Shedd Aquarium
Start Date
Project Status Completed
Project reports

Facility John G. Shedd Aquarium
Project ID AMMPA -21-6
Project Name Diving physiology in Pacific white-sided dolphins
Project description A study of aerobic and anaerobic metabolism during simulated dives. A partner in this study coordinated by the University of California at Santa Cruz.
Investigators K. Ramirez, J. Boehm
Institutions Shedd Aquarium, University of California Santa Cruz
Start Date
Project Status Completed
Project reports

Facility John G. Shedd Aquarium
Project ID AMMPA-21-7
Project Name Tactile sensitivity in Alaskan sea otters
Project description To develop methodologies to characterize the tactile sensitivity of the front paws of sea otters. A study to characterize the low frequency hearing in this species. Research has applications to field studies that use sound emission as an experimental variable. A partner in this research coordinated by Western Illinois University.
Investigators M. Hudson, K. Ramirez
Institutions Shedd Aquarium
Start Date
Project Status Inactive
Project reports

Facility John G. Shedd Aquarium
Project ID AMMPA-21-9
Project Name Use of Beluga Whale Milk to Determine Reproductive Hormones and Compositional Changes throughout Lactation - II
Project description This continued study will monitor reproductive hormone concentrations in the beluga whale through lactation. This will allow for characterization of the reproductive cycling in this species. In addition, analysis of milk composition will provide data on energetic requirements of beluga calves. Significance: This study will allow for the greater understanding of reproductive physiology of belugas – increasing the ability to manage controlled populations for reproduction. In addition, it will increase our knowledge of neonatal nutrition, allowing for greater care of orphaned neonates, with applications to stranded animals as well as those in public display facilities.

Investigators Kristi West and Shannon Atkinson
Institutions University of Hawaii
Start Date 1999
Project Status Completed
Project reports

Facility John G. Shedd Aquarium
Project ID AMMPA-21-10
Project Name Total body water studies in Pacific white-sided dolphins
Project description A study to characterize the low frequency hearing in this species. Research has applications to field studies that use sound emission as an experimental variable. A partner in this

research coordinated by Western Illinois University.

Investigators D. Tremel, K. Ramirez, J. Boehm
Institutions Western Illinois University, Shedd Aquarium
Start Date
Project Status Completed
Project reports

Facility **John G. Shedd Aquarium**
Project ID AMMPA-21-11
Project Name Diversity of odontocete vocalizations
Project description To develop an objective and reliable categorization scheme for the intraspecies comparison of vocalization. A partner in this research coordinated by the University of Hawaii.

Investigators K. Ramirez, J. Boehm
Institutions Shedd Aquarium
Start Date
Project Status Completed
Project reports

Facility **John G. Shedd Aquarium**
Project ID AMMPA-21-12
Project Name Low frequency audiometric studies on Pacific white-sided dolphins
Project description The effects of human-made noise on cetaceans has been a topic of recent concern among scientists. Biologists need to know whether low-frequency, high amplitude sounds from commercial and military ships or from offshore oil/gas exploration and other activities (e.g., Acoustic Thermography of Ocean Climate, ATOC) could cause cetaceans to avoid critical breeding or feeding areas. Most studies on cetacean bioacoustics have focused on the high frequency range of echolocation clicks. The aim of this study is to determine the low frequency hearing threshold of the Pacific white-sided dolphin. With this information scientists will be able to make more informed decisions regarding the possible effects of sound upon different species of cetaceans.

Investigators J. Thomas
Institutions Western Illinois University
Start Date
Project Status Completed

Project reports

Facility John G. Shedd Aquarium

Project ID AMMPA-21-13

Project Name Serologic study to detect transmission of phocine distemper virus

Project description Seals in the Atlantic Ocean off the Northeastern U.S. carry various levels of antibody to phocine distemper virus (PDV). When these animals enter rehabilitation centers and are found to have a titer to PDV, current regulations prevent them from being released for fear that they might disseminate the virus into the environment. This study will track seropositive seals that have been housed together with seronegative animals to better establish seroprevalence and epidemiology of the virus. Based on such information, it may be shown that the concerns for transmission are not grounded and this may lead to changes in regulations allowing for more effective rehabilitation programs.

Investigators J. House

Institutions U.S. Dept. of Agriculture

Start Date

Project Status Inactive

Project reports

Facility John G. Shedd Aquarium

Project ID AMMPA-21-14

Project Name Immunologic assessment of health in the sea otter, *Enhydra lutris*

Project description The sea otter is a threatened species in California, where localized populations are faced with acute exposure to oil from oil spills and chronic exposure to oil and oil by-products. In the sea otter, even the most basic tests of immune competence have not been performed. The objective of this proposal is to establish baseline values for normal animals using peripheral blood samples. Once baseline values are established, determination of specific effects of oil exposure on immune system function can begin. The implications of such a study are great for animals in aquaria and for their wild counterparts.

Investigators B. Taylor

Institutions Univ. of California, Davis

Start Date

Project Status Completed

Project reports

Facility John G. Shedd Aquarium

Project ID AMMPA-21-15

Project Name Semen cryopreservation and reproductive endocrinology of the Pacific white-sided dolphin

Project description Currently there are three male, Pacific white-sided dolphins in North American zoos and aquaria. This study seeks to develop consistent techniques among the three institutions for the procurement and cryopreservation of semen from these animals. This work will enable the management staffs to more effectively develop breeding programs for this species.

Investigators T. Robeck

Institutions SeaWorld Texas

Start Date

Project Status Inactive

Project reports

Facility John G. Shedd Aquarium

Project ID AMMPA-21-16

Project Name Investigation of the Cetacean Immune System

Project description This study will help to advance the characterization of the cetacean immune system (including anatomy and morphology of lymphoid tissues, innervation of lymphoid organs, proportions of T and B cells, functional aspects of the immune system and cloning and development of cetacean specific immunological reagents. Significance: The result of this work will be the provision of new tools with which to study and ultimately better understand the cetacean immune system.

Investigators Tracy Romano

Institutions The Scripps Research Institute/SPAWARSYSCEN/Texas A&M

Start Date 1999

Project Status Completed

Project reports

Facility John G. Shedd Aquarium

Project ID AMMPA-21-17

Project Name Quantification of serum haptoglobin from Pacific white-sided dolphins

Project description A diagnostic tool that could indicate apparent disease processes in clinically normal animals and measure response to corrective and preventative measures would be extremely useful in the management of marine mammals in zoos and aquaria. Such a tool is available in human medicine and is

based upon the detection of an acute phase response by quantitative determination of acute phase plasma proteins. The aim of this study is to investigate the value of monitoring the acute phase response in the Pacific white-sided dolphin. The information would be of value to clinicians working with dolphins in zoos and aquaria and to field researchers as they seek to assess the health status of large populations of animals.

Investigators T. Eurell
Institutions Univ. of Illinois, Urbana-Champaign
Start Date
Project Status Inactive
Project reports

Facility **Six Flags Marine World**
Project ID AMMPA-22-2
Project Name Whistle structure and use by bottlenose dolphins in contexts of isolation
Project description A study of whistle use by juvenile and adult bottlenose dolphins during isolation contexts. The focus of this study is to help resolve the current debate on dolphin whistle repertoire structure and organization and the role of signature whistles.

Investigators B. McGowan, D. Reiss
Institutions Six Flags Marine World; New York Aquarium
Start Date 01/98
Project Status Completed
Project reports McCowan, B. and Reiss, D. (1999) "Contact calls of bottlenose dolphins: signature "information" in a shared call." Thirteenth Biennial Conference on the Biology of Marine Mammals. November 28-December 3, 1999. Maui, Hawaii.

Facility **Six Flags Marine World**
Project ID AMMPA-22-3
Project Name Bubble ring play in juvenile bottlenose dolphins
Project description An observational study of the process and underlying cognitive abilities behind complex bubble ring play in bottlenose dolphins.

Investigators B. McGowan, L. Marino, D. Reiss
Institutions Six Flags Marine World
Start Date 01/97
Project Status Completed
Project reports Vance, E., McCowan, B., Marino, L., Walke, L. and Reiss, D. L.

(1998). "Evidence for advanced sensorimotor abilities in the bubble ring play of bottlenose dolphins." Thirty-fifth Annual Meeting of the Animal Behavior Society. July 18-22. Southern Illinois University, Carbondale, Illinois; McCowan, B., Marino, L., Vance, E., Walke, L. and Reiss, D. (In press). Bubble ring play of bottlenose dolphins: implications for cognition. Journal of Comparative Psychology.

Facility Six Flags Marine World

Project ID AMMPA -22-5

Project Name Organochlorine detection in postnatal dolphins

Project description This project correlates levels of organochlorine contamination and accumulation present in the blubber, blood, and milk in bottlenose dolphins, and determines the amount of organochlorine "dumping" during reproduction and lactation.

Investigators S. Ridgway

Institutions U.S. Navy

Start Date 03/95

Project Status Completed

Project reports

Facility Six Flags Marine World

Project ID AMMPA -22-6

Project Name Paternity determination of captive bottlenose dolphins

Project description A paternity analysis of two captive bottlenose dolphins, using skin scrapings and doing the analysis by Polymerase Chain Reaction.

Investigators C. Gubbins

Institutions Univ. Nevada

Start Date 05/95

Project Status Completed

Project reports

Facility Six Flags Marine World

Project ID AMMPA -22-7

Project Name Relationship of chaos in respiratory patterns of newborn bottlenose dolphins to survivorship

Project description Through observation of stranded cetaceans, it was noted that there appeared to be a period of chaotic breathing just prior to death. This study was designed to observe three newborn

bottlenose calves and monitor their breathing rates.

Investigators D. Bain
Institutions Six Flags Marine World
Start Date 1992
Project Status Completed
Project reports Bain, D. E. 1995. Breathing patterns and health: a place for chaos theory? Poster presented to the International Marine Animal Trainers Association Conference. Las Vegas, NV

Facility **Six Flags Marine World**

Project ID AMMPA -22-8

Project Name A study of the flow of water around dolphins

Project description The purpose of this research is to visualize by use of fine bubbles the flow of water around a single dolphin swimming at a certain velocity and to visualize the water flow around two or more dolphins at a certain velocity.

Investigators D. Bain

Institutions Six Flags Marine World

Start Date 1997

Project Status Completed

Project reports

Facility **Six Flags Marine World**

Project ID AMMPA -22-9

Project Name A test of object permanence in the bottlenose dolphin

Project description The objectives of this research are to respond to a serious paucity of scientific inquiry into maturation-related cognitive abilities in cetaceans by developing a general methodology for examining cognitive development in captive cetaceans that is comparable to studies of primates and other animals. During the early stages of the project it was determined that training protocols needed to be revised. We are waiting for investigator to review and revise protocols with training staff

Investigators L. Marino

Institutions Georgia Tech

Start Date 10/95

Project Status Pending

Project reports

Facility Six Flags Marine World

Project ID AMMPA-22-10

Project Name The killer whale auditory system assessed with evoked potentials

Project description Killer whale hearing was studied with both behavioral and evoked potential techniques. Frequency sensitivity, temporal parameters and effects were determined. The data have applications for the regulation of the effects of noise on marine mammals, and the use of noise to protect marine mammals from harmful interactions with fisheries

Investigators D. Bain, M. Szymanski, M. Dahlheim, A. Supin, K. Henry

Institutions Six Flags Marine World, NMFS, UC Davis, UC Santa Cruz, NRC, Russian Academy of Sciences

Start Date 1989

Project Status Completed

Project reports

Bain, D. E., M. Dahlheim, B. Kriete, J. Mullen, D. Marrin-Cooney, and P. Povey. In prep. Auditory thresholds and critical ratios of killer whales (*Orcinus orca*).

Szymanski, M. D., D. E. Bain, K. Kiehl, K. R. Henry, S. Pennington and S. Wong. 1999. Killer whale (*Orcinus orca*) hearing: auditory brainstem response and behavioral audiograms. *J. Acoust. Soc. Amer.* 106:1134-1141.

Szymanski, M. D., A. Ya. Supin, D. E. Bain, and K. R. Henry. 1998. Killer whale (*Orcinus orca*) auditory evoked potentials to rhythmic clicks in killer whales. *Mar. Mamm. Sci.* 14:676-691.

Szymanski, M. D., D. E. Bain and K. R. Henry. 1995. Auditory evoked potentials of a killer whale (*Orcinus orca*). In (R. A. Kastelein, J. A. Thomas, and P. E. Nachtigall, eds.) *Sensory Systems of Aquatic Mammals*. De Spil Publishers. The Netherlands. 1-10.

Bain, D. E. and M. E. Dahlheim. 1994. Effects of masking noise on detection thresholds of killer whales. In (T. R. Loughlin, ed.) *Marine Mammals and The Exxon Valdez*. Academic Press. N.Y. 243-256.

Bain, D. E., B. Kriete, and M. E. Dahlheim. 1993. Hearing abilities of killer whales (*Orcinus orca*). *J. Acoust. Soc. Amer.* 94:1829

Bain, D. E. 1992. Hearing abilities of killer whales (*Orcinus orca*). National Marine Mammal Laboratory Contract Report #43ABNF002499 and #43ABNF002500. 20 pp.

Facility Six Flags Marine World

Project ID AMMPA-22-11

Project Name Mechanisms of vocal learning in captive bottlenose dolphins from birth through two years

Project description An experimental study on the processes underlying vocal learning in captive infant bottlenose dolphins. The study's focus is on the ability and process by which young dolphins acquire novel signals into their vocal repertoire through the use of auditory information and feedback for comparison to the processes of vocal learning in other species such as birds and humans.

Investigators B. McCowan, D. Reiss

Institutions Six Flags Marine World

Start Date 01/96

Project Status Completed

Project reports McCowan, B. (1996). "Vocal development and learning in captive bottlenose dolphins." Presented as part of the symposium on Vocal Development in Primates and Higher Vertebrates. Sixteenth Congress of the International Primatological Society and Nineteenth Conference of the American Society of Primatologists. August 11-16. Wisconsin Regional Primate Research Center, Madison, Wisconsin.

Facility **Six Flags Marine World**

Project ID AMMPA-22-12

Project Name Nuclear DNA analysis of Tursiops

Project description The aim of this study is to analyze the distribution of genetic variation in captive versus wild populations of bottlenose dolphins

Investigators A. Rooney

Institutions Texas A&M University

Start Date 01/95

Project Status Completed

Project reports

Facility **Six Flags Marine World**

Project ID AMMPA-22-13

Project Name Ontogeny of whistle structures of captive dolphins

Project description A study of the development of whistle structure and function in captive bottlenose dolphins from birth through the first years of development.

Investigators B. McCowan, D Reiss

Institutions Six Flags Marine World

Start Date 06/90

Project Status Completed

Project reports McCowan, B. and Reiss, D. (1995). Whistle contour development in captive-born infant bottlenose dolphins: role of learning. *Journal of Comparative Psychology* 109 (3): 242-260.

Facility Six Flags Marine World

Project ID AMMPA-22-4

Project Name The structure and organization of bottlenose dolphin whistle Repertoires

Project Description A study of the structure and organization of bottlenose dolphin whistle repertoires using a quantitative approach for comparison with vocal repertoires of other mammalian species.

Investigators B. McCowan

Institutions Six Flags Marine World

Start Date 06/94

Project Status Completed 2003

Project reports

- McCowan, B. (1995). A new quantitative technique for categorizing whistles using simulated signals and whistles from captive bottlenose dolphins (*Delphinidae Tursiops truncatus*). *Ethology* 100: 177-193.
- McCowan, B. and Reiss, D. (1995). Quantitative comparison of whistle repertoires from captive adult bottlenose dolphins (*Delphinidae Tursiops truncatus*): a re-evaluation of the signature whistle hypothesis. *Ethology* 100: 193-209.
- McCowan, B., Reiss, D. and Gubbins, C. M. (1998). Social familiarity influences whistle acoustic structure in adult female bottlenose dolphins (*Tursiops truncatus*). *Aquatic Mammals* 24: 21-40.
- McCowan, B., Hanser, S. F. and Doyle, L. R. (1999). Quantitative tools for comparing animal communication systems: information theory applied to bottlenose dolphin whistle repertoires. *Animal Behaviour* 57: 409-419.

Facility Theatre of the Sea

Project ID AMMPA-24-1

Project Name Assessment of immunologic and endocrine parameters in cetaceans engaged in human contact

Project description To ascertain whether cetaceans that regularly come into contact with human subjects through a swimming program display immunologic and endocrine profiles that differ from control profiles. Despite the lack of evidence, there are a number of individuals and groups who maintain that allowing human subjects to swim with cetaceans --primarily *Tursiops truncatus*--is detrimental to the animals' health. The purpose of this pilot study will be to ascertain whether or not the endocrine and immunologic profiles following contact with humans is indicative of a stress response.

Investigators N. Hall

Institutions Univ. of South Florida

Start Date

Project Status Discontinued

Project reports

Facility Theatre of the Sea
Project ID AMMPA -24-2
Project Name Evaluation of human-cetacean swimming program as an anxiety reducing intervention
Project description
Investigators N. Hall
Institutions Univ. of South Florida
Start Date
Project Status Discontinued
Project reports

Facility Theatre of the Sea
Project ID AMMPA -24-3
Project Name Interaction with dolphins as part of a therapy program for emotionally disturbed youths
Project description These studies will determine if swimming with dolphins results in significant decrease in negative emotions such as anxiety and anger in humans. The program is also designed to investigate the personality and coping styles of those who choose to visit Theater of the Sea.
Investigators M. A. Kingle
Institutions Clearwater Marine Aquarium
Start Date
Project Status Discontinued
Project reports

Facility Vancouver Aquarium Marine Science Centre
Project ID AMMPA -24-1
Project Name Social dynamics of belugas
Project description
Investigators F. Delfour
Institutions Universite Paul Sabatier
Start Date
Project Status Completed

Project reports PhD thesis. Spacial and Social organization in captive beluga whales. 1994

Facility **Vancouver Aquarium Marine Science Centre**

Project ID AMMPA-24-5

Project Name Social organization in beluga whales in a public display facility

Project description Social interactions and dominance in belugas at Vancouver Aquarium, New York Aquarium and Shedd Aquarium

Investigators C. Recchia, P. Tyack

Institutions Woods Hole Oceanographic Institution

Start Date 1991

Project Status Completed

Project reports Recchia, C. 1994. Social organization in captive beluga whales (*Delphinapterus leucas*). PhD dissertation, Woods Hole Oceanographic Institution

Facility **Vancouver Aquarium Marine Science Centre**

Project ID AMMPA-24-9

Project Name Effects of icebreaker noise on sound discrimination in belugas

Project description

Investigators C. Erbe

Institutions Univ. of British Columbia

Start Date 1994

Project Status Completed

Project reports The masking of beluga whale vocalizations by icebreaker noise.

Facility **Vancouver Aquarium Marine Science Centre**

Project ID AMMPA-24-11

Project Name Harbor seal handling and ingesting of different prey sizes and species

Project description

Investigators P. Cottrell

Institutions Univ. of British Columbia

Start Date 1993

Project Status Completed

Project reports Assessing the use of hard parts in feces to identify harbour seal prey. Can. J. Zoology

Facility **Vancouver Aquarium Marine Science Centre**

Project ID AMMPA-24-12

Project Name Identification of prey species from fecal remains in captive Steller sea lions

Project description

Investigators P. Cottrell

Institutions Univ. of British Columbia

Start Date

Project Status Completed

Project reports MA thesis

Facility **Zoomarine**

Project ID AMMPA-26-3

Project Title Toys as an enrichment source for dolphins and sea lions in public display environments

Project description Development of safe devices that serve as environmental enrichment for marine mammals

Investigators Staff, with the involvement of under-graduate students from a Psychology Faculty

Institutions Zoomarine

Start Date 1997

Project Status Completed

Project reports Project Report Available