

## **Introduction and background to the collected papers on the rescue, rehabilitation, and scientific studies of JJ, an orphaned California gray whale calf**

On 11 January 1997, a very young California gray whale was rescued near Marine del Rey, Los Angeles, and delivered to SeaWorld of California in San Diego. She was semi-comatose, severely infested with whale lice, and had numerous cuts and ulcers over her body. She weighed 758 kg, was 4.2 m long and judged to be only a few days old. Veterinarians and Animal Care Specialists at SeaWorld immediately began emergency procedures to restore her electrolyte, water, and energy balance and to combat bacterial infections. Although the initial prognosis for the infant's survival was poor, a committed staff with around the clock protocol of intensive care, force-feeding, and observation greatly improved her condition during the critical next several days. Anheuser-Busch Corporation, the parent corporation of SeaWorld, and SeaWorld Incorporated quickly committed to providing economic and personnel resources to do whatever it would take to ensure the best nutrition, care, and housing possible for JJ's rehabilitation<sup>1</sup>.

As the calf's condition steadily improved, she gained the name 'JJ' in memory of Judy Jones, a long-time and generous devotee of marine mammal rehabilitation in Laguna Beach who recently died suddenly. For those who attended to her, made studies of her, and the public who routinely visited her, witnessing 'JJ's' growth, development, and scientific legacy during the next 14 months, the process was absolutely awesome.

With continued around the clock care and observation JJ continued to grow and thrive. By late summer, she was weaned off a formula slurry and eating most of her food (about 180 kg a day) from the bottom of her pool (Fig. 1), and gaining around 23 kg a day or nearly 1 kg an hr (Fig. 2). In early spring 1998, just prior to release, she had grown to nearly 9 m and 9000 kgm. The rehabilitation yielded substantial advances in basic husbandry and veterinary medicine of a baleen whale, it also provided unique opportunities for scientific inquiry and learning.

As JJ's health stabilized and she continued to improve, SeaWorld staff asked me to help organize and co-host a scientific workshop. Its purpose was

to address issues of timing and location of her release and to identify projects of benefit to whale science that would be compatible with JJ's welfare and vitality during the rehabilitation and release. Fortunately, there were already some terms of reference to help frame the discussions because SeaWorld of San Diego had raised and released a gray whale calf (Gigi II) nearly three decades earlier.<sup>2</sup> An important difference was that Gigi II was captured in good condition in a breeding lagoon in Baja California after it had been nursed by its mother for around two mo, whereas JJ was only a few days old and near death when she arrived at SeaWorld.

The workshop, held in June 1997, was attended by invited local marine mammal scientists, animal care staff and veterinarians, and government representatives. There was substantial dialogue and debate on a surprising array of issues, including whether JJ might be maintained in captivity for several years as a tremendous resource for learning more about mysticete cetaceans, if actually released when and where that should occur, and whether her movements and behavior should or should not be monitored after release. The outcome was general consensus that JJ should be reintroduced to the Pacific Ocean near San Diego in spring 1998 to coincide with the northward migration of gray whales from their breeding lagoons in Baja California, and that she should be monitored electronically. There was also consensus that as much scientific research as possible should be encouraged during the rehabilitation provided that it did not risk her health or result in substantial imprinting on humans. One key specific concern was that the attachment of electronic tags to monitor post-release movements might pose a risk for pathogenic bacteria and viruses to track into the muscle layer and cause systemic infections and subsequent death if implants or deep tissue anchors were used. Another concern was that post-release monitoring might encourage generally well-meaning whale watchers and JJ enthusiasts to search-out and follow her, resulting in burdensome harassment. Consequently, it was decided that any attachment

<sup>1</sup>Busch, A. III, this issue; Andrews *et al.*, this issue; Antrim, this issue.

<sup>2</sup>Evans, W. E. (ed.) (1974) The California gray whale: Special Number. *Mar. Fish. Rev.* 36, 1–64.



**Figure 1.** Transition of feeding patterns of a rehabilitating gray whale calf (JJ). A. delivery of custom formula via stomach tube during first several weeks; B. voluntary suckling on modified formula delivery system; C. voluntary acceptance of solid food and D. expression of natural foraging behavior of free-ranging gray whales and voluntary foraging on bottom of pool on solid food.

mechanisms would be shallow and not penetrate the blubber-muscle fascial interface. The National Marine Fisheries Service also requested that information on her whereabouts not be released immediately, but delayed several days or longer to prevent troublesome disturbances.

A number of scientific studies were already in progress and recommendations from the workshop stimulated the initiation of several more. Behavioral observations, began in February by Dr Ann Bowles from Hubbs-SeaWorld Research Institute (HSWRI), detailed clinical studies of blood chemistry, nutrition, and growth were underway by veterinarians Drs. Tom Reidarson, Jim McBain, and Pamela Yochem (Fig. 3), and documentation of the growth and feeding patterns of JJ were in progress and several of the other suggested studies were soon implemented.

Sheyma Wisdom and colleagues from HSWRI studied the development of JJ's feeding, acoustic, and swimming behavior. Dr. Sam Ridgway and colleagues from the U.S. Navy's marine mammal program tested non-invasive methods of

monitoring baleen whale hearing abilities using electrophysiological techniques. Dr. Jim Sumich and students at Grossmont College and colleagues at SeaWorld of San Diego and the National Marine Fisheries service collaborated to measure the development of JJ's efficiency in extracting oxygen from inhaled air, ventilation rates, and metabolic rate, and document patterns of body and baleen growth. Dr. Mike Castellini and colleagues investigated the relative distribution of glucose in plasma and red blood cell components of circulating blood to understand the dynamics of glucose transport to various body tissues. Dr. John Heyning of the Los Angeles County Museum of Natural History examined thermoregulation in JJ's mouth while feeding and documented the function of an important heat conservation system in the tongue. Dr. Paul Ponganis and Dr. Gerry Kooyman from the Scripps Institution of Oceanography tested techniques for recording electrocardiograms and heart rate to learn something of the development and regulation of JJ's heart function and to assist in



**Figure 2.** Physical growth of a rehabilitating gray whale (JJ) from arrival at SeaWorld in San Diego in comatose condition (A), to early days after transfer to large pool (B), and just before reintroduction to the Pacific Ocean over a year later (C).



**Figure 3.** Veterinarians (Dr. Tom Reidarson and Dr. Pamela Yochem) obtaining a blood sample from JJ for standard diagnostic analysis of health and condition.



**Figure 4.** Transport of (JJ) from SeaWorld (A) and aboard the U.S.C.G. buoy tender *Conifer* (B) enroute to reintroduction to the Pacific Ocean off San Diego on 31 March 1998.

developing instruments for studies of free-ranging whales<sup>3</sup>. Dr. Jim Harvey and colleagues from Moss Landing Marine Laboratories introduced two trained California sea lions to JJ's pool to aid in their studies of free-ranging gray whales by employing those sea lions to carry video cameras to document gray whale behavior. Dr. Oleg Lyamin and Dr. Lev Mukhametov and colleagues from the Russian Academy of Sciences and UCLA studied JJ's sleep patterns. And Dr. Pamela Yochem of HSWRI, Dr. Jim Harvey (Moss Landing Marine Laboratories), and I developed housings and attachment mechanisms for satellite-linked radio transmitters to be used to track JJ's movements and diving patterns after release.

After consulting with these scientists and many others involved in supporting, coordinating, and implementing the rehabilitating JJ, I submitted a

proposal to *Aquatic Mammals* in 1999 to publish a collection of papers on the results of these various studies. This was enthusiastically endorsed by the former (Dr. Paul Nachtigall) and current (Dr. Jeanette Thomas) editor of *Aquatic Mammals* and I have been honored to assist in guest editing the collection of papers that appear here. The documentation of the observations and scientific studies here will certainly be an invaluable resource for consultation during future efforts to rehabilitate other stranded gray and baleen whales and a springboard for enhancing scientific knowledge presented by these unique opportunities for scientific inquiry and learning.

To all those who devoted more than a year of intense, selfless, dedicated effort to caring for JJ and endured a bittersweet separation on 31 March 1998 (Fig. 4), and of course to this remarkable gray whale, JJ, for teaching all of those whose good fortune allowed even the briefest contact with this wonder of a whale . . . long may you run!

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*Guest Editor*

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<sup>3</sup>Ponganis, P. J. & Kooyman, G. L. (1999) Heart rate and electrocardiogram characteristics of a young California gray whale (*Eschrichtius robustus*). *Mar. Mamm. Sci.* **15**, 1198–1207.