Keto & Tilikum Express the Stress of Orca Captivity

by

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Appendix A Compiled by John Kielty
Appendix B Adapted by the Authors
Keto & Tilikum Express the Stress of Orca Captivity

The practice of keeping killer whales in captivity has proven to be detrimental to the health and safety of animals and trainers alike. On Christmas Eve, 2009, trainer Alexis Martinez was killed by a male captive bred orca named Keto, who was on loan from Sea World to a facility called Loro Parque, in the Canary Islands, Spain. Two months later, on 24 February 2010, trainer Dawn Brancheau was killed by Tilikum, an animal involved with two previous human fatalities. Medical Examiner (ME) reports described massive trauma to both Dawn and Alexis. Neither death was accidental.

While orca captivity generates large profits for companies like Sea World (SW), life in a shallow concrete tank is greatly impoverished compared to the lives of their free-ranging counterparts. Trainer deaths, whale deaths, and numerous documented injuries to both trainers and whales provide evidence of several key issues related to killer whale captivity.

Tilikum is representative of the many social and health issues plaguing captive orcas. Typically spending their entire lives within tight family groupings, orcas captured from the wild, including Tilikum, have been traumatically extracted from the security, comfort and mentoring which these groupings provide. Captured animals are confined to small, acoustically-dead, concrete enclosures where they must live in extremely close proximity to other whales with which they often share no ancestral, cultural or communication similarities. The resultant infighting amongst captive orcas is exacerbated by virtue of having no place to run, as confinement fails to provide spatial escape options that natural settings offer. As a result, social strife is common in captivity, including aggression, in which whales are cut, raked, and rammed, usually by members higher on the social ladder. In one particularly brutal example, Kandu V, a female orca at Sea World of California (SWC), bled to death after 11.9 years (4332 days) in captivity when an artery was severed at the upper jaw (See Appendix). The wound was self-inflicted as she collided with another whale in a display of dominance. Over the next 45 minutes, and in view of the public, she slowly bled out, spouting blood from her blowhole until she died.
It was whale to whale aggression that resulted in cancellation of the “Believe” show immediately prior to Tilikum pulling Dawn Brancheau into the water at Sea World of Florida (SWF). This clash involved Kayla and the original “Baby Sham,” Kalina. Although this level of aggression usually causes reaction from the other whales in adjacent pools, it is unclear how this clash factored into Tilikum’s choice to grab, thrash and dismember his trainer. Just four months later, in June of 2010, Kayla and Kalina were fighting again. This time, Kayla inflicted a significant laceration above Kalina’s right eye, forcing yet another show cancellation. Kalina would die on 4 October 2010 at the age of 25 from “acute bacterial septicemia.” It is not clear how bacteria entered her bloodstream.

Social strife and boredom accompanying orca captivity also contribute to broken teeth. Steel gates are the primary method of separating orcas prior to training sessions, shows, or when aggressive tensions exist between animals (e.g. Kayla and Kalina). It is common for separated whales to bite down on the horizontal metal bars, or to “jaw-pop” through the gates as they display aggression at each other. In addition, under-stimulated and bored animals also “chew” metal bars and mouth concrete pool corners, like the main stage at SWF. As a consequence, tooth fragments can sometimes be found on the pool bottoms following these displays. This breakage leaves the pulp of some teeth exposed.

If left alone, the decaying pulp forms a cavity that leads to food plugging. The reaction of the orca’s immune system to this plugging is to create inflammation and eventually a focus for systemic infection. Because of the relative youth of most captive whales, the roots of many of their teeth are immature, which makes a root canal procedure impossible. Instead, using a variable speed drill, trainers drill holes through the pulp and into the jaw via an endodontic procedure called a modified “pulpotomy.” This is an uncomfortable husbandry procedure for the whales, which have been observed refusing to participate by sinking down into the water, shuddering, or splitting from their keepers. After “tooth drilling” is complete, trainers must irrigate (flush) the bored out teeth two-three times each day, for the rest of the orca’s life, to prevent abscess, bacteremia, and sepsis. (Kalina’s reported cause of death, “acute bacterial septicemia,” should make one ponder how bacteria entered her bloodstream. See Appendix A).

Consequently, orcas at SW and other facilities, like Six Flags, often possess a significantly reduced number of viable teeth, making them poor candidates for release into the wild.
In the medical field it is known that poor dentition can lead to a host of diseases including valvular heart disease, gingivitis, pneumonia, stroke, and heart attack. These open bore holes represent a direct route for pathogens to enter the blood stream where they can then be deposited into the tissue of various organs throughout the body, such as the heart or kidney. Unfortunately, orca necropsies are mostly done in-house, by park personnel, and under a relative cloak of secrecy. So despite the prevalence of poor teeth, it is not known what role they play in captive orca deaths. For example, many whales reportedly die of pneumonia. Could the cause of pneumonia be bacteria carried to the lungs from rotting food plugs or tooth decay? This is unclear due to insufficient research and lack of scrutiny. Along these lines, pathology reports, and other relevant documentation of the lives and deaths of captive orcas are poorly archived at the National Marine Fisheries Service (NMFS), a division of the National Oceanic and Atmospheric (NOAA), the federal agency tasked with tracking captive marine mammal data. Unfortunately, as a means of obfuscating relevant data, marine parks such as SW typically avoid attaching animal names with the cetacean records kept by the aforementioned agencies. Instead, by utilizing code numbers, marine industry claims are difficult to fully investigate.

[NOTE: Please see the attached Appendix A for captive orca birth, capture, and death data. This compiled spreadsheet reconstitutes missing and/or coded information contained in the NMFS's Marine Mammal Inventory Report (MMIR), and introduces a new statistic, “Mean Duration of Captivity,” (MDC) measured in days for ease of comparison and computation.]
Veterinary and animal care workers at marine parks are under considerable pressure to keep valuable captive assets, such as orcas, alive. As such, it is common practice to administer on-going prophylactic medications such as those that reduce stomach acid production and block histamine, like Tagamet. Stress-related ulcers are common in captive marine mammals and must be dealt with medically. Similarly, the use of antibiotics is often the immediate response to an animal appearing “off” or “slow,” and at any given time one or more orcas may be receiving antibiotics.

According to a preliminary report prepared by the Investigative and Enforcement Services of USDA APHIS (US Department of Agriculture’s Animal and Plant Health Inspection Service) and obtained via the Freedom of Information Act, Tilikum was on antibiotic and antifungal drugs for an “inflammatory issue” with an elevated white blood cell count beginning “about February 11” (2010) and during the time he pulled Ms. Brancheau to her death. Also in the report, “This whale had a similar issue last October that was treated and fully resolved. It is unknown where the inflammation was, but they had ruled out the teeth using a thermography unit, but were suspicious of the respiratory tract based on history of other whales with similar blood parameters and clinical signs.”

Pills, such as antibiotics, are typically packed into the morning feeding sessions by pushing them through the gills of herring (fish). The deleterious effects of chronic antibiotic usage are well established, and include disruption of normal bacterial flora in the gut, malnutrition, and susceptibility of the host to opportunistic pathogens such as fungi and yeast. The long-term consequences of other commonly used medications at marine parks are poorly understood, as are the effects of a life spent in water treated with oxidative agents meant to kill E. coli and other pathogens. It is reasonable to expect that as public opinion shifts toward disfavoring killer whale captivity, the pressure on veterinary and animal care staff to utilize prophylactic medications to prevent future deaths will increase. Dead captive killer whales are bad public relations and they serve to fuel the anti-captivity movement.
Wild killer whales can swim a hundred miles daily as they socialize, forage, communicate, and breed. In stark contrast, with little horizontal or vertical space in their enclosures, captive orcas swim only limited distances, with most spending many hours surface resting. Consequently, a random visitor to SWF will almost certainly find Tilikum, and others, statically suspended and without significant movement for long periods. The resultant physical deconditioning amongst captives is poorly understood from a long-term health perspective, as few captive orcas live to old age; however, based upon animal and human studies, one can speculate that the impacts are anything but positive. More obvious are the drastic changes in dorsal fin architecture (bending) that accompany a life spent at the surface. *Dorsal collapse* is a phenomenon nearly exclusive to captivity as it is rarely seen in wild orcas. 100% of adult captive male dorsal fins have succumbed to gravity versus approximately one percent of free-ranging orcas.

Left: A Sea World trainer measuring the progressive bending of the dorsal fin of a captive orca (Kanduke, deceased 9/20/1990). Right: The straight dorsal of a wild killer whale (T20). Note: 100% of captive adult male orcas have collapsed dorsal fins, versus less than 1% in the wild.

Less understood are the consequences from increased ultraviolet (UV) radiation exposure to the skin, eyes, and immune systems as animals float motionless at the surface. Orcas in marine parks sometimes suffer from sunburn, and trainers or animal care staff will apply sun-block and black (colored) zinc oxide to the backs of those animals which show signs of burn, or who otherwise spend inordinate amounts of time surface resting. Furthermore, at least one serious trainer injury has been linked to a whale’s poor visual acuity, possibly secondary to cataract formation. It is known that UV radiation exposure is a factor in the development of cataracts, especially in low latitude environments with elevated sun exposure. Compounding the issue, water in orca tanks is shallow and clear, offering no natural protection from the sun’s harmful rays. Contrastingly, free-ranging orcas spend most of their time at higher latitudes, in darker water, and at greater depths, and none spend time looking up at humans with their heads “on deck.”

In the medical community it is also accepted that UV radiation can act as an immunosuppressant and can cause retinal damage, among other physiological risks. Unfortunately, little is known of the long-term effects on captive orcas exposed to the sun to such an unnatural extent. The USDA-APHIS, which is charged with enforcement of Animal Welfare Act (AWA) provisions such as protection from the weather and direct sunlight, has historically been ineffective in ensuring compliance with the numerous regulations designed to provide minimum standards of care for captive marine mammals.
Orcas are carnivores, not scavengers. In the wild they consume a diet of live (not dead) prey items depending on which cultural subset they come from. For example, New Zealand orcas are known to feed on sharks and rays, while Icelandic and Northwestern orcas eat herring and salmon. Still others feed on marine mammals such as sea lions, porpoise, and baleen whales. Although from diverse places of origin, orcas in captive environments are forced to eat a non-varied diet of carrion. At Sea World this consists of frozen-thawed whole fish, *Clupea harengus* (herring), *Thaleichthys pacificus* (smelt), and *Oncorhynchus gorbuscha* (pink salmon), at approximately 2-3% of their body weight each day. Although staff members at these parks are trained to repeat the script that the fish is of “restaurant quality,” they fail to mention that free-ranging orcas don’t typically eat smelt, which are the size of sardines, and which constitute nearly half of their captive diet. It is not known how refrigeration and freezing of these fish impact the nutritional quality, nor is it known what long-term health consequences arise from feeding captive orcas food inconsistent with their culture. Additionally, since captives receive essentially the same diet every day, they are more susceptible to vitamin deficiencies from a lack of prey variety.

Marine parks such as Sea World tout their ability to provide environments adequate to keep orcas alive. *However, this claim is not supported by the evidence.* Approximately 157 orcas have died in captivity, not including stillborns and miscarriages. Based upon the MMIR data, and represented in Appendix A, we have calculated the mean duration of captivity (MDC) to be *less than nine years.* This is regardless of whether an orca was extracted from the ocean, or born at a theme park.

Globally, marine parks have enjoyed 60 live births since 1977. However, 32 of those animals (53%) are already deceased (Dec.). SW alone has had 28 live births, with nine deceased (32%), as are ten of the mothers. In the wild, successful calf-rearing is facilitated by mentoring mid-wives, family, and stable matriline. Based on revised estimates by Olesiuk, Ellis and Ford, (2005), and regarding “Northern Resident” orcas, the mean age at first birth has been estimated to be 14 - 15 years. For comparison, captive orcas often become pregnant much earlier. In regard to wild female reproductive lifespan, “single calves are subsequently born at five-year intervals (from the mid-teens) over a [span] lasting about 25 years.” Reproductive senescence (the equivalent of menopause) occurs around 40 years of age.

*Only 2 of the 7 pools at Shamu Stadium, SWF, are deeper than Tilikum is long (A & G pools)*
Giving birth at a young age comes with risks, including immature mothers refusing, or not knowing how, to properly nurse their calves. This is happening currently with a captive orca named Kohana, who is famous as SW’s second AI calf. On loan from SW to Loro Parque, she has recently given birth at eight years of age, in October of 2010. Kohana is not nursing this young orca and it is not clear whether it will survive via bottle and tube feedings. At SWF, Taima was a notoriously poor mother as well. She died from a prolapsed uterus while giving birth to her fourth calf on 6 June 2010, at the age of 20. Keep in mind that killer whale gestation is approximately 18 months in duration, and to reiterate, wild Northern Resident calves are “born at five-year intervals.”

Fathered by a transient bull named Kanduke (Dec. 9/20/1990, SWF) and an Icelandic mother Gudrun (Dec. 2/25/1996, SWF), Taima was a true hybrid, unknown in nature, being genetically half-transient and half-resident (transient and resident refer to two culturally and genetically distinct types of orcas). Was she too young at eight years of age to have Sumar (Dec. 9/7/2010, SWC)? It is known that she became very aggressive with him, and for his own protection he was shipped out of Orlando prior to his first birthday. Taima was also eventually banned from performing with trainers in the water, as she was deemed aggressive and unpredictable. As an aside, contrary to the common practice at marine parks of moving young whales to other parks and away from family, wild orcas typically spend their entire lives with family members who, among other things, assist mothers with calf-rearing (see Appendix B for a summary of Kalina’s travel record to various parks).
In light of Ms. Brancheau’s horrific death, the recent focus of public discourse has been on the safety measures in place at marine mammal facilities, and future steps to prevent morbidity and mortality amongst the human keepers of captive orcas. Safety measures aside, the objective of this article is to identify several key issues related to the whales themselves. It is our hope that a more holistic understanding of orcas within captive environments may lead to better judgments by park managers, the public, and regulatory agencies such as the USDA, APHIS, NOAA, NMFS and the Occupational Safety and Health Administration (OSHA). While parks such as SW should be credited for some of the early research on basic killer whale behavior and physiology, a review of the scientific literature suggests that very little new knowledge is being generated as a result of orca captivity.

Additionally, the authors introduce a new statistic, the **Mean Duration of Captivity (MDC)**, which allows for the evaluation of lifespan in captivity. MDC and lifespan are the same for captive born orcas. We acknowledge that the MDC is not equivalent to lifespan for captured animals. However, it is a valid approximation based upon the historical preference of whale collectors to extract the younger orcas of a given clan or pod.

For our population of 152 killer whales that have lived and died in captivity, the MDC equals 2413 days or 6.6 years. This is a surprisingly low number, especially when compared with free-ranging orca longevity. We also acknowledge that husbandry procedures and veterinary care may have improved with time, and that the *MDC only addresses dead whales for which data exist (n=152).*

To incorporate both dead (n=152) and living whales (n=41) we utilized the *Kaplan-Meier (KM)* method of examining captive orca survival. Employing the median as most representative of the central tendency of the dataset, this method allows “credit” to be given for those whales that are still living, and helps predict orca survival in captivity. According to the records, there are 41 whales *currently living* at marine parks, and six (Corky, Lolita, Ulises, Katina, Kasatka, Tilikum) that have been living in captivity for greater than 28 years. It is not known what attributes have contributed to their exceptionally long lives (by captive longevity standards). However, expanding the overall population from 152 to 193, to include all whales still alive in captivity (including these long-lived whales), only produces a median duration of captivity of 3108 days or 8.5 years. Using KM, we can be 95% sure that the true median duration of captivity lies between 998 and 3250 days (2.7 and 8.9 years, respectively).
Using “Baby Shamu's” landmark birth as a point when successful captive birthing began, 26 September 1985, the MDC differs little between the pre-Kalina (2453 days = 6.7 years, n=105) and post-Kalina birth cohorts (2323 days = 6.4 years, n=47). Though the data suggests that the post-Kalina birth cohort whales are living shorter lives, the MDC between the two is not statistically significant.

The time has come to evolve beyond keeping killer whales confined in small, unnatural spaces, purely for entertainment purposes. As we've demonstrated, their life spans are decreased and their behaviors altered from the stressors associated with confinement.

One solution, which has already been proposed, and we support, would be to phase out captive populations naturally, via attrition. In short, stop breeding the animals and let those already in captivity live out their lives. Animals such as Lolita at the Miami Seaquarium, whose mother and family group are still alive, and whose teeth are in relatively good shape, may be candidates for a transitional reintroduction to the wild. However, whales with broken and bored teeth, such as Tilikum, and many others, are likely poor candidates for release back to their natural habitat without ongoing human intervention.

Jeffrey Ventre, MD, is a medical physician specializing in physical medicine and rehabilitation in New Orleans. John Jett, Ph.D, is a visiting research professor focusing on waterway management issues at Stetson University.

Both Drs Jett and Ventre worked as trainers at Sea World of Florida for a combined total of 12 years. They worked with several orcas, including Tilikum, and with Dawn Brancheau. After SeaWorld, they began professional careers that allow for this unique perspective. The authors thank Wendy Cooke, John Kielty, Samantha Berg, Carol Ray, Kim Ventre, Howard Garrett, Colleen Gorman, Chica, and Tim Zimmermann for their contributions to this paper.

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### Appendix A: Captive Orca Longevity
#### Table I
Pre-Kalina Mortalities: Orcas Entering Captivity prior to 9-26-85

<table>
<thead>
<tr>
<th>Orca Name</th>
<th>Begin Captivity</th>
<th>Date of Death</th>
<th>Duration of Captivity (days)</th>
<th>Years of Life in Captivity</th>
<th>Reported Cause of Death</th>
<th>Place of Death</th>
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<tbody>
<tr>
<td>Ahab</td>
<td>M</td>
<td>10/1968</td>
<td>1974</td>
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<tr>
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<td>1989</td>
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<td>Benkei II (Ushikawa)</td>
<td>M</td>
<td>10/1980</td>
<td>07/1983</td>
<td>1,006</td>
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<td>Malignant Lymphoma</td>
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<td>Benkei III</td>
<td>M</td>
<td>02/1982</td>
<td>12/1983</td>
<td>665</td>
<td>2</td>
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<td>Betty</td>
<td>F</td>
<td>10/1978</td>
<td>09/08/1987</td>
<td>3,264</td>
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<td>Bjossa</td>
<td>F</td>
<td>11/19/1980</td>
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<td>Bonnie</td>
<td>F</td>
<td>04/1968</td>
<td>08/15/1968</td>
<td>134</td>
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<td>Canuck</td>
<td>M</td>
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<td>12/1974</td>
<td>989</td>
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<td>Candidiasis</td>
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<td>M</td>
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<td>Caren (Calen)</td>
<td>F</td>
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<td>Chappy</td>
<td>M</td>
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<td>Periostitis of Lumbar Bone</td>
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<td>Chi</td>
<td>F</td>
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<td>05/1979</td>
<td>65</td>
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<tr>
<td>Chimo</td>
<td>F</td>
<td>03/1970</td>
<td>11/02/1972</td>
<td>971</td>
<td>3</td>
<td>Pneumonia, Streptococcal Septicaemia, Chediak-Hijanshi-Syndrome</td>
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<td>Clovis</td>
<td>M</td>
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<td>Corky II's Calf (No Name)</td>
<td>M</td>
<td>02/28/1977</td>
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<td>08/20/1985</td>
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<td>Dzul-Ha (Shamu)</td>
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<td>Finna</td>
<td>M</td>
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<td>10/06/1997</td>
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<tr>
<td>Frankie</td>
<td>M</td>
<td>07/1973</td>
<td>01/29/1974</td>
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<td>Influenza</td>
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<td>Freyja (Patty)</td>
<td>F</td>
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<td>09/16/1987</td>
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<td>Gudrun</td>
<td>F</td>
<td>10/1976</td>
<td>02/25/1996</td>
<td>7,089</td>
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<td>Septicemia, Bacteremia associated w/ Endomyometritis</td>
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<tr>
<td>Haida</td>
<td>M</td>
<td>10/1968</td>
<td>10/03/1982</td>
<td>5,115</td>
<td>14</td>
<td>Lung Infection</td>
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<tr>
<td>Haida II</td>
<td>F</td>
<td>10/1982</td>
<td>08/2001</td>
<td>6,880</td>
<td>19</td>
<td>Necrosis of Cerebrum/ Fungal Infection</td>
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<td>Hoi Wai (Peanuts) (Suzie Wong)</td>
<td>F</td>
<td>10/1977</td>
<td>04/21/1997</td>
<td>7,145</td>
<td>20</td>
<td>Severe Intestinal Blood Loss</td>
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<td>Hugo</td>
<td>M</td>
<td>02/1968</td>
<td>03/04/1980</td>
<td>4,416</td>
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<td>Aneurysm Cerebral Artery</td>
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<td>Hyak II (Tung-Jen)</td>
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<td>Jumbo</td>
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<td>1,424</td>
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<td>Junior</td>
<td>F</td>
<td>11/1984</td>
<td>06/01/1994</td>
<td>3,502</td>
<td>10</td>
<td>Brain Damage</td>
</tr>
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</table>

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## Appendix A: Captive Orca Longevity

### Table I

**Pre-Kalina Mortalities: Orcas Entering Captivity prior to 9-26-85**

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</thead>
<tbody>
<tr>
<td>Kahana F</td>
<td>1978</td>
<td>05/14/1991</td>
<td>4,881</td>
<td>13</td>
<td>Severe Trauma, Intestinal Ganglioneuroma</td>
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<td>Kandu F</td>
<td>02/15/1967</td>
<td>06/16/1971</td>
<td>1,582</td>
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<td>Pneumonia, Liver Necrosis</td>
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<td>Kandu II M</td>
<td>08/1971</td>
<td>10/1979</td>
<td>2,982</td>
<td>8</td>
<td>Pneumonia</td>
<td>Marineland of Canada</td>
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<td>Kandu III F</td>
<td>08/1971</td>
<td>06/1975</td>
<td>1,401</td>
<td>4</td>
<td>Uraemia-Nephritis</td>
<td>SeaWorld of California, USA</td>
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<td>Kandu V F</td>
<td>10/12/1977</td>
<td>08/21/1989</td>
<td>4,332</td>
<td>12</td>
<td>Hemorrhage; Maxillary Bilateral Fracture</td>
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<td>Kandu VII M</td>
<td>11/1984</td>
<td>12/21/2005</td>
<td>7,720</td>
<td>21</td>
<td>Cancer</td>
<td>Marineland of Canada</td>
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<tr>
<td>Kanduke (Kandu IV) M</td>
<td>08/16/1975</td>
<td>09/20/1990</td>
<td>5,513</td>
<td>15</td>
<td>Viral Leptomenigitis</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Kandy F</td>
<td>08/1973</td>
<td>11/16/1973</td>
<td>105</td>
<td>0</td>
<td>Acute Pneumonia</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Katy F</td>
<td>02/15/1967</td>
<td>05/1967</td>
<td>76</td>
<td>0</td>
<td>Unknown</td>
<td>Seattle Marine Aquarium, WA, USA</td>
</tr>
<tr>
<td>Kenua F</td>
<td>10/25/1976</td>
<td>08/06/1991</td>
<td>5,400</td>
<td>15</td>
<td>Hemorrhagic Bacterial Pneumonia</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Kenny M</td>
<td>12/11/1969</td>
<td>05/1972</td>
<td>876</td>
<td>2</td>
<td>Pneumonia</td>
<td>Marineland of the Pacific, CA, USA</td>
</tr>
<tr>
<td>Kianu (Clyde) F</td>
<td>05/09/1968</td>
<td>06/1980</td>
<td>4,405</td>
<td>12</td>
<td>Gastrointestinal Disease</td>
<td>Nanki Adventure World, Japan</td>
</tr>
<tr>
<td>Kilroy M</td>
<td>02/1967</td>
<td>09/23/1978</td>
<td>4,250</td>
<td>12</td>
<td>Gangrenous Pneumonia</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Kim (Oum) M</td>
<td>06/1976</td>
<td>07/24/1982</td>
<td>2,244</td>
<td>6</td>
<td>Lung Abscess</td>
<td>Marineland Antibes, France</td>
</tr>
<tr>
<td>Kim H M</td>
<td>10/1982</td>
<td>11/23/2005</td>
<td>8,453</td>
<td>23</td>
<td>Pneumonia</td>
<td>Marineland Antibes, France</td>
</tr>
<tr>
<td>King M</td>
<td>11/1979</td>
<td>10/04/1983</td>
<td>1,434</td>
<td>4</td>
<td>Acute Pneumonia</td>
<td>Kamogawa SeaWorld, Japan</td>
</tr>
<tr>
<td>Kiva F</td>
<td>06/18/1982</td>
<td>08/03/1982</td>
<td>45</td>
<td>0</td>
<td>Respiratory Failure</td>
<td>Marineland of the Pacific, CA, USA</td>
</tr>
<tr>
<td>Kona F</td>
<td>08/1971</td>
<td>09/28/1977</td>
<td>2,248</td>
<td>6</td>
<td>Septicemia. Also reported as Pulmonary Abscession</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Kona II F</td>
<td>10/12/1977</td>
<td>10/15/1987</td>
<td>3,655</td>
<td>10</td>
<td>Pulmonary Abscession</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Kotar M</td>
<td>1978</td>
<td>04/1995</td>
<td>6,299</td>
<td>17</td>
<td>Acute Hemorrhagic Pneumonia</td>
<td>SeaWorld of Texas, USA</td>
</tr>
<tr>
<td>Lil Nooka M</td>
<td>08/08/1970</td>
<td>03/18/1971</td>
<td>225</td>
<td>1</td>
<td>Asphyxiation</td>
<td>Sea-Arama Inc, TX, USA</td>
</tr>
<tr>
<td>Lupa F</td>
<td>02/1968</td>
<td>09/06/1968</td>
<td>215</td>
<td>1</td>
<td>Pneumonia</td>
<td>New York Aquarium, USA</td>
</tr>
<tr>
<td>Magnus M</td>
<td>10/26/1977</td>
<td>12/18/1977</td>
<td>52</td>
<td>0</td>
<td>Agranulocytic Anaemia</td>
<td>Harderwijk Dolphinarium, Netherlands</td>
</tr>
<tr>
<td>Mamuk M</td>
<td>10/15/1968</td>
<td>06/14/1977</td>
<td>2,070</td>
<td>6</td>
<td>Acute Streptococcal Septicemia</td>
<td>Sea-Arama Inc, TX, USA</td>
</tr>
<tr>
<td>Milagro M</td>
<td>08/08/1985</td>
<td>02/10/1991</td>
<td>2,013</td>
<td>6</td>
<td>Unknown</td>
<td>Acuario Mundo Marino, Argentina</td>
</tr>
<tr>
<td>Miracle F</td>
<td>08/02/1977</td>
<td>01/1982</td>
<td>1,615</td>
<td>4</td>
<td>Drowning</td>
<td>Sealand of the Pacific, Canada</td>
</tr>
<tr>
<td>Moby Doll M</td>
<td>07/16/1964</td>
<td>10/09/1964</td>
<td>83</td>
<td>0</td>
<td>Drowning, Skin Disease.</td>
<td>Vancouver Aquarium, Canada</td>
</tr>
<tr>
<td>Namu M</td>
<td>06/23/1965</td>
<td>07/09/1966</td>
<td>381</td>
<td>1</td>
<td>Drowning. Infection- Clostridium Perfringens</td>
<td>Seattle Marine Aquarium, WA, USA</td>
</tr>
<tr>
<td>Nandu M</td>
<td>11/1983</td>
<td>03/02/1988</td>
<td>1,587</td>
<td>4</td>
<td>Adrenal Gland Tumor</td>
<td>Aquareama Sao Paolo, Brazil</td>
</tr>
<tr>
<td>Natsidalia M</td>
<td>04/1968</td>
<td>11/1968</td>
<td>210</td>
<td>1</td>
<td>Heart failure</td>
<td>Pender Harbour, BC, Canada</td>
</tr>
</tbody>
</table>
# Appendix A: Captive Orca Longevity

## Table I

**Pre-Kalina Mortalities: Orcas Entering Captivity prior to 9-26-85**

<table>
<thead>
<tr>
<th>Orca Name</th>
<th>Begin Captivity</th>
<th>Date of Death</th>
<th>Duration of Captivity (days)</th>
<th>Years of Life in Captivity</th>
<th>Reported Cause of Death</th>
<th>Place of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neptune M</td>
<td>10/1981</td>
<td>06/01/1983</td>
<td>610</td>
<td>2</td>
<td>Appendicitis</td>
<td>Clacton Pier, UK</td>
</tr>
<tr>
<td>No Name M</td>
<td>10/26/1978</td>
<td>02/1979</td>
<td>100</td>
<td>0</td>
<td>Heart Attack</td>
<td>Sædyrasafnid Aquarium, Iceland</td>
</tr>
<tr>
<td>No Name F</td>
<td>10/26/1978</td>
<td>02/1979</td>
<td>100</td>
<td>0</td>
<td>Pneumonia</td>
<td>Sædyrasafnid Aquarium, Iceland</td>
</tr>
<tr>
<td>No Name F</td>
<td>02/26/1979</td>
<td>03/31/1979</td>
<td>35</td>
<td>0</td>
<td>Birth Complications. Delivered a stillborn calf</td>
<td>Nanki Adventure World, Japan</td>
</tr>
<tr>
<td>No Name F</td>
<td>02/26/1979</td>
<td>04/28/1979</td>
<td>62</td>
<td>0</td>
<td>Nutritional Disorder</td>
<td>Nanki Adventure World, Japan</td>
</tr>
<tr>
<td>No Name F</td>
<td>11/1979</td>
<td>01/1980</td>
<td>65</td>
<td>0</td>
<td>Acute Enterotoxaemia</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>No Name M</td>
<td>10/1981</td>
<td>12/11/1981</td>
<td>70</td>
<td>0</td>
<td>Traumatic Shock. Ruptured Kidney</td>
<td>Clacton Pier, UK</td>
</tr>
<tr>
<td>No Name M</td>
<td>02/1982</td>
<td>06/01/1982</td>
<td>120</td>
<td>0</td>
<td>Pneumonia</td>
<td>Taiji Whale Museum, Japan</td>
</tr>
<tr>
<td>No Name M</td>
<td>10/1982</td>
<td>05/27/1983</td>
<td>241</td>
<td>1</td>
<td>Haemophilia</td>
<td>Sealand of the Pacific, Canada</td>
</tr>
<tr>
<td>No Name M</td>
<td>11/1984</td>
<td>01/1985</td>
<td>65</td>
<td>0</td>
<td>Neck Injury</td>
<td>Sædyrasafnid Aquarium, Iceland</td>
</tr>
<tr>
<td>No Name F</td>
<td>04/1969</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Known</td>
<td>Seattle Marine Aquarium, WA, USA</td>
</tr>
<tr>
<td>No Name *</td>
<td>02/1970</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Known</td>
<td>Seattle Marine Aquarium, WA, USA</td>
</tr>
<tr>
<td>No Name *</td>
<td>11/1971</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Known</td>
<td>Seattle Marine Aquarium, WA, USA</td>
</tr>
<tr>
<td>No Name *</td>
<td>11/1971</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Known</td>
<td>Seattle Marine Aquarium, WA, USA</td>
</tr>
<tr>
<td>No Name F</td>
<td>11/1981</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Known</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Nootka (Knootka) F</td>
<td>03/1970</td>
<td>03/13/1990</td>
<td>7,317</td>
<td>20</td>
<td>Pyogranulomatous; Pneumonia</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Nootka II M</td>
<td>08/1973</td>
<td>05/1974</td>
<td>275</td>
<td>1</td>
<td>Ruptured Aorta</td>
<td>Sealand of the Pacific, Canada</td>
</tr>
<tr>
<td>Nootka III M</td>
<td>08/16/1973</td>
<td>05/1976</td>
<td>991</td>
<td>3</td>
<td>Perforated Post-Pyloric Ulcer. Abscess in Gastrointestinal Tract</td>
<td>Sealand of the Pacific, Canada</td>
</tr>
<tr>
<td>Nootka IV F</td>
<td>10/1982</td>
<td>09/13/1994</td>
<td>4,365</td>
<td>12</td>
<td>Pneumonia; Septicemia</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Nootka V F</td>
<td>11/1981</td>
<td>01/08/2008</td>
<td>9,569</td>
<td>26</td>
<td>Unknown</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Orky F</td>
<td>07/25/1967</td>
<td>07/1969</td>
<td>706</td>
<td>2</td>
<td>Pneumonia. Influenza</td>
<td>Marineland of the Pacific, CA, USA</td>
</tr>
<tr>
<td>Orky II M</td>
<td>05/10/1968</td>
<td>09/26/1988</td>
<td>7,441</td>
<td>20</td>
<td>Acute Bronchopneumonia Nephropathy</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Patches M</td>
<td>12/12/1969</td>
<td>08/1971</td>
<td>599</td>
<td>2</td>
<td>Mediastinal Abscess. Salmonellosis.</td>
<td>Marineland of the Pacific, CA, USA</td>
</tr>
<tr>
<td>Ramu M</td>
<td>02/15/1967</td>
<td>01/12/1982</td>
<td>5,446</td>
<td>15</td>
<td>Old Age</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Ramu II M</td>
<td>04/1969</td>
<td>05/21/1970</td>
<td>415</td>
<td>1</td>
<td>Unknown</td>
<td>Marineland, Australia</td>
</tr>
<tr>
<td>Ramu IV M</td>
<td>08/08/1970</td>
<td>08/1971</td>
<td>358</td>
<td>1</td>
<td>Unknown</td>
<td>Marineland, Australia</td>
</tr>
<tr>
<td>Ruka (Orca) F</td>
<td>10/1981</td>
<td>03/29/2000</td>
<td>6,758</td>
<td>18</td>
<td>Traumatic Shock</td>
<td>Nanki Adventure World, Japan</td>
</tr>
<tr>
<td>Sacchi F</td>
<td>02/1982</td>
<td>04/1984</td>
<td>790</td>
<td>2</td>
<td>Pneumonia</td>
<td>Enoshima Aquarium, Japan</td>
</tr>
<tr>
<td>Sacchi's Calf (No Name) M</td>
<td>05/01/1982</td>
<td>05/11/1982</td>
<td>10</td>
<td>0</td>
<td>Brain Abscess</td>
<td>Enoshima Aquarium, Japan</td>
</tr>
<tr>
<td>Samoa F</td>
<td>11/1983</td>
<td>03/14/1992</td>
<td>3,060</td>
<td>8</td>
<td>Mycotic Meningoencephalitis</td>
<td>SeaWorld of Texas, USA</td>
</tr>
</tbody>
</table>
## Appendix A: Captive Orca Longevity

### Table I

**Pre-Kalina Mortalities: Orcas Entering Captivity prior to 9-26-85**

<table>
<thead>
<tr>
<th>Orca Name</th>
<th>Begin Captivity</th>
<th>Date of Death</th>
<th>Duration of Captivity (days)</th>
<th>Years of Life in Captivity</th>
<th>Reported Cause of Death</th>
<th>Place of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandy</td>
<td>F 03/12/1973</td>
<td>10/1977</td>
<td>1,660</td>
<td>5</td>
<td>Cerebral Haemorrhage</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Scarred Jaw Cow</td>
<td>F 03/1970</td>
<td>05/15/1970</td>
<td>74</td>
<td>0</td>
<td>Malnutrition</td>
<td>Pedder Bay, BC, Canada</td>
</tr>
<tr>
<td>Shamu</td>
<td>F 10/31/1965</td>
<td>08/23/1971</td>
<td>2,124</td>
<td>6</td>
<td>Septicemia</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Shawn</td>
<td>F 01/1978</td>
<td>09/03/1979</td>
<td>607</td>
<td>2</td>
<td>Pneumonia</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Skana (Walter)</td>
<td>F 02/15/1967</td>
<td>10/05/1980</td>
<td>4,978</td>
<td>14</td>
<td>General Mycotic Infection</td>
<td>Vancouver Aquarium, Canada</td>
</tr>
<tr>
<td>Spooky</td>
<td>M 10/31/1978</td>
<td>11/10/1978</td>
<td>10</td>
<td>0</td>
<td>Pneumonia, Colitis</td>
<td>Marineland of the Pacific, CA, USA</td>
</tr>
<tr>
<td>Surfer Girl</td>
<td>F 05/26/1979</td>
<td>06/03/1979</td>
<td>7</td>
<td>0</td>
<td>Pneumonia. Kidney failure. Perforated Gastric Ulcer</td>
<td>Marine World Africa, USA, Redwood City, CA</td>
</tr>
<tr>
<td>Tai</td>
<td>M 02/26/1979</td>
<td>06/1982</td>
<td>1,191</td>
<td>3</td>
<td>Unknown</td>
<td>Taiji Whale Museum, Japan</td>
</tr>
<tr>
<td>Taiji</td>
<td>M 12/1978</td>
<td>12/1978</td>
<td>5</td>
<td>0</td>
<td>Harpoon Wound</td>
<td>Taiji Whale Museum, Japan</td>
</tr>
<tr>
<td>Tula</td>
<td>M 07/1968</td>
<td>10/1968</td>
<td>90</td>
<td>0</td>
<td>External Fungus</td>
<td>Harderwijk Dolphinarium, Netherlands</td>
</tr>
<tr>
<td>Vigga</td>
<td>F 11/19/1980</td>
<td>08/14/2000</td>
<td>7,210</td>
<td>20</td>
<td>Heart Failure, Brain/Lung Abscess, Pneumonia</td>
<td>Six Flags Marine World, CA, USA</td>
</tr>
<tr>
<td>Wanda (Newport)</td>
<td>F 11/18/1961</td>
<td>11/20/1961</td>
<td>2</td>
<td>0</td>
<td>Pneumonia, Gastroenteritis</td>
<td>Marineland of the Pacific, CA, USA</td>
</tr>
<tr>
<td>Whale (Wally)</td>
<td>F 08/08/1970</td>
<td>10/04/1971</td>
<td>421</td>
<td>1</td>
<td>Heart Failure</td>
<td>Munchen Aquarium, Germany</td>
</tr>
<tr>
<td>Winnie (Frya)</td>
<td>F 10/12/1977</td>
<td>04/11/2002</td>
<td>8,950</td>
<td>24</td>
<td>GI Tract Obstruction</td>
<td>SeaWorld of Texas, USA</td>
</tr>
<tr>
<td>Winston (Ramu)</td>
<td>M 08/08/1970</td>
<td>04/28/1986</td>
<td>5,744</td>
<td>16</td>
<td>Chronic Cardiovascular Failure</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Zero</td>
<td>* 09/01/1972</td>
<td>09/15/1972</td>
<td>14</td>
<td>0</td>
<td>Unknown</td>
<td>Kamogawa SeaWorld, Japan</td>
</tr>
</tbody>
</table>

### Table I: PRE-KALINA Notes:

The preceding table (Table I) does not include stillborn calves, miscarriages or other unsuccessful pregnancies that occurred during captivity. Orca mortalities from capture operations are not included.

110 orcas that entered captivity on or before 09/25/1985 are shown. Five orcas with an unknown duration of captivity are removed for the purpose of MDC calculations. (n=105)

Where estimated dates were required due to insufficient historical data, values were calculated using the following criteria:
If day of month is not known: default day is "01" (1st day of month).
If month is not known: default month is "01" (January).

*Gender unknown

The data utilized in this report was obtained from “The Orca Project Database” at www.theorcaproject.com which was compiled from multiple sources including National Marine Fisheries Service (NMFS) Marine Mammal Inventory Reports (MMIRs), marine mammal publications, websites, newspaper and news archives, government oversight agencies and marine mammal park documents and is believed to be accurate as of the date of publication.
### Appendix A: Captive Orca Longevity

#### Table II

Post-Kalina Mortalities: Orcas Entering Captivity after 9-25-85

<table>
<thead>
<tr>
<th>Orca Name</th>
<th>Begin Captivity</th>
<th>Date of Death</th>
<th>Duration of Captivity (days)</th>
<th>Years of Life in Captivity</th>
<th>Reported Cause of Death</th>
<th>Place of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ai (Al) F</td>
<td>10/1989</td>
<td>08/25/1995</td>
<td>2,155</td>
<td>6</td>
<td>Candidiasis</td>
<td>Nanki Adventure World, Japan</td>
</tr>
<tr>
<td>Algonquin M</td>
<td>12/18/1999</td>
<td>08/13/2002</td>
<td>971</td>
<td>3</td>
<td>Twisted Intestine</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>April F</td>
<td>04/07/2004</td>
<td>05/2004</td>
<td>24</td>
<td>0</td>
<td>Malnutrition</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Asuka F</td>
<td>02/07/1997</td>
<td>09/19/2007</td>
<td>3,874</td>
<td>11</td>
<td>Unknown</td>
<td>Sea Paradise, Japan</td>
</tr>
<tr>
<td>Athena F</td>
<td>08/08/2004</td>
<td>04/2009</td>
<td>1,699</td>
<td>5</td>
<td>Unknown</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Baby Shamu II F</td>
<td>01/05/1986</td>
<td>01/16/1986</td>
<td>11</td>
<td>0</td>
<td>Heart Defect</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Belen (Bethlehem)</td>
<td>01/06/1988</td>
<td>02/04/2000</td>
<td>4,411</td>
<td>12</td>
<td>Unknown</td>
<td>Acuario Mundo Marino, Argentina</td>
</tr>
<tr>
<td>Bjossa's Calf</td>
<td>11/13/1988</td>
<td>12/04/1988</td>
<td>21</td>
<td>0</td>
<td>Malnutrition</td>
<td>Vancouver Aquarium, Canada</td>
</tr>
<tr>
<td>Bjossa's Calf</td>
<td>03/08/1995</td>
<td>03/08/1995</td>
<td>0</td>
<td>0</td>
<td>Ruptured Umbilical Cord. Died minutes after birth.</td>
<td>Vancouver Aquarium, Canada</td>
</tr>
<tr>
<td>Goro M</td>
<td>10/1985</td>
<td>01/21/2005</td>
<td>7,055</td>
<td>20</td>
<td>Acute Pneumonia</td>
<td>Nanki Adventure World, Japan</td>
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<tr>
<td>Haida II's Calf</td>
<td>11/20/1994</td>
<td>12/28/1994</td>
<td>38</td>
<td>0</td>
<td>Pneumonia Multifocal Pyogranulomatous W/Gr+Filamentous</td>
<td>SeaWorld of Texas, USA</td>
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<tr>
<td>Halyn F</td>
<td>10/09/2005</td>
<td>06/15/2008</td>
<td>982</td>
<td>3</td>
<td>Acute Necrotizing Encephalitis</td>
<td>SeaWorld of Texas, USA</td>
</tr>
<tr>
<td>Kalina F</td>
<td>09/26/1985</td>
<td>10/04/2010</td>
<td>9,139</td>
<td>25</td>
<td>Acute Bacterial Septicemia</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Kanuck M</td>
<td>08/28/1994</td>
<td>1998</td>
<td>1,224</td>
<td>3</td>
<td>Traumatic Shock</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Katerina F</td>
<td>11/04/1988</td>
<td>05/03/1999</td>
<td>3,839</td>
<td>11</td>
<td>Severe Suppurative Hemorrhage. Bacterial Pneumonia</td>
<td>SeaWorld of Texas, USA</td>
</tr>
<tr>
<td>Kiska's Calf</td>
<td>08/24/1992</td>
<td>10/25/1992</td>
<td>61</td>
<td>0</td>
<td>Drowning</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Ku F</td>
<td>02/02/1997</td>
<td>09/19/2008</td>
<td>4,245</td>
<td>12</td>
<td>Heart Failure</td>
<td>Port of Nagoya Aquarium, Japan</td>
</tr>
<tr>
<td>Kyosha F</td>
<td>09/30/1991</td>
<td>01/04/1992</td>
<td>99</td>
<td>0</td>
<td>Brain Infection</td>
<td>Vancouver Aquarium, Canada</td>
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<tr>
<td>Kyu M</td>
<td>02/07/1997</td>
<td>09/18/2004</td>
<td>2,778</td>
<td>8</td>
<td>Bacterial Pneumonia.</td>
<td>Nanki Adventure World, Japan</td>
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<tr>
<td>Maggie (Magy) (Miss Piggy) F</td>
<td>11/1987</td>
<td>10/07/1997</td>
<td>3,628</td>
<td>10</td>
<td>Birth Complications</td>
<td>Kamogawa SeaWorld, Japan</td>
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<td>Maggie's Calf</td>
<td>03/03/1995</td>
<td>03/03/1995</td>
<td>0</td>
<td>0</td>
<td>Unknown</td>
<td>Kamogawa SeaWorld, Japan</td>
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<tr>
<td>Malik (E-Day)</td>
<td>04/21/1996</td>
<td>03/04/2000</td>
<td>1,414</td>
<td>4</td>
<td>Immune System Deficiency</td>
<td>Marineland of Canada</td>
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<tr>
<td>Nani F</td>
<td>10/01/1985</td>
<td>01/14/2011</td>
<td>9,239</td>
<td>25</td>
<td>Ulcerative Colitis (Necropsy pending)</td>
<td>Port of Nagoya Aquarium, Japan</td>
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<tr>
<td>Neocia (Baby October) F</td>
<td>10/21/1992</td>
<td>08/01/2004</td>
<td>4,303</td>
<td>12</td>
<td>Internal Infection</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>No Name F</td>
<td>02/1986</td>
<td>04/1986</td>
<td>60</td>
<td>0</td>
<td>Unknown</td>
<td>Japanese Fishermen Group, Coast of Japan</td>
</tr>
<tr>
<td>No Name M</td>
<td>02/09/1997</td>
<td>06/14/1997</td>
<td>125</td>
<td>0</td>
<td>Systemic Viral Infection (Herpes Grp)</td>
<td>Nanki Adventure World, Japan</td>
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<tr>
<td>No Name F</td>
<td>02/07/1997</td>
<td>06/17/1997</td>
<td>130</td>
<td>0</td>
<td>Bacterial Pneumonia (Bronchopneumonia)</td>
<td>Nanki Adventure World, Japan</td>
</tr>
<tr>
<td>No Name F</td>
<td>09/26/2003</td>
<td>10/24/2003</td>
<td>28</td>
<td>0</td>
<td>Unknown</td>
<td>Ulrsh Dolphinarium, Russia</td>
</tr>
<tr>
<td>No Name M</td>
<td>02/10/2006</td>
<td>02/13/2006</td>
<td>3</td>
<td>0</td>
<td>Unknown</td>
<td>Kamogawa SeaWorld, Japan</td>
</tr>
<tr>
<td>No Name (aka-Father Kshamenk) M</td>
<td>09/17/1992</td>
<td>09/17/1992</td>
<td>0</td>
<td>0</td>
<td>Unknown</td>
<td>Acuario Mundo Marino, Argentina</td>
</tr>
<tr>
<td>Neotka IV's Calf  (No Name) M</td>
<td>02/04/1992</td>
<td>03/10/1992</td>
<td>36</td>
<td>0</td>
<td>Infection. Extremely High White Blood Cell Count.</td>
<td>Sealand of the Pacific, Canada</td>
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</tbody>
</table>
### Table II: Post-Kalina Mortalities: Orcas Entering Captivity after 9-25-85

<table>
<thead>
<tr>
<th>Orca Name</th>
<th>Begin Captivity</th>
<th>Date of Death</th>
<th>Duration of Captivity (days)</th>
<th>Years of Life in Captivity</th>
<th>Reported Cause of Death</th>
<th>Place of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nootka V’s Calf</td>
<td>F 05/27/1998</td>
<td>06/07/1998</td>
<td>10</td>
<td>0</td>
<td>Unknown</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Nova</td>
<td>M 11/06/1996</td>
<td>08/20/2001</td>
<td>1,750</td>
<td>5</td>
<td>Pneumonia. Starvation</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Nyar</td>
<td>F 12/31/1993</td>
<td>04/01/1996</td>
<td>827</td>
<td>2</td>
<td>Suppurative Encephalitis; Osteoarthritis</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Prince (Bubba)</td>
<td>M 10/1987</td>
<td>07/10/1991</td>
<td>1,380</td>
<td>4</td>
<td>Pseudomonas</td>
<td>Ocean Park, Hong Kong</td>
</tr>
<tr>
<td>Ran’s Calf (No Name)</td>
<td>F 08/26/2004</td>
<td>08/28/2004</td>
<td>2</td>
<td>0</td>
<td>Broken Skull</td>
<td>Nanki Adventure World, Japan</td>
</tr>
<tr>
<td>Sarah</td>
<td>F 05/31/2003</td>
<td>04/26/2006</td>
<td>1,062</td>
<td>3</td>
<td>Unknown</td>
<td>Kamogawa SeaWorld, Japan</td>
</tr>
<tr>
<td>Shuchi</td>
<td>F 02/1986</td>
<td>03/1988</td>
<td>760</td>
<td>2</td>
<td>Pneumonia</td>
<td>Sea Paradise, Japan</td>
</tr>
<tr>
<td>Sharkan</td>
<td>F 10/1989</td>
<td>01/03/2009</td>
<td>7,037</td>
<td>19</td>
<td>Bacillus Pyocyaneus</td>
<td>Marineland Antibes, France</td>
</tr>
<tr>
<td>Splash</td>
<td>M 08/15/1989</td>
<td>04/05/2005</td>
<td>5,714</td>
<td>16</td>
<td>Acute Perforating Gastric Uceleration w/ Associated Peritonitis</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Sumar</td>
<td>M 05/14/1998</td>
<td>09/07/2010</td>
<td>4,496</td>
<td>12</td>
<td>Acute Intestinal/Mesentric Vol</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Taima</td>
<td>F 07/11/1989</td>
<td>06/06/2010</td>
<td>7,635</td>
<td>21</td>
<td>Peracute Uterine Prolate</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Taku</td>
<td>M 09/09/1993</td>
<td>10/17/2007</td>
<td>5,151</td>
<td>14</td>
<td>Severe Multifocal Interstitial Pneumonia</td>
<td>SeaWorld of Texas, USA</td>
</tr>
<tr>
<td>Tanouk (Yamato)</td>
<td>M 10/1989</td>
<td>10/24/2000</td>
<td>4,041</td>
<td>11</td>
<td>Unknown</td>
<td>Sea Paradise, Japan</td>
</tr>
</tbody>
</table>

Table II: POST-KALINA Notes:

The preceding table (Table II) does not include stillborn calves, miscarriages or other unsuccessful pregnancies that occurred during captivity. Orca mortalities from capture operations are not included.

Forty-seven orcas that entered captivity on or after 09/26/1985 are shown.

(n=47)

Where estimated dates were required due to insufficient historical data, values were calculated using the following criteria:
If day of month is not known: default day is “01” (1st day of month).
If month is not known: default month is “01” (January).

*Gender unknown

The data utilized in this report was obtained from “The Orca Project Database” at www.theorcaproject.com which was compiled from multiple sources including National Marine Fisheries Service (NMFS) Marine Mammal Inventory Reports (MMIRs), marine mammal publications, websites, newspaper and news archives, government oversight agencies and marine mammal park documents and is believed to be accurate as of the date of publication.
## Appendix A: Captive Orca Longevity

### Table III

**Orcas Presently Living in Captivity**

<table>
<thead>
<tr>
<th>Orca Name</th>
<th>Origin</th>
<th>Begin Captivity</th>
<th>Duration of Captivity (days)</th>
<th>Years of Life in Captivity</th>
<th>Present Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adan</td>
<td>M</td>
<td>Captive Born</td>
<td>10/13/2010</td>
<td>102</td>
<td>Loro Parque, Spain</td>
</tr>
<tr>
<td>Corky II</td>
<td>F</td>
<td>Wild Capture</td>
<td>12/27/1969</td>
<td>15,003</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Earth</td>
<td>M</td>
<td>Captive Born</td>
<td>10/13/2008</td>
<td>833</td>
<td>Kamogawa SeaWorld, USA</td>
</tr>
<tr>
<td>Freya</td>
<td>F</td>
<td>Wild Capture</td>
<td>10/1982</td>
<td>10,341</td>
<td>Marineland Antibes, France</td>
</tr>
<tr>
<td>Ikaika</td>
<td>M</td>
<td>Captive Born</td>
<td>08/25/2002</td>
<td>3,072</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Inouk</td>
<td>M</td>
<td>Captive Born</td>
<td>02/23/1999</td>
<td>4,350</td>
<td>Marineland Antibes, France</td>
</tr>
<tr>
<td>Kalia</td>
<td>F</td>
<td>Captive Born</td>
<td>12/21/2004</td>
<td>2,226</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Kasatka</td>
<td>F</td>
<td>Wild Capture</td>
<td>1978</td>
<td>12,072</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Katina (Kandu VI)</td>
<td>F</td>
<td>Wild Capture</td>
<td>1978</td>
<td>12,072</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Katina's calf (No Name)</td>
<td>M</td>
<td>Captive Born</td>
<td>10/09/2010</td>
<td>106</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Kayla</td>
<td>F</td>
<td>Captive Born</td>
<td>11/26/1988</td>
<td>8,095</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Keet</td>
<td>M</td>
<td>Captive Born</td>
<td>02/02/1993</td>
<td>6,562</td>
<td>SeaWorld of Texas, USA</td>
</tr>
<tr>
<td>Keto</td>
<td>M</td>
<td>Captive Born</td>
<td>06/17/1995</td>
<td>5,697</td>
<td>Loro Parque, Spain</td>
</tr>
<tr>
<td>Kiska</td>
<td>F</td>
<td>Wild Capture</td>
<td>10/1979</td>
<td>11,437</td>
<td>Marineland of Canada</td>
</tr>
<tr>
<td>Kohana (Makea)</td>
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<td>Captive Born</td>
<td>05/03/2002</td>
<td>3,184</td>
<td>Loro Parque, Spain</td>
</tr>
<tr>
<td>Kshamenk</td>
<td>M</td>
<td>Wild Capture</td>
<td>09/19/1992</td>
<td>6,701</td>
<td>Acuario Mundo Marino, Argentina</td>
</tr>
<tr>
<td>Kyuquot (Ky) (Kyuquet)</td>
<td>M</td>
<td>Captive Born</td>
<td>12/24/1991</td>
<td>6,971</td>
<td>SeaWorld of Texas, USA</td>
</tr>
<tr>
<td>Lara</td>
<td>F</td>
<td>Captive Born</td>
<td>02/08/2001</td>
<td>3,634</td>
<td>Kamogawa SeaWorld, Japan</td>
</tr>
<tr>
<td>Lolita (Tokitae)</td>
<td>F</td>
<td>Wild Capture</td>
<td>08/08/1970</td>
<td>14,777</td>
<td>Miami Seaquarium, Florida, USA</td>
</tr>
<tr>
<td>Lovey</td>
<td>F</td>
<td>Captive Born</td>
<td>01/11/1998</td>
<td>4,757</td>
<td>Kamogawa SeaWorld, Japan</td>
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<tr>
<td>Malia</td>
<td>F</td>
<td>Captive Born</td>
<td>03/12/2007</td>
<td>1,409</td>
<td>Sea World LLC Sea World of Florida</td>
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<tr>
<td>Morgan</td>
<td>F</td>
<td>Rescue</td>
<td>06/23/2010</td>
<td>212</td>
<td>Harderwijk Dolphinarium, Netherlands</td>
</tr>
<tr>
<td>Nakai</td>
<td>M</td>
<td>Captive Born</td>
<td>09/01/2001</td>
<td>3,431</td>
<td>SeaWorld of California, USA</td>
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<td>Nalani</td>
<td>F</td>
<td>Captive Born</td>
<td>09/18/2006</td>
<td>1,588</td>
<td>SeaWorld of Florida, USA</td>
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<tr>
<td>Orkid</td>
<td>F</td>
<td>Captive Born</td>
<td>09/23/1988</td>
<td>8,158</td>
<td>SeaWorld of California, USA</td>
</tr>
<tr>
<td>Oscar (Wolfie)</td>
<td>M</td>
<td>Wild Capture</td>
<td>11/1987</td>
<td>8,485</td>
<td>Kamogawa SeaWorld, Japan</td>
</tr>
<tr>
<td>Ran II</td>
<td>F</td>
<td>Captive Born</td>
<td>02/25/2006</td>
<td>1,791</td>
<td>Kamogawa SeaWorld, Japan</td>
</tr>
<tr>
<td>Sakari</td>
<td>F</td>
<td>Captive Born</td>
<td>01/07/2010</td>
<td>378</td>
<td>SeaWorld of Texas, USA</td>
</tr>
<tr>
<td>Shouka</td>
<td>F</td>
<td>Captive Born</td>
<td>02/25/1993</td>
<td>6,539</td>
<td>Six Flags Discovery Kingdom, CA, USA</td>
</tr>
<tr>
<td>Skyla</td>
<td>F</td>
<td>Captive Born</td>
<td>02/09/2004</td>
<td>2,538</td>
<td>Loro Parque, Spain</td>
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<tr>
<td>Stella</td>
<td>F</td>
<td>Wild Capture</td>
<td>10/23/1987</td>
<td>8,493</td>
<td>Kamogawa SeaWorld, Japan</td>
</tr>
</tbody>
</table>
Appendix A: Captive Orca Longevity

Table III

Orcas Presently Living in Captivity

<table>
<thead>
<tr>
<th>Orca Name</th>
<th>Origin</th>
<th>Begin Captivity</th>
<th>Duration of Captivity (days)</th>
<th>Years of Life in Captivity</th>
<th>Present Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Takara</td>
<td>F</td>
<td>Captive Born</td>
<td>7,136</td>
<td>20</td>
<td>SeaWorld of Texas, USA</td>
</tr>
<tr>
<td>Tekoa</td>
<td>M</td>
<td>Captive Born</td>
<td>3,730</td>
<td>10</td>
<td>Loro Parque, Spain</td>
</tr>
<tr>
<td>Thor (Bingo)</td>
<td>M</td>
<td>Wild Capture</td>
<td>9,581</td>
<td>26</td>
<td>Kamogawa SeaWorld, Japan</td>
</tr>
<tr>
<td>Tilikum</td>
<td>M</td>
<td>Wild Capture</td>
<td>9,946</td>
<td>27</td>
<td>SeaWorld of Florida, USA</td>
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<tr>
<td>Trua</td>
<td>M</td>
<td>Captive Born</td>
<td>1,888</td>
<td>5</td>
<td>SeaWorld of Florida, USA</td>
</tr>
<tr>
<td>Tuar (Flash)</td>
<td>M</td>
<td>Captive Born</td>
<td>4,231</td>
<td>12</td>
<td>SeaWorld of Texas, USA</td>
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<tr>
<td>Ulises</td>
<td>M</td>
<td>Wild Capture</td>
<td>11,024</td>
<td>30</td>
<td>SeaWorld of California, USA</td>
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<tr>
<td>Unna</td>
<td>F</td>
<td>Captive Born</td>
<td>5,142</td>
<td>14</td>
<td>SeaWorld of Texas, USA</td>
</tr>
<tr>
<td>Valentin</td>
<td>M</td>
<td>Captive Born</td>
<td>5,456</td>
<td>15</td>
<td>Marineland Antibes, France</td>
</tr>
<tr>
<td>Wikie</td>
<td>F</td>
<td>Captive Born</td>
<td>5,521</td>
<td>10</td>
<td>Marineland Antibes, France</td>
</tr>
</tbody>
</table>

Table III: LIVING ORCAS Notes:

The preceding Table includes all orcas known to be held in captivity throughout the world as of date of publication.

(n=41)

“Duration of Captivity” is calculated as of 01-20-2011.

Where estimated dates were required due to insufficient historical data, values were calculated using the following criteria:
If day of month is not known: default day is “01” (1st day of month).
If month is not known: default month is “01” (January).

The data utilized in this report was obtained from “The Orca Project Database” at www.theorcaproject.com which was compiled from multiple sources including National Marine Fisheries Service (NMFS) Marine Mammal Inventory Reports (MMIRs), marine mammal publications, websites, newspaper and news archives, government oversight agencies and marine mammal park documents and is believed to be accurate as of the date of publication.
Appendix B: Kalina Profile (1994)

The Sea World of Texas (SWT) document (represented in this Appendix) was provided to SWF trainers in October of 1994. It is the biopsychosocial profile of Kalina, the original Baby Shamu. As the first successful birth of an orca at a theme park, she ushered in the modern age of killer whale captivity.

Kalina's survival demonstrated the minimal spatial requirements needed for successful nursing behavior(s). Her premature death reminds us that even the best facilities cannot replicate life in the open ocean. Kalina died at the age of 25 from acute bacterial septicemia. It is not known how bacteria entered her bloodstream.
Appendix B: Kalina Profile (1994)

1.0. # SWF-Oo-8501

SEA WORLD OF TEXAS ANIMAL TRAINING DEPARTMENT

ANIMAL PROFILE

- Kalina (Orcinus Orca)
- Sex: Female
- Born: 9/26/1985
- Length: 16.9 ft.
- Weight: 4444 lbs. (10-14-1993)

Differentiating Characteristics

- Prominent lower jaw
- Clean, smooth skin
- Hook shaped dorsal fin -- slight lean to the left with notch towards base of fin
- Dark markings on roof of mouth
- Two freckles on right side of face Lower front two teeth slightly worn

Secondary Reinforcers

- Fish play
- Water hose on top of head Water jet play
- Tongue and mouth tactile Body tactile
- Socialization with other whales Overall play
- Variable feed
- Bucket pour
- Toys
- Visual stimulation
- Learning new behaviors
- Show sequence/environmental changes Object retrieval
- Chew rope
- Floating disc
- Cart follow with fish toss
- Kelp
- Barrel (under supervision)
Finds Aversive

- Major environmental and social changes
- Unclear/confusing situations
- Divided attention
- Long term separation
- Pulls away from tactile from strangers

Aggressive Tendencies

When excited or confused, she may slide over, push or bow over her trainer in the water.

Will aggressively and physically displace less dominant whales when frustrated, confused or sees an imbalance in attention.

Summary

Kalina was the first killer whale calf born at Sea World of Florida on September 26, 1985. She was born to Katina and fathered by Winston. On February 2, 1993 she bore a male calf (Keet) fathered by Kotar. She has demonstrated good "mothering" skills without being overprotective. She did exhibit some aggression towards trainers for a short period (two weeks following the birth) when attempting to get her to start eating. She would displace the calf during water work if the trainer was attempting to give too much attention to the calf.

Kalina was transferred from Florida to Ohio on February 12, 1990. She was then transferred from Ohio to California on October 13, 1990. She was next transferred from California to Texas on May 30, 1991. Her next transfer was from Texas to Florida on October 29, 1994.

She responds very well to a wide array of interactions, learning and creativity. She does have a short attention span appearing to have difficulty relaxing or becoming distracted during quiet relationship sessions. She does not seem to enjoy interacting with new people and will show discriminatory behavior, although nothing to excess. This also holds true during training sessions. Progress is at its most efficient when a minimum of trainers work with her to insure consistent criteria. Being motivated more by secondary reinforcers than food, she regularly solicits attention from trainers. Since her energy and excitability level runs high, it is important during both land and water sessions to have fun, but to concentrate on keeping her calm and controlled.

Kalina is a consistent animal. Uncooperative behavior from her arises due to social situations with other whales, either initiated by her or from signals from the others. Uncooperative behavior also occurs during heavy show schedules which manifests into tight, agitated behavior and very obvious incorrect responses to Sd's. She has a negative history with nets and has swam into them.
Kalina's past history with toys during playtimes has shown extreme excitement to borderline "aggression." since she has shown similar excitement during waterwork, her interactions with toys has been reduced. If given a toy, it should be closely monitored. This "aggressive tendency" has diminished significantly over the past two years. Her assertive tendencies had been seen mostly during waterwork. Aggression involves anything from slight bumping or sliding over her trainer to a complete bow over her trainer. The last episode of a "swim over" occurred in 1992. Her history states she has opened her mouth on trainers, yet this behavior has not been observed during the past few years. Her aggression has been decreasing due to concentration on controlling her excitability and frequent rewards for calmness and acceptance of the situation or mistakes. Her calls to stage and water desensitization are always stressed and rewarded with primary on a high ratio.