A Summary of the Effects of Captivity on Orcas

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The Effects of Captivity on Tilikum and Orcas Generally at SeaWorld

Orcas are highly intelligent and social apex predators, and living in captivity causes them extensive physical and psychological harm. Among other things, the physical constraints of the artificial enclosures at SeaWorld limit their opportunity to exercise, disperse from incompatible pairings, escape from conflicts, or engage in natural types of behavior, such as swimming at high speeds or diving, causing them extreme stress and frustration.

The stress of the captive environment is manifested in "physiological and behavioral abnormalities indicative of psychological distress and emotional disturbance," including stereotypic behavior, unresponsiveness, excessive submissiveness, self-inflicted physical trauma and mutilation, compromised immunology, and excessive aggression.[1] At SeaWorld Orlando, Tilikum lies listlessly at the surface or the bottom of the tank for extended periods, displays aggression toward humans, bites on the gates and concrete sides of the tanks, and is charged at and raked by other orcas so severely that he sometimes bleeds, shivers, and needs to be kept out of shows. While Tilikum has reached the average life expectancy for a male orca, the same stressors impair captive orcas' immune systems so that they have a mortality rate two and a half times higher than wild orcas, notwithstanding SeaWorld's alleged superior veterinary care and husbandry.

I. Orcas Are Extremely Intelligent Mammals Whose Brains Are Highly Developed in Areas Responsible for Complex Cognitive Functions, Including Self-Awareness, Social Cognition, Culture, and Language

Orca brains share a number of important features with human brains that are associated with complex intelligence.

As with the human brain, orca brains are much larger than expected for their body size. The proportion of brain and body size is typically expressed as an encephalization quotient (EQ). The EQ for orcas is 2.57, which means that even when their large body size is taken into account, their brains are still two and a half times larger than expected.[2] Orcas therefore have more brain tissue available to serve complex cognitive functions, such as self-awareness (a sense of personal identity), social cognition, culture, and language.[3]

In addition, the neocortex (the outer wrinkled surface of the cerebrum) of the orca brain is highly differentiated—i.e., different parts have different specialized functions—and even surpasses the human brain in the degree of its convolutedness—a measure of the surface area indicating the amount of information processing possible in the brain.[4] The neocortex is involved in integrating information from the different senses to form mental representations of objects and thoughts and is also part of the cerebral cortex—the system that processes higher-order thinking and complex, abstract processes, such as language, self-awareness, meta-cognition (the ability to think about one's own thoughts), social cognition, and theory of mind (the ability to think about and infer the thoughts of others).

In addition to all these complexities, the orca brain also contains spindle-shaped cells known as *von Economo neurons* in the same areas of the brain as humans.[5] These spindle cells are found in the parts of the brain that are thought to be involved in high-level cognitive processing, such as social and emotional cognition, awareness, and intuition.[6] This includes "feelings of empathy, guilt, embarrassment, and pain, as well as judgement [*sic*], social knowledge, and consciousness of visceral feelings."[7]

Finally, orca brains possess a highly developed paralimbic region,[8] which is believed to be involved in processing and integrating emotional information with other thought processes. In fact, the human brain is not elaborated in the same way and does not have an identifiable paralimbic lobe, which suggests that the orca brain may have evolved certain kinds of sophisticated or complex functions and thought processes related to the processing of emotion that did not evolve in the human brain—or at least not to the same extent.

II. Tilikum Is Deprived of Every Facet of His Culture and the Opportunity to Engage in Natural Behavior, Causing Extreme Stress and Suffering

Along with their complex intelligence and cognitive abilities, orcas are among the most highly social, far-ranging, communicative, and culturally complex mammals on the planet. Orca populations are distinguishable by diet, morphology, dialect, social structure, genetics, and behavior. Their transmission of these group-specific vocal and physical types of behavior from generation to generation in complex multicultural societies is recognized as a form of culture that, to researchers' knowledge, is unique outside humans.

SeaWorld causes Tilikum severe psychological and emotional suffering by depriving him of, among other things, adequate space, environmental enrichment, social stability, and the opportunity to perform natural behavior such as swimming long distances, diving, and foraging. The confined space, repeated scheduled performances, and related training completely compromise his autonomy. This deprivation is physically and psychologically harmful to orcas, and, as discussed below, causes them to display indicators of stress and trauma, which, notably, includes aggression, self-injury, and increased mortality.

A. The Tanks at SeaWorld Provide Inadequate Space and Result in Stress

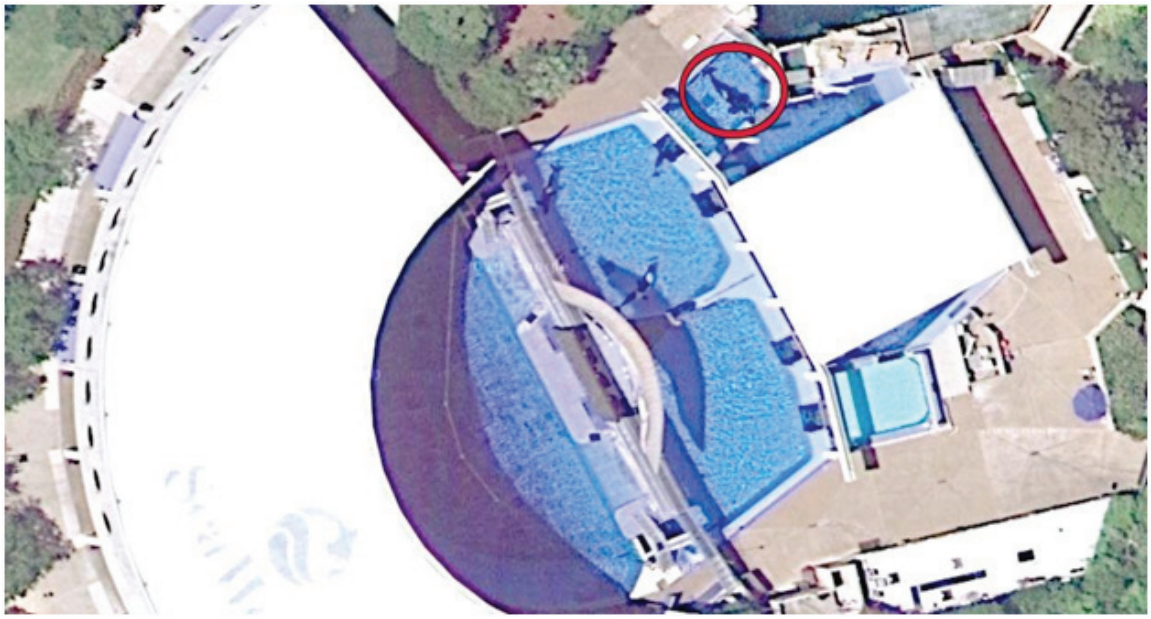
The tanks at SeaWorld offer woefully inadequate space for an orca. Orcas are one of the fastest animals in the sea, traveling at speeds of up to nearly 28 miles per hour.[9]

They are also adapted for swimming extended distances and durations. Individual orcas have been recorded traveling nearly 100 miles per day[10] and are capable of covering vast distances of many thousands of miles.[11] They regularly dive 200 to 300 meters (656 to 984 feet)[12] and spend 95 percent of their time submerged.[13] In the wild, orcas swim almost continuously.[14]

According to a reference book for zoos, aquariums, and wildlife parks and a standard course textbook for zoo biology students, the design and construction of marine-mammal habitats "should consider the natural history and behavior of the species to be maintained and should permit the performance of most, if not all, of their natural behaviors."[15] In addition, it "must meet the physical, psychological and behavioral needs of the animals."[16] Put simply, "[m]arine mammals need enough space to allow them to perform natural behaviors with freedom of movement."[17]

At SeaWorld, orcas are kept in a series of tanks that average approximately 86 feet by 51 feet and are only 34 feet deep—not even twice as deep as the average orca is long. At up to 22 feet long and 12,000 pounds, Tilikum is unable to engage in virtually any natural movement: He is unable to swim any meaningful distance or dive and is forced to spend a majority of his life on or just below the surface of the water.[18] The largest tank at any of SeaWorld's facilities holds approximately 0.0001 percent of the minimum volume of water (45.3 billion gallons) that an orca traverses daily in nature.[19] Tilikum would have to swim the circumference of that tank more than 1,900 times in a single day to approximate the distance he would have swum in that time in the wild before he was captured.

After Tilikum killed trainer Dawn Brancheau in February 2010, he was, at least at times, held in a tank intended for use only when administering medical care or husbandry procedures that was so small that his rostrum (nose) and fluke (tail) apparently could touch the sides of the tank. Small enclosures have been shown to induce stress in various species,[20] and "[a]mong the carnivores, naturally wide-ranging species," such as orcas, "show the most evidence of stress and/or psychological dysfunction in captivity."[21]



Tilikum is seen inside the circle in this aerial photo of SeaWorld.

B. SeaWorld's Constant Manipulation of Tilikum's Social Structure Results in Stress

SeaWorld utterly disregards the importance of orcas' complex familial and sociological bonds. Long-term studies of wild orcas have shown that most populations live in stable social groups with strong long-term associations, and some individuals, such as mothers and sons, stay together for life.[22] In resident orca populations of the Pacific Northwest, orcas live in "highly stable matrilineal pods averaging 12 animals" and "there is no known case of individuals changing pods."[23] In fact, these close relationships are so crucial that even adult offspring of a post-reproductive orca mother have been shown to have a significantly increased mortality risk in the year after their mother's death.[24] While other populations typically appear to live in smaller groups, even these individuals generally leave their natal pods only occasionally and temporarily travel with other groups.[25]

In contrast to the stable social structure in nature, SeaWorld transfers orcas between facilities regularly to "balance" the genetic pool for breeding[26] and for use in performances and often houses together orcas who don't know one another and

are incompatible.[27] In addition, SeaWorld removes calves from their mothers at ages far younger than they would be separated in the wild, if at all, and it is clearly distressing to these animals.

The orca Kayla exemplifies this disregard for stable social structure. Kayla was born at SeaWorld San Antonio in 1988, taken from her mother at only 11 months of age, moved to the now-defunct SeaWorld Ohio at the age of 2, returned to San Antonio in 1999, and finally moved to Orlando in 2006, where she remains today.[28] Another orca, Katina, who is held at SeaWorld Orlando, also had her first calf, Kalina, taken away from her. When Kalina, known as the Original Baby Shamu, was 4 years old, she was shipped to Ohio for reportedly disrupting shows at the facility.[29] The night that Kalina was taken, Katina "remained immobile in a corner of the pool, emitting wretched cries into the night."[30]

Research has shown that social instability—such as changes in group dynamics, competition for resources, and unstable dominance hierarchies—is a major stressor that is believed even to have caused the deaths of several captive dolphins.[31] In fact, while Tilikum has remained at SeaWorld for more than two decades, the company's own behavioral profile for him acknowledges that "[d]uring times of frustration due to social stress in the environment, Tilikum has exhibited aggressive behavior by mouthing [or biting] the stage, vocalizations, tightening body posture, banging gates, a deep fast swim, and sometimes lunging toward control trainer."[32]

In short, Tilikum is deprived of the stable, nurturing social family and pod structure that was so central to his life in the wild. The artificial groupings at marine facilities are, according to one expert, "a tremendous violation of the basic premise of the pod" and result in "constant stress."[33]

C. The Tanks at SeaWorld Create a Distressing Acoustic Environment

Orcas are highly acoustic animals who use a range of signals for distinct purposes,[34] including clicks for echolocation to navigate and detect environmental objects and prey[35] and whistles and pulsed calls for social communication.[36] Orca pods have distinctive sets of discrete call types known as dialects that are passed down

through vocal learning,[37] i.e., the dialect is learned by calves through contact with their mothers and other pod members. Indeed, in one well-studied population, family-specific call types dramatically increase in the days following a birth, which "supports the idea that discrete calls in orcas indeed function as family badges and suggests that the family may actively enhance vocal learning of a signal that is crucial for recognizing and maintaining contact with the family."[38] These dialects "are maintained despite extensive associations between pods," and some calls are shared between pods, "suggesting another level of population structure" and further evidencing the importance of communication to their complex society.[39]

SeaWorld's apparently wholesale disregard for orcas' stable social structure, as discussed above, strips Tilikum and the others of the opportunity to develop and transmit dialects—their principal form of communication and a crucial component of their identity. Additionally, the tanks at SeaWorld likely make any effort by Tilikum to communicate highly distressing. Dr. Hal Whitehead, an expert on cultural transmission in cetaceans—the order that includes whales and dolphins—and coauthor of a groundbreaking review of culture in orcas and other cetaceans, compares the experience of a "highly acoustic cetacean" such as an orca "living in a tank with acoustically reflective walls to that of a visually oriented animal, like a human, living captive in a room covered with mirrors on all walls and the floor. The experience is likely to be profoundly disturbing, especially over the long term."[40] Similarly, oceanographer Jean-Michel Cousteau compared keeping orcas in tanks to "a person being blindfolded in a jail cell."[41]

III. The Stressors of the Captive Environment at SeaWorld Result in Aggression, Self-Injury, and Other Physical and Behavioral Abnormalities

As a result of the aforementioned circumstances, captive orcas display behavioral indicators of severe stress and trauma, including stereotypies (abnormal repetitive behaviors), self-inflicted physical trauma, and excessive aggression toward humans and other orcas, among other abnormalities not observed in wild populations.[42]

A. Aggression Between Orcas and Between Orcas and Humans

Evidence of suffering caused by the captive conditions at SeaWorld is found in the "long record of orcas … killing and seriously injuring humans, other whales, and themselves in captivity."[43]

Despite hundreds of years of encounters between seafarers, researchers, and orcas, there has been only a single reliable report of an orca seriously injuring a human being in nature.[44] Yet as indicated by SeaWorld's own corporate incident logs revealed in the proceedings regarding its violation of federal workplace safety laws after trainer Dawn Brancheau's death, the company itself has recorded "600 pages of incident reports documenting dangerous and unanticipated orca behavior with trainers," consisting of "some 100 occurrences of killer whales biting, hitting, lunging toward, pulling on, pinning, dragging, and aggressively swimming over SeaWorld trainers" regularly for decades.[45] These logs are also incomplete. As the secretary of labor revealed during these proceedings, SeaWorld failed to document incident after incident, including Brancheau's death, which prompted the citation.[46] Most notoriously, Tilikum was involved in the death of a trainer at Sealand of the Pacific in 1991,[47] a member of the public at SeaWorld in 1999,[48] and Brancheau at SeaWorld in 2010.[49] At times, Kayla, also at SeaWorld Orlando, has "displayed some aggressive tendencies towards trainers in a variety of ways, including … moving her head (mouth open) towards a trainers' hand, and coming out of a line up towards a trainer with her mouth open."[50] Another orca named Keto, who was on loan to a Spanish facility called Loro Parque, rammed and killed his trainer during a training session in 2009.[51]

Similarly, the stressors of confinement at SeaWorld frequently cause orcas to exhibit abnormal aggression toward each other, further demonstrating that these conditions induce the types of behavior that pose a hazard to trainers. In nature, aggression between members of a pod or between pods is rare.[52] "[S]erious aggression among orcas in the wild is relatively low and most injuries, e.g., rake marks, are superficial."[53] Rather, conflict is resolved through dispersion and shifting alliances within groups of orcas (giving each other space),[54] which they are unable to do in captivity. Since subordinates in captivity "are unable to leave the area to avoid the situation,

stress, psychological, and physical trauma can occur."[55] At SeaWorld, orcas have no influence over their social associations because they are limited to the groups, tanks, and facilities to which they are confined by the staff,[56] leading to stress and aggression, despite the fact that "[t]heir social rules prohibit real violence and they seem to have worked out a way to peacefully manage the partitioning of resources among different groups."[57]

For example, at SeaWorld, orcas are separated by steel gates prior to training sessions, during shows, or when they become aggressive toward each other.[58] According to former SeaWorld orca trainers, "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. … As a consequence, tooth fragments can sometimes be found on the pool bottoms following these displays."[59] According to SeaWorld's own behavioral logs as well as photographs and affidavits, most of the orcas at SeaWorld have sustained broken and worn teeth from biting on the gates. As discussed in greater detail below, similar behavior is also displayed as stereotypies, i.e., abnormal repetitive behavior caused by the stress of inappropriate confinement and inadequate enrichment, often resulting in fractured teeth, chronic pain, and painful dental drilling.

In addition, in an attempt to establish social dominance in this environment, orcas repeatedly charge with open mouths and rake others with their teeth.[60] According to former SeaWorld trainers, this is aggressive behavior and its resulting injuries occur regularly. One trainer who worked with Tilikum noted that the orca would sometimes have streams of blood running behind him as he moved through the water and have to be held out of shows until his raked and bloody skin healed, after which he would exhibit nervous and agitated types of behavior, such as swimming in circles, making distress vocalizations, and avoiding contact with the other orcas.[61] SeaWorld's internal profiles from 2010 also note that Katina has "'[r]ake' marks in [her] right eye patch,"[62] that Kayla similarly has a "white scar through [her] right eye patch,"[63] and that "[s]ocially, Nalani has been aggressed on by Taima [who has since died] multiple times."[64]

A number of incidents involving other orcas have been reported that resulted in injury or death.[65] Indeed, following the death of the orca Kandu, who fractured her jaw when she exhibited aggression toward the orca Corky and died of fatal hemorrhaging of major arteries in her nasal passages,[66] staff at SeaWorld San Diego repeated that this was "common behavior" and that "the altercation was not a rare event at all."[67] Kandu's death left Orkid, her calf, orphaned at 11 months old,[68] and Orkid went on to have her own "long history" of aggressive incidents before the facility discontinued water work with her in 2006.[69]

Similarly, the orca Ikaika, who was returned to SeaWorld San Diego in 2011 after spending years at Marineland in Canada on a breeding loan, "exhibited certain aggressive tendencies towards the female killer whale at the Marineland facility. … Ikaika showed similar tendencies while at SeaWorld [Orlando] in both 2005 and 2006. In 2006, Ikaika raked a young calf with his teeth and had to be given tranquilizers by the SeaWorld staff."[70] SeaWorld's veterinary records state that Ikaika was "showing some aggression to [Katina's] calf" and was given diazepam to "try to mellow him"—which had already been given to two other orcas at the facility (Katina and Taku) for the same reason.[71]

B. Stereotypic Behavior

The harmful conditions at SeaWorld also cause Tilikum and the other orcas held there to exhibit stereotypic behavior, which is a strong indicator of severe psychological and emotional suffering.

In 2005, a special edition of the journal *Aquatic Mammals* was published featuring the results of a decade-long project by Laurence Couquiaud, a dolphin researcher with a degree in architectural design who has specialized in examining the design of captive facilities and husbandry. In the study, which made recommendations for the design of tanks and enclosures at captive facilities, Couquiaud observed that "some behaviours tend to occur when space is limited; the environment does not provide occupational activity; and when animals are kept alone, deprived of stimulus diversity, or are subject to environmental stress."[72] Another study on animal boredom acknowledged that "[s]tereotyped behavior patterns … tend to emerge

when the animal cannot engage in behavior it is highly motivated to perform, such as searching or hunting for food, seeking social interaction, or just trying to escape."[73] Other research and documentation has shown that orcas' inability to carry out even the most rudimentary types of behavior that they would engage in while in nature causes them instead to behave in abnormal and repetitive ways,[74] including biting on gates and the walls of the concrete tanks themselves and spending inordinate amounts of time "surface-resting" and lying motionless at the bottom of the tanks or on shallow ledges referred to as "slide-outs."

1. Painful Dental Problems Caused by Chewing Metal Gates and Concrete Tanks

"As animals stay longer in their cages, they begin to direct their attention to inadequate substrates. They may lick, suck, or chew the floors and bars of their cages ...."[75] "By the time the animal begins to develop a fixation on inadequate substrates, the situation has become severe."[76]

At SeaWorld parks, orcas are separated by steel gates prior to training sessions, during shows, or when they become aggressive toward each other.[77] As noted above, according to former orca trainers at SeaWorld, "under-stimulated and bored animals ... 'chew' metal bars [that separate the tanks] and mouth concrete pool corners, like the main stage at SWF [SeaWorld of Florida]. As a consequence, tooth fragments can sometimes be found on the pool bottoms following these displays."[78]

When the orcas' teeth break, it exposes the pulp, which, if left untreated, will decay and form a cavity and can lead to "inflammation and eventually a focus for systemic infection."[79] Since many of the orcas who sustain broken teeth are relatively young and the roots of their teeth have not yet matured, a root canal is not possible. "Instead, using a variable speed drill, trainers drill holes through the pulp and into the jaw via an endodontic procedure called a modified 'pulpotomy.'"[80] The orcas "often refused to submit to the drill by sinking down beneath the surface, shaking their heads violently, or breaking from control and swimming away. The staff knew it was a successful drill when blood started to bubble out from the bore hole."[81]

The open holes are not capped or plugged and "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."[82] The trainers are therefore required to flush out the pulp cavity with water or an antiseptic solution two to three times daily to remove debris that can cause "abscess, bacteremia, and sepsis."[83]

After SeaWorld was cited by the Occupational Safety and Health Administration for endangering the life and safety of its employees following Tilikum's killing of a senior trainer, the company's vice president of veterinary services, Dr. Christopher Dold, admitted in his testimony that the orcas at the company's facilities "will erode the surface of their teeth, exposing the pulp cavity, and that can be and is a common management concern of ours."[84] This can lead to "an abscess or an infection within the pulp cavity of the tooth that's under pressure," so the trainers will "drill out the center of the tooth," which as of late 2010 had been done to approximately 14 of the 20 orcas (or 70 percent of them) at SeaWorld parks at that time.[85]

Indeed, the veterinarian who was responsible for treating Ikaika, on breeding loan from SeaWorld at Marineland of Canada, noted that "[a]t the time of his transfer to Marineland in 2006, Ikaika exhibited … a chronic dental problem with which he still has difficulties today. Due to the nature of the dental problem, Ikaika's teeth will always be subject to infection. Ikaika's problem is with the roots of various teeth in his mouth. These roots are open, allowing bacteria to enter and cause infections. … The normal course of treatment is to flush his teeth consistently, numerous times daily, and treat him with antibiotics and pain medications."[86] According to veterinary records, Ikaika had suffered from at least four dental infections prior to being transferred to Marineland, during which he "would exhibit redness and swelling in the area around the infected tooth, would have less energy and would be less willing to eat."[87] Days before his transfer, SeaWorld staff drilled two teeth so badly damaged and infected that they were giving off heat noticeable to the trainers.[88] The veterinary records also reflected staff observations that "pulp is protruding from the third left mandibular canine" and that there was infected discharge ("purulent exudate") oozing from the "second left mandibular tooth."[89]

Similarly, each of the three adult orcas at SeaWorld Orlando has sustained broken and worn teeth from biting on the gates and concrete sides of their tanks. According to SeaWorld's own behavioral profiles and as apparent in visitor photographs: Tilikum has no remaining teeth intact on his lower jaw;[90] many of Katina's teeth have been broken, including "LL3 and LL4 badly chipped, LL6 broken at the base";[91] and Kayla's teeth have been badly broken and drilled through, including her "[u]pper left #6 tooth cracked, [she is] missing [her] upper left #8," and at least 12 of her "[l]ower teeth [have been] drilled for flushing (right side #1–7, left side #2–6)."[92]

Like Ikaika's records, which were revealed only in the course of litigation, SeaWorld's veterinary records likely contain additional details on the extent to which these orcas have damaged their teeth out of frustration and the subsequent effects on their health.

This high prevalence of painful broken and worn teeth and exposed pulp in captive orcas stands in stark contrast to those in nature, many of whom "show little or no tooth wear, while those who do tend to specialize in prey with abrasive morphology. Broken teeth in wild orcas are rare."[93]

2. Surface Resting and Lying on the Tank Floor

As discussed above, wild orcas regularly spend 95 percent of their time submerged and swim almost constantly. "[I]n aquaria … killer whales (and other whales and dolphins) rest while floating and lying on the bottom of pools."[94] At SeaWorld, "with little horizontal or vertical space in their enclosures, captive orcas swim only limited distances, with most spending many hours surface resting."[95] The amount of time that captive orcas commonly spend engaged in these behaviors has never been reported in wild populations.

In nature, resting orcas

> usually swim tightly together side by side, forming a resting line. Group diving and surfacing become closely synchronized and regular, with longer dives of 2-5 [minutes'] duration separated by 3 or 4 short, shallow dives.

> Rate of forward progression is slow compared to foraging and traveling, and resting groups may stop altogether and rest motionless at the surface for [only] several minutes.[96]

This type of stationary resting at the surface has never been observed to be repeated more than three or four times in succession by the same individual.[97] In contrast, researchers have reported captive orcas at SeaWorld alone and "completely immobile for about 1 hour or even longer while floating at the surface."[98] One visitor reported that Tilikum was observed doing this for nearly three and a half hours at a time.[99] According to former trainers, Tilikum would surface-rest with wide eyes and an arched posture consistent with preparation to flee as well as swimming in rapid circles, slamming his head into the side of the tank, making loud distress vocalizations, and avoiding contact with other orcas.[100]

Similarly, captive orcas have been reported to spend inordinate amounts of time lying motionless at the bottom of the tanks—"[l]ying on the bottom of the pool is characteristic of all adult killer whales currently residing at SeaWorld, San Diego."[101] "Single episodes of rest on the bottom for these killer whales lasted between 3 and 7 min."[102] This behavior has never been observed in wild populations.

APPENDIX

[1]Lori Marino & Toni Frohoff, *Toward a New Paradigm of Non-Captive Research on Cetacean Cognition*, 6(9) PLOS ONE 3 (2011).
[2]Lori Marino, *A Comparison of Encephalization Between Odontocete Cetaceans and Anthropoid Primates*, 51 BRAIN, BEHAV. & EVOLUTION 230 (1998).
[3]*See* Part II.B, *infra*.
[4]Patrick R. Hof et al., *Cortical Complexity in Cetacean Brains*, 287A ANATOMICAL REC. 1142, 1151 (2005); Lori Marino, *Cetacean Brains, in* THE ENCYCLOPEDIA OF NEUROSCIENCE 807–810 (Larry R. Squire ed., 2008); Lori Marino et al., *Neuroanatomy of the Killer Whale* (Orcinus orca) *from Magnetic Resonance Imaging*, 281A ANATOMICAL REC. 1256, 1262 (2004) [*hereinafter Neuroanatomy of the Killer Whale*].
[5]Camilla Butti et al., *Total Number and Volume of von Economo Neurons in the Cerebral Cortex of Cetaceans*, 515 J. COMP. NEUROLOGY 243, 244 (2009).
[6]*Id.*
[7]*Id.* at 257 (citations omitted).
[8]Marino, *Neuroanatomy of the Killer Whale, supra*.
[9]Terrie M. Williams, *Swimming, in* ENCYCLOPEDIA OF MARINE MAMMALS 1140, 1145 (William F. Perrin et al. eds., 2008) (Orcas swim at an average "casual" speed of 3.6 meters per second (m/sec), or 8.05 miles per hour (mph), and "sprint" at up to 12.5 m/sec, or 27.96 mph.); John K.B. Ford, *Killer Whale:* Orcinus orca, *in* ENCYCLOPEDIA OF MARINE MAMMALS 654 (William F. Perrin et al. eds., Academic Press 2002) (traveling over distances at speeds of over 20 kilometers per hour (km/h), or 12.43 mph); *id.* (a mean traveling speed of 10.4 km/h, or 6.46 mph).
[10]*See*, e.g., Robin W. Baird, *The Killer Whale: Foraging Specializations and Group Hunting, in* CETACEAN SOCIETIES: FIELD STUDIES OF DOLPHINS AND WHALES 131, 136–37 (Janet Mann et al. eds., U. Chi. Press 2000) (160 km (99.42 miles) in 24 hours) [hereinafter *Foraging Specializations*].
[11]Ingrid N. Visser, *Propeller Scars on and Known Home Range of Two Orca* (Orcinus orca) *in New Zealand Waters*, 33 N.Z. J. OF MARINE AND FRESHWATER RES. 635, 638 (1999) (15,600 km (9693 miles) in six years).
[12]Craig O. Matkin et al., Expanding Perspectives: Investigating Pod Specific Killer Whale Habitat with ARGOS Satellite Telemetry, Presented at the Alaska Marine Science Symposium, Anchorage, Alaska (Jan. 2012) (orca for whom "regular dives of 200–300 m were recorded and one dive of 400 m was logged"); Robin W. Baird et al., *Factors Influencing the Diving Behaviour of Fish-Eating Killer Whales*, 83 CAN. J. OF ZOOLOGY 257, 262–63 (2005) (a population that uses "primarily near-surface waters" still dives "below 150 m on a regular basis" and up to 264 m).
[13]National Marine Fisheries Service, Northwest Regional Office, *Proposed Conservation Plan*

for S. Resident Killer Whales (Orcinus orca) 16 (2005), *available at* http://orcasphere.net/pdfs/SRKWpropconsplan-Oct05.pdf.

[14]Rob Williams & Dawn P. Noren, *Swimming Speed, Respiration Rate, and Estimated Cost of Transport in Adult Killer Whales*, 25(2) MARINE MAMMAL SCI. 257 (2009).

[15]Brian Joseph & James Antrim, *Special Considerations for the Maintenance of Marine Mammals in Captivity*, in WILD MAMMALS IN CAPTIVITY: PRINCIPLES AND TECHNIQUES FOR ZOO MANAGEMENT 181 (Devra G. Kleiman et al. eds. 2010).

[16]*Id.*

[17]*Id.* at 183; *see also* Laurence Couquiaud, *Special Issue: Survey of Cetaceans in Captive Care*, 31(3) AQUATIC MAMMALS 279, 327 (2005) ("Enclosures in which cetaceans are housed should be as naturalistic as possible, considering the fundamental needs of the animals before aesthetic considerations.").

[18]Oleg I. Lyamin et al., *Cetacean Sleep: An Unusual Form of Mammalian Sleep*, 32 NEUROSCIENCE BIOBEHAV. REV. 1451, 1457–58 (2008); Robert W. Osborne, *A Behavioral Budget of Puget Sound Killer Whales, in* BEHAV. BIOLOGY OF KILLER WHALES 211, 231 (Barbara C. Kirkevold & Joan S. Lockard eds. 1986).

[19]*See* ERICH HOYT, THE PERFORMING ORCA—WHY THE SHOW MUST STOP 40 (Whale and Dolphin Conservation Society, 1992).

[20]*See generally* Kathleen N. Morgan & Chris T. Tromborg, *Sources of Stress in Captivity*, 102 APPLIED ANIMAL BEHAV. SCI. 262, 277–78 (2007).

[21]Georgia Mason, *Captivity Effects on Wide-Ranging Carnivores*, 425 NATURE 472 (2003).

[22]E.g., Luke Rendell & Hal Whitehead, *Culture in Whales and Dolphins*, 24 BEHAV. & BRAIN SCI. 309, 314 (2001) (citations omitted); Robin W. Baird & Hal Whitehead, *Social Organization of Mammal-Eating Killer Whales: Group Stability and Dispersal Patterns*, 78 CAN. J. OF ZOOLOGY 2096 (2000).

[23]Rendell & Whitehead, *supra*, at 314 (citations omitted).

[24]Emma A. Foster et al., *Adaptive Prolonged Postreproductive Life Span in Killer Whales*, 337 SCI. 1313 (2012).

[25]Rendell & Whitehead, *supra*, at 314 (citations omitted).

[26]Transcript of Proceedings at 651, 736, *Sec'y of Labor v. SeaWorld of Fla.* (OSHRC No. 10-1705). This balance must be difficult to achieve, as Tilikum has sired at least a dozen calves, making him the father or grandfather of more than half the orcas owned by the company.

[27]See, e.g., Tim Zimmermann, *Do Orcas at Marine Parks Injure One Another?* (Sept. 14, 2010), http://timzimmermann.com/2010/09/14/do-orcas-at-marine-parks-injure-one-another/.

[28]SeaWorld, *Kayla Profile*, http://www.scribd.com/doc/85235907/seaworld-orca-profile-killer-whale-kayla-2010.

[29]DAVID KIRBY, DEATH AT SEAWORLD 112 (2012).

[30]*Id.*

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[32]SeaWorld, *Tilikum Profile*, http://www.scribd.com/doc/85239975/seaworld-orca-profile-killer-whale-tilikum-2010.

[33]Mike Thomas, *Tilikum's Captivity May Be Problem, but He's Important for Conservation,*

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[35]John K.B. Ford et al., *Killer Whales: The Natural History and Genealogy of Orcinus Orca in British Columbia and Washington State* 21 (2d. ed., U. Wash. Press, 2000)

[36]*Id.*

[37]Rendell & Whitehead, *supra*, at 314 (citations omitted).

[38]Brigitte M. Weiß et al., *Vocal Behavior of Resident Killer Whale Matrilines with Newborn Calves: The Role of Family Signatures*, 119(1) J. ACOUST. SOC. AM. 627, 634 (2006).

[39]Rendell & Whitehead, *supra*, at 314.

[40]VANESSA WILLIAMS, CAPTIVE ORCAS: "DYING TO ENTERTAIN YOU": THE FULL STORY 35 (Whale and Dolphin Conservation Society, 2001) (quoting Hal Whitehead, Speech, *The Value of Oceanaria* (Whales in Captivity: Right or Wrong? Symposium 1990).

[41]Tyler Haden, *Cousteau on SeaWorld Tragedy*, THE INDEPENDENT (Feb. 27, 2010). Like social structures and dialects, foraging is also an important component of orca culture, and their methods of finding, capturing, and eating prey as well as the types of prey vary widely. Orcas are the oceans' apex predators and forage on, inter alia, fish, seals, sharks and rays, and other cetaceans. They are also known for their use of a range of often complex and cooperative hunting techniques, including launching out of the water to take prey on dry land, coordinating to create a wave to wash prey off ice floes, and debilitating prey by ramming or striking them with their tail fluke. *See generally* Rendell & Whitehead, *supra*, at 314–15 (citations omitted). Alternatively, all captive orcas are fed only frozen and then thawed dead fish, which prevents them from engaging in any of the social and cultural aspects of hunting. Williams, supra, at 34–35.

[42]*See* Marino & Frohoff, *supra*, at 3; *see generally* JOHN S. JETT & JEFFREY M. VENTRE, KETO AND TILIKUM EXPRESS THE STRESS OF ORCA CAPTIVITY 1 (2011), http://theorcaproject.files.wordpress.com/2011/01/keto-tilikum-express-stress-of-orca-captivity.pdf; INGRID N. VISSER, REP. ON THE PHYSICAL & BEHAV. STATUS OF MORGAN, THE WILD-BORN ORCA HELD IN CAPTIVITY, AT LORO PARQUE, TENERIFE, SPAIN, at 2–5 (2012) [hereinafter Morgan Report], http://www.freemorgan.org/wp-content/uploads/2012/11/Visser-2012-Report-on-the-Phyisical-Status-of-Morgan-V1.2.pdf.

[43]Marino & Frohoff, *supra*, at 3 (citations omitted).

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[45]E.g., Brief for Respondent Secretary of Labor at 25–28, *SeaWorld of Fla. v. Perez* (D.C. Cir. No. 12-1375).

[46]Transcript of Proceedings at 373–74, 448–57, 467–69, *Sec'y of Labor v. SeaWorld of Fla.* (OSHRC No. 10-1705) ["Tr."].

[47]*Whales Kill Trainer as Spectators Watch*, CHICAGO TRIBUNE, Feb. 22, 1991, at C3.

[48]*Park Is Sued Over Death of Man in Whale Tank*, N.Y. TIMES, Sept. 21, 1999, at F5.

[49]Ed Pilkington, *Whale Killing: They Played as Usual. Then He Drowned Her*, THE GUARDIAN, February 26, 2010.

[50]*Kayla Profile*, *supra*.
[51]Tim Zimmermann, *Blood in the Water*, OUTSIDE MAGAZINE (July 15, 2011).
[52]Ingrid N. Visser, *Prolific Body Scars and Collapsing Dorsal Fins on Killer Whales* (Orcinus orca) *in N.Z. Waters*, 24 AQUATIC MAMMALS 71, 79 (1998) ("There have been very few reports of conspecific aggression in wild killer whales").
[53]Marino & Frohoff, *supra*, at 3.
[54]*Id.*
[55]Couquiaud, *supra*, at 296.
[56]Id. ("These disruptions also can be caused by the fact that some of the animals may have been removed from their original social structure, separated from family members or a social unit, and now have to adjust to a new social environment").
[57]*See generally* Jeff Warren, *Why Whales Are People Too*, READERS' DIGEST CAN. (July 2012) (quoting Marino), available at http://www.readersdigest.ca/magazine/true-stories/why-whales-are-people-too?page=0,3.
[58]JETT & VENTRE, *supra*.
[59]*Id.*
[60]*See*, e.g., Morgan Report, supra, at 4, 12; Tim Zimmermann, *The Killer in the Pool*, OUTSIDE MAGAZINE (July 30, 2010).
[61]Zimmermann, T*he Killer in the Pool*, *supra*.
[62]SeaWorld, *Katina Profile*, http://www.scribd.com/doc/85235353/seaworld-orca-profile-killer-whale-katina-2010.
[63]SeaWorld, *Kayla Profile*, supra.
[64]SeaWorld, *Nalani Profile*, http://www.scribd.com/doc/85239104/seaworld-orca-profile-killer-whale-nalani-2010.
[65]*See* Zimmermann, *Do Orcas at Marine Parks Injure One Another?*, *supra*.
[66]*Performing Whale Dies in Collision With Another*, N.Y. TIMES, Aug. 23, 1989.
[67]Greg Johnson, *Killer Whale Bled to Death After Breaking Jaw in Fight*, L.A. TIMES, Aug. 23, 1989.
[68]KIRBY, *supra*, at 170–71.
[69]Tr. at 531, 556–59.
[70]SeaWorld Parks & Entm't v. Marineland of Canada, Affidavit of Lanny Cornell (Mar. 28, 2011) ¶ 40.
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[72]Couquiaud, *supra* at 297.
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[74]Ros Clubb & Georgia Mason, *Captivity Effects on Wide-Ranging Carnivores*, 425 NATURE 473 (2003); *See generally* JETT & VENTRE, *supra*.
[75]Wemelsfelder, *supra* at 84.
[76]*Id.*at 85.
[77]JETT & VENTRE, *supra*.
[78]*Id.*
[79]*Id.*
[80]*Id.*

[81]KIRBY, *supra*, at 162.
[82]JETT & VENTRE, *supra*.
[83]*Id*.; *see also* Tr. 1730.
[84]Tr. 1730.
[85]*Id*. at 1743.
[86]Affidavit of Lanny Cornell, *supra*, ¶¶ 16–17.
[87]*Id*. ¶ 19.
[88]*Id*. Ex. B.
[89]*Id*.
[90]*See* Photos of Tilikum's Teeth, attached.
[91]*See* SeaWorld, *Katina Profile, supra*; Photo of Katina's Teeth, attached.
[92]*See* SeaWorld, *Kayla Profile, supra*; Photo of Kayla's Teeth, attached.
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[94]Lyamin, *supra*, at 1457.
[95]JETT & VENTRE, *supra*, at 5.
[96]Ford, *supra*, at 654.
[97]*See* Robert W. Osborne, *A Behavioral Budget of Puget Sound Killer Whales, in* BEHAVIORAL BIOLOGY OF KILLER WHALES 211, 231 (Barbara C. Kirkevold & Joan S. Lockard eds. 1986).
[98]Lyamin, *supra*, at 1458.
[99]The Orca Project, *Tilikum's Lonely Life After Dawn*, (Sept. 3, 2010), http://theorcaproject.wordpress.com/2010/09/03/seeing-is-believing-tilikums-lonely-life-after-dawn/.
[100]Complaint, *Tilikum et al. v. SeaWorld Parks & Ent., Inc. & SeaWorld*, LLC, No. 11 Civ. 2476 (S.D. Cal. 2011), at ¶ 42.
[101]*Id*. at 1459.
[102]*Id*.

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