European Association for Aquatic Mammals

What People Believe - What Science Knows

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Contents

About Cetaceans' Biology

- **Is it true that dolphins are as intelligent as humans?**

  There is no consensus among scientists on how to define and measure intelligence (in humans and in non-human species). The matter is very complex due to the fact that intelligence is a cognitive trait that is very difficult (if not impossible) to completely/accurately evaluate from a quantitative perspective, as it relates to (depends on…) several capacities such as, for instance, (i) the capacity for abstract thought (including self-awareness), (ii) the skills of communication, (iii) the level of emotional intelligence, (iiii) the power of problem-solving, (v) the dynamics of learning, (vi) and reasoning, (vii) and planning, (viii) the ability to complete complex ideas, (ix) and adapt effectively to the environment, (x) to engage in various forms of reasoning, among others.

  As such, intelligence not only varies tremendously between species, but also between individuals of the same species. Many scientists defend the fact that as dolphins and humans are so far apart in evolutionary terms, it is very difficult to compare their cognitive abilities (the current reference is human-based).

  To complicate matters even further, many non-experts tend to try to relate (confuse) brain-size with "brain-power" (QE "encephalization quotient" being one of the tools used as a reference), and inherently, make unsubstantiated assumptions about dolphins' intelligence from the dolphins' size. For instance, many people tend to believe that the fact that the bottlenose dolphins' brain (in terms of absolute brain mass) is bigger than humans' (1,5 - 1,7 versus 1,3 - 1,4 kilograms, respectively), associated with the fact that, just like humans, some species of dolphins also have spindle cells (a particular kind of neurons), would imply that dolphins might be as or even more intelligent than humans.

  However, the biological sonar, present in all odontocetes, is their main source of information about their surrounding environment; due to the physical nature of sound (which travels 4,5 times faster in water than it does in the air), which demands a considerable faster brain stem transmission time, dolphins require a very fast sound "processing ability" (thus explaining why the dolphins' part of the brain dedicated to acoustical analysis is around 10 times bigger than the humans' equivalent).

  Being this a very complex matter, it is easy to assume that dolphins are, in their very specific context, intelligent - as they have adapted extremely well to their aquatic environments; however, comparisons between species are very controversial and understudied, and certainly do not support claims that dolphins possess an equivalent or superior intelligence level as humans'. Humans can process information in very specific areas and through very specific methods and act accordingly in ways that dolphins cannot; the contrary is also true. However, so do many other species, like octopus, crows, European magpies, *et cetera*. - and that does not mean that they have an intelligence similar to humans, who have all the ten capacities described above, including a language system that allows transfer of the information in such a precise and wide way that no other species currently possess.

  Specific References: Au & Nachtigall (1997), Mercado *et al* (2010), Harley *et al* (2010), Delfour (2010), Herman *et al* (1984), Kuczaj *et al* (2006), Johnson (2010), Kuczaj *et al* (2008), Kuczaj *et al* (2009), Kuczaj *et al* (2010), Pack (2010), Tomonaga *et al* (2010), Highfill & Kuczaj (2007), Reiss & Marino (2001)

- **Is it true that killer whales are more aggressive than regular dolphins?**
  Killer whales (*Orcinus orca*), also known as orcas, are the largest dolphins in the world. Similarly to other cetaceans, including, for instance, bottlenose dolphins (*Tursiops truncatus*), their social structure is based on a matriarchy system (the females tend to spend their lives in the same pod as their mothers, sisters, grandmothers, *et cetera*, while males tend to leave the group when they are weaned and/or reach their adolescence).
  From an ecological standpoint, three (eco-)types of killer whales are currently recognized:
    - transient: those with a very wide range; may seem more aggressive because they tend to prey on larger species (such as seals, sea lions, birds and even other cetaceans), which could easily be confused as "attacks";
    - resident: those orcas that prey on fish;
    - off-shore: those orcas that feed mainly on sharks.

  However, agonistic behaviour can and should not be immediately associated to the species or its ecology. Aggressive behaviours can have a more individual motivation rather than being a species/population-related characteristic; and are often related to social context.
  The size of killer whales (males can reach 5.5 tons and reach 9 meters), which are the world's largest marine predators, though, can have a stronger impact on humans, thus, allowing observers to unfairly correlate physical impact with intensity of aggressiveness; but it is not the size that defines the "aggressiveness" of a species or a specimen.
  Hunting techniques in this species are passed between generation by the older females (who tend to live much longer than males) and they know how important it is to cooperate for foraging… This type of behavioural analysis is related to survival and has nothing to do with the aggressiveness; it is, in fact, a social activity that involves: sharing knowledge of resource distribution, prey-catching and food processing (crashing, saving, sharing, *et cetera*) and the aggression towards the prey is only one of the actions to achieve foraging success.
  Specific References: Pitman *et al* (2001)

- **How can the sea-diving species like dolphins cope with the (more limited) depth of artificial habitats?**
  We must accept that space limitation is one of the contrasts between the wild and zoological environments and one should provide the best possible conditions for the species according to the type of needs each species has in the wild. The fact that a species can dive dozens or even hundreds of meters does not necessarily mean it must do so to survive.
  The physiological and/or behavioural extreme limits of any species/specimen are exactly that: limits, and not "average" or "comfortable behaviours/needs".
  The depth of a habitat is just one of many factors that can influence (but not necessarily determine or condition) general welfare. In species like dolphins, known for being long-term residents of bays and estuaries, for instance, a reduced depth is not a challenge and can even been an ecological advantage (which is maintained in a zoological setting).
  Specific References: Wells *et al* (2005), Mann (1999), Mercado *et al* (2010), Bejder *et al* (2006), Buckstaff (2004), Herman (2010), Wells & Scott (1997), Wells (2009)

- **Is it true that killer whales are so big and pools are so small that the species should not be kept under human care?**
  To determine how species/specimens can be held, one should look at the reasons why one should keep them and the level of the husbandry programme one can provide for the length of their lives. These include, among others, the experience and ethics of the professionals implementing such programme, the educational aspects that can be shown as an outcome, the capability of adaptation of the species to zoological environment, the availability of adequate nutrition, availability of proper space, environmental requirements, the safety needs for the species itself and its caregivers, among others. Killer whales, the largest of the dolphins' species, are no exception.
  Specific References: Mann *et al* (1999), DeMaster & Drevenak (1988)

- **Is it true that dolphins, when confined to pools, cannot dive deeply enough and begin suffering from eye problems?**
  As in humans (and many other species), pathology of the eye can be related to a very wide variety of origins. The causes can be divided into infectious origin (virus, bacteria, fungus, parasites) or non-infectious origin (congenital, traumatic, age-related, *et cetera*). In cetaceans, there are no scientifically recognized causes of eye pathology related to the depth of a habitat; however, one must always pay a lot of attention to the insulation of the pool and the quality of the water. For instance, the population of bottlenose dolphins living in Sarasota, Florida, in the United States of America, are permanent residents of that specific and well known home range - and spend most of their lives in the areas where the average depth is inferior to 5 meters; and that does not implies an increase in eyes-related pathologies.
  Specific References: Wells *et al* (2005), Mann *et al* (1999), Wells (2009), Bejder *et al* (2006), Dierauf & Gulland (2001), Wells (2009)

- **Is it true that dolphins need to be constantly travelling (swimming dozens/hundreds of kilometres/miles per day) in order to be safe, healthy and/or in good physical condition?**
  Dolphins do not need to be in constant travel. Swimming is mainly related to feeding (foraging and capture prey), socializing, seeking refuge, avoiding predators (including direct or indirect harassment by humans) or negative *stimuli* (e.g.: acoustic pollution, among others). Many species and populations of dolphins, if allowed, may keep within a small range. Many populations around the world (eg: Sado, in Portugal; Sarasota, in the USA; Moray Firth, in Scotland; *et cetera*), which are known for their "resident status", tend to exhibit considerably reduced travelling behaviours, although still moving permanently. That means that the members of such populations tend to use a very small range within a very specific ecosystem.
  Quite frequently, such specimens swim just enough to catch their prey, interact with conspecifics and/or avoid predators. In short, their health and safety may require a considerably reduced (when compared with other species/populations/specimens) need to swim and/or migrate. Certainly, the migrations of hundreds of kilometres (and, sometimes, involving hundreds or thousands of species, during a few days, or hours or, more frequently, a few minutes) is not a recurrent need.
  All in all, health and safety are more immediately related to the availability of prey and the absence of predators or other threats, rather than quantity and type of migrations. Nevertheless, one must still provide enough space of them to move all day long, should they desire to.

These needs justified the recent review of the EAAM's Standards and Guidelines, regarding the housing of marine mammals.

Specific References: Rohr *et al* (2002), Wells *et al* (2005), Lyamin *et al* (2008), Mann *et al* (1999), Wells (2009), Paulos *et al* (2010), Bejder *et al* (2006), Ridgway & Carder (1997)

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About Cetaceans' Ecology

- **Do dolphins commit suicide?**

  According to science, only humans commit suicide. Even though other species can get depressed, science is still unable to prove that the despair (the hopelessness that implies the ability of perception of the future) occurs in non-human species, including cetaceans. Such a strong emotional condition (despair) has only been associated to humans; as such, in other species, the extremely powerful survival "instinct", associated to self-awareness (which some species of cetaceans, like the bottlenose dolphins, do have) to oneself and one's environment (which cetaceans do not seem to have), prevents non-human species committing suicide.

  The myth associated with "suicides" tends to be related to accidents in the wild (undesired and unpredicted strandings) and accidents in zoological settings (traditionally related to specimens recently introduced to unfamiliar environments, which, associated to high levels of stress, can induce fast/energetic behaviours, such as high-speed swimming, leading to unintentional crashing against objects/walls).

  Unfortunately, throughout the years, many cetaceans have been kept in substandard (and frequently, also illegal conditions) for dozens of years - one would expect such dolphins to commit suicide, if capable of doing so; on the contrary, many live to be over 30 or 40 years old.

  Specific References: Mercado & DeLong (2010), Reiss & Marino (2001)

- **Is it true that collections from the wild disrupt dolphins' families?**

  It is possible. Many species of cetaceans tend to be part of a population organized around a matriarch. From the cultural and genetic standpoint, the (either anthropogenic or natural) removal of a specimen from a group may have an impact, depending on the age, size, sex, experience and the reproductive status of the specimen. However, many dolphins, especially younger males ("bachelors"), tend to be associated in groups with a very high aggregation/dissociation (fusion-fission) dynamics, where the presence or the absence of a specific specimen has no direct or immediate impact on the cultural, genetic or behavioural nature of that particular group.

  Dolphins are social animals, but some individuals are known to have spent months and even years in solitary conditions, near to the coast. Sometimes (or even frequently), such individuals are been reported to approach humans and, in some situations, even allow human contact.

  In order to avoid all these potential problems, nowadays these species are protected almost worldwide, and capture can only occur in certain countries under special permits and after proper scientific analysis on the wild population and the impact such captures could have (e.g.: "Non-detriment Findings").

  Some of the criteria used in these impact studies are the age and sex of the members of the population and its correlation, the age of sexual maturity, the breeding history and physiology of the species (e.g., multiparous vs uniparous species, poliestrous vs diestrous vs seasonally polyestrous vs monoestrous females), average lactation periods, among many others.

  Specific References: Lusseau *et al* (2005), Mann *et al* (1999)

- **If, in the wild, dolphins live in large family groups, how can they adapt to living in small captive groups?**
  Dolphins do not live in large family groups; they live in complex fission-fusion societies and, in many populations, the average group size varies between 4 and 7 individuals.
  In Europe, all cetaceans are included in the Appendix A of the CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora. As such, collection of wild cetaceans is prohibited - meaning that no adaptation is required, as no specimens are being imported.
  However, in the countries where such collections are legal and ethically accepted, adaptation to a zoological habitat can be achieved quite straight forwardly, depending on the origin, collection method, husbandry procedures, composition of the group and, of course, the nature of the individual itself.
  As such, size of the group, as it happens with the size of the enclosure, it's not the determining factor of the general welfare of the individual or the group. The husbandry policies, including the inherent behavioural and socialization programmes (which take into account sex, age, physical condition, sociability pattern, *et cetera*) - associated to an enrichment programme, tend to be much more important and relevant than the size of the group, when considering adaptation and general welfare.
  Specific References: Lusseau *et al* (2005), Mann *et al* (1999), Wells (2009), DeMaster & Drevenak (1988), Paulos *et al* (2010), Kuczaj *et al* (2006), Kuczaj & Yeater (2006), Johnson (2010), Highfill & Kuczaj (2007)

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About Cetaceans' Husbandry

- **Is it true that dolphins suffer from living in chlorinated water?**
  Chlorine has two key functions: to sanitize (kill living organisms, such as bacteria and algae) and oxidize (i.e, destroy contaminants and waste products). However, if kept at appropriate levels, chlorine (associated or not with other disinfecting systems, like ozone) does not create any significant pathology for the mammals living therein.
  In many zoos, chlorine is not even used (as other systems are used). Harmful chlorine levels could have a short or long-term impact on the general welfare of a specimen - but that would depend on the overall level of combined chlorine.
  Whenever in use, each facility knows and implements an ideal range of free versus total chlorine concentrations for a specific exhibit, which takes into account many factors such as: total volume of the water, number of specimens with access to such water, the presence or absence of flora, the volume of waste materials (urine and faeces, for instance) expected on a daily basis, the presence or absence of non-zoological organic matter (e.g., leaves, pollen, insects, *et cetera*), presence of calves, complementary life support systems, *et cetera*.
  Regional and national authorities regularly supervise such levels and indicators and correlate them with several indicators of animal welfare, thus deciding if any changes/corrections need to be implemented.
  Specific References: Hicks *et al* (1985), Dierauf & Gulland (2001), Boness (1996)

- **Is it true that bacteria found in pools harm dolphins?**
  Marine animals cannot and do not live in sterile environments; their immune system tends to be prepared to fight potential infections (bacteria, virus, and fungus) and infestations (parasites) by which it is constantly challenged. There are millions of species of bacteria - some of them have very strong pathological impact on mammals. However, modern dolphinaria use a wide range of techniques and equipment (Life Support Systems – LSS) to prevent the proliferation of harmful bacteria/virus/fungus. These include filtration systems, safety and hygiene protocols, *et cetera*.
  These techniques, protocols and equipments are regulated and overviewed by local, regional and/or national authorities, that ensure high levels of safety are implemented on a daily basis. The husbandry professionals, taking that into account, secure adequate indicators, which are regularly checked (once or multiple times per day).
  Specific References: Hicks *et al* (1985), Abollo *et al* (1998), Dierauf & Gulland (2001), Boness (1996)

- **Is it true that captive dolphins' infant mortality is extremely high?**
  When compared to well known and scientifically studied populations of bottlenose dolphins (e.g., Sarasota, in the USA - up to 50% in the first year of life) dolphin infant mortality rates of captive populations cannot be considered high. Due to the physiological nature of these species (which are immune-depressed upon birth), it is expected that only one in every two calves reach sexual maturity.
  Specific References: Wells *et al* (2005), Mann *et al* (1999), DeMaster & Drevenak (1988), Hartmann (2000)

- **Is it true that dolphins suffer if exposed to water with less salt than seawater?**

  Dolphins do not breathe through the water; they are warm blooded mammals and, just like humans, inhale and exhale atmospheric air. As such, they come to the surface whenever they need to exchange the air in their lungs (75 to 90% of its total capacity - the "tidal volume"-, in each exchange).

  For any cetacean, water is fundamental for locomotion and thermal-regulation, hydration, kidney function and osmosis, and even for skin repair. As such, if kept below or above specific salinity range for a prolonged period of time, cetaceans may experience different levels of discomfort or even suffering.

  In general, the salt in the water, in what concerns cetaceans, has, mainly, a direct influence on the density of that medium; nevertheless, all dolphins can freely change between salt, brackish and sweet water, without any significant impact to their welfare.

  Many wild populations of dolphins are known to inhabit estuaries and river mouths (thus changing between river-water and ocean-water) without any relevant physiological impact. Some specimens may shed the upper layer of the skin when very abrupt and time-prolonged changes occur (from salt water to fresh water or *vice versa*).

  The change in salinity between different masses of water has implications on its density, and as such, on the energetic needs to swim in more or less dense water – and that is the main implication. Therefore, there are some limitations in the range of salinity one species can and must live in, and these are characteristics and requirements that must be taken into account whenever holding the species.

  Specific References: Dierauf & Gulland (2001)

- **Is it true that hundreds of dolphins have already died in European dolphinaria?**

  There are very few species of dolphins living in zoological facilities – and more than 90% of the specimens are of the bottlenose dolphin species (others being, mainly, killer whales, beluga whales and harbour porpoises).

  Currently, less than 250 representatives of the species (100% of the European zoological population) integrate the EEP of the *Tursiops t. truncatus*, where all births, transfers and deaths are officially recorded.

  As with normal (wild or not) populations, an annual death rate of 2 to 5% can be expected. As such, it is understandable that, over the past half century, many specimens would have died and, as with all other aspects of human culture, knowledge and expertise, also the husbandry techniques and protocols regarding the holding of these species have evolved and improved tremendously.

  Specimens that stranded and died during rescue/rehabilitation are not included in the zoological traditional records, as they are wild specimens and do not belong to zoological collections.

  Specific References: Barlow & Boveng (1991), Hartmann (2000)

- **Is it true that the breeding success of captive dolphins/cetaceans is very low, reduced or non-existent?**

  Each facility (like human families, regions and countries, for instance) has its own breeding success rate, which is influenced by a very wide range of factors, such as: the structure of the group (ratio of males and females; ratio of adults and sub-adults and juveniles), the age of the individuals (especially the females of breeding age), the breeding experience of each female and breeding male, the quality of the nutrition, the

specificity of the husbandry programme, potential pathological conditions within the population, genetically predisposition to dystocia, prophylactic programs, the experience of the care-giving staff, the features of the facility, among others.
Needless to say, the "acquisition programme" (i.e., the desire and needs of each facility – which defines the adequate number of specimens within each group) also has fundamental implications, as it may imply that, albeit possible, females are not allowed to breed in each physiological opportunity/season.
Some limitations are also directly related to the calf; in fact, the physiological specificity of this *taxa* (which is immune-depressed upon birth) inherently implies a biologically expected high mortality rate (up to 50%) in the first year, both in natural and artificial conditions.
In the USA, a recent study involving populations kept under human care showed that over 86% of the calves born in zoos and similar facilities survived the first (and most difficult) year. In Europe, where less than 250 bottlenose dolphins are held under human care, most facilities which desire and promote breeding have a good (and even very good) success rate and the population is considered stable and is steadily increasing.

Specific References: Wells *et al* (2005), Mann *et al* (1999), Wells (2009), DeMaster & Drevenak (1988), Hartmann (2000)

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About Cetaceans' Welfare

- **Is it true that dolphins live less under human care (captivity)?**
  In modern zoological facilities, dolphins can live as long, or longer, than their wild counterparts. Many European facilities have, within their populations, dolphins which live (and have lived) to be 40, 45 and even 50 years old.
  In the United States of America, for instance, "Nelly", a bottlenose dolphin born at Marineland, in St. Augustine (in Florida), celebrated her 59th birthday in February 27, 2012 – Nellie was born in 1953.
  In Europe, some facilities hold (or have held) 45 and 50 year-old dolphins – most frequently due to the state-of-the-art husbandry techniques and protocols, which routinely include trained/voluntary medical procedures (such as blood samples, ultrasound examinations, vaccinations, heart- and lung-auscultations, among many others).
  Furthermore, we should also remember that the "mean" or "average" age of any given dolphin (either living in the wild of under human care) or its population of origin is not an indicator of its "longevity" (as these are very different concepts).
  Specific References: Oftedal (1997), Brando (2010), Wells (2009), DeMaster & Drevenak (1988), Hartmann (2000)

- **If captive dolphins have ulcers, does that mean that they have stress?**
  Dolphins do suffer from ulcers. In humans, the majority of peptic ulcers (reportedly, 70 to 90%) are caused by a chronic inflammation related to the presence of *Helicobacter pylori*, a bacteria that survives (actually, "enjoys") the acidic environment of the stomach, where it colonizes the mucosa. In short, the large majority of ulcers are caused by an infection (which is very common in humans).
  Besides parasitic infections, ulcers can also be caused by drugs (such as aspirin, ibuprofen, and others) and (malignant) tumours. Many experts, however, believe that stress is not necessarily a cause but a complication of peptic ulcers - meaning that an ulcer may cause stress, but that the other way around is not necessarily true.
  Furthermore, scientists cannot confirm that humans and cetaceans are identical in these pathologies – however, *Helicobacter pylori,* as well as *Candida* infections, have been identified in some instances. A strong relevance on the pathogenesis is given to specimens' social and physical environment, while pain is certainly a complication in the evolution of the ulcer. Stress is omnipresent in wild populations, as individuals need to deal with predators, diseases, dominance from other individuals, oceanographic and atmospheric phenomena, acoustic pollution and famine. But that does not necessarily implies ulcers – and *vice versa*.
  Specific References: Bossart (2007), Abollo *et al* (1998), Fair & Becker (2000), Harper *et al* (2000)

- **Is it true that the filtration equipment is harmful, due to its noises and vibrations, to the cetaceans?**
  Yes, it is possible that filtration systems (life-support systems) may have had an acoustical impact in some species/specimens of cetaceans and thus, became a source of constant low to medium stress. In modern zoological facilities, such impacts are considered in advance (during planning and construction) in order to avoid them.
  Many filtration systems are mounted on anti-vibration foundations, thus eliminating such potential impact, and others use natural sea water.
  Specific References: Fair & Becker (2000)

- **Is it true that dolphins under human care cannot use their sonar abilities due to the physical nature of their surroundings?**
  Dolphins can use their biological sonar, at any time and without limitation – in any aquatic environment. Even though it is a complex system to explain, the dolphins' sonar could, from an educational standpoint, be compared to a flashlight – the humans' visual aid that one can use whenever necessary, pointing it to a specific object or direction that we need to see more clearly. Like a flashlight, cetaceans' sonar is extremely focused, is used in bursts of microseconds, and under a specific and conscious need. The energy in such acoustic pulses is considerably low and under total control of the emitting dolphin (in terms of duration, direction, energy, *et cetera*). Furthermore, it is considered "dolphin etiquette" not to direct such acoustic signs to other dolphins. In short, even if surrounded by metal walls, dolphins would still be able to use their sonar (quietly or not so quietly) without any limitation and without any impact on their general (including acoustic) welfare. Just like any human using a flashlight - either during the day or the night…
  Specific References: Au & Nachtigall (1997), Mercado & DeLong (2010), Nachtigall *et al* (1994), Harley *et al* (2010), Kuczaj *et al* (2009), Kuczaj *et al* (2008)

- **Is it true that should any dolphin use its sonar in a pool, the sound reverberates on the walls and stresses/frightens them?**
  Dolphins have full control of their biological sonar. They have full control of every aspect of it, at every single moment, adjusting both the frequency and amplitude of their signals, as needed. As such, a dolphin knows exactly how and when and why to use such a remarkable ability. The use of the biological sonar is not a cause of stress nor does it frighten the dolphins. Being a very efficient and adaptive biological system, a dolphin immediately compensates the energy, direction, and impact of the acoustic pulses involved in each "deployment". And just like in the wild, dolphins can be silent for very long periods, should they wish or need to do so.
  Specific References: Au & Nachtigall (1997), Fair & Becker (2000), Mercado & DeLong (2010), Nachtigall *et al* (1994), Harley *et al* (2010), Kuczaj *et al* (2009), Kuczaj *et al* (2008)

- **Is it true that visitors' clapping and loud music being played in dolphinaria is harmful to the dolphins?**
  Water propagates sound quite differently than the air. As such, marine species, like dolphins and whales, manatees and dugongs, fish and invertebrates, respond to sound in different ways than terrestrial mammals or, for instance, birds. As such, cetaceans, and, in particular, dolphins, have hearing abilities different from humans. In *Homo sapiens*, the audible range of frequencies tend to be between 20 and 20,000 hertz (notwithstanding, of course, the traditional variations within specific individuals). In *Tursiops truncatus*, for instance, the hearing frequency ranges between 1 and 150,000 hertz (most probably, the record in vertebrates), being their peak sensitivity ("best hearing") between 40 to 100,000 Hz. As such, many of the human-produced noises have a much reduced or even irrelevant impact on the dolphins' sensitivity and welfare in the air, but it is probably different when the sound is produced underwater. Several scientific studies involving specimens held under human care can also serve the purpose of projecting analysis to the responses of free ranging specimens – specifically for those sounds of anthropic origin.
  Specific References: Au & Nachtigall (1997), Fair & Becker (2000), Mercado & DeLong (2010), Nachtigall *et al* (1994), Kuczaj *et al* (2009)

- **Is the scarring on the dolphins' bodies related to fighting and/or to the "stress of being captive"?**
  Dolphins, like all other cetaceans, lack arms and hands. As such, whenever they feel the need or the desire to manipulate an object and/or interact with other dolphins, for instance, they can only resort to the use of their rostrum, flippers and/or mouth. In specific ethological contexts, dolphins deliberately interact with other dolphins using their mouths and teeth. And although dolphins' dermis can feel very hard to the touch, it is very sensitive to trauma. "Rake marks" is the name given to a specific kind of scars, because they resemble the marks made by a rake on sand (with very regular distance between the teeth, as occurs with dolphins' teeth); the scars can be temporary or permanent and dolphins induce them on each other whenever interacting with their teeth - quite frequently, such interactions are of sexual nature (intense courtships and sexual interactions); other times, such marks can be related to the social structure (which can vary frequently and drastically) and hierarchy-related confrontations. However, due to the social nature of the majority of cetaceans' populations (fission-fusion societies), confrontations to determine dominance positions within the groups can lead to the presence of rake marks - a sign that dolphins are behaving like dolphins.
  As such, rake marks are signs of interactions, but such interaction may not imply (negative) stress, rather being expressions of eustress (positive stress); on the contrary, it may simply imply normal, healthy and expected behaviour.
  Specific References: Lusseau *et al* (2005), Paulos *et al* (2010)

- **Is it healthy for the captive cetaceans to eat dead fish and dead squid?**
  Quite frequently, it is the live prey (such as fish, squid, cuttlefish, *et cetera*.) that causes disease. Almost any prey item in the wild is naturally "contaminated" with viruses, bacteria, fungus and/or parasites.
  Whenever a dolphin preys on those animals, such viruses, bacteria fungus and/or parasites can be transmitted to the predator. The same thing happens in terrestrial animals. Although humans, for instance, can deal with such contaminations (by either destroying them through heat, by cooking their food, and/or by using medication - antibiotics, alcohol, laxatives, *et cetera*), cetaceans cannot. As such, quite frequently, they suffer and can even die from infestations and infections.
  By providing dolphins with previously frozen, thawed fish, squid, cuttlefish, *et cetera*, the care-giving staff is ensuring that the majority of such sources of contamination are destroyed through the cold temperatures (-20 to -25°C) necessary to freeze the food items. By adding certain supplements lost due to the freezing/thawing process (such as vitamins and specific minerals), husbandry professionals are guaranteeing that not only major contamination risks are avoided, but also ensuring that cetaceans receive high quality food/nutrition.
  Specific References: Lusseau *et al* (2005), Bossart (2007), Harper *et al* (2000), Dierauf & Gulland (2001)

- **How can a small pool (when compared to the big ocean) allow good welfare for any cetaceans?**
  Although a pool cannot replace the ocean, it is not the size of a specific space that determines welfare - it is the amount and quality of the *stimuli* (either natural or anthropogenic) present/available within it.

Just like humans would not like to live in a football stadium (or in a desert, as a matter of fact) it's not the size of a dolphin's habitat that directly determines it welfare and motivation. As such, dolphins living in small habitats (either natural or zoological) can be much more stimulated, engaged and healthy (both physically and mentally) than dolphins living in large monotonous and/or predictable habitats.

It is up to the care-giving staff to ensure that an habitat is constantly creating/deploying new (or increasingly challenging) *stimuli* to the cetaceans - new activities, and/or new objects, new strategies to forage, new conspecifics, new timetables, new prey items, new sounds, *et cetera*.

Specific References: Mann *et al* (1999), Paulos *et al* (2010), Hill *et al* (2007), Morisaka *et al* (2010)

- **Is it true that dolphins kept under human care have a lot of diseases?**

Like other mammals, dolphins can be victims of almost the same type of diseases and accidents as any other animal.

Independently of where they live, dolphins can succumb to pneumonia, infestations, dystocia, congenital defects, cardio respiratory insufficiency, cancer, immune-suppression-related diseases, septicaemia, and constipation, among many other infectious and non-infectious medical conditions. That means that dolphins can, and frequently do, get sick - however, such conditions may have no relation whatsoever to its zoological context, as we can also find many pathologies both in wild and stranded cetaceans.

The characteristics of the husbandry programme and/or the experience and professionalism of the care-giving staff are very important to understand the health of the specimens and precede the start up of symptoms, thus preventing the disease and administrating proper therapies in due time… However, "life is life" and it is made of births and deaths (even when human expertise is available, readily and professional...).

Specific References: Bossart (2007), Brando (2010), Abollo *et al* (1998), Harper *et al* (2000), Dierauf & Gulland (2001)

- **Is it true that dolphins living in pools lack adequate and enough *stimuli* and, as such, have boring and stressful lives?**

It depends on the pools or habitats... It is not the habitat itself that determines if a specific individual gets bored or stressed - it is the amount, quality and unpredictability of the *stimuli* that determines how a specific individual engages with its surroundings (knowing that different specimens react differently to different *stimuli* – and even the same specimen experiences changes throughout the day and even throughout its life).

Just like different dogs react differently to the same toy (or food item, or family member, or sound, *et cetera*), dolphins react differently to the same *stimuli*. As such, it's not the habitat itself that can determine the quality of life of an individual and the general welfare of the specimen - it is how the specimen interacts with its surroundings. The majority of the experts in marine mammal husbandry agree that, for instance, social groupings can outweigh other welfare-related factors, such as size/volume or shape of a specific habitat.

Specific References: Brando (2010), Fair & Becker (2000), Mercado & DeLong (2010), Paulo *et al* (2010), Dudzinski (2010), Kuczaj *et al* (2008), Kuczaj *et al* (2009)

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About Cetaceans' Management

- **Do dolphins from "drive fisheries" end up in modern/European dolphinaria?**
  Current national and European legislation, as well as international agreements (such as CITES), do not allow dolphins to be captured in the wild and/or be imported from the wild should they have been collected in waters managed by non-European countries.
  As such, in modern times, no wild dolphins (either from drive hunts or other hunting techniques) can be imported into European dolphinaria. The same cannot be said in regard to Eastern Europe.

- **Where did the dolphins currently being kept in European dolphinaria come from?**
  The vast majority of dolphins being kept at European Dolphinaria were born under human care (quite frequently, at the facility where they live).
  For instance, the European Studbook for the bottlenose dolphin shows that almost 70% of the European zoological population of the species was born under human care. Some of them were even born through Artificial Insemination.
  However, founders (wild specimens) can still be found in some facilities; many of those specimens were captured in the wild (mainly, in Cuba and Florida) between the 60's and the 90's (since, in Europe, until as recently as 1988, it was still legal to hunt, kill, and eat cetaceans in European waters). Some founders are/were stranded specimens that were rescued and kept under human care after their stranding event (frequently, because their final medical condition would not allow an independent survival in the wild).
  Currently, under European regulations and international agreements (e.g.: CITES), it is illegal to capture cetaceans in the wild and/or to import wild-caught cetaceans from outside the European region.
  Specific References: Hartmann (2000)

- **Are captive dolphins trained exclusively for public performances (i.e., shows)?**
  Dolphins can be trained/taught for many purposes, including research (bioacoustics, ethology, reproductive biology, cognition, *et cetera*), education (school classes, training of interns, documentaries, *et cetera*.) and breeding (artificial insemination). Some facilities may also promote interactions with humans for educational, entertainment, and/or medical reasons. In modern zoos, public presentations (and the teaching inherent to those) are just a small part of their potential daily/weekly activities.
  Furthermore, the age, medical condition, reproductive status, experience and motivation of an individual are also taken into account whenever deciding the activities (and related teachings) and schedules of each member of the group.
  Many dolphins are not included, at all, in presentations to visitors.
  Specific References: Brando (2010), Houser *et al* (2010), Kuczaj *et al* (2009), Kuczaj (2010), Kuczaj (2010b), Jaakkola *et al* (2010), Zoomarine (2007)

- **Is it true that dolphins need to be starved in order to be motivated to participate in training sessions and/or other human-based interactions?**

  Just like humans do not need to starve their dogs, children, students, *et cetera*, to teach them whatever one thinks appropriate, the same thing applies, for instance, to dolphins.

  Training, in modern families and modern zoos, is based on trust and motivation, through a technique called "Operant Conditioning". Through operant conditioning, one can shape any behaviour by regulating the immediate consequence of such behaviour – for instance, if immediately after one behaviour (e.g., a bird finds a worm in a plant and eats it), something positive occurs, the behaviour tends to increase its frequency and/or intensity and/or duration (e.g., the birds make more frequent flights to such a plant); the opposite would occur if a negative event or a lack of event (e.g.; a cat approaches the plant or no other worm is found) follows the original behaviour.

  Should starvation be used as a tool for training, as soon as a meal would occur the motivation to interact/learn would terminate. As such, and although food can be used as a secondary reinforcement (or even primary reinforcement), the inherent motivation of each individual and the fundamental trust between teacher-pupil (trainer-specimen, parent-child) would be destroyed whenever a specimen (either a dog, a dolphin, a horse, or a child) would be kept hungry (and, as such, frustrated and distracted).

  For instance, the food that each dolphin receives during a public presentation tends to be just a small fraction (usually between 5 and 10%) of the overall and specific needs of each individual.

  There are many ways to reinforce marine mammals. A marine mammal expert can easily use, for instance, toys, activities, tactile stimulation, interaction with other animals (including humans - their caregivers or others), *et cetera*.

  Ethically, using starvation as a training tool would be questionable and undesirable; from the technical stand-point, it would also be one of the less effective methods.

  Specific References: Brando (2010), Mercado & DeLong (2010), Paulo *et al* (2010), Harley *et al* (2010), Kuczaj *et al* (2009), Ramirez (1999), Pryor (1999), Pryor (1975)

- **Can captive dolphins be trained to return to the wild and live free and healthy?**

  According to some experts, it is very difficult but not totally impossible.

  Many factors are involved in the potential success of this type of operation; some of the factors are the origin (wild-born versus zoological-born), age (calves, sub-adults or adults), overall experience (to defend itself, identify and hunt specific prey, identify and avoid potential predators, *et cetera*), number (alone versus group of two or more individuals and their direct interactions), physical and medical condition, anthropic relations (avoidance of humans versus appeal for humans), specific behaviour of the specimens (shy versus curious, *et cetera*), among others.

  The location of the release site (and its biotic and abiotic specificities), the time of the year (winter versus spring), the presence or absence of wild conspecifics (and the success of a potential integration in a pre-existing group or groups) are also determining factors. However, it should be noted that in many countries (including those within the European Union), the release of dolphins previously housed in zoological facilities (not to be confused with stranded, rehabilitated specimens) is not legally permitted due to (i) sanitary- (to avoid the transmission of potentially pathological agents between zoological and wild populations), (ii) conservation- (the

introduction/release of specimens is only relevant when creating/reinforcing wild populations of endangered species/populations), (iii) welfare-related (specimens that were born or kept for many years under human care tend to be ethologically unprepared for independent/solitary living) and ethical reasons.
Several experiences of this kind were considered and some were even implemented, with various results. Invariably, the scientific community and many international and national authorities do not recognize the success of such efforts, with the exception of Echo and Misha (initially collected in Tampa Bay, in July of 1988, and released after two years, on 6 October 1990; the dolphins were housed at the University of California at Santa Cruz's Long Marine Laboratory and returned to the wild, under a very specific and professional protocol, as was intended from the beginning – even before the specimens had been removed from the wild).
The operation "Into the Blue", of 1991 (Turks and Caicos) and involving three dolphins, and the release, in 1992, of the nine dolphins held at the Atlantis Marine Park, are two examples of what many experts consider to be failed releases. Furthermore, many experts quote the Keiko/Willy (the orca feature in the "Free Willy" movie) as the most recent and classical example of an unsuccessful release, as the killer whale always tried to obtain human companionship and never associated with wild counterparts until it eventually died.
Specific References: Wells (2009), Abollo *et al* (1998), Bril & Friedl (1993), Gales & Waples (1993), IUCN (1987)

- **Was the release of Keiko/Willy, the killer whale, a success?**
  Keiko died of pneumonia, without the help of its care-givers. Keiko was never able to feed by and fend for himself, find and integrate a group of conspecifics, or even learn that humans are enemies. Keiko did, indeed, live alone in the "wild".
  However, the successful level of a release operation cannot be measured by the ability on one individual to find food and live alone. The importance and need to interact with other members of the species, and, when applicable, be integrated into a group, is fundamental in killer whales and other dolphins.
  And that explains why the release was a failure.
  Specific References: Simon (2009)

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About Cetaceans and Humans

- **Do dolphins enjoy being trained?**
  Training is synonymous of learning (and of educating) - and different individuals react differently to learning through humans. Many aspects have to be considered; however, it is commonly accepted that training/learning, when deployed professionally, is a very powerful tool to reinforce communication and trust between humans and non-humans (including dolphins) and, furthermore, it is an extraordinary enrichment opportunity, maintaining dolphins stimulated, engaged, attentive and less prone to suffer from stress (the one related, for instance, with predictability and routines, due to insufficient or deficient *stimuli*). When techniques of Operant Conditioning based on positive reinforcement are applied, humans and non-humans tend to desire and enjoy (tremendously) the experience, as their behaviour tends to be immediately followed by a specifically rewarding event. As such, the reinforced behaviour tends to increase its frequency, intensity and amplitude, which, in turn, induces even more openness for further experiences/learning.
  Training is also used to maintain marine mammals as fit as possible, as the activities involved in adequate training programmes also allow a good and regular mental and physical stimulation. Furthermore, training is also an enrichment opportunity, as it minimizes or avoids potential stereotypies. However, it is fundamental that such training be implemented by professionals that not only know how to correctly apply all aspects of Operant Conditioning, but also know how to consistently use, and at all levels, a strong ethical attitude towards each individual being taught, under a customised training programme.
  Specific References: Brando (2010), Mercado & DeLong (2010), Harley *et al* (2010), Highfill & Kuczaj (2010), Jaakkola *et al* (2010), Kuczaj *et al* (2009), Pryor (1986)

- **Don't dolphins get stressed by performing to an audience?**
  Dolphins tend to ignore their potential audiences during a public event, as they are mainly focused on the humans with whom they are directly interacting with and, more importantly, with the humans that they already know and trust. Generally speaking, dolphins have poorer vision and poorer hearing outside of the water (even in their immediate range); as such, many professionals believe dolphins most frequently are unaware of the presence of strangers/visitors, as they have difficultly seeing them and hearing them. A specific performance, however, might become stressful if the humans in charge of it do not respect the individual needs, expectations and physical abilities/potential of each dolphin. This, therefore, reinforces the need, in modern zoological facilities, for very qualified and experienced care-givers.
  Specific References: Brando (2010), Au & Nachtigall (1997), Fair & Becker (2000), Mercado & DeLong (2010), Paulos et al (2010), Pryor (1986), Tomonaga *et al* (2010), Wright & Kuczaj (2007), Wright *et al* (2007), Wright *et al* (2007b).

- **Can dolphins be used as therapists?**
  No. In some very specific circumstances, dolphins may be used as "therapeutical mediators" (i.e., they can be used, by psychiatrists and psychologists, for instance, as a "motivational tool" under a specific medical programme). However, dolphins themselves, just like dogs, horses, and many other species, do not have any direct or formal therapeutical [*pet therapy*] impact.

- **Do dolphins enjoy interacting with humans?**
  It depends on many factors such as: the dolphin, its age, its reproductive condition, nature and duration of the interaction, the amount and type of the exogenous *stimuli* (which can distract and/or cause distress), *et cetera*.
  One should note, however, that wild dolphins differ from dolphins under human care, as these are not only used to seeing and interacting with humans, but also because their experience lets them know (contrarily to the large majority of those in the wild) that the interaction has a strong potential to become fun and poses no harm.
  Specific References: Mercado & DeLong (2010), Paulo *et al* (2010), Highfill & Kuczaj (2010)

- **Can interactive programs with dolphins jeopardize their safety and health?**
  As with horses, cats, dogs, camels and many other species, any interaction with a human has the potential to inflict stress, discomfort, pain or even death.
  Needless to say, interactive programmes with dolphins or any other species should be idealized, implemented and supervised, at all times, by experienced professionals, who are responsible for ensuring a safe experience for both humans and non-humans alike, guaranteeing mutual adequate training and adaptation of both species, securing adequate time, pace, resources and emotionally rewarding environment to all the individuals (human and non-human) involved.
  Specific References: Brando (2010), Trone *et al* (2005)

- **Can people who interact with dolphins be victims of aggression and/or contamination?**
  Yes. All non-humans have the potential, for instance, to become scared, frustrated and/or stressed. Furthermore, just like humans, it is impossible to predict 100% of the behaviour of an individual.
  As with dogs and horses (two species domesticated by thousands of years of interactions with humans), it is fundamental to understand the behaviour and expectations of any aquatic species and to be able to identify, for instance, any potential pre-aggressive sign (the precursors of a direct, physical aggression) in every individual.
  Furthermore, in an aquatic environment (due to its physical nature), the tendency is to be more easily exposed to viruses, bacteria and fungus (either transmitted by the dolphin or by any other organisms present or adjacent to the aquatic habitat), either in a zoological environment or in the wild.
  However, in modern facilities and programmes, such risks are extremely minimal, which explains the highly reduced list of negative events, of which none requiring medical intervention has ever been recorded.
  Programmes involving killer whales and pinnipeds present different challenges and risks.
  Specific References: Bossart (2007), Abollo *et al* (1998), Harper *et al* (2000)

- **Is it true that the dolphins' sonar has healing abilities?**
  It is false. Considering that a dolphin's sonar has healing abilities is equivalent to believing that a medical sonogram has healing abilities.
  Specific References: Au & Nachtigall (1997)

- **How can people be educated and/or motivated towards conservation, simply by witnessing cetaceans' presentations?**
  Personal beliefs and behaviours can (and tend to) be changed by strong emotional experiences. Whenever someone is exposed to profoundly engaging/emotional events, one's motivation (to be further engaged or dissociated) can be immediate and very powerful. When interacting, either actively (for instance, in the water) or passively (by attending a public presentation) with dolphins, many people feel the need to further increase their knowledge about the species, their habitats, the threats to their conservation, *et cetera*. Better informed and more knowledgeable visitors will more readily cooperate with *in situ* and *ex situ* conservation programmes, NGO and legislative initiatives, to name just a few. Emotion associated with knowledge has been, in the past century, an extremely powerful tool for change. And positive emotions (based on the physical characteristics of dolphins, their ecology, their biology, their ethology and their evolutionary path, for instance) are the underlying structure of any modern and ethical presentations with aquatic animals.
  As Baba Dioum stated, "In the end we will conserve only what we love. We will love only what we understand. We will understand only what we are taught" – and modern dolphinaria, aquaria and zoos are a perfect setting to apply such tool.
  Specific References: Harley *et al* (2010), Falk *et al* (2007), Kuczaj *et al* (2009), Morisaka *et al* (2010), Sweeney (2009), Falk (2006), Falk (2007), Zimmerman (2007)

- **Wouldn't it be better if people, instead of visiting zoos and dolphinaria, would watch the dolphins in the wild?**
  Yes, but only from the human perspective – it would be more "romantic" and could eventually allow for even more "appealing" photographs. But it may not be better for the cetaceans' (direct and indirect, immediate and posterior) welfare or for the environment. Visiting dolphins in the wild is, in most circumstances, an invasion of their natural habitat, with a very strong, immediate, and direct impact on the quality and safety of the habitat (physical, acoustical, chemical, *et cetera*) of all the wild specimens living therein. Most humans tend to engage in dolphin-watching operations through the use of boats; when such platforms are not sailing boats (i.e., motors, petrol and oil), such operations are creating gases and residues that tend to be introduced into the aquatic environment. Furthermore, such boats produce underwater acoustic pollution which can have a strong impact on cetacean welfare. The presence of humans and their boats can also disturb natural behaviours, such as foraging, breeding, nursing, detection of predators, *et cetera*. Finally, the presence of humans can lead to the familiarization of wild dolphins with the presence of humans - thus leading to potential negative interactions with boats (wounds from propellers, entanglements in fishing nets, collisions with keels, *et cetera*), and humans (habituation to begging for food, contamination with human bacteria and/or virus and/or fungus, *et cetera*). Overall, the human pressure on wild populations can lead to profound disturbances on a very delicate natural equilibrium - both related with the cetaceans, the other species and their interactions (including trophic relations).
  Furthermore, in most of the programmes in the wild, most visitors can only glimpse parts of the dolphins (mainly, the dorsal fin, the dorsal area and, sometimes, the flukes) and very infrequent aerial behaviours, while in a zoological setting, one can observe the entire specimens and most of the complexity of its behaviours and interactions with conspecifics.
  Specific References: Lyamin *et al* (2008), Fair & Becker (2000), Bejder *et al* (2006), Buckstaff (2004), Orams (2004), Wells & Scott (1997), Wright *et al* (2007)

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About Cetaceans and Ethics

- **Is it legal/ethical to collect dolphin from the wild?**
  Depending on the country, it can be legal. However, in the European Union, for instance, collection from the wild is not authorised (unless it is done under specific and previously approved scientific programmes).
  Furthermore, the importation of specimens collected in the wild (in countries outside the European Union) is also not allowed.
  Ethically, the collection from the wild can be seen from many perspectives, which are directly and indirectly related to philosophical, historical, religious, cultural, and even legal traditions, among many others.
  The ethical legitimacy is, generally speaking, an individual perspective and cannot be addressed in general terms.

- **Is it ethical to keep such intelligent species in zoos?**
  The ethical legitimacy is, generally speaking, an individual perspective and cannot be addressed in general terms. However, intelligence is a very complex definition and cannot be easily transferred/measured in non-human species.
  However, many professionals believe that the quality of the habitat and the associated husbandry programme are much more relevant in defining which species/specimens can be held under human care, rather than emotions or personal beliefs.
  Specific References: DeMaster & Drevenak (1988), Mercado & DeLong (2010)

- **Is it legal/ethical to keep dolphins in dolphinaria?**
  Similarly to the previous question, it depends on the country and its culture. In the European Union, for instance, it is legal in the majority of the countries (even in the United Kingdom - where no dolphinaria exist, albeit being legal).
  The ethical legitimacy is, again, and generally speaking, an individual perspective and cannot be addressed in general terms.
  Nevertheless, facilities must abide, *sine qua non*, to national and European laws and directives regarding to animal welfare – many of which have direct contributions from the zoological community.
  Specific References: Wells (2009), DeMaster & Drevenak (1988), Mercado & DeLong (2010), Kuczaj (2010)

- **Is it true that dolphins are self-aware and, thus, more closely related to humans?**
  Bottlenose dolphins are one of the very few species (there are less than 10 currently known to science) that can recognize themselves in the mirror (others being, for instance, elephants, bonobos, chimpanzees, orang-utans, gorillas, rhesus macaques, and orcas).
  As such, scientists classify them as self-aware (i.e., they know the difference between themselves and other members of the group – as such, one exists as an "individual being" - and they have conscience of their own body).
  However, so are European Magpies (*Pica pica*), a species that is self-aware; and that does not mean that these birds they are very closely related to humans or similar to humans in terms of cognition and/or processing emotion.
  Specific References: Reiss & Marino (2001)

- **Is it legal/ethical to promote interactive programmes with dolphins?**
  It depends on the country and on one's understanding of ethics and values. Should a country legally allow interactive programmes (either with horses, camels, dolphins, donkeys, whales, birds *et cetera*), and should the safety and welfare of all the participants (both human and non-human) be secured, then there should be no reason to limit such programmes.
  The programmes should be safe, educational, promote conservation (both *in situ* and *ex situ*), through a stronger emotional involvement with the species and its natural habitat, thus inducing a deeper appreciation and respect for Nature and, of course, promote enduring and positive memories that allow a change of perspective and motivation for engaging in Nature Conservation.
  Specific References: Paulos *et al* (2010), Sweeney (2009)

- **Is it legal/ethical to promote therapeutic programmes with dolphins?**
  That depends on the programme's medical protocol, the specialists' ethical and clinical goals, the legislation of the country where the programme takes place, the facility's ethical philosophy (altruism versus capitalism) and, of course, it's respect for the general welfare of the dolphins being integrated as therapeutic mediators. In short, it can (and should only) be legal and ethical.

- **How is it possible for a dolphinarium (and it is captive population of cetaceans) to contribute to conservation?**
  It can do so through many ways... It can motivate its visitors to engage in conservation programmes (both *in situ* and *ex situ*), it can participate directly (through making staff, equipment, expertise, *et cetera*, available) and indirectly (through funding campaigns and projects, communicating/educating about the different programmes, *et cetera*), it can interface/lobby with regional, national and international authorities and NGO, it can provide training to scientists and other experts who work *in situ* with endangered species of the same *taxa*, it can provide/run rehabilitation centres, it can produce/disseminate educational and/or scientific documents and resources, it can inspire children and adults to pursue careers in biology, veterinary medicine, zoology, genetics, taxonomy, *et cetera*, it can motivate and recruit volunteers, and, among other things, it can lead by example, showing its visitors how to identify, pursue and apply more modern attitudes towards non-humans and Nature.
  Furthermore, these facilities can also lead by example, by respecting and implementing modern environmental principles (and, whenever in existence, laws), opportunities and techniques, such as the ISO 14001, waste management programmes, use of sustainable materials, endorsing and application of fair trade opportunities and principles, *et cetera*.
  Specific References: Rohr *et al* (2002), Well (2009), Harley *et al* (2010), Houser *et al* (2010), Jaakkola *et al* (2010), Kuczaj *et al* (2009), Sweeney (2009)

- **Why is it that many citizens do not agree with maintaining captive populations of cetaceans?**
  Some members of the public believe that zoos do not provide sufficient welfare conditions for many species. Furthermore, many people believe that some species are "intelligent", and, as such, should not be submitted to "human domination".

Some people also still believe that training can only be done through punishment and/or food deprivation. There are also people who believe that animals under human care are not happy and/or are unable to express their full repertoire of natural behaviours. There are also those who believe that public presentations do not dignify the wild nature of some species. And many people believe that a specific complaint related to a specific facility is something that can be generalized to the entire facility and/or all similar facilities (as if a particular dishonest neighbour could determine how dishonest the remaining inhabitants of the same building are). Generalizations are not a wise tool to identify, classify and/or manage the members of any community - and the same applies to zoos. The variety of zoos exhibiting marine mammals, including dolphins, is tremendous - and judgments should be done on an individual, direct basis, using modern and scientifically recognized and legally based (and unbiased) criteria. Should these be implemented, much fewer people would continue to believe and/or promote negative and old-fashioned criticism to modern dolphinaria and their state-of-the-art facilities, teams and husbandry programmes.
Specific References: Mercado & DeLong (2010), Harley *et al* (2010), Jaakkola *et al* (2010), Kuczaj *et al* (2009)

- **Shouldn't we, as humans, be generous and release all captive cetaceans?**
"Generosity" is a human trait, based on human emotions and personal criteria. The release into the wild of dolphins kept/born under human care should be based on scientifically goals and conservation needs; it should never be done if it will have a negative impact, directly or indirectly, on the individuals being "released" or on the ecosystem. The needs and perceptions of cetaceans are inherently different from humans' - and our moral and ethical obligation to make decisions urges us to make decisions based on other criteria than emotions.
Specific References: Brill & Friedl (1993)

- **If dolphins kept under human care cannot be released, shouldn't their breeding be stopped altogether, in order to implement the phasing out of cetaceans in zoological facilities?**
Dolphins being kept under human care continue to constitute a tremendous opportunity for research on and development of new and more efficient husbandry techniques and procedures that can have a tremendous impact on wild populations (of the same species or similar). Unfortunately, the continuous and increasing pressures of mankind on our planet, on natural ecosystems and on biodiversity continues to push more and more populations and many species to the brink of extinction. As such, the expertise gathered by zoological professionals and scientists from around the world, including those working in marine mammal facilities is, and will continue to be, fundamental to the success of many conservation projects involving species such as the vaquita (*Phocoena sinus*), and many other marine mammals currently facing immediate extinction in the wild. Phasing out cetaceans from modern zoological facilities would mean that such collective knowledge and such potential new technical opportunities would lose momentum and, eventually, be lost. Furthermore, reproductive behaviours and breeding opportunities constitute a fundamental aspect of each specimens' ethology and physiology - it is, thus, of paramount importance to allow the expression of such biological needs, in order to promote/allow welfare and general health.
Specific References: Rohr *et al* (2002), Houser *et al* (2010)

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Facts, Names and Figures

- The oldest (male/female) dolphin in the world
Nellie, a bottlenose dolphin. Nelly was born at the [recently renamed] Marineland Dolphin Adventure (Florida, USA) on February 27th, 1953 and celebrated the 59th birthday in 2012.

- The general numbers of dolphins under human care (Europe vr USA)
In 2011, there are around 225 bottlenose dolphins kept under human care at European facilities, and around 900 in facilities in North-America, Canada, Bahamas and Mexico.

- The number of dolphinaria in Western Europe
In 2011, there were 31 facilities holding cetaceans under human care in Western Europe (rehabilitation centres are not included, as they are not zoological facilities).

- The number of countries with dolphinaria in Western Europe
In 2012, there were 13 European countries with dolphins in zoological facilities.

- The average reproductive age for female dolphins
On average, and depending on the species and/or population, a female bottlenose dolphin becomes sexually mature once it attains a body length of 2,3 meters, between 5 and 10 years.

- The average reproductive age for male dolphins
On average, and depending on the species and/or population, a male bottlenose dolphin becomes sexually mature once it attains a body length of 2,4-2,6 meters, between 8 and 13 years.

Relevant Websites

"Aquatic Mammals" – EAAM's Scientific Journal
www.aquaticmammalsjournal.org/

Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
www.accobams.org

Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas
www.ascobans.org

Alliance of Marine Mammal Parks and Aquariums
http://ammpa.org/

CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora
www.cites.org/

CMS - Convention on Migratory Species
www.cms.int/index.html

EAZA – European Association of Zoos and Aquaria
www.eaza.net

ECS – European Cetacean Society
www.europeancetaceansociety.eu/

IAAAM - International Association for Aquatic Animal Medicine
www.iaaam.org/

IMATA – International Marine Animal Trainers Association
www.imata.org/

IUCN Red List of Threatened Species (with the marine mammals update)
www.iucnredlist.org/
http://cmsdata.iucn.org/downloads/cetacean_table_for_website.pdf

International Whaling Commission
http://iwcoffice.org/

Underwater bioacoustics and marine mammals
www.unipv.it/cibra