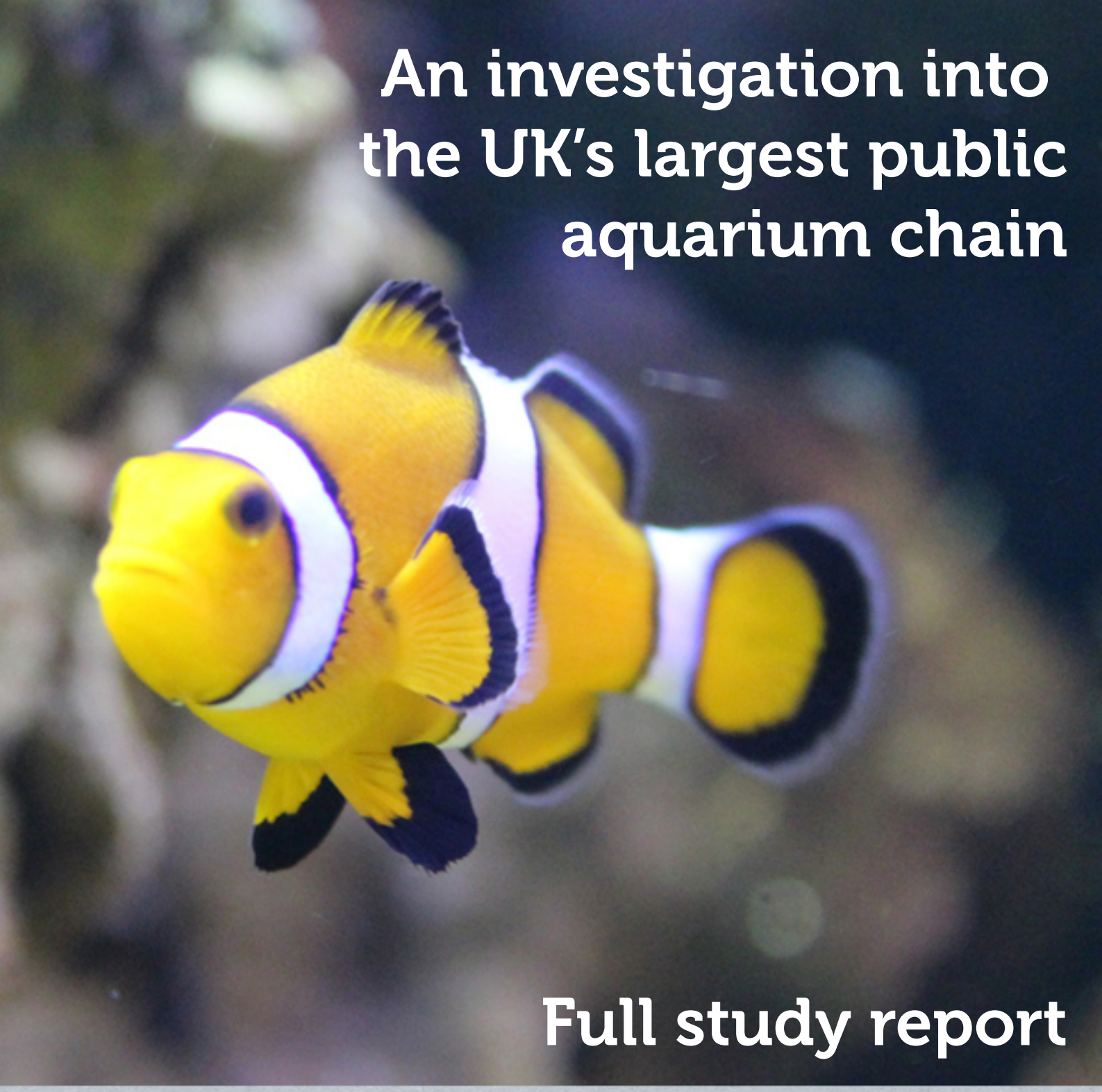
An investigation into the UK's largest public aquarium chain



Full study report

C. Palmer/CAPS 2014

CAPS
Captive Animals' Protection Society

www.captiveanimals.org

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Contents

1. INTRODUCTION

1.1 Definition of a 'Zoo'

The UK Government defines a zoo as:

'An establishment where wild animals are kept for exhibition (other than a circus or a pet shop) to which members of the public have access, with or without charge for admission, on more than seven days in any period of twelve consecutive months' (Zoo Licensing Act 1981).

Aquariums can therefore be considered zoos for aquatic animals.

1.1.1 An Introduction to Zoos and Aquariums

Displays of captive animals have existed since ancient times. The predecessor of the zoo is the menagerie, which has a long history from the ancient world to modern times. Animal burials have revealed that one of the oldest menageries was located at Hierakonpolis, Egypt at circa. 3500 B.C. (Archaeology website). The oldest zoo in existence today is Vienna Zoo, and this facility was constructed in Vienna by Emperor Franz Josef in 1752 (The Times of India website). Zoos, aquaria and marine parks were, until recently, generally accepted forms of entertainment with little thought given to their purpose, or the welfare of the animals in these facilities (Marino *et al.,* 2010).

Ostensibly, zoos provide an opportunity for people to get close to animals. Yet there is more to zoos and aquariums than meets the eye. Exactly what are we learning about other animals in these facilities? And what is it like for them, living in confinement?

There are thousands of zoos around the world, with hundreds of millions of visitors each year. There is, undoubtedly, a strong motivation amongst people to view animals in close proximity. Most of the ethical concerns that result from the incarceration of wild animals are countered by the zoo industry; an industry that perpetrates the myth that people need to get up close to animals to learn about them and form a desire to protect them in the wild. The experience of interacting with other animals *should* enhance our understanding of our interconnected, mutually shared environment, yet the very nature of zoos curb any such insights. In fact, the lesson that zoos teach us about wild animals and their environment is a dangerous one: that non-human animals can justifiably be confined by us, primarily for our entertainment.

Zoo legislation, accreditation schemes and bodies, such as the World Association for Zoos and Aquariums (WAZA) and British and Irish Association of Zoos and Aquariums (BIAZA), do not question the existence of zoos. WAZA and BIAZA are, in fact, composed of zoological institutions, and thus act as something akin to trade representatives for the industry. Legislation, accreditation schemes and bodies, rather, seek to regulate the facilities to ensure they maintain so-called standards, and keep up with the times, with regards to public opinion. The zoo industry also undoubtedly has much input and influence over the legislation.

It is therefore animal protection organisations, rather than the governments and regulating bodies, which have revealed zoos and aquaria to be inherently detrimental to animal welfare. Sadly, very little meaningful legal protection exists for animals housed in zoos and aquariums - penalties for violations of legislation are minor, and the agencies that perform zoo inspections are extremely understaffed relative to the number of facilities requiring examination. A study published in 2012 by Captive Animals Protection Society (CAPS) revealed over 1,000 instances of breach of legal obligations by zoos in England, and an almost complete absence of enforcement action between 2006 and 2011. Nearly 90% of zoos were found to be non-

compliant with one or more aspect of the Council Directive 1999/22/EC ('the EC Zoos Directive') during the 2006 and 2011 period (CAPS, 2012). A 2014 study by Born Free Foundation (BFF) further concluded that the inspections required by UK law are failing to ensure the welfare of animals in zoos (BFF website; The Times website).

In modern times, awareness of the natural world, animal welfare, and environmental issues has come to the forefront. With this has created the need for captive animal facilities to reinvent themselves as centres working to educate on and conserve animal species. They have needed to portray themselves as 'Noah's Arks' for animals at threat in nature. It is a thinly-veiled façade however, and zoos continue to exist predominantly as commercial operations profiting from the display of animals for public entertainment. A confined animal is denied freedom and the ability to make life decisions that are so necessary for its well-being. Some zoos offer 'close encounters' with animals, where visitors can even touch animals and have their photograph taken with them. These encounters are dressed up as being 'educational', yet how can they be when the animal is confined in such an unnatural environment? Many animals behave unnaturally in zoos and little is learnt from their incarceration.

Public aquariums are more recent phenomena than zoos, though fish have been held captive for centuries, particularly in Asia (Kisling, 2001). In 1853, the Zoological Society of London (ZSL), which operates London Zoo and Whipsnade Zoo, opened the first public aquarium in history at its Regent's Park site and, by 1920, there were over 45 major public aquaria in the world, drawing in around 10 million visitors annually (Koob, 2001). A 1999 survey revealed that, during 1998, Europe's most-visited public aquaria attracted 17,615,000 visitors, thus almost doubling the world's figures for 80 years earlier.

One of the few aquariums which has retained many of its original features is Brighton Sea Life, though generally the past two decades have seen a great modernisation of aquariums, and the opening of many large, spectacular aquariums (and chains operating public aquaria) around the world. Since the beginnings of public aquaria, major investments have meant that the facilities are larger than ever before, housing thousands of species and attracting many more visitors. Almost every major seaside town in Britain now hosts an aquarium. Millions of aquatic animals are on public display at these facilities. Aquaria strive to exhibit more unusual, or larger, animals than their competitors, and offer the most stimulating 'close encounters' to their visitors.

Unlike with traditional zoos, the challenging of aquariums did not come about until very recently. With the exception of marine mammals such as whale and dolphin species, aquatic animals, such as fish, have been relatively ignored with regards to welfare and conservation. Nowadays however, much research is carried out on fish sentience, pain, intelligence and welfare. This research, and the heightened awareness and interest in the rights of animals, has invoked many questions about the aquarium industry.

There is a growing opposition to public aquariums, for example the campaign against the recently opened £65 million GBP Sea Life aquarium at Old Trafford in Manchester (Mancunian Matters website).

Similar to zoos, the aquarium industry has responded to concerns by rebranding themselves as 'Bioparcs' and 'Sanctuaries'. Many aquariums have replaced more traditional exhibits with naturalistic, ecosystem and landscape immersion exhibits. They have also worked hard to portray the image that they are facilities with an important role to play in the conservation of endangered aquatic species.

The notion that aquariums are principal agents for species preservation and public education is somewhat difficult to swallow considering that the aquarium trade (along with fishing) is one of the major threats to many of the displayed species. Whilst it holds true that the majority of fish in oceans around the world are caught for display in home aquaria, public aquariums also receive large numbers of wild-caught fish, and their display in these facilities fuels peoples' desire to house fish in their homes. It is widely acknowledged that public aquariums support the global aquatic pet trade industry by acquiring many of the same species through the same sources. In other words, many fish obtained for these facilities are acquired from the

same suppliers that provision the home aquaria trade (Tlusty *et al.,* 2013). This is evidenced by the 54.3% overlap between marine species on exhibit at public aquariums and those species imported into the United States (Rhyne *et al.,* 2012).

Given the overlap in diversity and acquisition, public aquariums are inextricably linked to the home aquaria trade (Andrews, 1990), and the demise of many, many aquatic species.

Predictably, public aquaria do not respond to the glaringly obvious role they and the fishing industry play in this demise by backing efforts to ban fish-keeping and fishing. Instead they promote the 'sustainable use' of these animals.

Aquaria, like zoos, feed the notion that it is ethical to hold wild animals in captivity for entertainment purposes. By making captivity appear normal, necessary, and ethically sound, zoos and aquariums mask the cruelty behind the confinement. Even in zoos where an effort by staff is made to provide nutritious food, social contact, some kind of 'natural setting', and environmental enrichment, the animals suffer multiple deprivations because it is extremely difficult, if not impossible in some cases, to replicate the richness of a natural life in freedom.

1.1.2 Zoo Legislation

The EC Zoos Directive, relating to the keeping of wild animals in zoos, was adopted in 1999 and came into force in April 2002. Since then, all countries that are Members of the European Union have been obliged to transpose the requirements of the EC Directive into national legislation and, from April 2005 (or 2007, in the case of Bulgaria and Romania), fully implement and enforce its requirements.

The EC Zoos Directive was transposed into national law in the UK by means of The Zoo Licensing Act 1981 (Amendment) (England and Wales) Regulations 2002 (Statutory Instrument No.3080 of 11.12.2002); in Wales by means of The Zoo Licensing Act 1981 (Amendment) (Wales) Regulations 2003 (Standing Order 11.5); Scotland, The Zoo Licensing Act 1981 (Amendment) (Scotland) Regulations 2003 (Statutory Instrument No.174/2003); and Northern Ireland, The Zoo Licensing Regulations (Northern Ireland) 2003 (Statutory Rules No.115/2003).

The Zoo Licensing Act 1981 (as amended) requires that all zoos are licensed and inspected. It incorporates specific conservation measures, for example, and sets out requirements for the appropriate keeping and care of animals which are consistent with the EC Zoos Directive.

Implementation of The Zoo Licensing Act 1981 is the responsibility of the Department of Environment, Food and Rural Affairs (DEFRA); the Welsh Assembly Government in Wales; and the Scottish Government in Scotland. However, the overall responsibility for the licensing and inspection of zoos in the UK falls on the Local Authority for the area within which the whole or the major part of the zoo is situated.

The Animal Welfare Act 2006 is another piece of legislation which supposedly sets out to ensure a 'Duty of Care' regarding animals (National Archives website). Under the Animal Welfare Act, a fish's needs include:

- The need of a suitable home and environment
- The need for a suitable diet
- The need to exhibit normal (appropriate) behaviour
- The need to be with, or apart from, other fish
- To be protected from pain, suffering, injury and disease

Unfortunately, many animals kept in aquariums, such as octopuses and crustaceans, are not protected under the Animal Welfare Act and so zoos theoretically have no duty of care to them under this particular statute.

1.1.3 Standards of Modern Zoo Practice

The Secretary of State's Standards of Modern Zoo Practice (SSSMZP) were developed using powers granted to the Secretary of State under s. 9 of the Zoo Licensing Act 1981. The Local Authority and the zoo operator must be aware of and apply SSSMZP, which include the following:

'Where relevant species are held, a zoo must be an active participant in recognised species management programmes' (Section 7.6, SSSMZP).

'Zoos should be able to demonstrate their conservation measures, including research if undertaken. Areas to be examined will include overall conservation policy, and how this relates to the World Zoo and Aquarium Conservation Strategy, and type and level of input into international conservation programmes' (Section 7.7, SSSMZP).

Zoos must also apply the following specifications:

'A zoo must have a written education strategy and an active education programme' (Section 7.11, SSSMZP).

'Suitable facilities, commensurate to the size of the zoo, should be available for education purposes' (Section 7.12, SSSMZP).

'Accurate information about the species exhibited must be available. Generally, this should include, as a minimum, the species name (both scientific and common), its natural habitat, some biological characteristics and details of its conservation status' (Section 7.13, SSSMZP).

Regarding the welfare of animals in zoos, under the Zoo Licensing Act 1981, zoos must accommodate their animals in conditions which aim to satisfy the biological and conservation requirements of the species to which they belong, including:-

(i) providing each animal with an environment well adapted to meet the physical, psychological and social needs of the species to which it belongs; and

(ii) providing a high standard of animal husbandry with a developed programme of preventative and curative veterinary care and nutrition' (Section 1A(c), ZLA).

1.1.4 Licensing

Initially, licences are granted for four years, and they are then renewable every six years. An annual inspection is undertaken by a local authority inspector and the Act also requires that, at least twice during the term of the licence, an inspection is carried out by an inspector (or inspectors, dependent on the size of the zoo and the number of animals housed in it) appointed for that purpose by the Secretary of State. For example, a licence inspection was carried out in April 2013 at the newly opened Manchester Sea Life. At the time of inspection however, no animals had been delivered (DEFRA, 2013). Whilst it is standard practice to carry out an inspection prior to opening, with inspectors stating whether they think the zoo will meet

standards, the absence of animals in the aquarium means that no assessment can be made of animal welfare during this initial inspection.

1.2 Sea Life Aquariums

Aquariums, such as the global brand, Sea Life Centres, exist as profit-driven entertainment ventures. According to Sea Life however, the company has 'built a reputation not just on creating exciting and informative marine attractions, but most importantly doing this responsibly and ethically' (Mancunian Matters website).

Sea Life is the world's largest global aquarium chain. It is owned by the British company, Merlin Entertainments, which is the world's second largest attraction operator. Merlin's origin dates back to 1979 when the first Sea Life aquarium was opened in Oban, Scotland. The company's 'Midway sites' are marketed primarily under five global brand names: Sea Life, Madame Tussauds, Dungeons, Legoland Discovery Centres and the Eye.

During 2012, Merlin acquired Living and Leisure Australia Group (LLA) which owns and operates leisure attractions in the Asia-Pacific region, as well as the Dubai Aquarium through a management contract (Merlin Entertainments Annual Report, 2012).

In late 2013 there were 51 Sea Life aquariums across the world, and others were under construction. The company states: 'We've spent the last 30 years developing our attractions into the spectacular and educational experiences that you would expect from the world's largest aquarium brand' (Sea Life website).

With over 54 million visitors at its attractions during 2012 alone, Merlin is second only to the Walt Disney Company in terms of visitor admissions. In December 2012, Merlin operated over 90 attractions in 21 countries across four continents. In the same year, Merlin made its first entry into the rapidly expanding Asian aquarium market.

An example of a Merlin attraction which brings in millions of visitors a year is London Sea Life. This aquarium receives over ten million visitors on a yearly basis. Footfall at Manchester Sea Life alone is expected to be in excess of 300,000 visitors per year (DEFRA, 2013).

Merlin's 2012 revenue was around £1,074 million GBP, and the Midway attractions (including Sea Life), brought in £458 million GBP (44% of Merlin's annual income) to the company. The sheer scale of revenue generated by visitor attractions such as Sea Life is astronomical. During March 2012, Merlin also acquired the 'Cotswold Village Green LTD' – a shop adjacent to Sea Life London - for 1 million GBP in cash, so that the company could expand its retail offerings (Merlin Entertainments 2012 Annual Report).

2. METHODS

2.1 Data Collection

All of the 12 UK-based Sea Life aquariums, including the two Sea Life seal sanctuaries located in Scotland and Cornwall (Oban and Gweek respectively), were visited as part of a six-month investigation carried out by CAPS between July 2013 and February 2014. The field work was carried out between July and October 2013.

Two further visits were made - to Bray Sea Life Centre in the Republic of Ireland and to the Chang Feng Sea Life Centre in Shanghai, China – after the main investigative work and analysis had been carried out.

Findings from these two centres are therefore not included in the analysis of the study, but photographs and footage taken from these sites have been included in this report and the accompanying website.

Attractions that feature Sea Life-owned tanks (such as Chessington World of Adventures) were not included in the investigation.

The Sea Life aquariums visited, their general locations, and dates and times of visits are listed in Table 1. In total, over 45.5 hours of field work were carried out in the aquaria, and the average time spent in each of the facilities was around 3.5 hours.

Two main methods were used to obtain the findings - scientific research and investigative journalism. Visits to Sea Life aquariums were carried out incognito by the CAPS investigator who posed both as a normal visitor and a student when interviewing Sea Life staff. Interviews with both 'Entertainers' and 'Animal Care' staff were recorded in their entirety inside the aquariums. Photographs and video footage were obtained of exhibits, signage, animals present, security issues, and the behaviour of visitors during visits. Descriptive notes were made at each aquarium. The exhibits at Sea Life were recorded in the order the investigator came across them. Analysis of footage, stills and notes was carried out following the visits. 'Behind-the-scenes' Sea Life tours were attended and recorded where possible, as well as talks, animal feeds, handling demonstrations, and close encounters at rock pool areas. Literature, guides and maps were collected from aquariums, and additional information was obtained by carrying out general bibliographic research and from the internet, particularly using Sea Life's own websites.

Hand-written notes illustrated the types and designs of exhibits, and numbers and types of animals observed. Marine mammals were present at some of Sea Life aquariums (e.g. Penguins and Seals), however the investigation focused solely on fish, reptiles, amphibians and invertebrates.

Name	County	Country	Date	Duration (hr)
Oban	Argyll	Scotland	25/10/03	2
Great Yarmouth	Norfolk	England	18/07/13	5.5
Hunstanton	Norfolk	England	22/07/13	3.5
London	London	England	31/07/13	5.5
Brighton	East Sussex	England	06/08/13	4
Gweek	Cornwall	England	09/08/13	2
Manchester	Greater Manchester	England	31/08/13	4
Blackpool	Lancashire	England	01/09/13	6.5
Scarborough	North Yorkshire	England	03/09/13	2.5
Weymouth	Norfolk	England	08/10/13	4.5
Birmingham	West Midlands	England	11/10/13	3
Loch Lomond	Dunbartonshire	Scotland	24/10/13	2.5

Table 1: Sea Life aquariums visited during 2013-2014 CAPS investigation

2.2 Data Analysis

The data was analysed following visits. Calculations were limited to descriptive statistics, for example rank, percentages and other basic calculations.

The time, type of animal (based on available information signage), conservation status on signage, exhibit type, animal behaviour, signs of ill health, and visitor behaviour were logged from the video tapes. Microsoft Excel was used to generate data spreadsheets, and transcripts of every conversation with Sea Life staff were produced, along with the date, time and location of conversation.

Bibliographic research was carried out to determine the correct taxa names to ensure that even where the signage was incorrect, CAPS could still be able to establish what taxa were present at the aquariums. Where signage was absent, this was also logged onto timesheets.

Images were logged by date and aquarium, and used in this report. Still captures were taken from the video footage to illustrate further the CAPS findings.

This six-month investigation by CAPS follows on from a study that was carried out by the same organisation in 2004 into public aquaria in the UK. It aims to reveal the truth behind the many claims made by the company, Sea Life Centres.

3. SEA LIFE AND DOLPHINARIUMS

Sea Life states on its website: '*Sea Life believes it is wrong to keep whales and dolphins in captivity. No matter how spacious, no captive facility can ever provide such far-ranging, highly social and highly intelligent animals with the stimulation they need for a good quality of life*' (Sea Life website).

As will be explained, this is a somewhat confusing statement for a company which still hosts daily circus-style cetacean shows in one of its centres to make.

In November 2006, Merlin Entertainments, owner of Sea Life Centres, announced its acquisition of the Italian theme park 'Gardaland' which operated one of Europe's largest captive dolphin shows (Merlin Entertainments website) and housed six dolphins at the time – 'Tango' 'Nau', 'Ted', 'Betty', 'Robin' and 'Mia' (Parchi website; Gardaland website).

Upon discovery of this fact, UK based charity, Marine Connection, working for the protection and welfare of dolphins and whales worldwide, immediately raised concerns with Merlin – a company which had, in the past, publicly claimed to have a strict policy that no captive cetaceans were to be held at any of its facilities (Marine Connection website). According to Marine Connection, Merlin responded by stating that the welfare of dolphins at Gardaland would be the 'overriding consideration governing all decisions on their behalf' (Marine Connection website).

Perhaps unsurprisingly, the dolphin shows at the Gardaland marine park are not mentioned anywhere on Sea Life websites.

One of the organisations who have partnered with, and continues to partner with Sea Life is Whale and Dolphin Conservation (WDC). WDC published a statement defending their relationship with Sea Life and Sea Life's practices with regards to captive dolphins: 'Sea Life opposes the captivity of whales and dolphins and accepts the arguments that WDC puts forward as to why they are unsuitable for captivity. WDC is confident that the declared position of Sea Life, and Merlin Entertainments, with respect to whales and dolphins (cetaceans) is fully compatible with WDC' own opposition to the keeping of cetaceans in captivity' (WDC website).

It has been demonstrated time and again that no zoo, aquarium or other facility that exploits dolphins and other cetaceans for the entertainment of visitors can provide for these animals' complex behavioural needs and additionally, two dolphins at Gardaland - 'Betty' and 'Robin', were captured from the ocean (Cetabase website).

Stress, behavioural abnormalities, illness and premature death are common in captive dolphins, and are caused by the artificial living conditions of a tank where the animals are forced to live in chemically-treated water, held in artificial social groups, and denied the opportunity to forage (instead the animals are fed a restricted diet, supplemented with pills e.g. Whale and Dolphin Conservation, 2011). Dolphins become weak in these conditions and can die from infection. In fact, several dolphins have died at Gardaland, the most recent being 'Tango' who died in 2008.

Following the acquisition of Gardaland, in 2007 Merlin Entertainments went on to acquire the Tussauds Group whose facilities include Heide Park in Germany. Another park which housed dolphins (Merlin Entertainments website). Merlin advised Marine Connection that the dolphin residing here, 'Arnie', was to be rehouse at what is now the 'Dolphin Lagoon' in Nurnberg Zoo (Nurnberg Zoo website). When Merlin acquired Heide Park however, 'Arnie' was still present and performed throughout the 2007 and 2008 season before being transported to Nurnberg Zoo (Nurnberg Zoo website).

In 2009, the Blackstone Group purchased over 50% of shares in Merlin. The Blackstone Group also holds 25% shares in the notorious SeaWorld Parks/Busch Entertainment in the United States. As at February 2014, Merlin's largest stakeholder is Blackstone (e.g. Financial Times website). This is ironic considering Sea World's captive orca and dolphin stadiums.

According to Marine Connection, in response to criticism regarding the hypocrisy of Sea Life's links with captive dolphin parks, in December 2012 Merlin released a statement claiming that the company was planning to construct a 'sanctuary' to house the six dolphins at both Gardaland and Heide Park when they acquired the parks (Marine Connection website).

Merlin portrayed the sanctuary as being a novel 'retirement' facility for the animals. By this time however, 'Arnie' had been moved to Nuremberg Zoo, and the Gardaland dolphins had been shifted to another dolphinarium in Italy – Aquarium of Genova. The Aquarium of Genova already housed dolphins and, according to the park's website (and media kit), a new 'Cetaceans Pavilion' was opened in July 2013 to house all of the dolphins (Aquarium of Genova press kit), plus more. The main 'exhibition tank' in the Pavilion measures just 580 square metres in area and is only seven metres in depth in the deepest area of the pool (Aquarium of Genova website; Marine Connection website). The marine park makes the spurious claim that this area is large enough to house ten dolphins.

The same year that Merlin announced its plans to construct a 'sanctuary' for 'retired' performing dolphins, the company acquired the LLA, and therefore Changfeng Ocean World which housed Beluga whales.

Photo 1: Beluga whales perform daily at the Sea Life Centre in Shanghai

On one hand Merlin Entertainments, through Sea Life Centres, publicly denounces dolphinariums and claims to be planning to construct a sanctuary, and on the other hand, the company is purchasing parks with performing cetaceans. Plus Merlin is owned by the same company which owns the orca stadiums of Sea World in the United States.

In 2012, Merlin's Display Development Director, Rob Hicks, was quoted in an article for 'theming and design specialists' of the leisure industry stating: "*In the short term, we will for example completely cease or*

review [Beluga] 'shows' involving such creatures to ensure that in future any presentations are simply designed to highlight the creatures' more natural behaviour and instincts, and are educational" (Blooloop.com website). Yet from then until March 2014, Belugas have continued to perform tricks for visitors in shows at Changfeng Ocean World, with no indication that Merlin plans to bring them to an end.

On 15th June 2013, there was a special feature in the Shanghai Daily newspaper on the Beluga show at Changfeng Ocean World, and the 'purchase' of the park by the 'Sea Life brand' (C6 Life, Shanghai Daily website). It was reported that the Belugas 'swim around and jump out of the water at the commands of their trainers' (C6 Life).

Bizarrely, despite the fact that Merlin displays Beluga whales at its own facility, Changfeng Ocean World, and its major shareholder is the Blackstone Group, it was reported in the Orlando Sentinel in February 2014 that the 'Merlin Entertainments Group's Sea Life Centres' publicly lodged opposition to the export of 18 wild-caught Beluga whales to Sea World aquariums in the United States (Orlando Sentinel website).

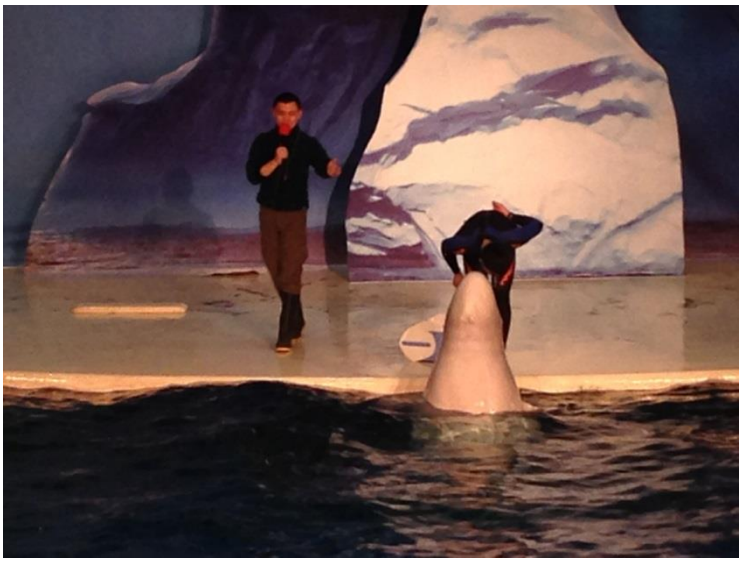


Photo 2: The beluga whale show March 2014

In 2013, Merlins ownership of Changfeng Ocean World was again referred to in the media when Rob Hicks of Merlin Entertainments was quoted in an article about the park (China Daily USA website).

In October 2013, Merlin Entertainment's Managing Director of Midway Attractions was quoted in another China Daily article which reported that 'in China, aside from the three Madam Tussauds, Merlin Entertainments also operates Ocean World aquarium in Shanghai' (China Daily USA website). The Director stated in the article that the localisation of entertainment venues is a key strategy of Merlin Entertainments' China expansion and "*while our attractions are all based on the same proven global concepts, each one is tailored to ensure it is also very Chinese in its very nature and appeal*" (China Daily USA website). The October 2013 article states also that 'more than 6 million overseas tourists and many more domestic ones have visited Changfeng. It offers performances by polar beluga whales, California sea lions, dolphins and other marine mammals' (China Daily USA website).

Photo 3: The whales are the major selling point of the Shanghai Centre

In December 2013, another article about Changfeng Ocean World quoted Rob Hicks, and it was revealed that the Beluga pavilion can seat up to 2000 visitors (MMA Melee website).

Additionally, on Merlin's own website, the Changfeng Ocean World is listed under 'Sea Lifes and sanctuaries', along with the Dubai Aquarium and Underwater World – an aquarium allocated in a shopping mall which controversially displayed Whale sharks (*Rhincodon typus*) (Merlin Entertainments website). Sea Life fails to mention this on its own websites.

The transfer of dolphins away from Gardaland to Aquarium of Genova by Merlin is likely to have taken place to silence the criticism that was directed at them for not constructing this promised 'sanctuary' for 'retired' dolphins. As at March 2014, there exists no evidence that Merlin will construct a dolphin sanctuary. Direct queries raised with senior staff at Merlin Entertainments as to the progress of the sanctuary plans have gone unanswered.

Clearly, there are strong links between Sea Life and the inhumane confinement of dolphins and whales for public entertainment. Whilst the distribution of revenue is not publicly available, visitors to Sea Life aquariums in the UK may well unwittingly be funding the incarceration and exploitation of dolphins (and other cetaceans such as Beluga whales) in overseas marine parks.

The ownership of Sea Life by Merlin – a company that has no scruples about funding dolphin parks and operating cetacean shows – also means that it is also not inconceivable that dolphinariums will return to the UK at some point in the future.

4. FROM OCEAN TO TANK

The term 'fish' covers a wide and very disparate group of vertebrates. In teleosts alone, which are a group of bony fish, there are more than 20,000 living species which inhabit diverse aquatic environments and thus possess a vast range of specific adaptations and variations (Kittilsen, 2013).

The fish 'pet' trade is a large, biodiverse, global industry. The trade in marine, so-called 'ornamental' animals alone has also grown dramatically, with over 2 million people worldwide owning aquaria. This has led to at least 10 million invertebrates (excluding corals) alone being collected per year (Green, 2003; Wabnitz *et al.,* 2003; Rhyne *et al.,* 2009), though recent analysis of traded polychaetes would suggest that this number is likely to be a 10–20-fold underestimate (Murray *et al.,* 2012).

In at least 40 countries throughout the tropics, animals destined for aquariums are plucked from their home reefs (Yale Environment 360 website). As at 2011, coral reefs in Indonesia and the Philippines were the most at risk (consisting of around 95% of existing reefs), due to the use of destructive fishing techniques in these countries (Burke, 2011).

Since the 1990s, most aquarium fish have originated from South-East Asia (Lecchini *et al.,* 2006). Literally millions of fish are collected illegally from coral reefs every year using cyanide, with over 500 metric tons of cyanide being used annually for this practice on Philippine reefs alone (deRivera *et al.,* 2007; Sadovy *et al.,* 2003; Rubec *et al.,* 2001). It cannot be denied that the removal of fish for the aquarium industry is having a negative effect on the abundance and diversity of fish on the world's coral reefs. These reef habitats already face an increasing number of anthropogenic threats, and the burgeoning demand for live fishes and invertebrates puts extremely heavy pressures on these fragile tropical ecosystems.

Marine fish, caught both legally and illegally, are transported mainly to the United States (where in fact more than half the captured ocean animals are exported to), the European Union, and Japan to supply the marine aquarium trade (Wabnitz *et al.,* 2003). There are an estimated 192 million individual fish imported into the United States alone yearly (Barker and Barker, 2009).

Globally, the trade may be worth up to 330 million USD per year, according to a report from the United Nations Environment Program (Wabnitz *et al.*, 2003), but whilst this multi-million dollar industry involving the harvest, sale and use of live animals for display in aquaria profits large companies, fishermen typically sell fish for a very small price, before the animal is passed to an often complicated chain of dealers and middlemen (Yale Environment 360 website).

Zoo and aquarium staff *should* be familiar with the substantial issues, develop greater expertise, and become better integrated in wider regional and global initiatives in freshwater-fish conservation and sustainability as freshwater fishes may now be the most threatened group of vertebrates or chordates, based on the > 5000 species (< 40% of total) so far assessed by the International Union for Conservation of Nature (IUCN) (Reid *et al.,* 2013).

4.1 Origin of Animals at Sea Life

The term 'captive-bred' - as outlined by the Marine Breeding Initiative (MBI) - can be defined as 'captive-bred fishes who were spawned and raised in tanks or other captive facilities on land' (MBI website).

Without internal data from Sea Life, it is not possible to establish exactly which fish at Sea Life aquariums were wild-caught and which were captive-bred. Bibliographic research and an analysis of historical industry trends and statistics however can give a good idea which taxa came from the wild, and which had been born in captivity. The 2004 CAPS study estimated that the vast majority (79%) of animals housed in UK public aquaria were wild-caught. It was also revealed that 45% of UK public aquaria visited housed 90% or more wild-caught individual animals, whilst in 87% of the aquaria, half or more of the animals are wild-caught. 16% of public aquaria *only* housed wild-caught animals.

Whilst companies such as Sea Life do not publicise how many of their animals are wild-caught, a number of assumptions can be made. For example, if bibliographic research reveals that animals belong to taxa which has rarely (if ever) successfully bred in captivity, then it is likely these animals have been wild-caught. For example, as at October 2013, only a handful of aquariums had successfully bred Weedy sea dragons in captivity and no aquarium had yet bred Leafy sea dragons. Therefore the Leafy sea dragons observed in Sea Life aquariums are likely to have been wild-caught.

Public aquaria, including Sea Life, often publicise the fact they have 'successful breeding programmes', however there is a distinct lack of information regarding the captive-breeding of individual species in the facilities, which indicates that these 'successful breeding programmes' are very few and far between.

Most marine species (corals, other invertebrates and fish) are uneconomical to produce in comparison to the collection of their wild-caught counterparts so again this would indicate a high chance that these species are wild-caught. It has been estimated that only 1-10% of marine 'ornamental' species in trade are captive-bred (Wabnitz *et al.,* 2003), and the rest are wild-caught. At the end of the 1990s, only 25 species were cultured for commercial purposes but the vast majority (98%) were taken from the wild (Moe, 1999).

By contrast, approximately 90% of freshwater fish have been reported to be captive-bred (Andrews, 1990; Olivier, 2001; Tlusty, 2002) with farms in countries such as Singapore, Malaysia, Japan, Israel and the United States.

The practice of captive-breeding marine fish greatly lags behind the farming of freshwater tropicals because of the biological and economic constraints associated with culturing most species (Reef Culture Technologies website). Many species of fish simply cannot be raised yet as we do not have a great enough understanding of their requirements and life cycles, others can be raised but as yet have only been done so on small scale experimental operations. Even those that can be raised in large numbers can prove uneconomical due to the huge amounts of time and money that need to be invested to do so.

It has been stated that, as at 2011, only 6% of over 2,000 traded marine aquarium fish and shrimp species are captive-bred commercially (Reef Culture Technologies website). Species which are regularly bred on a commercial scale include clownfish, dottybacks, seahorses, some species of goby and several species of shrimp (Reef Builders website). Companies, such as 'Reef Culture Technologies' in Hawaii announced the successful rearing of several species of marine fish which were not spawned in aquaria, but whose eggs

were collected from the Ocean, though it has been reported that most of the species reared by Reef Culture Technologies have already been bred and raised in captivity (Reef Builders website).

4.2 Display of Wild-Caught Animals

4.2.1 Sea Lies

The vast majority of public aquaria have been demonstrated to acquire animals from the wild themselves, or purchase animals from dealers (Wetzer and O'Brian, 1995) and, in 2006, it was estimated that around 95% of fish exploited for the aquarium industry are wild-caught (Lecchini *et al.,* 2006). The aquarium industry differs from the zoo industry in its reliance on wild-caught animals for display purposes. In the words of Joao Falcato, CEO of Ocean de Lisboa, one of the largest stand-alone aquariums in Europe, in the 2014 quarterly publication of EAZA: "*Aquariums still rely on nature as a source of animals where zoos largely do not*" (Zooaquaria website).

The sustainability of this industry is frequently questioned and it is often involved in controversy (Olivotto *et al.,* 2011). The farming of marine 'ornamental' species is commonly cited as the solution to the problem of sustainability, yet it has been revealed to be part of the problem. For example, during the harvesting of wild post-larvae of fish and marine invertebrates for grow-out in captivity (Hair *et al.,* 2004; Lecchini *et al.,* 2006; Bell *et al.,* 2009) there is a large by-catch of post-larvae from species with no value for the aquarium trade, and negative effects of removing post-larvae from the ecosystem (Bell *et al.,* 2009).

Even when aquariums claim that animals they house are 'captive-bred', it is extremely difficult to distinguish reliably between captive-bred, captive-raised, and wild marine fish. The implementation of 'Ecocertification' programs (such as those by the Marine Aquarium Council) are a false safety net, as the traceability of marine 'ornamentals' along the chain of custody is not reliable (Shuman *et al.* 2004).

Perhaps one of the reasons that no Sea Life aquariums are members of the European Association of Zoos and Aquaria (EAZA) is that the 2004 Code of Practice states: 'All members will endeavor to ensure that animals acquired are born in captivity' (EAZA website). The vast majority of UK aquariums in fact fail to meet this requirement – as mentioned in a previous chapter, the 2004 CAPS study estimated that a massive 79% of animals in UK aquariums were wild-caught (CAPS, 2004).

Aquariums are often secretive about the origin of the animals they display, presumably so that they can refute the accusation that they contribute to the demise of wild fish populations. Sea Life is no exception. In 2013, CAPS repeatedly requested information from the company regarding the origin of the animals housed at the UK centres. Eventually, Sea Life admitted that animals are taken from the wild to stock Sea Life aquariums but no figure was put on how many, or what percentage of the animals held in the aquariums have been taken from their wild homes to spend their lives in tanks (CAPS website). During the 2004 study however, previously unpublished research by CAPS reveals that in fact Oban Sea Life housed 85% wild-caught animals, Great Yarmouth Sea Life, 76%, Birmingham Sea Life, 76%, Weymouth Sea Life, 66%, and Blackpool, 58% (CAPS, 2004). Overall, the vast majority of animals housed in UK public aquaria were wild-caught, and, given the status of the industry at present, and the sheer volume of animals still being caught for the aquarium trade, it is unlikely that these percentages have decreased significantly since then.

Having established that Sea Life do take animals from the sea, to determine whether Sea Life is providing the correct information to their visitors regarding the acquisition of animals, the CAPS investigator asked questions at each Sea Life centre visited about the origin of the animals housed there. The results, along with other findings of this investigation, provide a shocking insight into the lies and misinformation

provided by Sea Life. At only 58% of Sea Life aquariums visited, did staff inform the CAPS investigator that animals are wild-caught, although they usually implied it was when there were no other options available, suggesting that it wasn't a regular occurrence. There is no reason to assume this is not the same information that they provide to the other visitors.

It is not known whether both Sea Life 'Animal Care' staff or 'Entertainers' set out to deliberately misinform visitors, or whether they are misinformed by their superiors. What is apparent however is that visitors leave the aquariums with very little accurate or meaningful information about the animals they have just observed.

Staff at Weymouth Sea Life do admit to displaying wild animals, stating that they come "*from different parts of the world*". Wild-capture is described at Blackpool Sea Life as "*part of the industry ... unfortunately*". At Gweek Sea Life and Loch Lomond Sea Life, it is claimed by staff that the only wild-caught animals present are rock pool animals (i.e. animals, mainly crabs and sea anemones, who are housed in small pools, tanks and buckets in areas where visitors can touch them).

Photo 4: Visitors are encouraged to touch wild-caught animals

Aquariums with staff who misinformed the CAPS investigator by denying any animals are wild-caught, include London Sea Life, where an evidently experienced and knowledgeable senior staff member taking visitors on 'Behind-The-Scenes' tours responded with: "*As far as I know we don't*". It seemed bizarre that this member of staff, who was also giving talks at the rock pool and answering other questions about the animals, would not know where the animals came from. Similarly, at Weymouth Sea Life, an Aquarist pleaded ignorance, stating: "*That's beyond me. That's beyond me*" when asked the same question, though followed this with "*the majority of sharks are captive-bred*" (which implies that the rest must be ocean-caught), and "*where we can, we don't take them from the wild*".

At other Sea Life aquariums, staff contradicted each other with their responses – some staff claimed that no animals are taken from the ocean, and others admitted they are. One 'Entertainer' at Great Yarmouth Sea Life went further than a flat denial to state: "*We never get any animal - from the shrimps to the sharks - never get any animal from the sea because we find it cruel. It's part of our company policy not to*" and bizarrely went on state: "*We also don't keep wild sharks, um sorry, intelligent sharks either. So all sharks have a higher intelligence but the really, really intelligent ones we won't keep*". In a different area of the same aquarium, an area where Blacktip reef sharks (*Carcharhinus melanopterus*), Nurse sharks (*Ginglymostoma cirratum*) and Zebra sharks (*Stegostoma fasciatum*) are housed, a staff member informed the CAPS investigator that some of these animals *will* have been caught in the wild. Another member of staff at Great Yarmouth Sea Life asked the investigator to "*Contact the Head Office for the official policy*" due to it being "*a sensitive subject and some people get quite irate about it*".

At Brighton Sea Life, staff stated that "*a lot of animals come from the sea*", and yet a senior member of the 'Animal Care' team claimed: "I *don't know if we do that anymore*".

At Hunstanton Sea Life, there are four staff members in the 'Animal Care' team. One of these staff members informed the CAPS investigator that Sea Life is leading the way with regards to testing fish for

cyanide traces, yet Sea Life also claims to only source fish "*sustainably*". The company recently made a splash in the media on this same issue (e.g. Blooloop website; Sea Life website).

At Weymouth Sea Life, Hunstanton Sea Life and Scarborough Sea Life, it was claimed by staff that sharks, and in particular the larger, more 'difficult to breed' species, are regularly captured from the sea for 'education' purposes. Both Hunstanton Sea Life and Scarborough Sea Life staff gave the Blacktip reef shark as an example. At Hunstanton Sea Life, it was stated that: "*There are certain creatures that are not compatible with breeding in captivity*". Blacktip reef sharks are in fact one of the few species of shark that have bred in captivity. Staff at Scarborough Sea Life stated that sharks are wild-caught, and also: "*we don't want to take from the wild ... but for example if they really needed to, with the sharks they'd take one male and one female, then breed them*". Staff at Scarborough Sea Life, claim the wild-capture of Blacktip reef sharks is carried out "*sustainably*". At Blackpool Sea Life, staff claim that sharks are caught from the ocean "*every now and again*" and that the larger sharks do not breed because they "*don't feel comfortable enough to do so*".

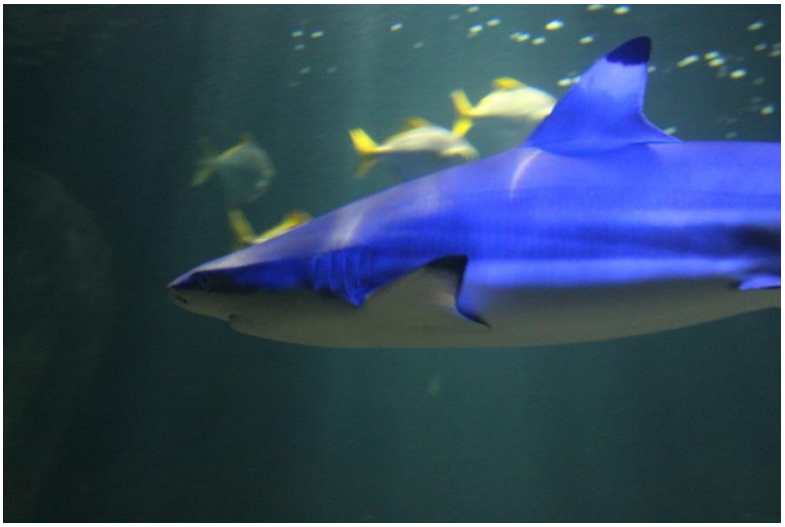


Photo 5: Blacktip reef sharks are taken from the wild by Sea Life

Sea Life are aware of the consequences of publicising that they display wild-caught animals, and attempt to draw attention away from this unethical and scientifically-unsound practice, with extravagant captive-breeding programmes and far-fetched conservation claims. Yet the public should be informed truthfully about the lives of the animals on exhibit in aquariums and other captive animal facilities.

4.2.2 Welfare Implications of Wild-Capture

Aside from the concerns regarding the decimation of fish populations and the environmental degradation that is caused by the fishing and aquarium industry, the removal of animals from the wild also presents animal welfare concerns. Animals are removed from their social groups, families and natural habitat, and transported often long, arduous journeys to be placed in captivity. Sadly the welfare aspects of the capture and transportation of fish is often overlooked, yet whilst the total death toll is not accurately known, it is known that tens of thousands of fish die every year *en route* to their destination.

4.2.2.1 Emotion, Pain and Suffering

It is difficult for most humans to see fish as sentient animals who are aware of a range of sensations and emotions (subjective, conscious experience characterised primarily by expressions, biological reactions, and mental states), of feeling pain and suffering, and of experiencing a state of well-being. They are often spoken of in terms of 'crops' and catching them from the ocean is termed 'harvesting'. They are often encountered, not in the natural habitat that they have been adapted for, but flopping helplessly out of water or lying frozen at the supermarket (Kittilsen, 2013). However, divers and scientists that watch fish

hunt for food, engage with mates or raise young gain a very different view of the behavioural complexities and the lives that fishes lead.

Sentience and emotion are important as humans tend to offer moral consideration only to beings considered sentient. The denial of sentience for fish therefore, has been a major driver for their poor treatment in comparison to other animals.

The scientific debate concerning whether fish have emotions or sentience has largely focussed on brain anatomy and function, physiological and behavioural responses, and the cognitive abilities that fish possess. Fish have marked differences in structures and relative brain size compared to higher vertebrates and some scientists (e.g. Rose, 2002) have argued that, since fish lack the neocortex, they cannot experience emotions. On the other hand, for example, increasing amounts of scientific evidence suggest that the fish telencephalon has functional homologous limbic and dopaminergic structures involved in emotional processing. It appears that emotions do involve relatively primitive brain circuits that have been conserved through vertebrate evolution (Chandroo *et al.,* 2004).

Emotions are adaptive products of natural selection which have played an important part in maximizing fitness throughout history. The principle of phylogenetic continuity suggests that the differences between fish and higher vertebrates in the functional aspects of emotions are a matter of degree, rather than of kind. Furthermore, the fact that fish meet many of the same socio-ecological challenges as do other vertebrates supports a similar view. Emotional stimuli elicit autonomic and endocrine responses in fish, which induce flexible behaviour and motivate behaviour. Studies have also demonstrated that fish evaluate stimuli in a cognitive way and they can remember for a sufficient amount of time.

By viewing fish behaviour, physiology and cognitive abilities in the light of this functional framework, it is possible to infer what functions emotions may serve in fish. Research carried out in 2013 concluded that emotions are likely to serve a function in fish similar to that of other higher vertebrate species (Kittilsen, 2013).

Regarding the physiological component of emotions, fish show stress responses in a way that is largely similar to mammals. Fish release adrenalin and noradrenalin, resulting in increased heart rate and ventilation. Fish also produce cortisol in response to emotional stimuli (Wendelaar Bonga, 1997) and there have been identified transmitter substances in fish such as dopamine, serotonin and oxytocin/isotocin that are associated with emotional phenomena such as 'mood' in humans (Winberg and Nilsson, 1993).

Fish are now understood to be sentient, intelligent animals who suffer pain and distress as vertebrates do. Pain is a complex state, with a distinct perceptual quality that is associated with the emotional state of suffering. There is a great deal of research on anaesthesia and analgesia in fish (e.g. Sneddon, 2012) and pain has received a substantial amount of attention in the debate concerning fish emotion. Several studies have shown that fish do possess important criteria for pain perception. Nociceptors, natural pain-killers (opioids), neural pathways and brain areas for pain processing have all been identified in fish (Braithwaite, 2010; Braithwaite and Boulcott, 2007; Sneddon *et al.,* 2003; Broom, 2001).

Pain responses have been observed in Rainbow trout, Common carp and Zebra fish (Sneddon, 2009). In a 2009 study, researchers also concluded that Goldfish feel pain, and that their reactions to pain are much like those of humans (Nordgreen *et al.,* 2009).

Fish are capable of learning and living cooperatively. Social living is a common practice within the animal kingdom that provides well-known evolutionary advantages, such as foraging and protection from predation. Animals that stay together often have higher rates of survival when compared with lone individuals. Some species are adept hunters and even cooperate with other species whilst hunting. Groupers (fish of any of a number of genera in the subfamily *Epinephelus* of the family *Serranidae*), for example, cooperate with moray eels (eels of the family *Muraenidae*). The groupers swim to resting eels and

invite them to hunt by shaking their heads. Scientists have observed the partnership for up to 44 minutes (Bshary *et al.*, 2006).

Staff at Weymouth Sea Life were observed informing visitors that the rays have no individual characters, yet in the same sentence staff called them "*friendly"*, and attributed other anthropomorphic traits to the animals. For example, when one ray swam near to a staff member giving a talk, he said in front of visitors: "*Hello! Wagging your tail, you're that excited are you?!"* The message and information provided by Sea Life staff about animals is confusing, to say the least.

Nowadays, there is little reason to disbelieve that fish have emotions, can feel pain, are intelligent, and therefore have the ability to suffer. The suffering endured by animals pulled out of the ocean and then transported to a tank may be widely felt amongst fishes. Sadly though, whilst studies on attitudes towards animal welfare have been increasing, fish welfare has received only limited empirical attention. This is one of the reasons that there has been limited policy progress on the welfare of fish (Kupsala *et al.,* 2013), to the extent that, whilst fish are protected by the Animal Welfare Act 2006, the Act explicitly states: 'Nothing in this Act applies in relation to anything which occurs in the normal course of fishing' (S.59). Octopuses and crustaceans are not protected by the Act at all.

It has also been stated that further research should be directed toward studying the moral positioning of fish and the distinct moral categorisation they receive (Kupsala *et al.,* 2013).

There is no reason to disbelieve that fish suffer when separated from their families and social groups. Sharks, for example, use social interactions as opportunities to learn how to find food, identify predators, and engage in courtship. Lemon sharks (Negaprion brevirostris) have been demonstrated to prefer some individuals in their group than others. Some individuals are preferred to follow and have social interactions with (National Geographic website; Guttridge *et al.,* 2009).

Because of fishing, and collection for the aquarium trade, young fish can be left behind when the parents are captured, and often die. Even when fish have been allowed to return to their brood following capture, the stress of the experience means they may not be fit enough to fan their eggs to bring in oxygen and keep away silt, or to protect them against predators (Thompson, 2008).

4.2.2.2 Netting and Other Capture Methods

In rivers and streams, most freshwater fish are caught using artisan fishing methods - consisting of small beach seines, dip nets, and a variety of small trap nets. For the collection of marine fish, diving gear is commonly employed with hand nets, fish-holding buckets, and barrier nets serving to corral and fence the fish (Livengood and Chapman, 2007). Trawls can be deployed on the soft-bottom substrate adjacent to coral reefs, though they catch mainly non-reef-associated species (Dalzell, 1996).

Both freshwater and marine fish are selected on body colour, shape and suitability for the aquarium. However fishing for certain species (e.g. Bangaii cardinalfish *Pterapogon kauderni*) may be unselective, as most sizes and ages are considered 'suitable' for home aquaria (Kolm and Berglund, 2003). A study in 2012 indicated that the age of fish at capture can also have an effect on the animal's well-being and health when they reach the aquarium. It was revealed that small (and presumably young) sharks caught by nets may be exposed to disease-promoting conditions (including diet or habitat deficiencies) in aquaria if they are captured during the critical growth phase of their life history, as this affects their proper development and maintenance of cartilaginous tissue (Andersen *et al.,* 2012).

Nets, used to scoop fish out of the water, harm fish, and can lead to death. In 2003, researchers at the University of Maryland in the United States observed that nets harm fins, gills, scales and the protective

mucus on the skin (Reiss *et al.,* 2003). American and Canadian researchers have also discovered that fish are harmed in nets. Some of the animals die from their injuries immediately, and others die later (Cooke, 2000). Aside from the welfare implications of netting, considerable skill is required to collect fish efficiently without causing damage to the habitat (European Commission, 2008).

Net mesh type has been demonstrated to affect injury rates and fish survival. Even landing nets, used by recreational fishermen, were shown in a 2003 study to cause a 14% death rate post-capture (Barthel, 2003). The study also revealed not only those landing nets injure fish, but also that mesh type alters the severity of injury.

Nets with small barbless hooks are used for species difficult to trap, and tubular nets may be used to catch marine 'ornamental' species living in burrows as they are tickled out of their hiding place (Wood and Rajasuriya, 1999; Wood, 2001*a*). In the Philippines and Indonesia, two places where much of the marine collection trade is occurring, many marine 'ornamental' collectors are free divers.

In many studies, cortisol levels in fish captured have been measured as an index of the stress associated with, for example, capture duration. The behaviour of fish during capture has included initial flight response, successive struggles of decreasing magnitude, reverse swimming and finning to maintain position. Struggle activity has reduced as duration of capture increased (Chopin, 1996).

The time spent out of the water, as well as handling, causes great stress in fish. Cortisol has been known to quickly increase following capture, and can remain elevated for a day. There can be increased heart rate, unnatural behaviour, and the fish are less likely to be able to reproduce in the long term. Some may suffer permanent tissue damage, and are more likely to die.

A study in 2005 revealed that after just two minutes of angling, cortisol levels in Rainbow trout (*Oncorhynchus mykiss*) increased significantly. Handling by fishermen added to the physiological pressure put on the fish and it took up to 24 hours for the cortisol to return to a normal level (Mekaa *et al.,* 2005).

Even when fish are exposed to air for a short period only, there are serious deleterious effects. In a 2008 study, largemouth bass (*Micropterus salmoides*) were hooked using rod and line (which are commonly used by anglers), and placed into a tank on a boat so that blood samples could be taken (Thompson, 2008). The animals were exposed to air from 1 second to 15 minutes, mimicking exposure to air by anglers. The fish were then observed for 30 minutes thereafter, and another blood sample was taken. A radio tracking device was attached to the fish before they were released. Researchers found that whenever the fish were removed from the water, the fish's breathing rate increased, indicating stress. Also, the level of the enzyme Alanine Aminotransferase increased, indicating permanent tissue damage. When the bass were out of the water for long periods, they showed abnormal behaviour, and rather than leaving the release site normally, they tended to linger there (Thompson, 2008).

Deep water fish, such as the white bandit angelfish (*Holacanthus arcuatus*), which are desirable for the aquarium trade, inhabit deep ocean waters and when they are collected the fish may encounter decompression sickness. The bladder can burst (Randall, 1987) as when bottom fish are brought rapidly from deep waters where the pressure is high to the surface where the pressure is significantly lower, the gas inside the air spaces in the body can cause damage to the surrounding tissues if that gas becomes trapped.

Some collectors use a method labelled 'needling' whereby a needle on a syringe is used to pierce the animal's swim bladder, and this speeds up the process (Pyle, 1993). This procedure undoubtedly causes pain and stress for the animals brought to the surface.

In some cases, damaging techniques are used to collect reef-dwelling animals. In Brazil, corals are often deliberately smashed while harvesting the yellowtail damselfish (*Chrysiptera parasema*), causing extensive

damage (Gasparini *et al.,* 2005). Some of the collectors use cyanide and then place their catch in plastic bags instead of floating pens prior to transport. Fishing with the poison is illegal in most countries, but remains prevalent in around 15 nations which supply the aquarium business (Yale Environment 360 website).

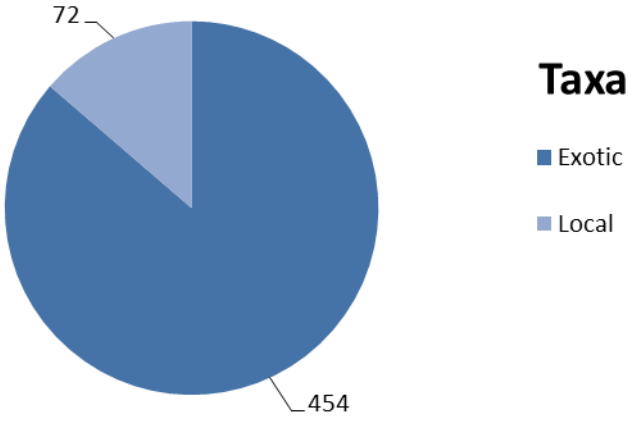
After capture, animals may be held in floating pens, which is the preferred method for holding these animals prior to transportation (National Geographic website).

4.2.2.3 Handling and Transport

Fish captured from the wild are subjected to a number of unfamiliar environments. They are typically collected in remote fishing sites, where they may be held in floating, holding pens, or fish 'camps', before reaching distribution warehouses and their mode of long-distance transportation (National Geographic website; Livengood and Chapman, 2007). In aquaculture, when captured and transported, the fish are subjected to a number of stressors, such as crowding, with skin abrasions, as well as low oxygen and high ammonia levels in the water as results of the crowding (Poli *et al.,* 2005; Gatica *et al.,* 2008). Regarding fish who are caught for human consumption, any handling of fish prior to slaughter, such as capturing or transfer from transport vehicle to holding pens before slaughter, has been demonstrated to be a stressful experience for fish (Hastein *et al.,* 2005), due to crowding and struggling, and the poor water quality caused by the crowding (Poli *et al.,* 2005; Gatica *et al.,* 2008). It is likely that these problems exist also for fish who are captured for the aquarium trade.

Most fish are not fed for at least 48 hours prior to packing for export, so their guts are empty and they do not pollute the water in transit (Wood and Dakin, 2003), which is likely to cause suffering. The starvation has an impact on their energy reserves and therefore the overall condition of the fish, and furthermore results in stress and possible behaviour changes, such as increased aggression, or 'eye snapping' (Hastein *et al.,* 2005; Ashley, 2007), which may lessen their ability to cope with other sources of stress.

Often, following their transportation by aeroplane, fish are forced to endure further time travelling to their destination aquarium by road. Hunstanton Sea Life confirmed that they transport animals on lorries inside bags containing oxygen following air transport.



Assuming that many of the animals at Sea Life do originate from the wild, it is useful, when considering the effects of transport, to know whether they were sourced locally, or further afield. Sea Life have refused to provide information to CAPS on the number of animals that are wild-caught at their aquariums, however the data illustrated in Figure 1 is an indication of the proportion of animals housed at Sea Life who would have travelled from far afield, *had* they been wild-caught. The term 'exotic' has been used as synonymous of 'not native of the British Isles or surrounding seas' (Howson and Picton, 1997).

Figure 1: Proportion of Sea Life taxa considered to be 'exotic' and 'local' biota

There are 526 species housed at Sea Life. Figure 1 reveals that the vast majority (86%) of species are considered as 'exotic biota', in other words, had they been wild-caught (as many are likely to be), they would have been sourced from further afield than the British Isles and surroundings areas. Only 14% of species are considered 'local biota' and therefore would have been sourced locally, had they been wild-caught.

Following shipping, from ports of entry, large importers, wholesalers, or trans-shippers distribute the fish to smaller franchises that sell to retailers. Transport associations, for example International Air Transport Association (IATA) and the Animal Transportation Association (AATA), oversee the transportation of marine fish destined for aquaria.

Though the length of the chain of transportation varies, the longer the journey, the greater the potential for a decrease in welfare and an increase in exposure to pathogens. When Sea Life sources wild-caught fish, they may be transported extremely long journeys for display. For example, during this investigation, it was revealed that a metre long, ten-year old Napoleon wrasse *(Cheilinus undulatus)* residing at Blackpool Sea Life was transported (allegedly under a 'special licence') from the coast of Australia to the UK. Sea Life plans to attempt to mate this male with a female wrasse at a Belgium Sea Life centre which means further transportation.

During transit, fish may be subjected to pain and stress arising from physical injury due to rough handling, prophylactic treatment and conditioning prior to packing, overcrowding, ammonia burns, water temperature fluctuations, and indiscriminate exposure to toxic chemicals used as prophylactic treatments for disease control and poor water quality (Livengood and Chapman, 2007; Branson, 2008).

Problems can be also exacerbated by indirect and delayed flights. When the animals reach the importing country, importers clear the shipments with customs, and the consignments undergo veterinary checks, however there is a distinct lack of veterinary control and care, and individuals performing these important checks are generally not qualified to examine fish. Additionally, fish can be left in bags for several days without water and oxygen changes (Wood, 2001*a*).

Individuals of some species fare worse than others during transport (Livengood and Chapman, 2007). The blue-spotted ray (*Neotrygon kuhlii*) for example, has a notoriously poor survival rate when taken from the wild, with many individuals dying in the collection and shipping process. The animal rarely thrives in captivity due to trauma post-shipping, being housed in too-small tanks, and infections. The death rate has been estimated to be as high as 80% in some of marine species housed at Sea Life aquariums, such as the Banggai cardinal fish (Chao *et al.,* 2001; Gil and Martinez, 2001; Vagelli and Erdmann, 2002; Cato and Brown, 2003; Lunn and Moreau, 2004).

Sharks are particularly sensitive to electromagnetic signals and transportation can therefore interfere with their receptive signals. Additionally, sharks do not have a hard, bony skeletal structure to support their bodies when out of the water and so, during their movement from the ocean into a stretcher, their organs may be crushed under the weight of their own bodies.

Large obligate ram-ventilating demersal and pelagic shark species are often difficult to transport for extended periods of time with any degree of success (Young *et al.,* 2002). Water quality is paramount during any shark transport, and water treatment mechanisms must be able to provide optimal conditions throughout the entire process (Young *et al.,* 2002).

Many octopuses die *en route* because they become stressed and release ink into their water (The Cephalopod Page website). Although this ink is not directly toxic to the animals, if an octopus inks into a small volume of water, the ink can mechanically coat the gill surface which causes asphyxiation (Hayter, 2005).

Catching, trapping, handling, holding and storing has been described as causing injury, stress and suffering to both cephalopods and decapod crustaceans.

4.2.3 Health Implications

Aquaculture and public aquaria house high densities of fish (Blanch *et al.,* 1999). Fish held in these intensive systems are extremely sensitive to the microbial flora of the water. Moreover, bacterial populations in aquaculture facilities and in public aquaria may differ from those found in the natural environment, and thus can impact on the nutrition and health of captive fish (Blanch *et al.,* 2001).

Most fish physical health problems are caused by poor water quality. It has long been recognised that the movement of fish provides a means of transmitting exotic viral pathogens. Recently, some of these pathogens have emerged as the source of significant disease in fish. Despite a mandatory quarantine period, Megalocytivirus and Cyprinid herpesvirus-2 for example represent significant exotic pathogens in Australia and case studies show that there is disease risk posed by the importation of fish. Viral diseases now represent a significant threat to Australia's native fish species (Stephens *et al.,* 2004; Go *et al.,* 2006). The large scale cultivation of fish is also facing many problems as a result of pathogenic microorganisms, for example the accumulation of unconsumed feed and bad water quality influences the growth of pathogenic forms of Vibria species (Velmurugan and Rajagopal, 2009).

4.2.4 Transport Losses

The mortality rate of fish has been indicated to be as high as 30% during capture, and during transportation, a further 5-10% of fish are estimated to die. A massive 30% die during acclimatisation following importation (Huntingford *et al.,* 2006).

At destination wholesalers, some companies will dip fish in salt or potassium permanganate solutions upon arrival. Weak fish succumb to the procedure and they, along with any other dead fish, are removed (Branson, 2008).

Bagged and boxed, the animals are flown around the world from countries such as Indonesia and the Philippines. It has been estimated that the annual transportation losses account for, on average, 0.5 to 1.5% of fish imported into the UK (Branson, 2008). Transportation losses are obviously influenced by the condition of fish prior to shipment (e.g. Body score and health status), and another significant survival factor is human error with regards to packaging. Fish may be transported in containers which are overcrowded, or in the wrong type of water (Branson, 2008). Mortality rates tend to increase when collectors are unskilled and have not had any formal training. For example, in Brazil, where marine fish were reported to be poorly handled, the mortality rate in the holding tanks was estimated to be at least 30-40% (Gasparini *et al.,* 2005).

A 2003 study carried out in Indonesia revealed 49-80% losses on the long journey from collector to exporter, that 70% of reef fish imported into the UK are dead within a year of arrival from stress and disease, and 10% die in transit prior to even reaching their destination (Wood and Dakin, 2003). A 2005 study in Indonesia revealed post-harvest mortality rates of 10-40%, with total losses, including injured fish, of between 25-51% (Schmidt and Kunzmann, 2005). Such a high mortality increases collection pressure on wild fish populations.

For many animals, the shock of being moved to a tank, and having to adapt to such unnatural conditions, can be too much to bear. In the United States, all of the Newport Aquarium bowmouth guitar fish (*Rhina ancylostoma*) were collected from the waters surrounding Taiwan. During July 2013, a newly-acquired female bowmouth guitar fish died just days after she was introduced in the Newport Aquarium tank. She was estimated to be around 6 years old and died from internal bleeding after a male in the tank attempted to mate with her. It is possible the animal would have been in shock from the transportation and being placed into a new environment, as well as the injuries. She had been shipped in a container of around 8 foot in diameter. The aquarium has claimed it usually attempts to arrange for direct flights to Chicago's O'Hare International Airport, but this is not always possible. From there, Newport Aquarium staff meet the flight with extra oxygen, sometimes extra water, testing equipment and a rented container truck, and then drive the animals to the Aquarium (USA Today website).

In the late 1990s, four sharks died within a week of arriving at a British aquarium. The animals had travelled over 4,500 miles from Florida and their deaths were blamed on freak weather conditions delaying their transportation for three hours. All were suffering from hypothermia (BBC News website). The aquarium was reported as stating "*What we will do now is look at what lessons we've learnt and decide whether ethically or from a husbandry point of view we should continue to keep those particular animals*". In fact, soon after the deaths, the aquarium opened its new centre-piece shark tank as part of a multi-million pound expansion and the aquarium currently houses Sand tiger sharks (*Carcharias taurus*) and Nurse sharks (National Marine Aquarium website).

Sea Life has frequently imported large, wild-caught invertebrates for display, such as giant pacific octopuses (*Enteroctopus dofleini*), Tasmanian king crabs (*Pseudocarcinus gigas*) and Japanese spider crabs (*Macrocheira kaempferi*). These animals have been transported from as far away as Australia.

Several large public aquariums around the world, including Sea Life, house Japanese spider crabs – a species of crab that is harvested for, and threatened by, both human consumption and the aquarium trade and can have a leg span of up to 12 foot. These huge crustaceans would naturally live on the sea floor as deep as 2,000 foot below the surface off the east coast of Japan. According to the United Nations Environment Programme, trade in these animals can cause serious conservation problems (Wabnitz *et al.,* 2003).

Whilst captive-breeding programs to replenish declining wild populations of Japanese spider crabs have been suggested, such programs would require large, specialised facilities. Not the small, barren tanks that the animals are forced to live in at Sea Life aquariums. Similar to the giant pacific octopuses, none of the large crustaceans at Sea Life aquariums have ever been successfully bred by the company.

Both crabs and octopuses, Sea Life claims, have been 'rescued' from fishermen. The reality is more likely to be that Sea Life purchased these animals from fishermen not to 'rescue' them, but to bring them into captivity to pull in visitors. As at the February 2014, there have been no attempts made by public aquaria to rehabilitate these incredible animals back into the wild following their 'rescue'.

These huge crabs are completely unsuited to life in a tank. In fact, many of the Japanese spider crabs that Sea Life have 'rescued' do not appear to have thrived at Sea Life aquariums. And when the animals have died, they have soon been replaced with other wild individuals.

For example, in February 2010, a Japanese spider crab with a two metre claw span that Sea Life named 'Crabzilla' was imported into the UK from Japan and transported by road to Birmingham Sea Life where he was housed for a month before being re-exported to Blankenberge Sea Life in Belgium (Birmingham Mail website; Mail Online website).

In February 2011, Blackpool Sea Life 'took delivery' of more Japanese spider crabs (BBC News website) and, during the same month, another Japanese spider crab (who allegedly was caught by fishermen in Japan)

went on display at Weymouth Sea Life. Sea Life named this animal 'Crab Kong' and he was estimated to be around 30 and 40 years old. He had a claw span of over eight foot. Sea Life stated in the media: "*Getting an animal as impressive as Crab Kong is the aquarium equivalent of signing Ronaldo*". 'Crab Kong' was due to be exported once again to a Sea Life aquarium in Munich, Germany around April that same year (BBC News website).

A report published in 2005 by the animal protection organisation previously named 'Advocates for Animals' (now 'OneKind') in Scotland provided an extensive literature review of research investigating decapod crustaceans' ability to suffer, feel stress, and feel pain. The review highlighted that these animals do indeed suffer, and presses on the fact that their welfare needs should be considered (Advocates for Animals, 2005). There is little reason to doubt that the frequent transportation of large, wild spider crabs over long distances, and the housing of them in small tanks at Sea Life aquariums can cause suffering.

Around May 2012, three Tasmanian king crabs were imported from Australia to the UK. One crab remained at Weymouth Sea Life, whilst the other two were due to be transported onto Birmingham Sea Life and a Sea Life centre in Berlin, Germany. The crabs were caught off the coast of Tasmania and once again were reportedly 'saved from death' when Sea Life purchased them from a fishermen (for £3,000). The animals spent a potentially arduous 29 hours on the plane, and then two weeks in a quarantine tank. One of the crabs, named 'Claude', was housed in a small (ten foot tall and six foot wide) tank at Weymouth Sea Life. Sea Life stated in the media that: "*They are such impressive creatures we thought that it was worth the cost and effort of flying them halfway round the world so they can flourish in an aquarium display. They had a stopover in Hong Kong and arrived with us two weeks ago. It took them a few days to get over the jet-lag but now they're feeding happily and don't seem any the worse for their trip*" (Mail Online website). In October 2012 one of these crabs, 'Russell' was sent on to Birmingham Sea Life. The media reported that 'happily' Sea Life had a new £100,000 exhibit – CLAWS! for him. Sea Life stated in the media that they: "*thought it was time Russell was unveiled to an admiring public*" (Birmingham Mail website). During February 2013, another 18lb Tasmanian giant crab was transported to the CLAWS exhibit to take 'centre stage' (The Press website; ITV News website).

In March 2013, a nine foot Japanese spider crab arrived at Blackpool Sea Life who, once again was allegedly "*rescued from being on Japanese dinner plates*" (The Metro website). Again the media reported that Sea Life had purchased the animal from fishermen. There was a smaller female Japanese spider crab at Blackpool Sea Life around the same time who had laid eggs that required fertilisation (Live Blackpool website; Sea Life website).

Sea Life also releases lobsters to lobster fisheries as juveniles, and when they are mature they are caught by fishermen. Sea Life claim that this release programme "*helps both lobster conservation and the food industry*" (Sea Life, pers. comm., 15 February 2014).

During this investigation, giant pacific octopuses were on exhibit only at Birmingham Sea Life and Brighton Sea Life. Yet in 2012, Sea Life imported a wild-caught giant pacific octopus from Japan and put an animal on display at Scarborough Sea Life to "*give experts a chance to learn more about its behaviour*" (BBC News website). When the CAPS investigator enquired where this octopus was, both at the aquarium in September 2013, and by telephone in December 2013, staff admitted the animal had not been successfully bred from, and had in fact died (Sea Life, pers. comm., 23 December 2013). During a visit to Brighton Sea Life, the CAPS investigator noticed that the Giant pacific octopus tank there was marked as originating from Scarborough Sea Life.

In 2010, there was also another wild-caught giant pacific octopus on exhibit at Loch Lomond Sea Life, and another that Sea Life named 'Jock' on exhibit at the centre during 2012 (Practical Fish Keeping website). It is unknown what happened to the individual who was obtained in 2010, and also the individual on display in 2012, however when the CAPS investigator enquired as to why there were no giant pacific octopus at Loch Lomond Sea Life (Sea Life, pers. comm., 23 December 2013), staff admitted the previous animal had died.

At Hunstanton Sea Life, a staff member also admitted they had previously had a giant pacific octopus but she also died.

4.2.5 Stress and Mortality of Animals Transported between Sea Life Aquariums

During the investigation, it was discovered that animals are not only frequently transported between countries, but also between aquariums. For example, Sea Life staff informed the CAPS investigator that the larger reef sharks were regularly transported between Scarborough Sea Life and Blackpool Sea Life, and that zebra sharks have been transported between Sea Life aquariums in Netherlands and Great Yarmouth. Sea Life has been quoted in the media as claiming to have transported "*over 100 shark in 20 years*" (Practical Fish Keeping website; BBC News website).

In January 2013, all the sharks at Blackpool Sea Life were moved temporarily to London Sea Life and Weymouth Sea Life whilst the ocean tank was drained and refurbished (Mail Online website). In June 2013, six blacktip reef sharks were transported more than 200 miles overnight from Weymouth Sea Life to Manchester Sea Life. This involved an overnight drive in special vehicles with tanks inside (1-2-1 website; BBC News website).

During November 2013, a young leopard shark was transported from Blackpool Sea Life to Manchester Sea Life, and was then due to return to Blackpool Sea Life to take part in a breeding programme once the aquarium had obtained a female Leopard shark (Youtube website). Another male zebra shark ('Zorro') is transferred once a year from Great Yarmouth Sea Life to London Sea Life to mate with the resident zebra shark ('Athena') there. A Sea Life staff member stated: "*We get one in from London Aquarium and he's called Zorro. We take him in more during the summer time for Athena, our Zebra shark. So they can try and produce young. So far we haven't been so lucky".*

The two main reasons for these transfers appear to either be the refurbishment of tanks or captive-breeding programmes. However, according to staff, the larger sharks at Scarborough Sea Life are transported when they become a threat to the Green Sea turtle (*Chelonia mydas*) at the aquarium. The larger sharks at this centre are replaced with younger sharks.

The transportation of animals can be fraught with difficulties, causing significant stress, and even death. Sharks, for example, are easily 'spooked' during handling and transport. These animals are extremely delicate, with exceptional sensory systems. Exposing them to the noise and handling during transport is likely to be an extremely stressful experience for them.

There have been several well-publicised transport losses to and from aquariums, yet these deaths are likely to represent only the tip of the iceberg. Internet research indicates that the deaths of sharks are often publicised in the media, yet there may be many more animals who die during transport between Sea Life aquariums.

An example of an animal who has showed signs of stress during transportation between Sea Life aquariums (and who has been moved more than once) is a wild-caught bowmouth guitar fish named 'Betty'. bowmouth guitar fish are currently present in four UK Sea Life aquariums – London Sea Life, Birmingham Sea Life, Loch Lomond Sea Life and Blackpool Sea Life. It is certain that these individuals have been captured in the ocean surrounding Taiwan as only seven pups have been born in captivity, and none of these have survived longer than a month.

In March 2013, 'Betty' was transported almost 130 miles between Blackpool Sea Life and Birmingham Sea Life for an unsuccessful breeding programme set up to supply other aquariums with bowmouth guitar fish.

She was then transported back to Blackpool Sea Life during August 2013 (Sea Life website). This return trip was not planned however, and a new, younger male bowmouth guitar fish from Birmingham Sea Life, had replaced her in the Blackpool Sea Life tank. Sea Life was quoted on social media as stating: "*There are no plans for Betty to return to Blackpool*".

Staff at Blackpool Sea Life informed the CAPS investigator that, during transport, the water inside the transport tank needed to be changed by staff at least three or four times *en route* as 'Betty' was excreting pheromones. This is a sign she was experiencing stress. Sea Life staff admitted: "*Obviously it's a very stressful experience*".

Even with the utmost care and specialist equipment (Sea Life uses shark carriers and specialist gloves from the company '1-2-1' (1-2-1 website)), the transport of sharks, and other aquatic animals, should obviously be avoided wherever possible. However, Sea Life staff admit that they do not want to house too many of the same species of fish in each aquarium as this makes exhibits less interesting for visitors. This probably explains why many of the larger, more unusual species, such as the bowmouth guitar fish, are housed separately in different Sea Life centres. Scarborough Sea Life staff state: "*We don't like to have too many of the same fish so that we have a variety ... so then people can see different sorts of fish".*

In 2007, Sea Life staff negligence was responsible for the deaths of three blacktip reef sharks who were being transported 70 miles between Great Yarmouth Sea Life and a refurbished tank at Hunstanton Sea Life. It was reported that the three died because their water was too cold. According to a BBC news report, the company confirmed that the water was 2°C below the minimum temperature required for sharks. This was due to a mistake made by a staff member (Practical Fish Keeping website; BBC News website).

5. CONSERVATION AND SUSTAINABILITY

The EC Zoos Directive provides a framework for Member State legislation, through the licensing and inspection of zoos, to strengthen the role of zoos in the conservation of biodiversity and the exchange of information to promote the protection and conservation of wild animal species. The requirement to carry out conservation work has been incorporated into the Zoo Licensing Act 1981 and also the Secretary of State's Standards of Modern Zoo Practice. Public aquaria are therefore required to carry out conservation work by law.

Sustainability is defined by the Brundtl and Commission as 'when resource extraction meets the needs of the present without compromising the needs of future generations' (World Commission on Environment and Development, 1987).

The main threats to fish are overfishing and the devastation of coral reefs for the aquarium and curio trade (CAPS, 2004). Most fish are caught for the hobbyists, however public aquaria play a role in the demise of wild fish populations, particularly as the number of aquariums is increasing and the facilities are larger than ever before, which means they house more animals.

Sea Life claim on their websites that 'Zoos and Aquariums play a huge role in educating the public on important environmental issues, giving people a unique chance to encounter some of the planet's most beautiful creatures up close and pioneering vital conservation projects to preserve precious wild habitats and their vulnerable inhabitants' (Sea Life website). It is a legal requirement in the European Union to participate in research which 'benefits' species conservation.

Hunstanton Sea Life and other aquariums claim to catch blacktip reef sharks from the wild 'sustainably' for 'education purposes'. Blackpool Sea Life claim that the larger sharks housed there are caught "*every now and again for breeding*" because "*unfortunately it's part of the industry*". Sea Life also claims to work with 'sustainable fisheries'. However the reality is that the trade is not 'sustainable' and aquariums are bustling

to compete for the most unusual, or largest animal on display. There is no system available to reliably distinguish what the industry considers to be 'sustainably' caught and/or cultured animals from wild ones (Burke *et al.,* 2011). Some fish, such as the larger species of sharks which are displayed at Sea Life, have never been bred in captivity, and are likely never to do so.

It has been estimated that around 14-30 million coral reef fish are collected each year for the aquarium trade (Wood, 2001) and, in 2003, there was an estimated annual global trade in marine species of between 20 and 24 million individuals (Wabnitz *et al.,* 2003). In 1998, it was reported that there was a substantial decline in aquarium key species taking place in the wild – including 43% of yellow tangs (*Zebrasoma flavescens*), 54% of long nose butterfly fish (*Forcipiger flavissimus*) and 64% of achilles tang (*Acanthurus Achilles*). The European Union is the largest market for aquarium-destined fish, but the United States is the single largest importer of fish in the world (Chapman, 2000; Livengood and Chapman, 2007).

It has been estimated that approximately 36–38 million fish pass through the Animal Reception Aquarium at Heathrow each year (Walster, 2008). Over 1,000 species of freshwater and 1,000 species of marine organisms are imported into the UK alone, and there are more than 2,000 species in the trade. Damselfish, which comprise the family *Pomacentridae* except those of the genera *Amphiprion* and *Premnas*, make up almost half of the trade, with species of angelfish of the genus *Pterophyllum*, surgeonfish of the family *Acanthuridae*, wrasses of the family *Labridae*, gobies of the family *Gobiidae*, and butterfly fish of the family *Chaetodontidae*, accounting for approximately another 25-30% (Wabnitz *et al.,* 2003).

Animals which were previously not caught for aquaria, such as green sea turtles, sea dragons of the family *Syngnathidae*, the large sharks, and deep sea animals are under increasing pressure of being exhibited by those public aquaria that try and beat the growing number of competitors by having a display animal not seen elsewhere (CAPS, 2004). Fishes biologically unsuited to exploitation, for example large, late-maturing, low-fecundity species such as stingrays (cartilaginous fishes related to sharks), and silver arowana (*Osteoglossum bicirrhosum*) are now being caught. These charismatic species fetch high prices and are driving the growth in exports (Moreau and Coomes, 2007). Local fish populations of French angelfish (*Pomacanthus paru*) and gray angelfish (*Pomacanthus arcuatus*) in Brazil have been decimated (Gasparini *et al.,* 2005) and, also in Brazil corals are deliberately smashed whilst harvesting the yellowtail damselfish (Gasparini *et al.,* 2005).

Virtually all of the fish trade from South America involves wild animals (Crampton, 1999*b*; Junk, 1984; Olivier, 2001). Parental care and reproductive strategies that limit breeding potential are common in reef species, and represented over 70% of species caught up in the trade from Brazil in 2005 (Gasparini *et al.,* 2005). The removal of certain species can also affect others in unexpected ways through their behaviour, for example aggressive and territorial behaviour (Lubbock and Polunin, 1975).

One fish that is widely exploited for the aquarium trade is the Banggai cardinalfish (Lunn and Moreau, 2004) and over 100,000 individuals are caught monthly for international exporters. During shipping, up to 30% of the fish may die, with similar proportions frequently being rejected due to their poor condition. With increasing levels of exploitation, the global population is believed to have been reduced to approximately 10% of its historical level (Vagelli, 2008).

Destructive collection practices, the introduction of alien species, the threat of extinction of target species, over-harvesting, poor fish welfare and a lack of scientific information for collected species have raised concerns amongst conservation organisations. Cyanide fishing is a prohibited method widely employed to capture marine fish alive on coral reefs and there is a heavy mortality with this practice (Wood and Dakin, 2003), both for 'target' and 'non-target' animals. Half of the affected fish die on the reef, and 40% of those who survive the initial poisoning die before they reach an aquarium (Simpson, 2001). It has been revealed that the resulting asphyxiation 'stuns some fish and sends others into spasms, making them easy to grab by hand or net' (Simpson, 2001).

Although several techniques can be used to detect cyanide in reef fish, there is still no testing method currently available that can be used to survey the whole supply chain. In July 2013, Sea Life claimed they have started using a new test (Vas *et al.,* 2012) to identify whether fish have been caught for their aquariums with cyanide, yet the test has only been finalised for one species of coral reef fish (Yale environment 360 website). The vast majority of fish that are present in Sea Life are likely to have come from an unsustainable source, regardless of their claims to the contrary.

The test to determine whether fish have been exposed to cyanide has been researched in Portugal's University of Aveiro. During the pulse exposure to cyanide anion (CN^-) the fish used for the study displayed frantic swimming and strong gasping behaviour, followed by a loss of balance, cessation of swimming (specimens rested motionless at the bottom of the container). Four of the fish died during the experiment (Vas *et al.,* 2012).

Sea Life claim that if fish test positive, the supplier will be given six months to take action before the company imposes sanctions (Dorset Techo website; View From Online). This is an extremely delayed reaction to such a serious assault on wildlife.

Even if the test were to be developed for all fish housed at Sea Life, so-called 'non-destructive collection techniques' alone are not enough to protect tropical fish.

Conservationists have raised concerns regarding the effects of the trade on coral reefs and their inhabitants, in particular within the South East Asian ocean (Lecchini *et al.,* 2006). Indonesia and the Philippines are among the main suppliers of marine fish (Whittington and Chong, 2007), which are packed up in their thousands in plastic, packed in styrofoam boxes and exported by plane to consumers, including the public aquariums, all over the world.

Sea Life has developed ways of convincing the public they are sourcing their fish 'sustainably' (when they are not making the claim that they do not catch fish from the sea). For example, by using the Marine Aquarium Council (Marine Council website) certification which allegedly promotes 'sustainable practices' in the aquarium trade. The council's certification system uses 'best-practice standards' to reassure consumers of transparency (National Geographic website). Of course, the fact that Sea Life are having to test for traces of cyanide means that the fishing practices used by their suppliers have not been verified, despite claims to the contrary. If Sea Life were confident of the practices employed, there would be no need for these tests.

5.1 'Finding Nemo' Exhibits

Worldwide, there are twenty-seven species of clownfish belonging to the genus *Amphiprion*, and, according to the report *From Ocean to Aquarium: The Global Trade in Marine Ornamental Species*, around fourteen of them are commonly raised in captivity. Clown fish, as the global blockbuster film '*Finding Nemo'* suggests, have a special symbiotic relation with certain species of sea anemone.

At several Sea Life aquariums, clownfish, tangs and other coral reef fishes which were featured in the film are exhibited in 'Nemo's Cave' or 'Nemo's Kingdom' exhibits. The word 'Nemo' is also included on signs throughout the aquariums, and afforded special mentions on Sea Life websites. It was noticed during the investigation that these colourful areas were amongst the most popular of all exhibits - attracting large crowds of visitors, many of whom were using flash photography. At Manchester Sea Life, the word 'Nemo' is even given precedence over the species' names on signage. On the Sea Life website, the word 'clownfish' is featured in brackets, after the word 'Nemo' (Sea Life website). On the Brighton Sea Life website, it is stated: 'Clownfish '*Finding Nemo*' are beautiful little fish' (Sea Life website). Sea Life it appears, is cashing in on the film's popularity.

Photo 6: Clownfish feature heavily at Sea Life centres

Ironically, given the conservation message of the film '*Finding Nemo'* - that life in the wild is better than incarceration in a tank, and the actor whose voice brings the animated character to life is urging protection for tropical fish and coral reefs - sales of clown fish and other featured species rose considerably after the film opened. By referring to common clownfish (*Amphiprion ocellaris***),** as 'Nemo', and regal tangs (*Paracanthurus hepatus*) as 'Dory', Sea Life encourages its visitors to view animals as cartoon characters, rather than the complex, intelligent animals that they actually are.

5.2 Conservation Initiatives at Sea Life

Public aquaria should ideally be aware of, and contribute towards, existing and developing conservation and management strategies on an international and domestic level (e.g., CITES, IUCN etc.). It is not clear whether Sea Life has links with academia, and government agencies, to ensure possession of up-to-the-moment information about all aspects of animal conservation and research, nor whether they promote and support the activities of the IUCN Shark Specialist Groups (SSG).

Sea Life's independent conservation charity is 'The Sea Life Marine Conservation Trust', which became a registered charity (No. 1149058) during 2012 to 'provide a voice and focal point for global campaigns and fundraising'. The Sea Life Global Initiative strapline is 'Breed, Rescue, Protect' and the company claims to 'actively engage' Merlin visitors and staff in marine conservation and welfare work, and 'help them understand its importance and the role they can play to further its protection' (Merlin Entertainments website).

Sea Life publicises its cooperation with various Non-Governmental Organisations (NGOs). The below environmental and animal protection NGOs were mentioned by staff to the CAPS investigator during visits, in Sea Life literature, and on the Sea Life websites:

- Seahorse Trust (Save Our Seahorses campaign)
- Earth Sea and Sky
- Shark Trust
- Dorset Wildlife Trust
- Otter Survival Fund
- The Isle of Man Basking Shark Survey
- The Worldwide Fund for Nature
- Scottish Sea Angling Conservation Network
- Florida Sea Turtle Rescue
- Turtle Sanctuary
- The Wildlife Trusts
- Moon Reef
- Marine Conservation Society
- British Diver Marine Life Rescue
- Whale and dolphin conservation
- Greenpeace
- British Sub Aqua Club
- Hugh's Fish Fight (a campaign by television chef, Hugh Fearnley-Whittingstall)

- Sea Turtle Protection Society of Greece
- Project Tamar

According to signage at Brighton Sea Life, the aquarium has raised almost £1,000 GBP for the Whale and dolphin conservation (WDC) and almost £10,000 GBP for 'Earth, Sea & Sky', yet the fundraising and campaign initiatives which Sea Life carry out alongside NGOs appear to be transient and short-lived.

Sea Life cite work to ban the practice of whaling and, on their websites, state that they have supported WDC by sending letters to Environment Ministers across Europe urging them to block Greenland from slaughtering 10 humpback whales (*Megaptera novaeangliae*). Sea Life has also been involved in a mass postcard petition against return of commercial whaling. However these actions took place in 2007 and 2010 respectively. It does not appear that Sea Life have done any further campaigning since then on the issue or, if they have, it is not well-publicised. There remain collection boxes dotted around Sea Life aquariums raising money for WDC.

Sea Life claims to be actively involved in local conservation projects within species' range states and local breeding and release programmes. In 2013, CAPS received a long-overdue response to questions posed to a Sea Life senior manager during a meeting. Whilst Sea Life were unwilling to put a figure on their monetary contribution to *in situ* conservation initiatives, the only concrete evidence of monetary support for an in situ project was £250,000 for a turtle sanctuary in Greece. This represents just 0.02% of parent company Merlin's 2012 revenue, which was £1,074,000,000 during 2012. When extrapolated to visitors to Sea Life aquariums alone, this equates to less than three pence per person being traced directly to support for *in situ* conservation efforts (CAPS website). As well as the entrance fee for entering the aquariums (it costs a family of four to Sea Life's London Aquarium £64.26) there are requests for donations to build a turtle hospital inside the majority of UK aquariums.

5.3 Types of Species at Sea Life

The different types of animals housed at Sea Life aquariums are illustrated in Figure 2.

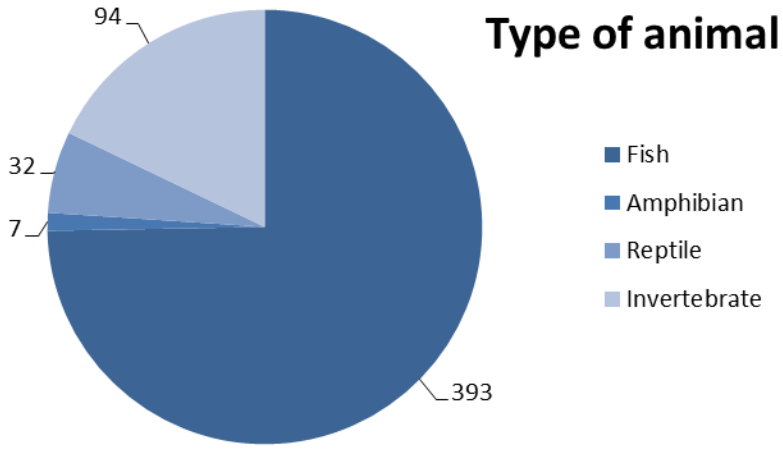


Figure 2: Types of animals at Sea Life aquariums

As would be expected, the vast majority (75%) of species housed at Sea Life are fish. Aquatic invertebrate species account for 18%, reptiles account for 6%, and amphibians account for just 1%.

The taxa observed on information signs were ranked to reveal the most commonly displayed taxa at Sea Life aquariums. The 100 most commonly-displayed taxa housed at Sea Life aquariums are illustrated in Table 2.

Number	TAXA (SIGNS)	SCIENTIFIC NAME	OCCURRENCE
1	Common clownfish	*Amphiprion ocellaris*	12
2	Yellow tang	*Zebrasoma flavescens*	12
3	Blacktip reef shark	*Carcharhinus melanopterus*	11
4	Common octopus	*Octopus vulgaris*	11
5	Dahlia anemone	*Urticina felina*	11
6	Green sea turtle	*Chelonia mydas*	10
7	Thornback ray	*Raja clavata*	10
8	Porkfish	*Anisotremus virginicus*	9
9	Moon jellyfish	*Aurelia aurita*	9
10	Lionfish	*Pterois volitans*	9
11	Nurse shark	*Ginglymostoma cirratum*	8
12	Common lobster	*Homarus gammarus*	8
13	Lesser spotted dogfish	*Scyliorhinus canicula*	8
14	Atlantic wolf fish	*Anarhichas lupus*	7
15	White spotted bamboo shark	*Chiloscyllium plagiosum*	7
16	Blue and yellow damsel	*Chrysiptera parasema*	7
17	European seabass	*Dicentrarchus labrax*	7
18	Atlantic cod	*Gadus morhua*	7
19	Spotted garden eel	*Heteroconger hassi*	7
20	Big bellied seahorse	*Hippocampus abdominalis*	7
21	Cleaner shrimp	*Lysmata amboinensis*	7
22	Spiny starfish	*Marthasterias glacialis*	7
23	Starry smoothhound	*Mustelus asterias*	7
24	Blue spined unicornfish	*Naso unicornis*	7
25	Regal tang	*Paracanthurus hepatus*	7
26	Guilthead bream	*Sparus aurata*	7
27	Bib	*Trisopterus luscus*	7
28	Purple tang	*Zebrasoma xanthurus*	7
29	Beadlet anemone	*Actinia equina*	6
30	Snakelocks anemone	*Anemonia viridis*	6
31	Common starfish	*Asterias rubens*	6
32	African snake necked turtle	*Chelodina longicollis*	6
33	Lined seahorse	*Hippocampus erectus*	6
34	Ballan wrasse	*Labrus bergylta*	6
35	Long horn cowfish	*Lactoria cornuta*	6
36	Blackbar soldierfish	*Myripristis jacobus*	6
37	Cownose ray	*Rhinoptera bonasus*	6
38	Greater spotted dogfish	*Scyliorhinus stellaris*	6
39	Pyjama cardinalfish	*Sphaeramia nemanoptera*	6
40	Greater pipefish	*Syngnathus acus*	6
41	Banded archer fish	*Toxotes jaculatrix*	6
42	Yellow-bellied slider	*Trachemys scripta scripta*	6
43	Tub gurnard	*Trigla lucerna*	6
44	Brown banded bamboo shark	*Chiloscyllium punctatum*	5
45	Green chromis	*Chromis viridis*	5

46	Common carp	*Cyprinus carpio*	5
47	Zebra moray eel	*Gymnomuraena zebra*	5
48	Bloody henry starfish	*Henricia oculata*	5
49	Port jackson shark	*Heterodontus portusjacksoni*	5
50	Giant japanese spider crab	*Macrocheira kaempferi*	5
51	Hermit crab	*Pagurus bernhardus*	5
52	Pollock	*Pollachius pollachius*	5
53	Banggai cardinalfish	*Pterapogon kaudemi*	5
54	Red bellied piranha	*Pygocentrus nattereri*	5
55	Undulate ray	*Raja undulata*	5
56	Picasso trigger fish	*Rhinecanthus aculeatus*	5
57	Atlantic mackerel	*Scomber scombrus*	5
58	Bonnet head shark	*Sphyma tiburo*	5
59	Bluespot ribbontail stingray	*Taeniura lymma*	5
60	Seagrass filefish	*Acreichthys tomentosus*	4
61	Razor fish	*Aeoliscus strigatus*	4
62	Axoloti	*Ambystoma mexicanum*	4
63	Blackspot puffer fish	*Arothron nigropunctatus*	4
64	Flame angel	*Centropyge loricula*	4
65	Grey mullet	*Chelon labrosus*	4
66	Goldskinny wrasse	*Ctenolabrus rupestris*	4
67	Edible sea urchin	*Echinus esculentus*	4
68	Three-spined stickleback	*Gasterosteus aculeatus*	4
69	Lemon goby	*Gobiodon citrinus*	4
70	North American map turtle	*Graptemys geographica*	4
71	Honeycombe moray eel	*Gymnothorax favagineus*	4
72	Epaulette shark	*Hemiscyllium ocellatum*	4
73	Bristlenose plecos	*Hypostomus plecostomus*	4
74	Blood Red Fire Shrimp	*Lysmata debelius*	4
75	Whiting	*Marlangius merlangus*	4
76	Silver mono	*Monodactylus argenteus*	4
77	Giant gourami	*Osphronemus goramy*	4
78	Red tailed catfish	*Phractocephalus hemioliopterus*	4
79	Pacu	*Piaractus brachypomus*	4
80	Guppy	*Poecilia reticulata*	4
81	Long fin lookdown	*Selene vomer*	4
82	Zebra shark	*Stegostoma fasciatum*	4
83	Long-spined bullhead	*Taurulus bubalis*	4
84	Red eared terrapin	*Trachemys scripta elegans*	4
85	Sand brittle star	*Acrocnida brachiata*	3
86	Spotted ray	*Aetobatus narinari*	3
87	Golden pufferfish	*Arothron meleagris*	3
88	Tiger Oscar	*Astronotus ocellatus*	3
89	Coral cat shark	*Atelomycterus marmoratus*	3
90	Clown trigger fish	*Balistoides conspicillum*	3
91	Edible crab	*Cancer pagurus*	3
92	Common shore crab	*Carcinus maenas*	3
93	Fly river turtle	*Carettochelys insculpta*	3
94	Racoon butterfly fish	*Chaetodon lunula*	3

95	Monkey faced blenny	*Chirolophis japonicus*	3
96	Clown loach	*Chromobotia macracanthus*	3
97	Bold-lined damsel	*Dascyllus aruanus*	3
98	Long spine sea urchin	*Diadema setosum*	3
99	Porcupine pufferfish	*Diodon hystrix*	3
100	Red-bellied short necked turtle	*Emydura subglobosa*	3

Table 2: The most commonly exhibited taxa at Sea Life

The ten most commonly-displayed species displayed at Sea Life are the common clownfish, yellow tang, blacktip reef shark, common octopus (*Octopus vulgaris*), dahlia anemone (*Urticina felina*, green sea turtle, thornback ray (*Raja clavata*), porkfish (*Anisotremus virginicus*), moon jellyfish (*Aurelia aurita*) and red lionfish (*Pterois volitans*).

The common clownfish was observed in 12 exhibits at 60% of the Sea Life aquariums visited, and the yellow tang also in 12 exhibits at 60% of aquariums. The common octopus was observed in 11 exhibits at 80% of aquariums.

Photo 7: Lionfish are one of the most commonly-displayed animals

An Animal Care staff member at Hunstanton Sea Life informed the CAPS investigator that *"Sea Life has standard stock ... they are all key creatures that people want to see*". These animals are obviously chosen on their popularity, rather than their suitability for life in a tank, such as the regal tang (or rather, the "*Dory*" fish). Sea Life claim that they house over 20 different species of shark, ranging from native dog fish (Genus: *Mustelus*), to blacktip reef sharks and zebra Sharks (Sea Life website).

During the investigation 24 species of shark were observed: blacktip reef shark, sand tiger shark, nurse shark, zebra shark, greater spotted dogfish (*Scyliorhinus stellaris)*, lesser spotted dogfish (*Scyliorhinus canicula)*, white tip reef shark (*Triaenodon obesus)*, scalloped hammerhead shark (*Sphyrna lewini)*, bonnet head shark (*Sphyrna tiburo*), white spotted bamboo shark (*Chiloscyllium plagiosum*), coral cat shark (*Atelomycterus marmoratus*), grey bamboo shark (*Chiloscyllium griseum*), zebra horn shark (*Heterodontus francisci),* epoulette shark *(Hemiscyllium ocellatum),* grey reef shark *(Carcharhinus amblyrhynchos),* Port Jackson shark *(Heterodontus portusjacksoni),* sandbar shark *(Carcharhinus plumbeus),* brown bamboo shark *(Chiloscyllium punctatum),* bull shark *(Carcharhinus leucas),* short-tailed nurse shark *(Pseudoginglymostoma brevicaudatum),* black nose shark *(Carcharhinus acronotus),* leopard shark *(Triakis semifasciata),* pyjama shark *(Poroderma africanum)* and blotchy swell shark *(Cephaloscyllium umbratile).*

5.3.1 Conservation Status of Animals at Sea Life

The IUCN Red List of Threatened Species (also known as the IUCN Red List), which was founded in 1964, is the world's most comprehensive inventory of the global conservation status of biological species.

Species are classified by the IUCN Red List into nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation.

- Extinct (EX) – No known individuals remaining
- Extinct in the Wild (EW) – Known only to survive in captivity, or as a naturalised population outside its historic range
- Critically Endangered (CR) – Extremely high risk of extinction in the wild
- Endangered (EN) – High risk of extinction in the wild
- Vulnerable (VU) – High risk of endangerment in the wild
- Near Threatened (NT) – Likely to become endangered in the near future
- Least Concern (LC) – Lowest risk. Does not qualify for a more at risk category. Widespread and abundant taxa are included in this category
- Data Deficient (DD) – Not enough data to make an assessment of its risk of extinction
- Not Evaluated (NE) – Has not yet been evaluated against the criteria

Using information on the signage at Sea Life, it was calculated that the 526 different species at Sea Life are housed in 1,122 exhibits at Sea Life aquariums. Some of these species are housed together in the same exhibit and these exhibits usually have a sign for each of the species housed there. The total number of exhibits observed at all of the Sea Life aquariums is 402. 1,059 signs are present at the exhibits.

The largest proportion (59%) of the species housed in the 1,059 exhibits with signs at Sea Life aquariums do not even appear on the IUCN Red List, as their conservation status has not been evaluated. The second largest proportion (26%) of exhibits house species listed as Least Concern. 6% of exhibits house species listed as Threatened, 2% of exhibits house species that are Endangered and only 0.5% are listed as Critically Endangered. Figure 3 illustrates these proportions.

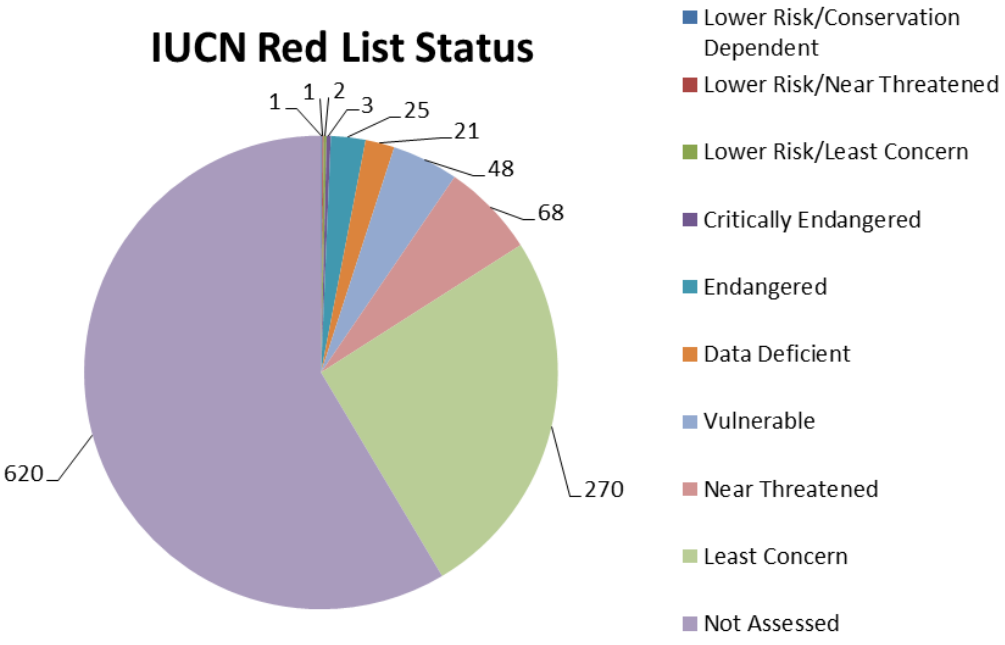


Figure 3: Proportion of IUCN Conservation Statuses at Sea Life aquariums

Loch Lomond Sea Life states on its website: 'Many of our creatures are on the endangered list ... or have been bred as part of our conservation project at Loch Lomond'. Both statements are, in fact, misleading. Only 2% of species at the aquarium are listed as Endangered by the IUCN, and only 1% are Critically Endangered. 50% of species housed at Loch Lomond Sea Life have not been assessed.

Similarly, Weymouth Sea Life claims on their website that 'many of the creatures' are Endangered (Sea Life website), however again this is misleading. Only 3% of species at Weymouth Sea Life are listed as Endangered by the IUCN, and only 1% are Critically Endangered. Almost half (49%) of species housed at Weymouth Sea Life have not been assessed.

The zoo industry claims that an indicator of its commitment to the conservation of biodiversity can be measured by its participation in ex-situ species management programmes. Particularly European Endangered Species Breeding Programmes (EEPs) or European Stud Books (ESBs). Only 0.7% of all exhibits at Sea Life aquariums house Critically Endangered animals, from five different species - the Axylotl (*Ambystoma mexicanum*), European eel (*Anguilla anguilla*), Cuban crocodile (*Crocodylus rhombifer***),** blackbelly tiliapia (*Sarotherodon linnellii*), and the roti snake neck turtle (*Chelodina mccordi*). None are involved in coordinated EEPs. Two of these species are advertised as have been bred from, or have bred at Sea Life. None of these species have been reintroduced to the wild by Sea Life.

2.6% of all exhibits at Sea Life houses species listed as Endangered, from 11 different species - Green sea turtle, Bangaai cardinal fish, undulate ray (*Raja undulata*), emperor cardinal fish (*Pterapogon kauderni*), European pond turtle (*Emys orbicularis*), giant freshwater stingray (Himantura chaophraya), Napoleon wrasse, phantasmal poison dart frog (*Epipedobates tricolor*), Asian arowana (*scleropages formosus*), Chinese golden thread turtle (*Mauremys sinensis*), and scalloped hammerhead. Again, none of these species is involved in any coordinated EEP, and only two are advertised as have been bred from, or have bred at Sea Life. None of these species has been reintroduced to the wild by Sea Life.

5.4 Sea Life and Fishing

Unlike whaling and shark finning, which Sea Life has campaigned to ban, Sea Life does not advocate an end to fishing even though, along with collection for aquaria, it is widely recognised as being the biggest threat that fishes face. The number of fish killed for human consumption and by-catch each year is steadily increasing, as consumer demand is increasing – also the demand for fish in 'pet' food and feed for farmed animals - as well as the world's human population, is growing rapidly.

Instead Sea Life advocates and promotes the 'sustainable' consumption of fish, asking visitors to 'Take Action' by consuming species not considered under threat (though they presumably will be if people continue to consume them). Decades of fishing have decimated fish populations and the situation is not improving as more and more species which were once widespread become threatened. In North America, a number of public aquariums have been involved in efforts to promote sustainable seafood for more than a decade (Koldewey *et al.,* 2009; Tlusty, 2012; Ward and Phillips, 2008*a*) and it has been stated that public aquariums function as environmental NGOs to help promote environmental stewardship of the seafood industry (Kuhlman and Farrington, 2010).

At Loch Lomond Sea Life, a staff member told the CAPS investigator "*I don't eat cod, 'cos I know the numbers are low, but I'll eat Pollock*". Sea Life also promotes restaurants that offer for sale species considered to be 'sustainably-caught' (Sea Life website), they serve fish in Sea Life restaurants, and offer a 'Good Fish Guides' to visitors, informing them which fish are deemed 'sustainable'.

Sea Life's answer to the burgeoning, catastrophic impact of fishing is for visitors to eat other species of fish, urging them to 'try mackerel, coley and sardines' instead of the more endangered species. However, even this 'conservation effort' rings hollow as, two years after signing the 'Sustainable Fish City Pledge' and promising to improve 'the sustainability' of the fish served at private events (Sea Life website), Sea Life continues to offer one of the species most in danger, cod (Genus: *Gadus*), in its event catering menu at Birmingham Sea Life.

5.5 Ex-Situ Conservation

The EC Zoos Directive requires all zoos in the European community to contribute to the conservation of biodiversity in accordance with the community's obligation to adopt measures for *ex situ* conservation under Article 9 of the Convention of Biological Diversity (1992). All zoos in the community are required to participate: "*….in research from which conservation benefits accrue to the species, and/or training in relevant conservation skills, and/or the exchange of information relating to species conservation and/or where appropriate, captive-breeding, repopulation or reintroduction of species into the wild'* (Article 3. European Council Directive 1999/22/EC).

During the investigation, the CAPS investigator was informed by staff at several Sea Life aquariums that the captive-breeding of animals is necessary to stop Sea Life, and other aquariums, taking animals from the wild.

At Manchester Sea Life, staff stated: "*We get animals from all over the world to avoid ordering more from an exporter who exports from the sea*". The Sea Life website also states: 'Our [sea horse breeding] programme has meant that we do not need to rely on external suppliers to find seahorses for our exhibitions. That means that none will ever be taken from the wild on our behalf. It also means that we may be able to use our stock to resupply wild stock if they become extinct in the wild'. There is no questioning of whether animals should be taken at all from the wild, only that they will be if they are not bred in captivity.

Blackpool Sea Life state on their website that 45 new-born rays at the aquarium are part of a breeding programme which 'aims to produce enough captive-bred rays (Sub-class *Elasmobranchii*) to keep aquariums stocked' (Sea Life website). If the captive-breeding programme fulfils no more purpose than to stock aquariums however, with no reintroduction of endangered species into the wild, then its validity should be questioned.

Zoos also claim that they exhibit endangered species and breed from them so that they can be released into the wild. However, this has been shown to be a claim rather than a reality (Casamitjana and Turner, 2001).

Captive-breeding is, in truth, neither an effective nor useful conservation tool for most species, and most of these programmes simply breed animals for zoo displays. The breeding and inter-aquarium distribution of species is failing to reduce pressure on wild populations. Besides, most zoo breeding produces animals who are already common in captivity (Laidlaw, 2008). Only a small number of species have ever been released into the wild.

Aquariums traditionally have had little success breeding marine fish. To understand the reason for this lack of success, one can look at the complicated early life histories of most marine fishes, and the often costly and labour-intensive investment needed to rear such species. Even with coordinated effort, the breeding of marine fishes and invertebrates will not fulfil the needs of public aquariums in the near future. Therefore, if public aquariums are set to continue to use animals in their exhibits and laboratories for education and research in the current numbers, the collection of animals from the wild will be necessary. A key question

must then be addressed: is it ethical for marine fishes and invertebrates to be collected from the wild? Only a fraction of all marine species have been assessed using the IUCN Red List criteria to date (Thoney *et al.,* 2003).

Signage at Sea Life aquariums state that, during the year 2013, 5,633 animals were born at Sea Life. Interviews with staff at Sea Life aquariums revealed that the attitude amongst Sea Life staff is overwhelmingly that, if an animal breeds, then the animal must be 'happy'. On the Sea Life website, it is also stated: 'breeding is the ultimate endorsement for our husbandry techniques and the quality of water and theming in our displays' (Sea Life website).

Photo 8: Seahorses are bred, not to be released to the wild, but to stock aquariums

Sea Life lists the breeding of seahorses (genus *Hippocampus*) as one of its highlights and claims to lead 'European efforts to breed the undulate ray' (Sea Life website). In fact Sea Life is not part of any recognised European Breeding programme for the species and one doesn't exist. Sea Life claim that their successes in the UK, and overseas, include the birth of a blacktip reef shark and a zebra shark (Merlin Entertainments Annual report, 2012), yet staff at several Sea Life centres have claimed that blacktip reef sharks continue to be wild-caught. In June 2013, there was a 'baby boom' at Great Yarmouth Sea Life - six baby thornback rays, a brood of baby Malawi cichlids (of the family *Cichlidae*) and hundreds of baby guppies (*Poecilia reticulata*) and tetras, of the family *Characidae* were born. The website states: 'delighted displays staff are also nurturing dozens of baby upside-down jellyfish (genus: *Cassiopea*), and now a pair of South American oscars (*Astronotus ocellatus*) have begun busily preparing a nest' (Sea Life website). A member of the Animal Care team at Hunstanton Sea Life claimed to the CAPS investigator that Sea Life breed 150 axolotl (*Ambystoma mexicanum*) each year, yet none of these animals have been released into the wild.

Captive-breeding can only be regarded as a temporary measure because of the numerous genetic and behavioural problems likely to arise from housing small numbers of animals together in captivity over several generations or more. The answer to fish conservation lies in tackling the causes of decline – overfishing, collection and habitat decline (contributed to by the aquarium industry) - rather than breeding animals in captivity for reintroduction, even if this were viable; and there is no real indication it is.

There is also a high risk of released aquarium fish transmitting disease to wild populations. In most aquarium tanks, the fish are living with many others, and the volume of water is limited. This means that communicable diseases can spread rapidly to most or all fish in a tank. Salmon housed on farms are also crowded and diseases and parasites transferred from farmed to wild salmon populations have had devastating effects (e.g. Costello, 2006). Sea lice from salmon farms are now one of the most significant threats facing wild salmon.

The European Association of Zoos and Aquariums (EAZA) currently has two different levels of breeding programmes - EEPs and ESBs. Out of all taxa observed at Sea Life aquariums, no species belongs to an EEP, and only 2% out of all species exhibited belong to an ESB (zebra horn shark, zebra shark, sandbar shark, blacktip reef shark, blue spotted sting ray, spotted eagle ray, long snouted sea horse, Malayan box turtle (*Cuora amboinensis kamaroma)*, giant Asian pond turtle (*Heosemys grandis*), Cuban crocodile and African dwarf crocodile (*Osteolaemus tetraspis*)).

Staff at Great Yarmouth Sea Life claimed to the CAPS investigator that they are part of the thornback ray "*breeding programme studbook*". A staff member at Weymouth Sea Life stated: "*This lady here [pointing to a Thornback ray] has supplied all the other Sea Life aquariums so has done very well for herself. You can always tell she's a hard worker, round the rear of the body she looks a bit rough and a bit worn and that's the male biting her for breeding purposes. As I say, fortunately that's just how the lady rays like it apparently, a bit of biting".* He also claimed that breeding her for Sea Life aquariums will "*keep her species on the planet a bit longer*". However, there is not currently an ESB for the thornback ray so this is not an official, coordinated European breeding programme.

Sea Life also claim they have established a studbook for the undulate ray to "*help pair-up unrelated adults to produce genetically sound offspring*", between Sea Life aquariums, presumably. Sea Life states that they aim to 'establish a thriving captive-bred population which could feasibly be used for re-introduction should the wild population fall to a dangerously low level' (Sea Life website).This is extremely unlikely to be feasible, given the small undulate ray gene pool that exists in public aquaria.

Photo 9: Sea Life claim to run breeding programmes for endangered rays

Sea Life claim to run 'global breeding programmes for 13 species of endangered rays' on signage at centres and websites, however out of the 16 species of ray observed at UK Sea Life aquariums - spotted ray, undulate ray, thornback ray, pelagic stingray (*Pteroplatytrygon* violacea), blue spotted stingray, painted ray (*Raja microcellata*), cownose ray (*Rhinoptera bonasus*), blonde ray (Raja brachyura), ocellate river stingray (*Potamotrygon motoro*), giant freshwater stingray (*Himantura polylepis*), common shovelnose ray (*Rhinobatos typus*), fiddler ray (Trygonorrhina dumerilli), southern stingray (*Dasyatis americana*), Xingu river ray (*Potamotrygon leopoldi*), tiger ray (*Potamotrygon schroederi*) and bigtooth river stingray (*Potamotrygon henlei*), only two are listed as Endangered on the IUCN Redlist (the undulate ray and giant freshwater stingray). The common shovelnose ray is listed as Vulnerable. Unless Sea Life houses many more endangered species of ray in European aquariums, this is another fallacy.

Sea Life claims to be a member of Seahorse International Taxon Advisory Group, yet the Chair of the Fish and Aquatic Invertebrate Taxon Advisory Group (*FAITAG*), who is also the Curator of the Zoological Society of London (ZSL) Aquarium, was unable to confirm this when the CAPS investigator contacted him (Sea Life, pers. comm., 22 January 2014). Neither was he able to confirm whether Sea Life is involved in an official coordinated conservation captive-breeding programme for ray species (Sea Life, pers. comm., 22 January 2014).

According to the media, Sea Life have stated that the bowmouth guitar fish is considered the 'panda of aquariums' (41 Action News website). Indeed, the species is listed as Vulnerable by the IUCN and is of considerable threat due to fishing as a target species and as bycatch and habitat destruction (McAuley and Compagno, 2003). However, whilst bowmouth guitar fish populations *are* dangerously low, aquariums have done nothing to help the species.

In 2007, Newport Aquarium in the United States launched the World's first 'Shark Ray Breeding Programme' using wild-caught individuals from Taiwan. Finally, on 24th January 2014, seven years into the breeding programme, the female bowmouth guitar fish 'Sweet Pea' gave birth to seven pups. However, within a month, all pups had died. The last surviving pup died on 24th February 2014. These were not the only deaths though at Newport Aquarium. During July 2013, a newly acquired female bowmouth guitar fish

died from internal bleeding after a male attempted to mate with her at the aquarium (The Dorsal Fin – Shark News website; USA Today website), which may have been a result of transport stress, and being forced to endure an overly-restrictive environment with insufficient escape zones.

Despite this disastrous breeding programme, Sea Life is launching 'Europe's first bowmouth guitar fish breeding programme'. The species again is not included in any EEP. Sea Life states: 'In spite of the lack of success so far we are determined to keep trying for Europe's first bowmouth babies. Not only will a successful programme help generate stock for educational shark exhibits at other Sea Life aquariums, a captive-bred population may prove a vital lifeline in the future should the wild population fall to a dangerously low level'. The fact is, bowmouth guitar fish populations are already dangerously low and it is unlikely Sea Life will be breeding and reintroducing the species any time soon, if at all.

The lack of participation in coordinated breeding programmes, published scientific research and language used by Sea Life to describe its breeding programmes reveal a lack of professionalism, knowledge, and scientific credibility. On Loch Lomond Sea Life's website, it is stated: 'Love is in the air at The Loch Lomond Aquarium with the arrival of an amorous female Undulate Ray, 'Wilma'. The female ray arrived at the aquarium in early February as a partner for the aquarium's frisky (but lonely) Fred, who has been living here since it opened in 2006'. This statement is incorrectly featured alongside an image of a cownose ray.

5.5.1 CASE STUDY: The Seahorse

A very special group of marine fish exploited by the aquarium industry are the *Syngnathidae*, a family that includes seahorses, pipefishes, and sea dragons. Seahorses are bony fishes whose evolutionary history is so recent that the major stages of morphological evolution are still represented in extant species.

Sea Life London states: 'We never take any [seahorses] from the sea for display – and if they become extinct, we'll release our stocks into the wild' (Sea Life website). In reality, if seahorse species become extinct, it is probably too late. Given that a considerable proportion of the seahorse trade is for aquaria, it would be more effective for Sea Life to focus on educating visitors about the dangers of fishing the animals for the aquarium trade and the importance of allowing animals to live naturally, in the ocean, free from exploitation (Sea Life website).

In 2003, Weymouth Sea Life opened the 'National Seahorse Breeding and Conservation Unit' which, similar to other Sea Life's captive-breeding programmes, is not part of any official EEP or ESB. There is no Stud Book which would enable the captive population to be managed genetically and the main aim is to stock aquariums with Seahorses.

Sea Life claim that Seahorses must be housed in aquariums because of the dangers they face in the wild, however it is the public aquaria trade itself which contributed to, and continues to contribute to, its demise (CAPS, 2004). In fact, public aquaria only began to breed seahorses when the EC Zoos Directive was introduced in 1999, and the subsequent Zoo Licensing Act 1981 Amendment Regulations 2003 and 2003 forced aquariums to establish conservation programmes (CAPS, 2004).

At Brighton Sea Life, a staff member claimed to the CAPS investigator that Sea Life saves 80% of live young, whereas in the wild, only 5% survive to adulthood. In fact, the number is around 0.5% yet litters are large and this survival rate is actually high compared to other fish, because of their protected gestation, making the process worth the great cost to the father. The eggs of most other fish are abandoned immediately after fertilisation (National Geographic website).

Sea Life do not campaign to end the Seahorse trade, yet this is what is desperately needed. Supporting the 'sustainable' harvesting of Seahorses means that Sea Life and other companies which profit from the exploitation of fishes can continue with business as usual. Even captive-bred exports should not be allowed

where they cannot be distinguished from wild-caught animals. A regulated trade in Seahorses benefits traders and consumers, rather than the animals themselves.

The Seahorse Trust is one of the NGOs which Sea Life supports, and there is no mention of the role that public aquaria play in the demise of the animals on this NGO's website. The Seahorse Trust advocates captive-breeding as the solution, advocates for an end to the trade for traditional medicine, and points a finger at the curio trade and the home aquarium trade' for the decimation of populations (Seahorse Trust website).

5.6 Rescue and Release of Animals

Sea Life claims to 'Rescue, Breed, and Protect', and indeed, some of the animals at Sea Life do appear to have been rescued. For example, at Hunstanton Sea Life and Brighton Sea Life, staff told the CAPS investigator that all of the fish housed in the 'Amazonian' section – for example the Pangassius, a genus of shark catfishes native to Asia, such as iridescent shark (*Pangasianodon hypophthalmus*), were rescued from home aquaria or 'donated' by members of the public to Sea Life. All the Green sea turtles at Weymouth Sea Life have been imported from Florida where they were injured by speed boats. The most controversial so-called 'rescue' however was in 2006, when Sea Life imported 20 Green sea turtles from the Cayman Islands for display around Europe.

5.6.1 CASE STUDY: Import of Twenty Green Sea Turtles from Cayman Islands

During the investigation, staff at Manchester Sea Life claimed to the CAPS investigator that 'Ernie', the Green sea turtle housed at the aquarium was 'rescued' from a turtle farm in Cayman Islands during 2006. Sea Life has also stated this in the media (The Guardian website). However, it is likely that 'Ernie' was in fact one of 20 Green sea turtles imported into the UK from the Cayman Islands amidst great controversy.

Investigation by CAPS has revealed that during a 2006 symposium, some of the world's leading Sea turtle experts and conservationists opposed this export of 20 Green sea turtles for Sea Life because, they claimed, it contravened the Convention on International Trade in Endangered Species (CITES) (Turtle Conservancy, 2006). The experts, plus the Costa Rican Government and animal conservation NGOs, strongly voiced their opposition to the export, by lobbying both the Belgium Government and the CITES Management Authority in an attempt to stop the export.

Photo 10: Twenty green sea turtles were acquired amidst controversy from a farm in the Cayman Isles

Regardless of this, the export appears to have gone ahead as planned, and the turtles were shipped to the UK and on to various Sea Life aquariums. If Sea Life's own statements are to be believed, one of the animals is likely to be 'Ernie', at Manchester Sea Life.

If 'Ernie' is one of the turtles who arrived

from the Cayman Islands, the fact that Sea Life are labelling this as a 'rescue' is highly misleading. The truth is that Sea Life acquired the 20 Green sea turtles from a Cayman Islands turtle farm, and shipped the animals despite widespread condemnations amongst experts and NGOs.

Additionally, numerous captivity-related health problems have been documented in the turtles at the Cayman Islands farm which exports turtles overseas (Warwick *et al.,* 2013). Several reports by the World Society for the Protection of Animals (WSPA) at the farm also reveal the inhumane conditions there (WSPA website).

Seals are rescued and rehabilitated at the two Sea Life Seal Sanctuaries in Gweek (Cornwall) and Oban (Scotland), and there are, on occasions, individual stranded animals which Sea Life releases. These operations tend to be featured positively in the media.

The majority of animals which Sea Life releases are not considered endangered by the IUCN, however in 2012, a Sea Life aquarium in Europe did release an endangered Kemp's Ridley sea turtle (*Lepidochelys kempii*) fitted with a satellite transmitter off the coast of Mexico who had been stranded in Holland.

Other animals which aquariums around the world have introduced to the wild are animals who have been unsuited to captivity, such as pelagic species, which are often released when they begin to show signs of stress. Animals such as great white sharks (*Carcharodon carcharias*) and whale sharks have been so clearly unsuited to life in a tank, aquariums have had little option but to release them. And animals have died as a result (e.g. Santa Cruz Sentinel website; Underwater Times website). Aquariums have also dumped sandbar sharks, dog fish and lemon sharks back into the sea because they weren't required or wanted any longer, despite the fact that the release of 'surplus stock' goes against IUCN Guidelines for Reintroduction (IUCN Species Survival Commission website).

Until 2004, attempts to hold great white sharks in captivity were unsuccessful, ending in either the death or early release of these animals. Attempts in the 1960's and 1970's were made by aquariums in the United States, Australia and South Africa, with most sharks lasting only a day or so. In September 2004, Monterey Bay Aquarium broke all records by housing a small female great white shark captive for 198 days before releasing her into the wild in March 2005. Even this animal had to be released however as, according to the media, she killed two other sharks and had become increasingly aggressive (Rodney Fox website). The 'Project Shark' website of Monterery Aquarium however makes no mention of this.

Following this release, five other great white sharks the aquarium has had on exhibit have all been returned to the wild. In 2006-2007, one animal was released early as he obtained a four inch wound he sustained from bumping into the tanks glass (Rodney Fox website). Again, no mention of this is made on Monterery Aquarium's website.

The great white shark is a species well-known to become depressed, disorientated, self-damaging and increasingly aggressive in captivity (Shark Bookings website). Many individuals also refuse to eat. Monterey Bay Aquarium paints a very different picture however, stating: 'Many of our sharks have thrived on exhibit' (Monterey Bay Aquarium website).

6. SCIENTIFIC RESEARCH

Brighton Sea Life has become involved in research on the cuttlefish, which have been bred at the aquarium for scientists at the University of East Sussex (ITV News website). This research was highlighted in both the media (ITV News website), and during this investigation, on a 'Behind-the-Scenes' tour at the aquarium. The research is headed up by neuroscientist Dr. Daniel Osorio from the university, who also sits on the Ethics Committee of Merlin Entertainments. The animals involved in the study were born at Sea Life during late 2013 as part of an 'ongoing study' by the university to determine ways in which cuttlefish adapt to their

environment. Brighton Sea Life have been quoted in the media on the 'potential' for this research to aid military operations and, according to the media, the Ministry of Defence are keen to adapt the animals' camouflage ability for use on tanks and other war vehicles (The Argus website).

An opportunity to publicise the conservation benefits of this research (if there are any) was missed by Sea Life when a member of staff stated on national television: "*These newborn cuttlefish may appear harmless – but they are set to change the face of modern warfare … it leads to lots of questions and whether we can use what they do in our environment and in case of war ...*" and "*If we can mimic what they can do then we are going to be way laughing and you know you can make an invisibility cloak just like Harry Potter*" (ITV News website).

Other areas of research carried out at public aquaria often aid advances in the aquarium industry, or other industries, rather than benefit or influence the conservation of biodiversity.

An example of research carried out by Sea Life which advances animal husbandry techniques, rather than the conservation of species in desperate need of help, is the 'target training' of sharks. Whilst Blackpool Sea Life claim that this 'valuable' research will 'help researchers understand the movement of wild sharks' (Sea Life website), the main use of this training is to simplify feed times for aquarium staff (e.g. The Telegraph website; Mail Online website) and it has been reported that training makes moving animals easier as staff don't need to "*chase them around*" (The Telegraph website; Mail Online website).

Shark training has been carried out at other public aquaria, for example at Shedd Aquarium in the United States (Discovery Communications website). This training once again surely indicates that these animals are not suited to life in a tank.

Learning in sharks was first investigated formally in the 1960s and 1970s, with numerous accounts demonstrating the ability of these animals to learn through operant and classical conditioning techniques (Guttridge *et al.,* 2009). Working with such large, elusive marine predators has made captive experimentation extremely difficult with certain species (Bres, 1993), forcing many researchers to have low sample sizes. For these reasons, many learning studies have primarily conducted experiments on smaller-bodied species, leaving substantial gaps in our general knowledge of learning among shark species.

In order for Sea Life's research to truly aid the understanding of wild shark movement, any controlled experiment should be conducted in parallel with field studies to ensure that experiments in captivity are relevant and applicable to wild animals. Due to the lack of published data from Sea Life, it is unlikely that the company develops investigations in concert with existing research and conservation efforts currently undertaken by academia. It is also important that future experiments are designed using standard experimental protocols to ensure that results can be compared to other taxa. Linking wild studies of sharks with captive controlled experiments is important so that learning can be placed in the context of natural behaviour, ensuring that patterns, processes and mechanisms identified in the lab are useful when explaining wild behaviour (Guttridge *et al.,* 2009).

7. EDUCATION

The EC Zoos Directive requires all zoos to have an Education Strategy that promotes: *'public education and awareness in relation to the conservation of biodiversity, particularly by providing information about the species exhibited and their natural habitats'* (Article 3. European Council Directive 1999/22/EC).

Zoos and aquariums portray themselves as facilities where visitors can learn about the natural attributes of animals which will, in turn, encourage visitors to protect them in the wild. Sea Life states: 'We attract over

six million visitors every year. This gives us a unique opportunity to increase awareness of, and support for, a wide range of marine conservation issues' (Sea Life website).

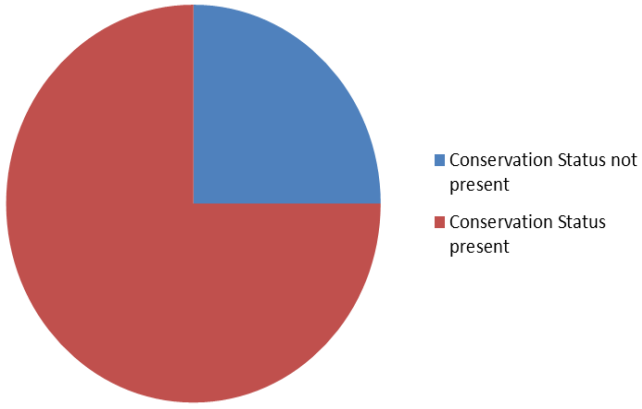
It was noted by the CAPS investigator that most visitors did not stop to read graphic panels as they rushed from exhibit to exhibit. To determine the level of commitment to public education by Sea Life, CAPS analysed the quantity and quality of signage at aquariums, and recorded whether the facilities offer guided tours or educational talks.

The UK zoo regulations state that there must be minimum information on exhibit signs and, in the SSSMZP, it is stated that accurate information about the species exhibited must be available. This should include 'as a minimum, the species name (both scientific and common), its natural habitat, some of its biological characteristics and details of its conservation status' (SSSMZP).

The investigation revealed that whilst signage is present on the majority of exhibits, the information provided is often incomplete or inaccurate. Signage at some aquariums do highlight that collection for the home aquarium and curios trade are causes for population declines, though at no aquarium is it mentioned that public aquaria have also contributed to the demise of fish and other animals.

Information signs at Manchester Sea Life are operated on touch screens, which visitors need to press to view all the information. It was observed during the investigation that visitors rarely use these screens. Possibly because visitors did not realise the signs were touch screens. At some aquariums, signage is barely readable or located far from the relevant exhibits. Some of the exhibits at aquariums have no signage at all.

Figure 4 and Figure 5 illustrates that, out of the 1,059 signs present at exhibits, 25% of the signs include no Conservation Status at all, which means they lack the required criteria as outlined in the SSSMZP. Where the conservation status is present, 20% of signs display incorrect Conservation Status of species.



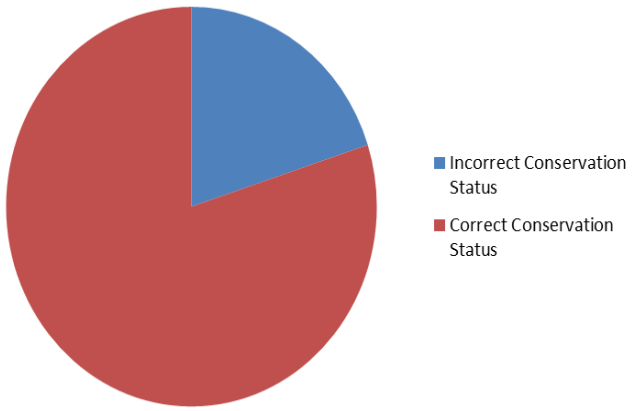


Figure 4 and 5: Conservation Status at Sea Life

The aquarium with the most number of exhibits featuring signage with no Conservation Status on at all is Birmingham Sea Life (which refers to itself as the 'National Sea Life Centre'). At this aquarium, 84% of signage is lacking this important information. At Oban Sea Life, 77% of signage lacks Conservation Status, at Great Yarmouth Sea Life, 48% of signage lacks Conservation Status, and at Scarborough Sea Life, 34% of signs have no Conservation Status.

The aquarium with the most number of signs featuring incorrect Conservation Status is Weymouth Sea Life. At this aquarium, 24% of signs display the incorrect information, at Loch Lomond Sea Life, 22% of signs are incorrect, at Blackpool Sea Life, 20% are incorrect, and at London Sea Life, 19% are incorrect.

Aside from missing and incorrect Conservation Status on signs, there are many exhibits at Sea Life aquariums with no signage at all. At Loch Lomond Sea Life, the excuse made by staff to the CAPS

investigator for an absence of signage was that animals had only just arrived. At Manchester Sea Life, there are incorrect and missing signs throughout the aquarium. Some animals, staff claimed, had been moved to other aquariums as they had not settled in, for example the Octopus who was replaced within weeks of the aquarium opening as she was not '"*active*" enough. The explanation for the other incorrect signs, for example at the ray pool, was that: "*some of the computers around Sea Life are a bit messed up like the information is different, they need to mend them basically*".

Promoting public education and awareness in relation to the conservation of biodiversity is extremely important, as well as being an aquarium's legal duty. It should therefore be questioned whether an aquarium should even be open to the public when incorrect information is being provided to visitors.

The lack of meaningful information provided to visitors at Sea Life, along with the unnatural tanks that the animals are housed in, indicates that, overall, the education value for visitors who visit Sea Life is extremely poor.

Some examples of misleading or inaccurate claims made by Sea Life staff acting in an educational capacity during the investigation are as follows:

"*There are no abnormal behaviours going on anywhere here*", when there were clear abnormal behaviours present at the facility. When asked whether turtles display abnormal behaviours, staff responded: "*No, haven't seen any abnormal behaviours. I mean if it was abnormal it would be hiding away all the time and he wouldn't be swimming around*".

The reasons given by staff for the presence of Surface Breaking Behaviour (SBB) in rays included: "*curiosity", "feeling comfortable enough to come out of the water", "dancing", "exercise", "coming up for air", "taking in oxygen", seeking out heat", "showing off", "excitement", "being attracted to visitors wearing the colour blue, as Sea Life staff also wear blue coloured uniforms", "friendliness*", and *"the monitoring of visitors' heartbeats, as they can detect electric signal".*

Staff at several centres claimed that Sea Life does not display wild-caught animals: "*As far as I know we don't*", "*we never get any animal - from the shrimps to the sharks - never get any animal from the sea because we find it cruel. It's part of our company policy not to*", and "I *don't know if we do that anymore*".

Signage and staff at Sea Life provided a false explanation for the hiding behaviour of the common octopus tank - the animal was "*camouflaging*".

Misinformation was provided to the CAPS investigator regarding the captive-breeding of rays. For example staff stated that Sea Life was part of the Thornback ray "*breeding programme studbook*".

Staff at Sea Life often provided misinformation to visitors regarding the behaviour and welfare needs of animals, for example: "*This lady here [pointing to a Thornback ray] has supplied all the other Sea Life aquariums so has done very well for herself. You can always tell she's a hard worker, round the rear of the body she looks a bit rough and a bit worn and that's the male biting her for breeding purposes. As I say, fortunately that's just how the lady rays like it apparently, a bit of biting".*

When asked whether animals should be in barren tanks, Sea Life staff responded**: "***They occur in quite bare areas and they don't have predators, they don't feel a requirement to hide*". Another Sea Life staff member claimed the octopus does not require larger tank as the animal would be "*overwhelmed ... in the wild, she would sit in a cave and wait .. they don't need a lot of space*".

The misinformation regarding animal behaviour was further highlighted when a ray swum at the surface of the water in one ray pool. A Sea Life member of staff stated: "*Hello! Wagging your tail, you're that excited are you?!".*

A staff member at Great Yarmouth Sea Life stated that the aquarium houses five blacktip reef sharks "*because they are a pack animal ... like a wolf, or a family of dolphins*", yet whilst Blacktip reef sharks have been observed cooperatively hunting in the wild, they are generally solitary.

Staff claimed that turtles "*do not need to bask*", as they "*spend their entire time under water anyway*". When staff were asked what welfare indicators are used for turtles, they responded: "*Feeding and swimming*", and "*a general sort of looking over the body*". The Animal Care member of staff added: "*I mean if he's swimming around he's pretty happy then that's probably a good indicator*" and "*if they stop eating they are not happy*".

Sea Life centres often claimed to 'rescue' animals from fishermen, yet in the same conversation admitting to purchasing them.

Some other bizarre statements include: "*We also don't keep wild sharks, um sorry, intelligent sharks either. So all sharks have a higher intelligence but the really, really intelligent ones we won't keep*", "*crabs are tamed, exactly the same as you'd tame a cat or dog*", "*these newborn cuttlefish may appear harmless – but they are set to change the face of modern warfare .. it leads to lots of questions and whether we can use what they do in our environment and in case of war ..*" and "*If we can mimic what they can do then we are going to be way laughing and you know you can make an invisibility cloak just like Harry Potter*".

8. ANIMAL WELFARE

The EC Zoos Directive specifies that all zoos should maintain high standards of animal husbandry and provide: '. . . *species specific enrichment of the enclosures* . . .' (Article 3. European Council Directive 1999/22/EC).

Most modern definitions of animal welfare accept that welfare involves both the biology of animals and the feelings they experience (Laidlaw, 2005). According to Donald Broom, Professor of Animal Welfare at Cambridge University: 'The welfare of an animal is its state as regards its attempts to cope with its environment. The origin of the concept is how well the individual is faring or travelling through life. It can be good or poor but, in either case, there will often be feelings associated with the state which we should try to measure, as well as using more direct measures' (WSPA, 2000).

Fishes are no longer regarded as having short-term memories and it is now accepted that they exhibit a rich array of sophisticated behaviours with impressive learning capabilities (Laland *et al.*, 2003). Sharks for example possess an excellent sensory system which provides them with visual, acoustical, chemical and electrical information about their physical environment. Most animals are active and spend much of their day (or night) exploring, foraging, hunting, evading predators, finding mates, communicating etc. They lead complex lives, and need to be able to make their own choices and have control over their own lives. Social animals need to live with others of their own kind so they can forage for food together or hunt cooperatively, or simply play. Many species also develop deep social and family bonds which can last their entire lives.

Captive conditions typically replace many features of the natural world with artificial and frequently poorly matched alternatives that deprive animals of known normal behaviour and associated biological needs, such as hunting, spatial range, and macro-habitat investigation (Arena *et al.,* 2004; Warwick *et al.,* 2004). The components of artificial environments are notoriously complex, involving issues that include, but are not limited to, space, temperature, humidity, light, airflow and furnishings – each with its own array of known (and often more importantly unknown) key factors (Warwick *et al.,* 2013).

Aquatic animals in captivity require the kinds of natural and complex experiences all animals encounter in the wild. Yet they are often almost completely reliant on humans. In Sea Life aquariums, the lives of the incarcerated animals are dependent upon the staff. Yet aquatic animals lead such different lives to ours, it is not easy for us to know what is best. Decisions regarding animals in aquariums and other captive animal facilities are often based on space availability and the desires of visitors, rather than the needs of the animals.

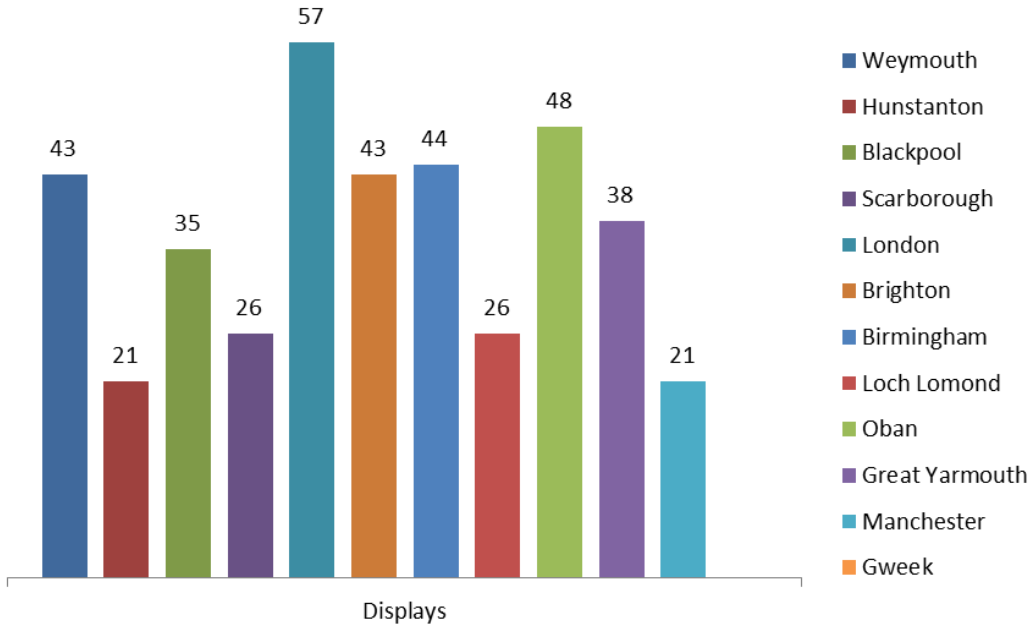


Figure 6: Number of tanks per Sea Life aquarium

As mentioned previously, staff at Great Yarmouth Sea Life informed the CAPS investigator that successful breeding is a positive indicator of welfare. However, in isolation, active reproduction is a poor indicator of welfare and can be highly misleading (Broom and Johnson, 1993; Warwick *et al.,* 2004).

The number of exhibits observed at Sea Life aquariums is 402, and this is illustrated in Figure 6. The average number of exhibits per Sea Life centre is 33.5 (n= 12, STD = 15.44). The Sea Life aquarium with the most number of exhibits is London Sea Life.

8.1 Tank Type

The types of exhibits at Sea Life aquariums is illustrated in Figure 7, and a description of the tanks in Table 3. Inside tanks are a variety of artificial decorations (corals, seaweeds, anemones, etc.) and rockwork.

TANK TYPE	DESCRIPTION
Big (no tunnel)	Tank bigger than 200 cubic metres of volume, more than three metres deep but without any underwater tunnel for the visitors to walk through
Big shallow	Relatively big tank much bigger in surface than in height (less than one metre deep),without a pentagonal or similar shape, and not designed to allow visitors or staff easy physical access to animals normally living in rock pool habitats
Cylindrical	Tank with its main acrylic/glass in a cylindrical shape
Tunnel	Tank with an underwater tunnel for visitors to walk through
Quarantine	Tank with no acrylic/glass walls, normally located in the quarantine or holding area of the public aquarium although still in public view
Ray pool	Relatively big tank (bigger in surface than in height), less than two metres deep and with a pentagonal or similar shape normally used to display rays and/or small sharks
Spherical	Tank with its main acrylic/glass in half spherical or a quarter of a sphere
Wave	Tank with a mechanical device that produces artificial waves
Immersion	Visitors can immerse themselves inside exhibit behind spherical acrylic/glass
Traditional	Square or rectangular tank
Outside	Tank located outside of facility
Shallow open top	Visitors can dip hands in, shallow, big, not ray pool nor rock pool

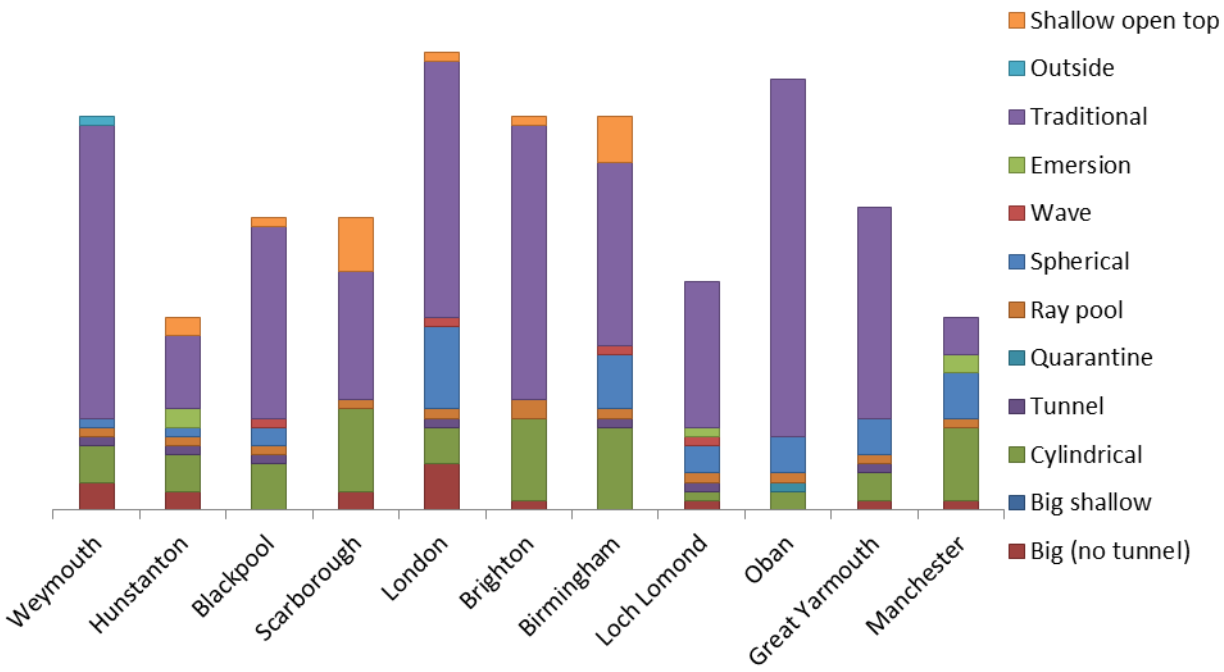


Table 3 and Figure 7: Types of tank at Sea Life aquariums

The most commonly-observed tank is the 'traditional tank', which accounts for 58% of all exhibits observed. The majority of these tanks can be found at Sea Life's oldest aquarium, Brighton Sea Life. 'Cylindrical tanks'

account for 14%, and 'spherical tanks' 9% of all tanks observed. In Sea Life's own words: 'the old-fashioned aquarium is out and tunnels, curved tanks and bubbles, that allow you to get astonishingly close to our wonderful creatures, are in' (Sea Life website). These modern exhibits offer little benefit to the inhabitants, but do appeal to Sea Life visitors.

Photo 11: Spherical tank

90% of the aquariums feature non-traditional tanks, such as cylindrical and spherical tanks. 25% of Sea Life aquariums feature 'immersion exhibits', which gives visitors the sense they're actually in the animals' (artificial) habitats.

The small, shallow 'ray pools' at Sea Life, which are present in 90% of Sea Life aquariums, are open tanks which enable visitors to view animals from above, and dip their hands in if they choose to. They do not cater well for the tank inhabitants. Many of the fish in these tanks are benthic feeders which would naturally spend much of their lives foraging on the ocean floor. In these tanks, animals were observed swimming in endless circles or repeatedly coming to the surface, an abnormal behaviour known as 'Surface Breaking Behaviour' (SBB).

Sharks swimming around the tanks create the impression amongst visitors that they are behaving as they would in the wild and therefore must be 'content'. Yet most shark species need to keep moving in order to breathe as they do not have gills to pump water when they are stationary.

The so-called 'modern' exhibits additionally attract undesirable behaviour from visitors. Spherical and cylindrical tanks encourage visitors to bang on the acrylic/glass, and the '*Finding Nemo*' tanks appear to attract high volumes of visitors taking pictures with their cameras. Many were observed using flash photography. There is signage at some of the tanks urging visitors not to use flash photography, yet it was observed during the investigation that this was vastly ignored by visitors.

8.2 Life in a Sea Life Tank

Photo 12: Many tanks are very small

Sea Life states: 'Naturally, we choose only those species that flourish in aquarium surroundings' (Sea Life website). However, in reality, the species displayed at Sea Life are often not suited for captivity, and do not thrive in the aquarium. This is likely to be that the reason that Sea Life does not publicise its mortality records.

The most commonly displayed animals at Sea Life include common clown fish, yellow tang, common octopus, blacktip reef shark and green sea turtle. Also common throughout the aquariums are rays and other shark species. These animals do not thrive particularly well in captivity, particularly the sharks, and require more space than Sea Life currently provides.

Acanthuridae are the family of surgeonfish, tangs, and unicornfish. The tangs, which are also commonly-exhibited at Sea Life, grow to a large size and require much space. Even Scarborough Sea Life's staff stated to the CAPS investigator that the regal tang - a common and apparently popular fish in Sea Life aquariums amongst visitors - is extremely difficult to house because of its large size. This species was rarely observed in large tanks, however, during the investigation. At one exhibit in Great Yarmouth Sea Life, the animals are housed in a small immersion tank with inappropriate substrate. Visitors were lining up to take photographs of members of their group immersed in the tank and flash photography was being used. Immersion tanks are designed with the visitors in mind, rather than the tank inhabitants. Foliage is often minimal to enable visitors to take photographs of the tank.

Wild aquatic animals hide to avoid predators, when they give birth and raise their families, and when it's time for a rest. The animals at Sea Life are surrounded by visitors for approximately seven hours a day, and there is little reprieve from the sights and noise of visitors during the aquariums' opening hours. Rock pool and ray pool animals are also touched by visitors when their hands are dipped in. This inability to escape such close proximity to visitors may cause stress for the inhabitants of Sea Life.

Many of the animals housed at Sea Life, such as the zebra sharks at Brighton Sea Life, Blackpool Sea Life, London Sea Life and Great Yarmouth Sea Life, are nocturnal. Most of these animals are housed in the same exhibits as diurnal fish, and therefore are forced to coincide with their cycle. Some nocturnal animals are housed in special night-illumination exhibits to invert their normal sleep-wake cycle and keep them active during aquarium opening hours.

In the wild, nocturnal animals would usually hide during daylight hours and come out only at night to forage and hunt. They generally have highly developed senses of hearing and smell, and well adapted eyesight. Nocturnal animals are primarily carnivores or scavengers. Zebra sharks, for example, would naturally spend most of the day resting, and hunting for molluscs and small bony fish on coral reefs at night.

At least 15 fish families have been reported as leaving coral reefs to forage in neighbouring areas at night time (Meyer, 1983). Nocturnal fish exhibited at Sea Life include cardinalfish of the family, *Apogonidae,* soldierfish and squirrelfish of the *Holocentridae* family, scorpion fish of the family *Scorpaenidae*, European sea bass (*Dicentrarchus labrax*), groupers and eels. In the ocean these animals would hide in nooks, caves, crannies and under overhangs during the day, and come out at night to hunt for food. Many invertebrates are also nocturnal, such as octopuses, lobsters, shrimp, crabs, and other crustaceans, molluscs, polychaete worms, and starfish.

Nocturnal fish such as freshwater eels need a place where they can feel secure enough to hide during the daytime. If denied this in captivity, they can become stressed. However, eels, catfish and other such species change their behaviour radically at night, and their level of activity drastically increases. Equally, diurnal fish, such as a parrot fish, do not use shelters by day, yet at night they habitually secret themselves within caves and crevices, and also can become stressed if prevented from doing so. Housing nocturnal and diurnal animals together can be the cause of stress for both types of animals due to differences in their lifestyles – such as sociality and food preference.

An example of two fish housed together at Sea Life who would naturally lead drastically different lives in the wild are the Red lionfish (*Pterois volitans)* and pufferfish species from the family *Tetraodontidae*. pufferfish are diurnal yet are commonly housed in shallow, barren tanks with the nocturnal Lionfish at Sea Life aquariums. Pufferfish can grow up to 38 centimetres and require large, deep areas to inhabit. Lionfish have been found in water depths from 1 to 1,000 foot, and are active, nocturnal hunters (Denver Zoo website). In the wild they would hide in crevices and other hollows in daylight hours, among the rocks and corals, yet Sea Life exhibits these fish in the same tank as pufferfish, with bare minimum hiding opportunities for both the Lionfish in the day, or the pufferfish at night.

At Hunstanton Sea Life, six lionfish are housed in a completely bare, restrictive tank aside from two large ceramic pots on the floor for furnishing. This environment is absolutely unsuitable for the animals and, during the visit, the CAPS investigator recorded all fish in the tank pacing stereotypically - an indication of psychological stress typically seen in captive felids and also in a variety of other animals including fish.

Photo 13: A typical open-top ray tank

Manchester Sea Life also houses lionfish in immersion tanks with a (pacing) boxfish of the family *Ostraciidae*, and a green moray eel (*Gymnothorax funebris*). There are no signs at the exhibit prohibiting the use of flash photography.

Some fish live in schools and others prefer to live alone. Lionfish are solitary as adults, seeking each other out during the breeding period only, yet at Sea Life several lionfish are housed together. For example, at London Sea Life, several of the species are housed in the same tank. All fish in this tank were pacing. Even the home aquaria community advises against keeping more than one lionfish together (Aquatic Community website).

The tiger shovelnose catfish (*Pseudoplatystoma tigrinum)* is a large species of nocturnal long-whiskered catfish native to the Orinoco and Amazon Basins which can grow over a metre in length. At Great Yarmouth Sea Life, the species is housed in a small, barren, cylindrical tank with a diurnal Silver arowana - another Amazon species. It is not possible for the arowana to swim more than its own body length in the Sea Life tank. Both animals were pacing stereotypically. Cylindrical tanks tend to lack sufficient hiding places, which is another reason why this tank is wholly inappropriate.

Photo 14: Immersion exhibit

The moon jellyfish (*Aurelia aurita*) is one of the most commonly housed species at Sea Life. This species is commonly housed in bare kreisel (a circular aquarium designed to hold delicate animals) and pseudokreisel (semicircle shaped) tanks with no furnishings. This is the correct way to house these animals in captivity, as they are fragile, slow moving and can easily get stuck in corners, however it draws attention once again to the fact that some animals Sea Life displays are not suited for tank life.

Cylindrical tanks account for 14% of exhibits at Sea Life, and spherical 9%. These tanks are used frequently at the entrances of the aquariums, housing eel species, and other fish. Birmingham Sea Life has a large cylindrical tank housing tangs and other reef species in the lobby area, and also one in the 'Nemo's Kingdom' area

housing long-nose butterfly fish, regal tangs, porcupine pufferfish of the family *Diodontidae* and yellow tangs. The fish were pacing repeatedly in both these tanks.

Some of the species housed at Sea Life have large home ranges, or are even migratory, travelling long distances between foraging and breeding grounds. Some of the most astonishing feats of endurance are performed by long-distance migrants of the ocean; however other migrants, such as the green moral eel (*Gymnothorax funebris*) make smaller journeys to spawning sites. At Blackpool Sea Life, a large moray eel was performing abnormal behaviour in a small, cylindrical tank with no signage.

Brighton Sea Life also houses Moray eels in a small cylinder tank at the entrance, with no signage, and large green moral eels are also housed in an extremely small tank in the 'Victorian Arcade'. This solitary, nocturnal species can grow up over two metres in length, and inhabit depths in the wild of several hundred metres.

At Great Yarmouth Sea Life, European conger eels (*Conger conger*) inhabit one of the first tanks that visitors encounter. The animals are again extremely restrictive and barren, with only tubing for furnishing - each one facing the visitors so that the animals are unable to fully retreat to an area out of public viewing. The signage states that the species is 'nocturnal, emerging from their chosen crevice to hunt for prey – relying on their strong sense of smell to find their food in the darkness' and that the species 'swims to warmer breeding grounds'. This tank is clearly not large enough or furnished appropriately to accommodate an animal with these behaviours and adaptations.

At Oban Sea Life, the three metre in length conger eels were observed hiding in tubing yet the animals have longer and wider bodies than the tubing, and so cannot fully retreat from public view. Again the tank, which is no more than two of the animals' body lengths, is far too restrictive and barren.

Other obviously unsuitable tanks include the black banded leporinus (*Leporinus fasciatus*) and regal tang tank at Blackpool Sea Life, the Azure poison frog (*Dendrobates "azureus")* tank at Brighton Sea Life, and the majority of 'traditional' fish tanks at Brighton Sea Life. Regardless, the tanks at Brighton Sea Life have received a glowing review by a licensing inspector who visited the aquarium during 2013, who stated: "*I have visited this aquarium a number of times as vet, visitor and inspector over almost 25 years and congratulate Merlin Entertainments on the improvements which have been made .. The quality of the exhibits and the educational component is high*" (Brighton and Hove City Council, 2013).

Previous inspections at Brighton Sea Life also received positive reviews. In response to concerns by CAPS, a report was submitted by the DEFRA-appointed veterinarian in October 2007. No concerns were identified by the veterinarian. A 'special visit' was then carried out by an Animal Welfare Officer during September 2012, in response to concerns raised this time by BFF. Again, no issues were identified (Brighton and Hove City Council, 2013).

At Birmingham Sea Life, large bat fish swam continuously around a barren, cylindrical tank with only a central statue for furnishing. At Great Yarmouth Sea Life and Hunstanton Sea Life, large pacus (*Serrasalminae*) are housed in small, dirty tanks which allow for visitors to dip their hands in. At Hunstanton Sea Life, pacus are housed in a tank with alligator gar (A*tractosteus spatula*), wels catfish (*Silurus glanis*), iridescent shark (*Pangasius catfish*), red-tailed catfish (*Phractocephalus hemioliopterus*), sailfin plecostomas (*Pterygoplichthys gibbiceps*) and koi carp (*Cyprinus carpio*). A visitor was documented throwing crisps into this tank.

At Oban Sea Life, two grey trigger fish (*Balistes capriscus*) were floating motionless against an acrylic/glass tank completely barren of foliage. In the wild, this species would thrive at depths around 200 feet. At Great Yarmouth Sea Life, another large (pacing) grey trigger fish is housed in a traditional tank no more than a few foot squared, and, at Loch Lomond Sea Life, a golden heart trigger fish (*Balistes punctatus*), which can grow in excess of a foot in length, was pacing stereotypically in a restrictive, cylindrical tank. As with most

predatory marine species, in the wild trigger fish would spend the majority of their time patrolling the rocky reefs in search of crustaceans and small fish on which to feed.

At Manchester Sea Life, upon entering the aquarium, visitors encounter 'The Shoal' exhibit, which houses Barref flagtail (*Kuhlia mugil*) circling around an entirely bare tank against a painted background. These animals would usually swim in tightly packed schools along the reef margin of rocky shorelines, up to depths of several metres (Randall and Randall, 2001). Similarly, in London Sea Life, lesser sand eels (*Ammodytes tubianus)* are also forced to swim in circles around a barren, cylindrical tank with only a central artificial rock piece for furnishing. A shallow sand substrate is provided by Sea Life, yet in the wild these animals would spend their days buried in sand, only emerging at dusk to feed.

At Great Yarmouth Sea Life, Atlantic wolf fish (*Anarhichas lupus*), which can grow to over a metre in length, are housed in another restrictive, traditional tank furnished with a toilet that expels bubbles, and the animals have no opportunity to retreat out of public view. This shy species is usually found on rocky terrain at depths of 76 to 120 metres. Blind cave fish (*Astyanax mexicanus*) at Great Yarmouth Sea Life are also housed in an artificially-lit tank which affords no hiding opportunities. Again their natural habitat would be rocky, crevices landscape.

A poor choice of substrate is evident in the axolotl tank at Hunstanton Sea Life. These animals are housed on large pebbles/gravel, yet suffer from impaction-related issues if housed on inappropriate substrate, with fine sand being the preferred option. Impaction can be caused by the digestion of gravel and it can be serious enough to cause death.

The longhorn cowfish (*Lactoria cornuta*) is a commonly housed fish at Sea Life. This species can grow up to 20 inches long, and is both solitary (though juveniles often form small groups) and territorial in the wild. At Hunstanton Sea Life, several individuals are housed together in a small, traditional tank with only a central log and artificial plants for furnishing.

During the investigation, pufferfish were the fish most commonly observed pacing in tanks. These animals are intelligent and suffer captivity-stress when not provided with the 'right' environment. At Sea Life, they are often housed in traditional or immersion tanks with little to keep themselves occupied.

Banggai cardinalfish at Great Yarmouth Sea Life are housed in a small, ceiling hanging spherical tank attached to the ceiling, above visitors' heads. The only furnishings afforded to the fish is a bundle of free floating foliage, presumably to mimic the sea grass habitat the species are found in naturally. Wild Banggai cardinal fish thrive in shallow lagoons, feeding on benthic organisms in groups that include up to 500 individuals. Nothing could be further removed from their natural habitat than this small, barren, spherical environment.

At Loch Lomond Sea Life there are dirty and overcrowded tanks in several rooms. Juvenile dog fish are housed in a small tank adjacent to the adult ray pool at Scarborough Sea Life and, at Loch Lomond Sea Life, juvenile rays were performing abnormal behaviours in a traditional, restrictive tank.

Green sea turtles are housed at 80% of Sea Life aquariums. These large, wide-ranging chelonians naturally inhabit tropical and subtropical marine and coastal environments. This is the second largest species after the leatherback turtle, weighing up to 225 kg and reaching four feet in length. Once hatchlings leave the beach, they begin an oceanic phase, perhaps passively floating in major currents or gyres for several years (Carr and Meylan, 1980; Carr, 1987). Most sea turtles migrate between foraging and nesting grounds, and seasonally to warmer waters. Often these migrations take them hundreds and even thousands of miles. They navigate the oceans of the world (Science Daily website) and with satellite telemetry and researchers have tracked the movement of sea turtles across entire oceans. At Sea Life aquariums, whilst Sea turtles are housed in the largest 'Ocean Tanks', they are only a fraction of the size of their natural, ocean habitat.

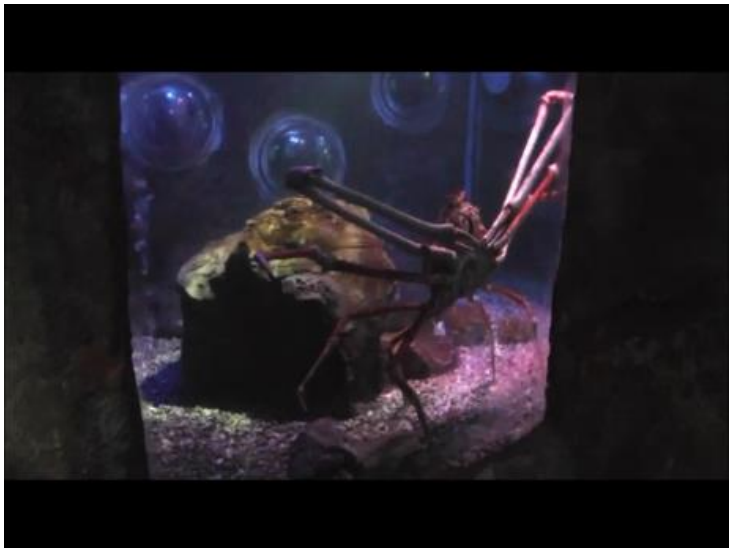


Photo 15: This huge crab lives in a cramped tank

The Japanese spider crab is the largest arthropod in the world in terms of leg span, reaching up to four metres in length (Sea Life website). During the investigation, these large crabs were observed in Brighton Sea Life and Great Yarmouth Sea Life. Both housed in identical small, cylindrical tanks with only a central, artificial rock formation as furnishings. In the wild, these animals would roam the ocean floor at depths of around 2,500 foot yet in the Sea life tanks the animals could often not walk more than one step fully stretched out. Instead, the animals were observed standing upright on their hind legs against the glass/acrylic. This is an unnatural posture, likely to be a consequence of their being forced into such restrictive space with limited leg room.

If these animals were to live out their natural lifespan at Sea Life (which is unlikely), they could live up to a hundred years in these tanks, which are a far cry from the ocean homes where they would roam in search of prey and mates. Japanese spider crabs have, in the past, been displayed at other Sea Life aquariums but they appear to have either died or been moved overseas.

Giant Tasmanian crabs - the second largest arthropod in the world – are also housed at Scarborough Sea Life. These crabs' carapaces can grow up to 18 inches, plus the claws, yet again the animals are housed in a small, cylindrical tank with a central, artificial rock formation. Known as the 'Giant deep-water crab', in the wild they would inhabit waters at depths of almost 3,000 foot.

The seahorses at Sea Life are housed in 'nurseries', or 'breeding' tanks – which are essentially rows of identical, barren tanks containing no or minimal furnishings. Weymouth Sea Life houses the animals in a 'research lab'. One tank at Oban Sea Life contained no substrate at all and only a small piece of netting for furnishing. At Great Yarmouth Sea Life tank, signage states: 'Sometimes I can be quite shy so I may be hiding in the plants', yet there is little hiding opportunity behind the artificial plants.

The number and type of animals housed together in the tanks is important, as the wrong mixing can trigger aggressive behaviour which in turn can lead to stress and disease. Feeding territories are more common amongst reef fish, and territory radius correlates with intruder threat (Godin, 1977). Overcrowded reef tanks, as observed in all Sea Life aquariums, can produce more aggressive, territorial behaviour.

At Brighton Sea Life, a small, overcrowded tank houses both zebra cichlid (*Maylandia estherae*) and electric yellow cichlids (*Labidochromis caeruleus*). The zebra cichlid is a highly aggressive species and the electric yellow cichlid is shy. Often the addition of another species to an exhibit serves to satisfy public demand, or another possible reason may be lack of knowledge on the part of the exhibit designers, fabricators, curators and/or aquarists. Exhibit design and maintenance is at the best of times a juggling act, between accuracy, institutional requirements, public demand and animal availability (Delbeek, 1999).

There is an absence of foliage and any meaningful open swimming area in the cichlid exhibit, as well as an inappropriate substrate. The main substrate is rocks yet in the wild these animals would inhabit mud and sandy-bottoms, therefore sand or fine gravel should be the main substrate. In the same tank is a Snake-necked turtle. When asked whether this animal should have foliage and places to hide, Brighton Sea Life

staff stated: "*They occur in quite bare areas and they don't have predators, they don't feel a requirement to hide*".

Also at Brighton Sea Life is a restrictive, overcrowded, cylindrical tank housing a highly aggressive species, the jaguar cichlid (*Parachromis managuensis*), along with a Chinese softshell turtle (*Pelodiscus sinensis*) (named 'Herman'). The jaguar cichlid is a territorial, predatory fish who should be able to claim part of its area as private territory. Living in crowded conditions can lead to stress, illness and even death.

8.2.1 The 'Big Fish Campaign'

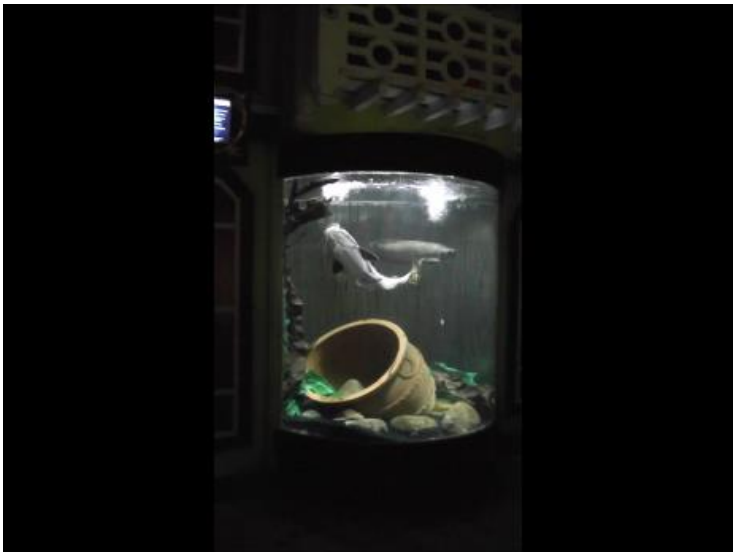


Photo 16: This large arowana can barely swim a few body lengths

Sea Life's 'Big Fish Campaign' aims to highlight the plight of larger species of fish housed in home aquaria. However, many of these 'Big Fish Campaign' animals supposedly 'rescued' from home aquaria are housed in small, restrictive, barren and overcrowded tanks in Sea Life aquariums. Whilst these tanks may be larger than their previous tanks, they remain far from adequate for large species such as pacu and catfish. At Weymouth Sea Life, there is one lone Giant gourami (*Osphronemus goramy*) in an extremely restrictive 'Big Fish Campaign' tank. This species is by far the largest of all gouramis, growing to around 28 inches in length. The tank is no more than four of the fish's body length and contains some vegetation and a mirror which leads visitors to believe the tank is larger than it actually is. In the wild, this large species would construct nests using weeds and twigs, a behaviour that is thwarted at Sea Life.

8.2.2 Sharks and Rays

Sharks, skates, and rays together form a group of around 900-1,150 species of ocean-dwelling and freshwater-dwelling fish named *Elasmobranchs*. Sharks and rays are amongst the most commonly exhibited animals at Sea Life, and they easily suffer in captivity.

Sharks are fragile, highly sensitive, intelligent animals who have been reported to display scoliosis, skin problems from poor water or sediment quality, and unhealthy or abnormal swim patterns and postures in captivity. They can detect the slightest vibrations, scents, sounds, and even electrical currents in the water. When visitors surround the tank, or enter into it in one of the 'close encounters' these senses may become confused. Additionally, many sharks experience a strong instinct to migrate or travel long distances.

Whilst some shark species are more suited to captivity than others, it is their ability to bring in the paying public that decides which species are selected for display. It has been stated that public aquariums often prefer sharks which exhibit a predatory appearance and display a fierce hunting behaviour. Due to public demand and the 'wow factor', aquariums want to include rarer sharks, such as the tiger shark and scalloped hammerhead shark in their exhibits. However, many of these shark species do not adapt to captive life and maintaining them successfully involves tremendous expertise and financial investment (Morris *et al.,* 2010).

Rays are close cousins to sharks. Aside from some species of stingray, most species of ray would usually rest on sedimentary sea beds such as mud or sand, or lie buried underneath it. In the Sea Life ray pools, the animals cannot do this. The Sea Life tanks are designed for the visitor, rather than the inhabitant. Top-feeding, which is normal practice at Sea Life ray pools, also does not encourage normal, benthic feeding behaviour (i.e. feeding on the bottom of the ocean, on the sediment surface and some sub-surface layers).

Substrate plays an important role in the behaviour of many animals, as they may use it for hiding and breeding. It can also be a valuable bacterial filter bed or regulate the water PH. The vast majority of ray pool tanks at Sea Life (aside from Manchester Sea Life and London Sea Life) have large gravel and/or crushed cockleshell substrate. This is despite the fact that these are hard and shark substrates which have been demonstrated to cause lacerations on the underside of rays and other animals who would normally lie on, or bury themselves in sand. Benthic feeders, and other animals who inhabit the ocean floor, bury themselves in sand to feel secure and protect themselves from predators.

The ray pool at Manchester Sea Life does have a fine gravel/sand substrate, however this tank does not house any of the rays who would naturally bury themselves. Only cownose rays, and the blue spotted stingray, which buries itself only occasionally in the wild. Cownose are pelagic (naturally living in the pelagic zone of ocean or lake waters - being neither close to the bottom nor near the shore), rather than benthic species, swimming long distances and rarely stop for too long. At all Sea Life aquariums which house cownose rays, the animals were observed swimming in continuous circles, typically in groups. In the wild, this gregarious species is assumed to make mass schooling migrations, triggered at least in part by water temperature (Smith and Merriner, 1985). They are pelagic swimmers found at depths up to 22 metres (Fishbase website). When the CAPS investigator enquired to staff at Scarborough Sea Life why these animals were swimming in endless circles, staff responded the animals were "*really greedy*" and "*searching for food*" which, if true, surely contradicts the staff's claim that the fish recognise the staff and know when it's time for feeding. It would also indicate that the animals are underfed.

The thornback ray is the most commonly exhibited ray species at Sea Life, the cownose ray the second and the Undulate ray the third. The Thornback ray inhabits continental shelf and upper slope waters from 10-300 metres through most of their range, with the notable exception of the Eastern Ionian Sea where it occurs from 300-577 metres (Whitehead *et al.,* 1986). Aside from living in deep waters, the species is also seasonally migratory, spending the winter in deeper water and coming into shallower areas in the late spring and summer to breed (Hunter *et al.,* 2005).

An example of an inappropriate captive environment is the ray pool at Great Yarmouth Sea Life - a small, restrictive tank no more than one metre in depth housing several ray species, European sea bass (a fish that displays dual feeding behaviour), mackerel, and small sharks such as the greater spotted dogfish, coral cat sharks and starry smoothhound. The greater spotted dogfish is a large cat shark with nocturnal habits. It would naturally inhabit waters of depths around 60 metres and is a benthic predator, spending the day inside small holes in rocks and swim into deeper water at night to hunt. There is nowhere to hide in the Great Yarmouth Sea Life ray pool yet in one tracking study, wild dogfish have been observed using several different refuges, consistently returning to each one over a number of days before moving on. Dogfish occupy refuges to hide from predators, avoid harassment by mature conspecifics, and/or to facilitate thermoregulation (Sims *et al.,* 2005). Even shallow coral reef cat sharks such as the Coral cat shark would normally be found in waters much deeper than one metre. The starry smoothhound is also most commonly found on or near the bottom of the ocean, at a depth of at least 100 metres.

8.2.3 Large Sharks

Until recently, only a few benthic species of shark, such as horn sharks, leopard sharks and cat sharks, had survived in aquarium conditions for over a year. Nowadays aquariums desire larger, open ocean (pelagic) sharks which brings further challenges in terms of providing adequate and appropriate space for the sharks to travel around in. There also arises the issue of electromagnetic signals. However, no aquarium tank can provide these animals an optimal environment and, in many cases, large shark species are dumped into unsuitable, restrictive and inappropriate tanks, where they do not survive or thrive for very long.

Photo 17: Sharks are a crowd-pleaser at most Sea Life centres

There are at least 24 species of shark displayed at Sea Life, including blacktip reef shark, grey reef shark, brown shark, bonnet shark, scalloped hammerhead shark, nurse shark and white tip reef shark. Each Sea Life centre has at least one species of shark, and most have more than five species. The most commonly-displayed sharks are blacktip reef sharks and nurse sharks.

In 2010, Birmingham Sea Life acquired two scalloped hammerhead sharks named 'Thora' and 'Freda'. Both were estimated to be around three years old. They are the first to be displayed in a British public aquarium.

Hammerhead sharks, in the family *Sphyrnidae*, represent a small group of eight distinct species. They are a wide-ranging, coastal marine shark, with family representatives occurring in warm-temperate and tropical oceans throughout the world. They typically feed on teleost fishes, cephalopods, and crustaceans (Compagno, 1984). Scalloped hammerhead sharks are highly mobile and partly migratory (Maguire *et al.* 2006), inhabiting depths of up to 450-512 metres (Sanches 1991; Klimley 1993), with occasional dives to even deeper waters (Jorgensen *et al.,* 2009). In Hawaii, it has been discovered that the sharks travel as far as 5.1 kilometres in the same day (Duncan and Holland 2006).

The uniqueness, notoriety, and sheer visual presence of the scalloped hammerhead makes them an interesting candidate for public display. Unfortunately the very morphological feature which makes the scalloped hammerhead so popular, the cephalofoil (a term used for the unique shape of the animal's head shape), also presents a challenge to workers with regards to the successful capture, transport, and maintenance of this shark (Young *et al.,* 2002). The capture and transport of scalloped hammerhead sharks (Howe 1998) historically has represented a difficult, expensive, and uncertain undertaking for the public aquarium community (Young *et al.,* 2002). During these processes, animals are often observed damaging their head and eyes by impacting the physical boundaries of the transport vessel or the holding facility (Arai, 1997; Howe, 1998). In addition, experience has demonstrated that scalloped hammerheads appear to be highly susceptible to the same physiological changes observed in other *Carcharhiniformes* during capture and transport, confounding an already difficult recovery process (Cliff and Thurman, 1984; Smith, 1992; Howe, 1998).

Scalloped hammerhead sharks can grow to over six foot in length (depending on the sex - female scalloped hammerhead sharks mature at a size larger than males), as is the case for many elasmobranch species

(Klimley, 1987). They are highly intelligent, and use the earth's magnetic field during their migrations (Klimley, 1993). Like other sharks, hammerheads are nocturnal, solitary predators during the night, yet in the day they naturally form large groups and frequently swim in deep water to forage and survive (Jorgensen *et al.,* 2009). This shark species tends to form huge schools whose function is presumed to be manifold and may, among other things, concern feeding habits and reproduction. All of these behaviours make them highly unsuitable for living in Birmingham Sea Life's 'Underwater Tropical Tank'.

Another species of shark clearly not suited for tank life include the bowmouth guitar fish – a species housed at 25% of Sea Life aquariums. Bowmouth guitar fish would naturally inhabit waters with a depth of 90 metres. They are primarily bottom-dwelling animals, preferring sandy or muddy substrates. Again, they are more active at night time (Ferrari and Ferrari, 2002).

The short-tailed nurse shark, housed in the 'Ocean Tank' at Scarborough Sea Life, is also a bottom-dwelling species, and a nocturnal predator who would roam widely, foraging for ground-dwelling crustaceans, urchins, squid and octopuses. At day, the Short-tailed nurse shark would sit on the open bottom or hide in holes or crevices (Leonard and Compagno, 2001). It is well adapted to life on the ocean floor, in common with other nurse sharks and has unique feeding apparatus, with a small mouth and enlarged pharynx that allows the shark to feed with a suction method (Compagno, 2001). This adaption is redundant in a Sea Life tank.

The nurse shark is the second most commonly exhibited shark at Sea Life, and one of the largest shark species, growing over 16 foot in length. Another nocturnal species, the nurse shark would naturally spend the day hidden under submerged ledges or in crevices within reefs in large inactive groups of up to 40 individuals at around 75 metres depth. At Sea Life, not more than two individuals are housed together and hiding places in the Ocean Tanks are sparse.

The leopard shark, housed in 25% of Sea Life aquariums, is an active, strong swimmer, known to form large schools in the wild which appear to be somewhat nomadic.

The blacktip reef shark, housed in 90% of Sea Life aquariums, is amongst the ten most commonly species exhibited at Sea Life. The species is migratory and naturally wary of humans, yet these animals are frequently forced into close contact with both Sea Life staff and visitors during 'close encounter' experiences. In the wild, a typical foraging area for the blacktip reef shark is one square mile.

A member of staff at Great Yarmouth Sea Life stated that the aquarium houses five blacktip reef sharks "*because they are a pack animal … like a wolf, or a family of dolphins*", however whilst blacktip reef sharks have been observed cooperatively hunting in the wild, they are generally solitary eaters. The staff member went on to say they also house a zebra shark alone, even though this species often forms loose aggregations of 20 to 50 in the wild.

Most sharks are either facultative or obligate ram ventilators, requiring constant forward motion to maintain respiration (Gruber and Keyes, 1981). This presents husbandry challenges to public aquaria maintaining sharks, as tanks should accommodate constant swimming motion by large animals. Klay (1977) described the swimming repertoire of sharks to include cruising, rest or glide, recovery, and turning stages, and calculated that shark species commonly housed in captivity need to conduct a normal swimming repertoire composed of all of the above stages (Klay, 1977). It is extremely difficult to house sharks in tanks large enough to provide sufficient distance to enable sharks to carry out full swimming cycles and necessitated excessive turning.

Aside from size, tank design is important - small, cylindrical shark tanks affect the animals' physical and psychological well-being and the constant swimming in circles, as observed at Sea Life aquariums (e.g. Manchester Sea Life), or rather, an excessive proportion of active, asymmetrical swimming, has been demonstrated to place undue lateral stress on the vertebral column, potentially contributing to scoliosis

(Tate *et al.,* 2013). A number of captive sand tiger sharks in public aquaria have developed spinal deformities over the past decade, ranging in severity from mild curvature to spinal fracture and severe subluxation (Anderson *et al.,* 2012), due to constrained aquarium space.

Additionally, because of their constant swimming, signs of depression in sharks due to their environment not being optimal are difficult to spot, as they are so different to ours. The study on sand tiger sharks revealed that these animals did not (or could not) glide, and they instead swam constantly. Overall, gliding was a rare phenomenon throughout the entire behavioural data set and the authors hypothesised that the repetitive circular swimming behaviour observed by the sand tiger shark, as observed in London Sea Life, is an example of an indirectly self-injurious, locomotory stereotypical behaviour. This constant swimming in one circular direction with no gliding behaviour to break the swimming cycle appears to be a repetitive and unvarying behaviour and as such, resembles stereotypic behaviour (Mason *et al.,* 2007). It is reminiscent of locomotor stereotypies documented in terrestrial mammals (e.g., pacing, Clubb and Vickery, 2006), birds (e.g., route tracing, Keiper, 1969), and aquatic mammals (e.g., circle or pattern swimming, Grindrod and Cleaver, 2001; Hunter *et al.,* 2002; Kastelein and Wiepkema, 1989).

Stereotypic behaviour often signals an elevated stress state (Cabib, 2006). Alternatively, it may develop as a coping mechanism to help the animal manage in a stressful environment (Novak *et al.,* 2006). In either case, it is often considered a behavioural symptom of sub-optimal animal welfare (Mason, 1991; Mason *et al.,* 2007). The practical implications of their mode of transport is that sharks need lots of room, are unable to change direction or level easily, and dislike square corners. All sharks are also talented jumpers. Though selachian brains are small, sharks are amazingly well hard-wired to do what they do, and capable of substantial learning. The difficulties in captive care of sharks are multitude, including the need for large, highly filtered systems, poor adaptability in terms of behaviour for most open-water species, keeping cold to cool water species in warm to tropical temperatures, and not maintaining a high, stable salinity.

Of the few species which have been studied thoroughly, they are known to have low birth rates, relatively long generation times and modest population densities in the wild.

8.2.3 Captive Shark Deaths

Whilst many deaths at aquariums go unpublicised, when sharks die, it can reach the media. These reported deaths often occur during transport.

Below is a list of recent captive shark deaths which have been featured in the media, though this is likely to represent only a fraction of all captive shark deaths which occur. Under The Zoo Licensing Act 1981, up-to-date records of the animals, including numbers of different animals, acquisitions, births, death, disposals and escapes, causes of deaths and the health of the animals should be kept. However at Sea Life, whilst there is apparently a company-wide system for these records, they are not publicly available.

- In 2003, a visitor jumped into the shark tank at Brighton Sea Life and, two days later, a 12-year-old smoothhound shark at the aquarium died of a sudden haemorrhage. Sea Life admitted the haemorrhage "*could have been the result of the stunt*" and "*the sight of an unfamiliar person swimming around would have caused a lot of stress*" (BBC News website).

- In 2004, three Lemon sharks purchased by the Aquarium of Niagara in Canada from an Ontario shark museum died whilst housed in a basement tank for several months at the aquarium during the construction of a new exhibit. A member of staff at the aquarium stated *"They were in a weakened state when we got them. I think it was a combination of their age and the transportation".* A veterinarian who conducted post mortem examinations however, said the animals died of stress. The three Lemon sharks should have been housed in water around 21°C, the veterinarian stated, but the heat in the building had been shut off and

the sharks were in water which had dropped to 4°C. Following the sharks' deaths, the aquarium went on to acquire two Tiger sharks from a private source for the new exhibit (Canoe.ca website).

- In 2007, two whale sharks died at Georgia Aquarium in the United States. It was reported that the first death was likely to be attributed with the tank's treatment routine. The second death came only a few weeks after two new whale sharks arrived at the aquarium from the ocean near Taiwan. The animals were flown more than 8,000 miles from Taiwan, through Alaska, to Atlanta (Southern Fried Science website).

- In 2008, a female reef shark jumped out of a tank at Mayan Temple Aquarium in the Bahamas, onto a water slide at the adjacent hotel swimming pool, and into the pool. It was reported that the shark's body could not cope with the chlorinated water in the swimming pool. The aquarium stated: "*The Atlantis Aquarists believe the shark was startled by an unusual circumstance that we have no way of defining completely .. once the shark fell onto the slide and into the chlorinated water, it was in significant distress*" (The Telegraph website).

- In 2012, a bowmouth guitar fish died from internal bleeding due to mating injuries just days after she was placed into the shark ray tank at The Newport Aquarium in the United States. The male shark ray bit the new shark ray's abdomen and she died from massive internal injuries (USA Today website).

- In 2013, six hammerhead sharks died at Ocean Park Aquarium in Hong Kong, all within a period of seven hours. The dead sharks succumbed to a mystery disease one by one, after staff found them 'swimming abnormally' at the weekend (Practical Fish Keeping website).

- In 2013, a white tip shark loaned from Long Beach Aquarium in the United States to feature in a Kmart television commercial died in a backyard pool (LA Times website; National Geographic website).

- In 2013, a great hammerhead shark (*Sphyrna mokarran*) - the largest species of hammerhead shark - died at Aquarium Adventure in the United States. The only animal was the only of its kind on exhibit in the country (Adventure Insider website).

- In 2013, a white tip shark died after it collided with the three-foot 'Wonder Wheel replica' at an aquarium at a restaurant on Coney Island in the United States. The death occurred on the same day that the sharks were moved into the tank, after the sharks were in transit for two days (Daily News website).

8.2.5 CASE STUDY: Crocodilian Exhibits

It is acknowledged that reptiles experience negative emotional states, can suffer, and there is growing evidence that reptiles are far more intellectually and socially complex than previously thought. In fact, new findings about the rich intellectual, emotional and social lives of reptiles surface every year (Laidlaw, 2005).

30% of Sea Life aquariums house four species of crocodile – Yacare caiman (*Caiman yacare*), Cuban crocodile, African dwarf crocodile, and Cuvier's dwarf caiman (*Paleosuchus palpebrosus).* None of these crocodile are suited to life in captivity - the Cuvier's dwarf caiman is secretive, especially during the day, shy, yet aggressive if cornered, and frequently fights with other captive animals; the Yacare caiman requires a great deal of space and can be dangerous to handle; the African dwarf crocodile is extremely aggressive, territorial and not at all social (younger specimens are excellent climbers and can also easily escape from exhibits) (Laidlaw, 2005); the Cuban crocodile is a small but aggressive species of crocodile which is a strong swimmer, also adept at walking, jumping, and noted for terrestrial abilities. Even the smallest species, the African crocodile, can grow up to six foot in length.

Photo 18: There is nowhere for this crocodile to retreat from public view

The two African dwarf crocodiles observed at Great Yarmouth Sea Life ('Ntombi' and 'Masozi') are eleven years old and arrived at the centre in 2010. On Sea Life's own website, it states 'African Dwarf Crocodiles are powerful swimmers', yet the animals are provided only a small, shallow pool to submerge in. The fear, aggression and stress that captivity brings to these individuals has been highlighted in media reports during 2010 (Great Yarmouth Mercury) and 2014 (EDP 24 website). They currently live in a small, acrylic/glass exhibit featuring a shallow pool around three foot deep located at the front of the exhibit, rocks, foliage and wooden steps. This small, restrictive exhibit would not enable animals to have their own, secure territory, yet this is a territorial species. There is no provision of sheltered, privacy areas for the animals to hide from view of the visitors. Visitors were observed banging on the acrylic/glass and using flash photography.

At Weymouth Sea Life, the Yacare caiman exhibit is furnished with a small pool, barely deep enough for the animals to submerge in, concrete substrate and foliage. There is a wider grassy area but no obvious provision of shelter for the animals. These animals can grow up to three metres and require a much larger water area to swim in, for example. Aside from an under-stimulating and overly-restrictive environment, there is a 'Crocodile Creek' train ride running adjacent to the exhibit for visitors. Weymouth Sea Life also supposedly housed five caiman crocodiles in 2010, donated by the Gerald Durrell Wildlife Conservation Trust at Jersey Zoo (Mail Online website).

At London Sea Life, a Cuban crocodile is housed in a grossly undersized, restrictive, uniform exhibit which is acrylic/glass fronted and features a small pool, rocks, sand substrate, and foliage. According to Sea Life staff, there were previously two crocodiles in the exhibit; however the current crocodile "*did not let the other one settle*" and so one of the animals was moved. There appears to be only one light and heat source in the exhibit, yet most reptiles are ectothermic, meaning their body temperature is dictated by the ambient temperature of their environment and thus they need to live in a wide range of temperatures in captivity. The Cuban crocodile would naturally inhabit freshwater swampland and bask in the sun. It is a strong swimmer and has toes that are short and lack webbing, indicative of a species that spends more time on land compared with most other crocodilian species. It is noted for its terrestrial abilities. During the 'Behind-the-Scenes' tour, London Sea Life staff informed visitors that Cuban crocodiles can "*run particularly fast*" yet the running possibilities in the aquarium exhibit are extremely limited. The pool is also not large enough for the animal to swim more than three body lengths.

The exhibit does not allow natural movement and behaviours, such as running, swimming and foraging. Neither does it provide a space where the animal could feel secure - a space that is sufficient enough to avoid violating the animal's fight or flight response. Overall it is a wholly unsuitable environment for this animal that fails to provide for even the most basic welfare requirements, and this could lead to suffering.

At Hunstanton Sea Life, three Cuvier's dwarf caiman are housed in an emersion exhibit where visitors can 'immerse' themselves into the centre of the exhibit behind a spherical acrylic/glass window. Not only is this

an intrusion of the animals' home, it also encourages visitors to take photographs of group members in the exhibit. Visitors were documented using flash photography. Again, the exhibit is furnished with rocks, foliage and a pool that is grossly undersized. The Cuvier's dwarf caiman is a freshwater species found in forested riverine habitats and areas of flooded forest around lakes. It is able to travel large distances overland at night and sub-adult individuals have sometimes been found in isolated, temporary pools. There is a complete absence of crevices, burrows, caves or foliage at Sea Life for these shy animals to retreat from visitors (and each other). The exhibit appears to be a relatively uniform thermal environment, with only one light/heat area.

Reptiles have evolved to inhabit a diverse range of marine, freshwater aquatic, terrestrial, subterranean and arboreal habitats. Most captive situations cannot replicate in any meaningful way the space, complexity and environmental conditions experienced by reptiles in nature. Crocodilians are large, active, powerful, often territorial reptiles which are unsuited for captivity. They are adapted for both terrestrial and aquatic travel, and are highly evolved and intelligent.
The captive management needs of reptiles are varied and complex. Some of the housing and environmental factors that must be addressed include, but are not limited to: the amount of space provided, the quality of that space, heat, light, hygiene, and nutrition. None of the exhibits at Sea Life completely fulfil the animals' needs, which can cause many of the common diseases that lead to the ultimate demise of many so-called 'exotic' animals in captivity.

8.2.6 CASE STUDY: Octopus Exhibits

Octopuses are carnivorous, marine animals considered the most intelligent invertebrate (Linden, 2002). They have a well-developed nervous system and a complex brain, which is relatively larger than the brains of some fishes and reptiles.

Octopuses have numerous sense organs which rival those found in vertebrates in their complexity, including excellent eyesight and sense of touch (Advocates for Animals, 2005). Like other animals, octopuses have temperaments that vary between individuals (Sinn *et al.,* 2001). They learn how to navigate mazes (Wells, 1978), distinguish between shapes and patterns in classical conditioning (Boal, 1991), use landmark navigation whilst foraging, use tools (Mather, 1994), and play (Mather and Anderson, 1999). Despite this, they are afforded no protection whatsoever under the Animal Welfare Act 2006.

Photo 19: This tiny tank is the permanent home of an octopus

In the wild, octopuses eat small scallops, snails, fish, turtles, particularly crustaceans and molluscs, and walk on the sea floor by a fast, relaxed scrambling or a slower exploratory walking, using their arms and suckers. They swim by propelling themselves backwards by spewing a jet of water from a funnel (or siphon), which is also used to pump water into the gills to obtain oxygen (Advocates for Animals, 2005).

Natural behaviours in octopuses include home modification (Mather, 1994) and complex tool use (Finn *et al.,* 2009). They are capable of long-term potentiation, facilitating the development of long-term memory. This potential for the development

of learning and memory might support suggestions that there is a need for larger, more stimulating enclosures if housed in captivity.

Four species of octopuses are housed at Sea Life aquariums – mud octopus (*Octopus bimaculoides*), mimic octopus (*Thaumoctopus mimicus*), giant pacific octopus and common octopus - all housed in extremely small, barren tanks in areas titled 'Octopuses Gardens', or 'Weird and Wonderful'. The majority of octopuses live alone, which Sea Life claims is to prevent aggression. With a large enough area for the animals to retreat from each other however, this would not be problematic as the animals could retreat a safe distance from one another. Staff at Scarborough Sea Life also admit that if the animals were housed in larger exhibits it would be "*possible*" that they could house more than one individual together.

The giant pacific octopus and mimic octopus, housed at Brighton Sea Life Aquarium, are likely to have been imported a great distance from the oceans to tank. During the investigation, staff at Brighton Sea Life told the CAPS investigator that the giant pacific octopus had been caught in the wild around a year and a half ago, when she was a month old.

The mimic species is highly intelligent and can decide which predator to mimic to protect itself. In captivity however, the octopus displays none of these abilities. The display of this species has been questioned as there does not appear to be the wild population base required to support the intense collection of mimics and the pressure to acquire mimics is rapidly increasing. Their natural habitat is limited, as the coastal habitats in which they occur are some of the most heavily impacted in Indonesia, and yet easily accessible to collectors.

The mimic octopus at Brighton Sea Life is housed in a restrictive, spherical tank no more than two foot in length. In captivity, these animals require a very deep, fine sand bed of around 10 inches to feel safe, however at Sea Life the animal is afforded only a thin layer of sand substrate and a child's toy tube placed at the front of the tank, which the animal was hiding in. The mimic octopus does not naturally live under rocks or in tubing. They have been demonstrated to live buried under sand for days at a time, which is possibly why Sea Life does not provide the animal with a deep layer. Like other species of octopus, the mimic octopus is active late at night, and very early morning when light is the weakest. Another indicator that this animal is not suitable for an aquarium environment (The Cephalopod Page website).

At Sea Life, octopuses are provided with tubing, rope and children's toys, such as Rubik cubes, 'Mr. Potato Heads', shape boxes, plastic telephones and plastic rocking horses. At Scarborough Sea Life, rocks, ceramic pots and netting serve as furnishings in the restrictive, traditional common octopus tank.

There is a lack of appropriate theming in the majority of octopus displays. At Brighton Sea Life, visitors were overheard questioning the children's play room theme, as they didn't understand it, and also comparing the octopuses with young human children. Sea Life staff also inform visitors on talks and privately that the octopuses have the same intellect as two or three-year old children. Signage also states the same. This is hardly a fair comparison for the Octopus.

Sea Life staff claim: "*We try and give them as much attention as we can and they seem happy*". Staff at Scarborough Sea Life told the CAPS investigator that the female common octopus could not be provided with a larger tank as the animal would feel "overwhelmed". Staff stated: "*In the wild, she would sit in a cave and wait" and "they don't need a lot of space*". This is completely unfounded logic and staff also admit that a larger tank would mean visitors are less likely to easily view the animal.

At Weymouth Sea Life, the octopus again is provided some netting, empty jars, pots and child toys. At Birmingham Sea Life, an octopus lives in a small spherical tank with an antique diving helmet for furnishing.

One of the most inappropriate environments afforded to octopuses however is at Hunstanton Sea Life – a very small cylindrical tank with only a central column, a piece of tubing and two rocks in it. The animal has

nowhere to retreat and, according to staff, has been living in this barren tank for over two years. Sea Life staff have put Astroturf along the top of the tank closed as the animal kept escaping. At Manchester Sea Life also, a staff member admitted that the "*Animal Care team have to pay special attention during feeding times 'cos they do try to escape*".

The octopus tanks at Sea Life are extremely restrictive, yet these animals are extremely intelligent, refuging predators who naturally live in dens and visit different areas each trip to hunt prey (Mather, 1991*a*). They do not hunt in the same area each time since it would have been depleted by previous hunts. Spending their life in a completely predictable and unchanging acrylic/glass box is not only boring for them; it has a strong impact on both their health and behaviour (e.g., Wood and Wood, 1999). They have little cover apparently so visitors can view the animals, yet the more refuges there are, the more the animal would behave naturally.

Tanks are lit up yet, if given a choice, an octopus would probably naturally have little or no lighting in its environment. Most species of octopuses are nocturnal and even those who are active during the day prefer subdued lighting, rather than the intense lighting that your average reef tank provides. They are highly active predators who also have an unusually high metabolism for an invertebrate. This means that in practice that they usually have much more particular demands on some aspects of water quality than do most reef invertebrates.

Environmental enrichment is a common husbandry practice used to encourage natural behaviours and stimulate overall physical and psychological well-being (Carlstead, 1996). 'Enrichment' for octopuses at Sea Life includes puzzle boxes and screw lid jars, however an optimal environment would never need enrichment. Even if enrichment is added, this doesn't change the fact that an animal's space is too small.

Sea Life houses octopuses in cramped quarters which prevent normal natural movement. Additionally, the majority of octopus tanks at Sea Life are spherical in design, which increases the likelihood of visitors banging on the tank in an attempt to view the animals. At Manchester Sea Life, after opening only a few weeks, staff at the aquarium replaced an Octopus with another as the species is apparently "*more active for visitors*". Hiding for all hours of the day is clearly viewed as undesirable. In fact, during the investigation and with one exception, none of these shy, nocturnal animals appeared active. Most were attempting to hide, albeit unsuccessfully.

There are strong similarities and signs of continuity between vertebrate and invertebrate stress systems. In many invertebrates, molecules similar to adrenocorticotropin, one of the major stress-signalling molecules in vertebrates, have been found to be present (Stefano *et al.,* 2002). In captivity, these animals have special needs - they are very inquisitive and need ample hiding places to prevent stress. The environment and lifestyle of cephalopods means that they need to be capable of complex and flexible behaviours. As active predators they need to explore, understand and remember their environment and the behaviour of other animals.

Octopuses are known to exhibit abnormal behaviours in captive settings (Wood and Wood, 1999), particularly in sparse environments - irregular colour patterns, inking, and swimming or jetting into the tank walls are all considered signs of stress in an octopus (Wood and Wood, 1999). Octopuses have also performed autophagy, or the eating of their limbs (Beigel and Boal, 2006).

9.2.6.1 Giant Pacific Octopus

The giant pacific octopus is the largest species of octopus in the world and frequently a choice exhibit species in zoos and aquariums (Anderson and Wood, 2001). The species is commonly held on display at aquariums due to its size and interesting physiology. Many natural behaviours are thwarted in tanks, perhaps most obviously, swimming and foraging. The Giant pacific octopus has developed many adaptations in order for it to survive in the wild that are useless in captivity, for example its sense of touch.

At Brighton Sea Life's 'Octopus Garden', a female giant pacific octopus has been housed in a standard 'GPO tank' for over a year and a half. According to staff she was captured from the ocean when she was around a month old. The tank is slightly larger than the other octopus tanks yet she is around six foot in length and cannot fully stretch out. Staff provide food hidden in Lego pieces as 'enrichment', and the tank contains only a ceramic pot and a single child's plastic rocking horse for furnishing. It is difficult to surmise how anyone could deem a purple rocking horse as conducive to an educational or naturalistic experience.

Staff were documented during the investigation 'playing' with the animal (i.e. pulling at her tentacles and tickling her), and they apparently do this "*twice a day*". Staff told the CAPS investigator that there is not a need for other enrichment or furnishings in the tank as "*she's quite happy just to be played with to be honestly*". During March 2010, a DEFRA veterinarian visiting Brighton Sea Life stated that "*One research project at the centre identified the benefit of one-way viewing glass and this innovation has enhanced the octopus display, making a positive contribution to keeping this species in captivity*" (Brighton and Hove City Council, 2013). However, Brighton Sea Life staff claimed to the CAPS investigator that the animals can see out of the acrylic tank walls and did not appear to know anything about the one-way viewing. The DEFRA veterinarian also clearly saw no problem with the size of the octopus tanks, or the furnishings.

The giant pacific octopus has around 280 suckers on each arm containing thousands of chemical receptors to enable it to grope for food in small, dark crevices. In the wild, yet the animals inhabit a wide range of depths, from shallow coastal waters to depths of at least 1,500 metres. The Brighton Sea Life exhibit is grossly undersized for this large cephalopod, which can grow an arm span of over four metres (though females are generally larger than males).

9. CAPTIVITY STRESS

Stereotypic behaviours are abnormal repetitive movements which often result from a deficiency in the environment or an animal's inability to perform behaviours which occur in natural settings. In the wild, animals are typically immersed in rich and complex environments for which evolution has equipped them with species-appropriate behaviours and abilities. For some species, their home ranges may encompass hundreds of square miles of habitat and, under normal conditions; most animals spend a good portion of their time searching for food (Herbers, 1981). For many carnivores, food is unpredictable in terms of both when and where it occurs. On the other hand, species in zoos and aquariums are typically fed on a routine schedule and in the same location within an exhibit or holding area (Shepherdson *et al.,* 1993). This is usually based on the schedules of animal management personnel to ensure that all animals are fed during the day. The acquisition of food is predictable, with no behavioural control on the part of the animals.

Captive animals frequently display abnormal, repetitive and stereotypical behaviours not performed in the wild. Animals are equipped with foraging skills, sometimes involving vigorous searching behaviours and food acquisition which can require a large proportion of an animal's daily time budget (Oftedal *et al.,* 1996). When animals have little to do in confinement, they can become stressed. There are a number of behaviours which indicate that a fish is stressed or ill, for example aggression, abnormal predator avoidance, abnormal feeding, shelter seeking, colour change, drifting, head-standing, hovering, piping, pacing, tail-walking or bottom-sitting (CAPS, 2004).

Many of the behaviours exhibited by fish – including their habitat selection, mate choice and shoaling decisions, are likely to have evolved, at least in part, to limit exposure to deleterious pathogens, including parasites. If captive housing during husbandry for research, display or aquaculture purposes constrains a fish's ability to undertake its normal adaptive behavioural repertoire, yet does not limit the number of infective parasites present, then increased exposure to parasites is a likely outcome, and this has clear welfare implications (Barber, 2007).

An unhappy fish may show reduced feeding, colour changes, closed finnage or abnormal behaviours such as hiding in the corner of aquariums. Stress can be caused by rapid changes in water temperature or quality, strong or rapidly changing light and loud noise.

Compulsive behaviours termed 'stereotypies' are characterised as repetitive, unvarying and apparently functionless behaviours (Mason, 1991). They stem from a lack of control, inactivity, boredom, stress and frustration, and may occur when an animal cannot cope with a stressful situation such as restricted movement, a lack of concealment, unfamiliar food, abnormal social situations or overcrowding. As the environmental complexity reduces, animals display a corresponding decrease in behavioural variability and an increase of self-directed behaviours. Gradually the animal closes off from the environment, instead of interacting with it, in an effort to cope with the stressors (Mason, 1991). Species differ greatly in how readily they develop abnormal and stereotypic behaviours, and the behaviours vary also amongst individuals.

In summary, stereotypies are considered to be indicators of poor well-being for three main reasons:

- They are linked with aversive environmental conditions.
- They often develop from attempts to perform specific behaviours.
- They are often linked with physiological signs of stress (e.g. von Borell and Hurnick, 1991; Wielebnowski *et al.,* 2002).

Stereotypy in fish has not been widely reported on, however there have been studies which demonstrate it is common in a captive environment (Casamitjana and Turner, 2001; Casamitjana, 2003; CAPS, 2004). In the 2004 CAPS study, at least 90% of UK public aquaria studied house animals displaying abnormal behaviours which have no obvious function and are strongly indicative of long-term welfare problems (CAPS, 2004).

The same categories which were used in the 2004 CAPS study to identify frequencies of stereotypic behaviours were used in this investigation. Likewise, the criteria of at least three repetitions in half a minute was used to categorise a behaviour as possibly being stereotypic.

The categories were as follows:

- Pacing (continuous swimming to and fro, following the same path)

- Circling (a form of pacing where the animal continues around a circular path)

- Head bobbing and swinging (staying stationary in one place and continuously moving the head up and down, or swinging it left and right)

- Interaction with Transparent Boundaries (ITB) (continuously walking/swimming onto acrylic/glass or reflecting walls of an exhibit either attempting to climb on them, go through them, or responding to a reflection from them)

- Surface Breaking Behaviour (SBB) (whilst swimming repeatedly lifting the front of the body so that the snout or front of the head is raised above the level of the water)

- Spiralling (continuously spinning through the water either around a central point or around an imaginary axis moving in a spiral course)

- Stereotypic flashing (repeatedly turning on one side and rubbing one flank on the substrate or on any other surface)

These categories were originally coined in previous research (Casamitjana and Turner, 2001; Casamitjana, 2003), and are similar to the stereotypies which have been observed being performed by terrestrial animals.

During the investigation, the only aquarium which did not house animals performing stereotypic behaviours was the Seal Sanctuary at Gweek – an aquarium which did not house fish in tanks.

The most common type of stereotypy observed was SBB, which accounted for 41% of all stereotypic behaviours observed, and the second most common stereotypic behaviour was pacing, accounting for 16%. ITB accounted for 13%, circling, 10%, spiralling, 10%, flashing, 9% and head bobbing, 1%.

The most common stereotypic behaviours observed therefore were 'Cage Stereotypies' a term which has been coined for behaviours which appear to occur due to the physical limitations of a captive environment (Draper and Bernstein, 1963; Berkson, 1967, Ridley and Baker, 1982). The vast majority of stereotypic behaviours observed at Sea Life are 'cage stereotypies', thus are an indication of a suboptimal environment.

When the CAPS investigator enquired of Sea Life staff at the aquariums whether any abnormal behaviours had been observed or are present, the overwhelming response was that they had not. A member of staff at Weymouth Sea Life claimed that she had "*never seen any abnormal behaviours*". At Brighton Sea Life, staff responded: "*There are no abnormal behaviours going on anywhere here*".

The denial that abnormal behaviours exist in the aquariums appears overwhelmingly to be because staff do not consider SBB, the most common stereotypic behaviour observed during the investigation, as being abnormal. For example, the aquarist at Weymouth Sea Life told the CAPS investigator that she does not view SBB as abnormal. However, some staff do recognise that SBB is not normal, or observed in the wild. At Great Yarmouth Sea Life, a member of the Animal Care team stated: "*Them coming up to the surface is the only odd behaviour that we notice*".

One staff member at Hunstanton Sea Life did acknowledge stereotypies and stated: "*Obviously with captivity you will see stereotypical behaviour*", as if it should be expected, and therefore is normal and fine.

The vast majority of abnormal behaviours observed at Sea Life were performed out by pufferfish, rays, tangs, turtles and terrapins. pufferfish were also observed carrying out the majority of stereotypies in the 2004 CAPS investigation.

9.1 CASE STUDY: Surface Breaking Behaviour at Ray Pools

Rays were observed performing SBB at all Sea Life aquariums aside from Gweek Sea Life, which doesn't feature a ray pool, and Manchester Sea Life, which does not house any rays of the genus *Raja* (e.g. thornback ray and undulate ray). Dogfish species and Atlantic cod (*Gadus morhua*) were also observed performing SBB in the ray pools. Cownose rays were observed breaking the water surface occasionally, whilst swimming around the tanks in continuous circles.

If SBB is an abnormal behaviour indicative of a sub-optimal environment, as research indicates it is, then there is clearly a widespread and serious problem with the housing of rays (and other animals) in Sea Life ray pools.

These pools also enable visitors to dip their hands in, and touch the animals, which can lead to lacerations on the animals' sensitive skin.

At Weymouth Sea Life, the staff member giving a ray talk asked that visitors not to touch the animals because this irritates their skin, but played down its seriousness, stating: "*An even better reason to not touch rays is that they poo in the water*".

It has been indicated that SBB has a temporal link with a scheduled feeding event, and that the behaviour is appetitive (Scott et al., 1998; Scott *et al.,* 1998). In a restrictive, barren environment with little for the animal to do, the behaviour can become fixed.

Sea Life has failed to provide interesting, varied feeding schedules for the animals, and the rays are fed the same times each day (usually two or three times, during opening hours and when the aquariums are closed to the public), which may make life easier for staff, but monotonous for the rays and other animals. Scarborough Sea Life and Weymouth Sea Life, for example, feed their rays at "*1 O'clock, dead on the nose*" and then again after opening hours. The cownose rays are also fed three times a day at Brighton Sea Life.

However, it has been demonstrated that improvements in the methods of food delivery - away from surface feeding, to a more natural, benthic nature, can result in a reduction in the level of the behaviour. At both Great Yarmouth Sea Life, and Scarborough Sea Life, food is available for visitors to purchase so that they can feed the rays (on the surface). At Scarborough Sea Life, staff acknowledge that allowing visitors to feed the rays increases SBB, claiming that since the public have been allowed to do this, prevalence of SBB has increased. They justify allowing the public to feed the animals by stating: "*It wouldn't so much be like this if we didn't let the public feed them but we're trying to raise money for shark tagging at the moment* ".

Staff claim that they "*don't see it as much of a problem*" as the animals will never be released anyway, and that "*it's not gonna harm them in any way, other than we get people touching them, which is bad for them*" and "*happens all the time*".

The following explanations for SBB were given by Sea Life staff during interviews and, alarmingly, on talks to the general public. Several of these reasons were also given by aquarium staff in the 2004 CAPS study:

- Curiosity

- Feeling comfortable enough to come out of the water

- Dancing

- Exercise

- Coming up for air

- Taking in oxygen

- Seeking out heat

- Showing off

- Excitement

- Being attracted to visitors wearing the colour blue, as Sea Life staff also wear blue coloured uniforms

- Friendliness

- The monitoring of visitors' heartbeats, as they can detect electric signals

Some evidence suggests associative learning is commonplace in some elasmobranchs (rays included) so the "*visitor colour*" explanation is not completely absurd. However the explanations that rays are smelling visitors, or scanning visitors' heartbeats and the electrical impulses of cameras with their electroreceptors, are not based on any research on the subject.

The varying opinion amongst Sea Life staff regarding SBB reveals a lack of knowledge about fish behaviour, and provides a worrying insight into the lack of knowledge amongst individuals who liaise directly with the public and are hired to inform visitors about the fish in their 'care'.

The poor knowledge of Sea life staff is also revealed by the ludicrous claim that the common name 'dogfish' was first coined by fishermen who named the animals after dogs, due to their "*frequent coming up to the surface to smell the air*". There is no evidence to show that this is the case, and in fact it has been alleged that these animals have been named as they are as they travel and hunt in packs.

9.2 CASE STUDY: Interaction with Transparent Boundaries at Chelonia Exhibits

80% of Sea Life aquariums house turtles and terrapins in 'Turtle Sanctuaries' or 'Turtle Shelters'. The most commonly-displayed amphibian species (aside from the green sea turtle) at Sea Life is the Eastern long-necked turtle, and the yellow bellied slider is also common.

Photo 20: This turtle demonstrated ITB behaviour

Over 24 species of smaller turtle and terrapin are housed at Sea Life, including the alligator snapping turtle (*Macrochelys temminckii*), Chinese soft shell turtle (*Pelodiscus sinensis*), eastern snake neck turtle, North American map turtle (*Graptemys geographica*), European pond turtle (*Emys orbicularis),* African helmeted turtle (*Pelomedusa subrufa*), musk turtle (*Sternotherus odoratus),* Mississippi map turtle *(Graptemys pseudogeographica),* river cooter turtle (*Pseudemys concinna),* fly river turtle (*Carettochelys insculpta),* pignose turtle (*Carettochelys insculpta),* Indian spotted pond turtle (*Geoclemys hamiltonii),* Asian box turtle (*Cuara ambainensis),* red-bellied short necked turtle (*Emydura subglobosa),* Chinese golden thread turtle (*Ocadia sinensis),* Roti island snake-necked turtle (*Chelodina mccordi),* Asian leaf turtle (*Cyclemys dentata),* Ouachita map turtle (*Graptemys ouchitensis),* common snapping turtle (*Chelydra serpentina),* Malayan box turtle*,* Mud turtle (*Pelomedusa subrufa),* Mediterranean pond terrapin (*Mauremys leprosa*) and red-eared terrapin (*Trachemys scripta elegans*).

There are numerous commonalities with the facilities filmed, notably the overly-restrictive and under-stimulating environments.

These issues can lead to captivity-stress, which leads to other complications. Perhaps the most serious concern with Sea Life's terrapin and turtle exhibits however is the lack of general furnishings related to basking opportunities and, in many exhibits, where a platform is provided, it is often the case that not all animals are able to bask simultaneously.

Chelonians possess few pre-adaptive features and are hard-wired with innate biological, behavioural and psychological needs that preset them to life in nature. At all aquariums that house these animals, the tanks are arbitrarily and poorly conceived. Clinical, uniform tanks with too few basking facilities platforms and other furnishings yet all reptiles in the wild appear to seek out and occupy 'angles' and orientations (sometimes highly subtle). These postural-positional desires appear to play roles in delivering comfort and focused thermal needs, as well as in the amelioration of discomfort (Warwick *et al.,* 2013).

At Brighton Sea Life, a Chinese softshell turtle is housed in an under-stimulating and overly-restrictive, cylindrical tank in the 'Victorian Arcade', with an apparent lack of basking area, and no opportunity to retreat from visitors and fish in the same tank. To make matters worse, the animal has apparently been living in this tank for over three years. Staff admitted that the animal does not fare well in this exhibit because of the flash photography, yet there are no plans to move him elsewhere.

Snapping turtles and softshell turtle species are housed in small, bare tanks at so-called 'Turtle Sanctuaries' and 'Turtle Shelters' at both Oban Sea Life and Weymouth Sea Life. At Weymouth Sea Life, the turtles are rotated regularly (staff told the CAPS investigator that there are "*loads out the back*"), so this may explain why staff do not feel the need to provide adequate basking areas. Staff at these aquariums claimed to the CAPS investigator that the animals do not require platforms as they can hold their breath under the water, that the Snake neck turtles "*do not need to bask*", and that they "*spend their entire time under water anyway*". These statements are alarming – no turtle spends its entire time underwater, and all turtles breathe air. Depending on temperature and metabolic rate, they can last for hours under water at a time as they have supplementary oxygenation systems to absorb some oxygen from water but they raise their snout to surface periodically (e.g. every few minutes to hours). Both Snapping turtles and Soft shell turtles *must* have the ability to leave water/bask whenever they want, and these areas must be large enough for all animals in the tank to do so comfortably.

The yellow-bellied slider tank at Weymouth Sea Life houses three individuals, yet only one can lie fully out of the water at a time. There is a complete absence of any other furnishing in the tank. This, along with insufficient basking area to accommodate all turtles, can create a predictable, stressful and totally unsuitable environment for these animals. A failure to provide for basking is what has been termed 'crypto-overcrowding', which essentially refers to the availability of all facilities to all animals when they require access to those facilities (Warwick *et al.,* 2013). In order that a space is not overcrowded, it must allow both space to roam as well as possess sufficient facilities – for example, a water bowl or basking site – that all animals can use together at any one time (Warwick *et al.,* 2011*b*).

Tens of millions of slider species have been bred from and distributed around the world for captivity. Despite these huge numbers, large adult sliders are relatively uncommon. The majority have probably died because of inappropriate accommodation, poor diet and other basic husbandry failures.

An alligator snapping turtle at Weymouth Sea Life also has no platform out of the water, and only a log and some gravel for furnishings. The foot-long common snapping turtle at Oban Sea Life was, according to staff, "*asleep*" in its sparse and restrictive tank. In fact the animal had adopted an unusual (tilted) body posture, which could suggest a problem. Again there are little basking opportunities in the tank, aside from a box which the animal can climb up to, but this is barely larger than the animal's body. Staff claimed that: "*he can kind of climb into the box but he doesn't tend to*".

Snapper turtles prefer turbid environments with muddy bottoms and lots of vegetation. They can be periodically sedentary but need space as they tend to travel. The opinion of the staff at Oban Sea Life regarding the restrictive, barren snapper turtle tank – similar to that of staff at Scarborough Sea Life regarding the common octopus tank, and staff at Brighton Sea Life regarding the softshell turtles – is that animals who would naturally be sedentary in the wild and live in 'barren' environments, do not need large tanks. Even if this were true of these animals, this rationale may suit the convenience of those seeking to promote reptiles as a 'cage pet', but it is scientifically and ethically wrong. While reptiles, like other animals, require shelter to which they can voluntarily withdraw, the key elements are that the animal seeks a 'hiding place' when it senses the need for it and it does this voluntarily. Imposing a confined space on an animal is biologically equivalent to trapping it.

Contrary to common perceptions, reptiles manifest an array of abnormal behaviours which indicate stress (Warwick *et al.,* 2013). Behavioural assessment of animals (including reptiles) is an essential method for evaluating their condition and welfare. While physiological stress measurements are available through blood and, less invasively, faecal sampling, numerous confounding factors are involved with this method, including a dearth of pure baseline data and the limitations of focused interpretation.

At Blackpool Sea Life, Birmingham Sea Life and Scarborough Sea Life, there are turtles who were displaying signs of captivity stress, such as hyperactivity and 'Interaction with Transparent Boundaries' (ITB). ITB is one of the most commonly-observed abnormal behaviours in captivity and appears to be related to exploratory escape activities (Warwick *et al.,* 2001). The animals were observed interacting with boundaries and apparently attempting to escape by pushing their bodies against, and climbing, acrylic/glass barriers of small and barren tanks. It has been stated by internationally-renowned reptile biologist, Clifford Warwick that: 'In nature the closest comparison to a reptile 'cage' might be when an animal falls into a deep crevice and cannot escape' (Warwick *et al.,* 2001).

A fly river turtle and a Mississippi map turtle at Scarborough Sea Life were observed performing ITB in small, traditional tanks with an acrylic/glass front. The animals have nowhere to hide, bask, forage, or carry out other normal behaviours. At Manchester Sea Life, two fly river turtles are housed in a similar under-stimulating and overly-restrictive environment. Captivity-stress-related hyperactivity and ITB was observed in one of these turtles. At Oban Sea Life, there are rows of predictable, square acrylic/glass tanks, though the extensive use of acrylic/glass is particularly bad practice. As with other Sea Life aquariums, turtles here were performing ITB.

Another behavioural sign of captivity-stress was observed in turtles at Weymouth Sea Life - 'jerky' locomotor or jumping actions (termed 'rapid body movement') which is again common in overly-restrictive, and exposed, deficient and inappropriate environments (Warwick *et al.,* 2013).

Hyperactivity has been described as 'abnormal high-level physical activity, surplus or redundant activity' (Warwick *et al.,* 2013), and is also indicative of captivity-related stress. It may be caused by overly-restrictive, deficient and inappropriate environments. When concern was raised by the CAPS investigator to Weymouth Sea Life staff that an animal was appearing stressed and attempting to escape, staff responded: "*No, he's fine. Animal people know what they are doing".* In fact, when an Animal Care member of staff was asked at the same aquarium what behavioural indicators her team use to the assess the welfare of turtles and terrapins (considering the behavioural change in reptiles, as in other animals, is often the primary indicator of disturbance, injury or disease), she replied that feeding and swimming are used, along with "*a general sort of looking over the body*". The Animal Care member of staff added: "*I mean if he's swimming around he's pretty happy then that's probably a good indicator*" and "*if they stop eating they are not happy*".

Sea Life staff also stated: "*No, haven't seen any abnormal behaviours. I mean if it was abnormal it would be hiding away all the time and he wouldn't be swimming around*". There was no mention at any of the Sea

Life aquariums of any of the major indicators of captivity stress – such as increased abnormal behaviour, behavioural inhibition, vigilance behaviour, hiding, fearfulness and frequency of startle, aggression, and freezing behaviour, and decreased exploratory behaviour, reproductive behaviour, and behavioural complexity, as summarised by Morgan and Tromborg (2007).

Reptile sellers, keepers and some professionals commonly interpret signs of 'good feeding', 'good bodyweight' and 'active reproduction' as positive indicators of welfare (Warwick, *et al.,* 2013). However, in isolation, these signs are poor indicators of welfare and may actually be highly misleading (Broom and Johnson 1993; Warwick *et al.,* 2004).

10. HEALTH AND DISEASE

There are many types of health problems that fish and other aquatic animals suffer in captivity, for example, owing to the limited volume of water and high concentration of fish in tanks, fish housed in aquariums can be susceptible to infectious diseases. The study of fish diseases however remains a rudimentary branch of veterinary medicine. There are concerns over emerging diseases, the biosecurity of facilities, and the inability to treat disease owing to a lack of pharmaceuticals. For example, there are no vaccines available for use in fish (Branson, 2008).

There were very few physical injuries or evidence of physical ill health in the animals on display at Sea Life aquariums, however a snapshot of the most commonly-occurring health issues for animals at Sea Life was revealed through interviews with staff. None of the Sea Life aquariums have veterinarians on-site; instead they receive visits from a veterinarian of the International Zoo Veterinary Group (IZVG) who turns up every quarter.

If any animals become ill, local veterinarians are called out to the centres or, with minor cases of ill health, photographs are emailed to Head Office for analysis.

It was revealed during the investigation that many of the animals at Sea Life receive 'Aquavit vitamins', which replace vitamins lost during storage and thawing of feed. In 2014, it was widely reported in the media that penguins at Scarborough Sea Life are even given antidepressants to cope with 'the weather'. The birds were given antidepressants previously when visitors broke into their enclosure (e.g. The Independent website; BBC News website; MSN News website).

Footage of the octopus exhibits were sent to a cephalopod expert by CAPS during this investigation, so that he could review the conditions. He noted that some of the octopuses at Sea Life appeared extremely pale in colour. Further evidence would be required to make a definite prognosis, however this *could* indicate ill health.

Staff in 59% of Sea Life aquariums visited claimed that "*old age*" is the most common cause of mortality. Staff at 25% of Sea Life aquariums claimed that "*pop eye*" is also commonly observed, occurring when air becomes trapped behind the animals' eyes. At two of the aquariums where pop eye was mentioned to the CAPS investigator, staff claimed that fish had been exposed to varying pressures in tanks. Staff at another other aquarium stated that is was caused by "*being brought from the ocean to the surface too quickly*". Pop eye is actually a condition, not a specific disease, and can be the result of a number of different causes. Possible causes are internal bacterial infection, trauma to the eye, and a suboptimal environment. It can, in some cases, be caused by oxygen super-saturation events. Environmental factors can include high levels of ammonia, ammoniac, nitrite, or nitrate, or otherwise poor water quality. It can also be caused by a carbon dioxide level in the water that is too high as a result of carbon dioxide enrichment of the water. If the carbon dioxide is released as bubbles the fish can swallow them, and this can cause pop eye.

Another common health problem, according to staff at Blackpool Sea Life, is "*cloudy eye*". There are several causes of this illness - internal parasites, such as protozoa or flukes, being one. Another is the onset of cataracts in fish. Severe stress or malnutrition could be involved. However, the most common cause of cloudy eyes in aquarium fish appears to be poor water quality. Staff at London Sea Life state that cloudy eye is their "*main illness*" and it is caused by "*excessive flash photography*" - a rarely-evidenced cause of this illness.

"*White spot*" was also frequently mentioned by Sea Life staff during the investigation. White spot, or *Cryptocaryon* - a species of ciliate protozoa that parasitises marine fish - is one of the most common causes of disease in marine aquaria. Fish who are infected with *Cryptocaryon* can get small white spots, nodules, or patches on their skin, fins, or gills. They may scratch, swim abnormally, act in a lethargic manner, hang at the surface or on the bottom, or breathe more rapidly as if they are in distress (Yanong, 2009). Stress is the prime cause of *Cryptocaryon* outbreaks, and a lowered immune system, along with poor water quality, are usually to blame.

Staff at Scarborough Sea Life admitted: "*white spot is quite common, especially in blue [Regal] tangs as they get a bit stressed with a lack of space*" and that the animals may "*feel claustrophobic*" in their tanks. This means that it can be prevented therefore, and controlled. Outbreaks shouldn't occur and certainly not regularly in mature and well-established systems. Staff at Sea Life aquariums mentioned white spot as if it was intrinsic with aquariums. Staff at Blackpool Sea Life stated: "*Obviously we get white spot from time to time which has meant high mortality in those tanks*". In fact, white spot can easily be treated and this is also admitted by staff at Blackpool Sea Life, who state: "*it is easily treatable*" and "*is very easy to treat but it does spread quick*". White spot should therefore never have caused a high mortality as it obviously has at Blackpool Sea Life.

A clear case of neglect by Sea Life staff was revealed during the investigation. At Oban Sea Life, an apparently knowledgeable member of staff allegedly voiced concerns to senior management regarding signs of *Sacculina carcini* in the captive Shore crab (*Carcinus maenas*) population. This parasite commonly infects Shore crabs and inflicts behavioral change, castration, ceased molting and feminises its male host morphologically (Larsen *et al.,* 2013). This member of staff's concerns were ignored for several weeks by the Animal Care team, and eventually the crabs were deemed too sick to be on display. They were then killed by a senior member of staff who placed them into a box containing an (unknown) toxic substance and the animals apparently took 30 minutes to die.

A treatment for *Sacculina carcini* infection is in fact widely available, and yet it appears the animals' tell-tale signs of infection were ignored. Sea Life states: 'Here at Sea Life we care deeply about our oceans, the creatures that live above and beneath the surface and those we are lucky enough to have in our care. We are experts in husbandry and will only keep creatures that we know will thrive in the displays we create for them' (Sea Life website).

When questioned about the euthanasia policy for animals who are not sick, but surplus, the CAPS investigator was informed (at Hunstanton Sea Life) that "*Sea Life never kills a healthy animal*" and, at Great Yarmouth Sea Life: "*We never put anything to sleep because we have got too many of them or because they are a problem*". Yet in the company's 'Euthanasia Policy' document, obtained by CAPS during 2013, it is stated that the euthanasia of animals due to their being a surplus, or the animals being too large to house, must be discussed at an 'Ethics Review' before being carried out. The killing of healthy or surplus animals therefore is *not* prohibited by Sea Life.

11. VISITOR BEHAVIOUR

The design of tanks at Sea Life (closed, open and touchable or open but not touchable) are categorised in Table 4, and illustrated in Figure 8.

TANK DESIGN	DESCRIPTION
Open but not touchable	Exhibits where visitors can see the surface of the water from above but they cannot easily touch it without either climbing on barriers or other exhibit structures, or by making a clear effort to reach it
Open and touchable	Exhibits where visitors can easily touch either the water or the animals in it without neither having to climb anywhere nor making too much effort trying to reach it
Closed	Exhibits where visitors cannot see the surface of the water from above

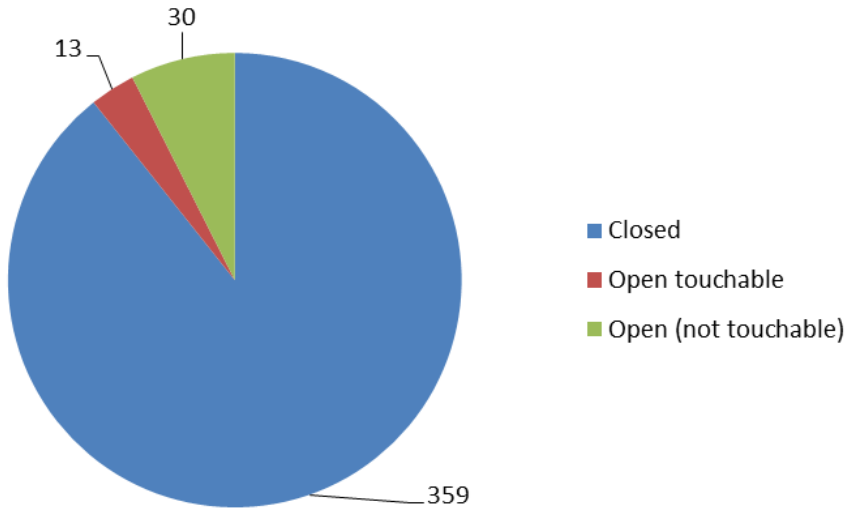


Table 4 and Figure 8: Tank Design at Sea Life

The investigation revealed that 90% of tanks at Sea Life are 'closed', 7% are 'open but not touchable', and 3% of tanks are 'open and touchable'. Each of the Sea Life aquariums has at least one open and touchable tank.

Information signs did little to prevent visitors touching the water and at all Sea Life centres, visitors were observed dipping their fingers in. Sea Life staff admit that "*you can't stop everybod*y" from dipping fingers in ray pools.

Undoubtedly, visitors play an important role in the daily lives of captive animals. Even when they are abiding by signs, their presence alone can be a disturbance. In particular, at immersion exhibits, Octopus tanks and *'Finding Nemo*' areas such as the 'Nemos Cave' at London Sea Life, and 'Nemo's Kingdom' at Great Yarmouth Sea Life and Weymouth Sea Life. The aquariums encourage the popularity of these areas by referring to the '*Finding Nemo*' film on posters, in the visitor guides, and on its websites. No standoff barriers are present at the aquariums to prevent visitors banging and, as mentioned, this was particularly common at cylindrical and spherical tanks.

Despite several signs around the aquariums asking visitors to commit to a code of conduct, the CAPS investigator recorded visitors carrying out all of the following:

- Throwing food into exhibits when it is prohibited
- Banging on tank barriers
- Climbing onto and over barriers
- Touching animals when it is prohibited
- Touching water when it is prohibited
- Using flash photography when it is prohibited

At Great Yarmouth Sea Life and Scarbourgh Sea Life, the feeding of animals in the ray pool and pacu tank is allowed. At Great Yarmouth, 'Pacu Food' is available for visitors to purchase at the entrance counter and at Scarborough Sea Life, visitors are encouraged to purchase plastic tubs of food after the ray talk to 'help fund Sea Life's conservation efforts of wild animals'. No staff were present at the Great Yarmouth Sea Life pacu tank to supervise the feeding of pacus, and visitors could potentially throw the food in any aquarium tank. The Oban Sea Life website also states that 'children can feed the sharks'.

11.1 Close Encounters

Sea Life offers a wide range of 'Close Encounter' experiences with apparently little concern for the welfare of animals housed in the tanks, or for public safety. More and more animals are forced closer and closer to the general public in order to exploit people's thirst for 'close up' and 'hands on' experiences in public aquaria and they are often extremely pricey. Sea Life states: 'Every aquarium opens a window into the magical world beneath our seas and offers close encounters for all ages with everything from humble shrimps and starfish to seahorses, sharks and stingrays' (Sea Life website).

Photo 21: Visitors are encouraged to enter the shark tanks

Manchester Sea Life offers a 'Sea Trek' experience for £60.00 per person, where visitors can enter the Ocean Tank with sharks and other animals. A licence inspection report carried out in April 2013 at the aquarium stated that 'the innovative nature of the Sea Trek experience undoubtedly will provoke some challenges, but the facilities are well provided and the staff has adequate skills and training to ensure that systems run smoothly and safely' (DEFRA, 2013).

London Sea Life offers interactive public feeding, diving displays and the opportunity to 'swim with sharks'. Visitors enter the water with a snorkel and swim above a transparent platform surrounded by netting. Tickets are also available for the 'VIP Turtle Feeding Experience'. For £55.00 per person, visitors can have one-to-one briefing with an 'expert aquarist' to learn more about the turtles and their habits, as well as the opportunity to 'hand feed' the animals. London Sea Life offers 'Sea Life After Dark' events which enables visitors to visit the aquarium after opening hours to 'drink cocktails' and eat a meal. DJ's are also permitted at the Birmingham Sea Life Aquarium after

hours, and visitors can have free access to all exhibits. This means that the animals at Sea Life are often exposed to the public even after the aquariums are closed.

At Brighton Sea Life, there are seahorse and turtle feeding opportunities for visitors and 'Sea Life Expert' days can be booked for children at a cost of £99.00 (a half day option costs £60.00).

The wide range of close encounters offered by Sea Life present a number of risks to visitors. Aside from the risk of zoonotic diseases (hand wash basins were located near to some of the aquarium rock pools though visitors were not once observed using them or being told to use them by Sea Life staff), there are public safety risks and animals experience stress at being in such close contact with humans. At Birmingham Sea Life, a staff member admitted that sharks at the aquarium often show fear behaviour when people enter the tank.

Visitor safety is most obviously at risk when they enter the large Ocean Tanks to experience close encounters with several species of large shark. Sharks are unpredictable, wild animals and for even the most experienced divers, swimming with them is a risky encounter. A frightened shark can be a dangerous shark.

At Great Yarmouth Sea Life, visitors can 'get up close' to nurse sharks, zebra shark, blacktip reef sharks and assist one of the Sea Life 'marine experts' feed these sharks for £25 per person. Blackpool Sea Life has a 'snorkelling cage' in the Ocean Tunnel to provide visitors the opportunity of getting up close with the tropical sharks and rays. Sharks in the tank include bull sharks, white tip reef sharks, nurse sharks, blacktip reef sharks and sandbar Sharks.

London Sea Life offers visitors the opportunity to dive with sharks in the Pacific Reef exhibit at a price of £125.00 per person (Sea Life website; Youtube website). A 'Snorkeling with Sharks' family ticket for two adults and two Children) costs an huge £450.00. The website states that it includes: 'a 15 minute snorkel with a group of over 15 magnificent sharks – including two impressive 2.7 metre long sand tiger Sharks, eight sleek blacktip reef sharks and two brown sharks (Sea Life website). Sand tiger sharks are notably dangerous and unsuited to captivity and absolutely no diving experience is required at Sea Life. Sea Life charges £25.00 for each spectator also. These dives are obviously geared up to raise profit for the aquarium. With each dive, just £5.00 is donated to The Sharks Trust, no doubt to demonstrate Sea Life's 'commitment' to shark conservation. Sea Life is asking its visitors to fund conservation initiatives from inside the centres, rather than using profit gained from the entrance fee.

Blackpool Sea Life also offers a 'Snorkelling with Sharks' experience for £50 per person (Sea Life website). The aquarium claims to have over 20 sharks, as well as stingrays and a 'snorkelling cage'. Sharks in the Ocean Tunnel include bull sharks, white tip reef sharks, nurse sharks, blacktip reef sharks and sandbar Sharks.

Appendix 12 of the SSSMZP provides a list of hazardous animal by category. Hammerhead sharks also inhabit the Sea Life tanks and these animals, along with nurse sharks and sand sharks, have been categorised as being of 'Greater Risk' according to the 'Secretary of State's Standards of Modern Zoo Practice (SSSMZP)'. Contact with animals in this category are said by likely to 'cause serious injury or be a serious threat to life, on the basis of hazard and risk of injury, toxin or disease, irrespective of the age and vulnerability of the visitor'. The bull shark has been described as possibly being the most dangerous species of tropical shark, and is certainly one of the three most dangerous sharks judging by numbers of attacks recorded on people (the other two being the great white and tiger sharks) (Florida Museum of Natural History website).

In late 2012, Blackpool Sea Life brought a Jenkins whiptail ray (*Himantura jenkinsii*) over a metre in length into the aquarium and, in 2013, the animal was moved to the Ocean Tank. The Jenkins whiptail is approximately 1 metre in length. The ray's 10 cm barb, which is a defensive weapon, can cause serious

injury. Staff apparently underwent an intensive training programme (ITV News website; Sea Life website).

Even the green sea turtles swimming in the Sea Life Ocean Tanks have been included in the SSSMZP categories as being of 'Less Risk' - 'Contact between the public and animals in Category '2' may result in injury or illness, on the basis of hazard and risk of injury, toxin or disease, but is not likely to be life threatening'.

Sting rays and eagle rays, who are housed in open and touchable tanks at Brighton Sea Life, and also must regularly come into close contact with staff, are categorised as being of 'Less Risk'. There is a 'Venomous Stingrays Please Do Not Touch' sign on the open top tank, however visitors were observed still putting fingers in the water. The pacus have a strong bite. According to the member of staff giving the 'Behind-the-Scenes' tour at London Sea Life, their bite can "*crack brazil nuts and dent metal*". Yet they are housed in open and touchable tanks at Sea Life. Visitors were observed dipping their fingers into these tanks. At Great Yarmouth Sea Life, Pacus can be fed by visitors, which is a bizarre risk for Sea Life (and visitors) to take. A member of staff told the CAPS investigator that there is "*one in particular, Mani. He is the biggest, he will if he sees someone with their hand over, he will come straight to the surface. He'll stick his head out*".

11.2 Touch Pools

All Sea Life aquariums feature small rock pools, housing animals such as Sea urchins, anemones, crabs, shrimps, star fish and small fish.

Crabs have the ability to learn, to make discriminations about their environment and to make associations and generalisations (Sømme, 2005). They show understanding and memory both of places and of other individuals, and appear to understand when they are in a novel environment. Researchers have revealed that crabs put in an experimental chamber explore it very actively for a few minutes, but they do not do this if they are put back in the chamber shortly after their first experience of it, suggesting that they had acquired a degree of knowledge and did not need to explore the familiar surroundings (Martinez *et al.* 1988). The frequent movement of crabs between pools, tanks, visitors and staff members at Sea Life may well be an aversive experience for these animals.

During visits, Sea Life staff were observed urging visitors to "*touch and tickle*" the animals. Signage at London Sea Life urges visitors to touch Starfish, stating: 'Are you brave enough to touch a crab or starfish at the rock pool?' Staff were observed touching the undersides of starfish though at Scarborough Sea Life and Loch Lomond Sea Life, though this was deemed as "*damaging*" to the animals by staff at Great Yarmouth Sea Life. At Brighton Sea Life, a DEFRA-appointed inspecting veterinarian in 2010 stated: "*A touch pool is in regular use and it is constantly supervised by a member of staff when animals are in the pool. There is limited physical contact of animals by the public. There are good animal rotation records and adjacent hand washing facilities*" (Brighton and Hove City Council, 2013). This shows that 'limited physical' contact with animals in touch pools is considered acceptable by DEFRA.

Some crabs had limbs missing which, according to staff, was due to their capture in the wild. At Loch Lomond Sea Life, the staff member who was overseeing the rock pool area stated that the crabs with missing legs were collected from the sea like this. This could be true, or the animals could have been injured during the catching and transport process. In fact, injury, limb loss, and mortality are immediate results of wild-capture and handling. Long-term effects include reduced growth, increased intermoult period, egg loss, increased susceptibility to predation, failure to successfully moult, reduced foraging capability, and mortality. Sea Life staff openly informed visitors that these animals are caught in the sea during talks. At Loch Lomond Sea Life, a member of staff told the CAPS investigator that "*the only animals caught in the wild here are rock pool creatures*", which is clearly misinformation.

Staff at both Birmingham Sea Life and London Sea Life compared the feel of the animals to "*fish fingers*" which hardly promotes respect amongst visitors for the animals being handled.

A licence Inspection in April 2013 at Manchester Sea Life revealed concerns regarding the noise and vibrations that animals would likely experience in the 'rest area' for rock pool animals, as it is in close proximity to the general flow of public through the facility. The wall of this area is a simple studded and panelled construction (DEFRA, 2013).

At Sea Life aquariums, visitors can touch crabs either in pools, or in plastic tubs. At Hunstanton Sea Life, the crabs did not appear to have the opportunity of being in the pool, and instead were housed in a small, dilapidated tank balanced on the side of it. The plastic tubs mean that animals can be rotated to prevent the same animals repeatedly being touched by visitors, and they remain in these tubs for varying periods at the different aquariums. For example, at London Sea Life, starfish spend three hours in tubs a day, every three days. Staff at one Sea life aquarium admitted to visitors that being in the tubs is "*just not nice*" for the animals. In fact, long term or repetitive exposure to visitors is likely to be detrimental to their health and welfare. Handling by staff at the Sea Life aquariums was observed to be often rough and prolonged. At Hunstanton Sea Life, a crab was held upside down by a staff member to demonstrate how the animals feign death. Death feigning is a method crabs use to protect themselves when under threat. It may be a sign of fear.

Sea Life staff often were heard telling visitors that the animals were "*working*" when they were in the tubs, and that the animals were "lucky" they were have three days off, and then one day's work. At Weymouth Sea Life, the staff member overseeing the rock pool stated that the animals "*work one hour a day*" and "*To be fair, with the crabs, their job is to be picked up and poked in the head*". This is actually a fairly accurate portrayal of life for a Sea Life rock pool crab.

Crabs show stress in a variety of ways, such as lethargy or over activity, loss of appetite and inhibition of growth rate. It is difficult to determine how long Shore crabs can safely be out of the water for as they would naturally be subject to the effects of the tide but whether or not being out of water impacts negatively on them is not easy to determine in the short term.

Sea Life aquariums mark the rock pool animals in different ways to aid the rotation process, for example Weymouth Sea Life uses plastic tags glued onto the bodies of crabs, and Scarborough Sea Life uses a ring tagging and a colour scheme.

Sea Life staff were present at each of the rock pools, however at Loch Lomond Sea Life, the member of staff who was clearly supposed to be in charge of the rock pool area was absent for most of the day giving talks in other rooms. She stated early on in the day: "*The welfare of our creature is absolutely paramount*" and "*we really look after our rock pool creatures",* yet in her absence, visitors were observed dipping fingers in the water and prodding the crabs. In the same rock pool room that was unattended for most of the day, the CAPS investigator found a dead crab in one of the tanks. It is now known how long the animal had been dead for but staff hurriedly removed the animal when the investigator pointed it out.

Statements made by the Entertainer staff at Sea Life, who are hired to communicate with visitors and provide information about the animals in rock pools, were often bizarre, yet Sea Life states that their 'experienced and knowledgeable team' are on hand to expand the knowledge of visitors (Sea Life website).

At Gweek Sea Life, one staff member told the CAPS investigator that another member of staff who was giving the rock pool talk had very little knowledge on the animals. A staff member at Great Yarmouth Sea Life told visitors: "*The crabs are tamed, exactly the same as you'd tame a cat or dog*" and then admitted that "*they don't like being held*". At Gweek Sea Life, a Shore crab was waved in front of a visitor's dog – again not teaching any respect for the animals supposedly in their 'care'.

12. CONCLUSION

According to its literature, Sea Life aims to 'Breed, Rescue' and Protect', yet the findings of this investigation indicate that the breeding and rescue programmes carried out by the company have been set up to appease the general public, and to facilitate the continuation of an industry based on the exploitation of animals for entertainment purposes.

Sea Life has also so-far failed to 'protect' many of its inhabitants and their wild counterparts, whilst at the same time leading visitors to believe that aquariums provide a vital role in the preservation of biodiversity, and an essential lifeline for many endangered species. Sea Life has in fact provided no real, tangible solutions to the crisis currently affecting many wild animal populations. Instead, Sea Life places great store in breeding animals who will never be released into the wild whilst offering no real contribution to meaningful scientific research. The majority of animals at Sea Life aquariums have not even been evaluated by the IUCN, which means that their population statuses are, at present, unknown. Yet evidence suggests that many of these animals will have been, and continue to be, caught from the ocean to 'stock' Sea Life aquariums.

Sea Life fails to provide any meaningful education to its visitors. The inaccurate information provided its staff members, not only regarding the origin of the animals at the aquariums, but also about their behaviour, provides a worrying insight into an industry clearly driven first and foremost by profit, rather than concern for conservation or animal welfare.

This report touches on the serious welfare issues involved in removing fish from their ocean homes, and transporting them often long distances for display. Sea Life provides a poor environment for many animals in its aquariums; lacking in suitable furnishings, substrate, enrichment and space. Even with the best 'care', fish and other animals do not adapt well to life in a tank as their lives are naturally complex and impossible to reproduce in captivity.

CAPS is opposed to the incarceration of animals in aquariums and the continuation of the aquarium industry as we know it today.

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