Orcinus orca (Killer Whale)

Family: Delphinidae (Oceanic Dolphins and Killer Whales)
Order: Cetacea (Whales and Dolphins)
Class: Mammalia (Mammals)

Fig. 1. Killer whale, *Orcinus orca.*

[http://oceanox.org/english/ocean-02/orca-most-intelligent-marine-animal-02.html, downloaded 1 November 2015]

TRAITS. The killer whale is also known as the orca. The largest species of the oceanic dolphin family (Berta et al., 2006), with a distinctive black back and a white underside, with white areas generally at their sides and at the far side of the eyes (Fig. 1). Newborn calves have a yellow shade that eventually turns white. The total length of adult males range between 7-9m with females slightly smaller at 6-8m. Body shape is generally elongated, and gets narrower at both ends, making it adapted to swimming efficiently and quickly. Dorsal fin located on the back, and can reach lengths up to 2m. Grey mark located behind their dorsal fin, called a saddle (Ford, 2002). Large tail fin with two lobes called flukes (Heyning and Dahlheim, 1999). Two roundish pectoral flippers, one on each lower side of the body directly after the head. Males have larger dorsal fins and pectoral flippers than females. Eyes located on both sides of the head, directly after the mouth, with a blowhole located at the top. Ears found behind the eyes, noticeable only by small indentations in the skin. Mouth usually contains 40-56 strong, large teeth in total. Upper and lower teeth interlock. Skin is very smooth and has a thick layer of blubber (7-10 cm) beneath it (Pitman, 2011).

ECOLOGY. The second most widely distributed animal in the world, and occurs in all of the oceans on Earth. Highly adaptable and can live in waters ranging from very deep to only a few

metres in depth. Their preferred habitats are coastal areas of cold surface water that are highly productive in nutrients and aquatic life. These include the northwest Pacific Ocean, Southern Ocean and the Atlantic Ocean, along the north coast of Norway (Pitman, 2011). Also found less commonly in warm tropical waters such as around Trinidad and Tobago, Argentina, and Hawaii. Worldwide, their diet comprises of an immensely diverse amount of animals. However, groups usually specialize to hunt a few species of animals. There are two categories, transient and resident. Resident orcas are those that live permanently in a location and feed on fish, while transient ones are those just "passing through," and prefer marine mammals (Heyning and Dahlheim, 1999). E.g. in the northwest Pacific Ocean some resident pods hunt fish such as salmon and herring while transient ones hunt mammals such as seals and otters. They never interfere with each other's prey. It is estimated that killer whales feed on more than 150 species of animals across the world, including turtles and birds (Berta et al., 2006). Due to their size and dominance, killer whales do not usually have to compete with other animals for habitats and food.

SOCIAL ORGANIZATION. Very complex social structure and organization. Extensive research has been done on the killer whales that permanently reside in the north Pacific. It was found that they show various levels of social structure, where females are the dominant members (Heyning and Dahlheim, 1999). The first level is called the matriline. This is a group of killer whales that consist of a female whale, her calves and sometimes the young of her calves (Fig. 2). Matrilines have an extremely strong and stable bond among members. No whale has ever been reported to leave one of these matrilines, and members never stray too far from another for too long. The next level is called a pod. These comprise of matrilines that are all related to one another. All matrilines in a pod share a common ancestor, and they all travel together. This level of structure is less stable, as matrilines have been observed to leave the pod for extended periods of time. The next level is a group of pods called a clan. Clans consist of pods that share the same vocal communication methods (dialect). As with the other levels, pods in a clan are related to one another. Clans are not very stable, and pods from different clans often overlap. The largest and final level of social structure is the community. This is the least stable, and is only formed by pods that share a common habitat and interact with each other. Pods from one community do not usually migrate into another one, except for breeding (Ford, 2002).

SOCIAL BEHAVIOUR. Extremely social. Members of a pod form strong connections with one another and certain individuals form lasting friendships with each other that they would not do with another member. The strongest bond observed is between mothers and their calves. The mother pays close attention to her newborn calf, dictating its movements, disciplining and protecting it until it has matured to a point that it no longer requires it (Pitman, 2011). Ranks in these groups are established based on physical activities such as butting heads with each other, beating the water with their tails, biting each other and demonstrating dominant body language. They exhibit individual behaviours as well such as: breaching, in which the whale jumps almost fully out of the water and hits the surface on its side or back with a large splash; spyhopping, in which the whale vertically comes out of the water exposing half its body to the air (Fig. 3); and slapping the water surface with their tails, dorsal fins and pectoral flippers (Heyning and Dahlheim, 1999). These are thought to be forms of play, communication and courting.

ACTIVITY. May be active during both day and night hours. Most of a day is normally spent foraging for food, socializing with one another, resting and general swimming (Ford, 2002). They are commonly observed at the water surface engaging in different forms of social behaviour (stated above). Although they are active whole day, most of the activity is observed during daylight hours. Transient orcas however use the darkness of the night to sneak up on their mammal prey (Berta et al., 2006). Orcas sleep by half its brain going into a state of sleep while the other half remains awake, allowing the animal to see, hear and breathe. They have irregular sleeping patterns, which can last a very short or an extended period of time (Lyamin et al., 2008).

FORAGING BEHAVIOUR. Killer whales are apex predators, which means they have no natural enemies themselves, thus can freely hunt for prey. They do so in pods, working together to catch their target using a variety of methods. Resident orcas in the north Pacific hunt in small groups to capture salmon, then share the catch with other members. They use teamwork to encircle the fish, herding them all into a desired area, then hit the fish with their large tails. This technique stuns the prey, and makes it very simple to then eat (Baird, 2000). To hunt larger prey requires a larger group, and orcas use these to hunt for other whales e.g. a baleen whale. A group of 30 or so orcas surround the whale in a specific manner, each orca knowing their role. This prevents the baleen whale from escaping, then they all attack from their delegated position (Berta et al., 2006). Transient orcas have been observed to sneak up on their mammal prey, using the darkness of the night. Other methods involve chasing prey into narrow beaches trapping them, or drowning the mammal by dragging it underwater. In Argentina, orcas are observed beaching themselves to catch baby seals on the shore, then using the waves to get back into deeper water (Deecke et al., 2005) (Fig. 4). In Antarctica, they hit into the floating ice slabs above them to cause the prey to fall into the water. If the ice is too hard, it has been observed that they would swim in a line straight towards the slab, then dive underwater at the last minute. This causes a wave to be formed, knocking the prey off of the ice (Fig. 5). Killer whales have also been observed "playing" with their prey after they have successfully captured it by tossing it into the air to each other, and hitting it with their tails (Au et al., 2004).

COMMUNICATION. Vocal communication: For close ranges, orcas use a variety of high pitched whistles to interact with one another. These whistles are always in a specific direction and only used when they are in close proximity to each other (Deecke et al., 2005). For longer distances, a more common pulsed call is utilized. These calls may be used to recognize other orca pods or when hunting to organize a formation (Thomsen et al., 2002). Calls made repeatedly by an orca is that animal's repertoire, and members of a pod all share the same repertoire of calls. Each pod makes slightly differing calls, thus have their own dialect. Pods that have similar dialects are believed to be representative of their relationship to each other. Calves always develop their dialect from their mother (Ford, 2002).

Echolocation: orcas have the ability to find objects by sending out sound waves (via clicks) that are of high frequency, and listening for the echo that returns to them. By using this method, they could locate objects and other orcas that they would not see with the naked eye and communicate with them (Au et al., 2004). Body language is also used to showcase dominance, aggression and playfulness (Berta et al., 2006).

SEXUAL BEHAVIOUR. Many aspects of this are not known due to the orcas being underwater. However it has been observed that females become sexually receptive several times

a year, and that they mate with more than one partner, i.e. they are polygamous in nature. Mating can occur at any time during this period but is most common during the summer months. One offspring is born per season and are released into the water (Robeck and Monfort, 2006). It is proposed that breaching and spyhopping by males may also be used as courting rituals.

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Fig. 2. A matriline of orcas (mother and two calves).

[http://www.aquablog.ca/2015/07/killer-whale-culture-from-matrilines-to-mating-rituals/, downloaded 3 November 2015]

Fig. 3. An orca spyhopping.

[http://www.gowhales.com/Features/Photos1002/ph1002KillerWhaleSpyHopping.htm, downloaded 3 November 2015]

Fig. 4. An orca beaching itself in an attempt to catch prey on the shore.

[http://www.redorbit.com/news/science/1345802/killer_whales_hunt_on_shore_in_argentina/, downloaded 3 November 2015]

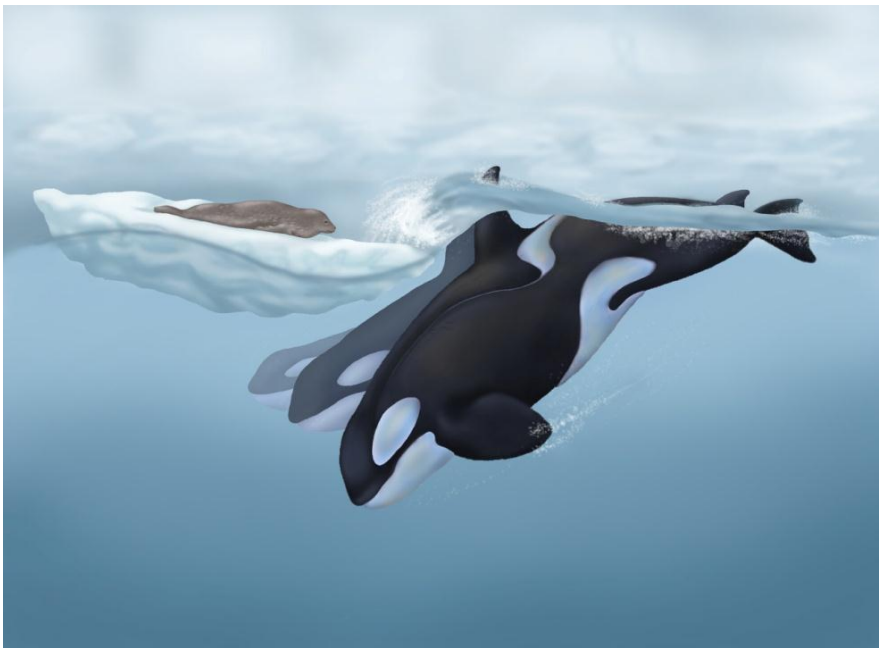

Fig. 5. Illustration of orca creating waves to knock prey off ice slab.

[http://morrisillustrations.tumblr.com/post/89677647287/my-orca-illustration-showing-the-orca-hunting, downloaded 3 November 2015]

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