

= Killer whale =

The killer whale or orca ( *Orcinus orca* ) is a toothed whale belonging to the oceanic dolphin family , of which it is the largest member . Killer whales are found in all oceans , from Arctic and Antarctic regions to tropical seas . Killer whales have a diverse diet , although individual populations often specialize in particular types of prey . Some feed exclusively on fish , while others hunt marine mammals such as seals and dolphins . They have been known to attack baleen whale calves , and even adult whales . Killer whales are apex predators , as there is no animal which preys on them .

Killer whales are highly social ; some populations are composed of matrilineal family groups ( pods ) which are the most stable of any animal species . Their sophisticated hunting techniques and vocal behaviours , which are often specific to a particular group and passed across generations , have been described as manifestations of animal culture .

The IUCN ( International Union for the Conservation of Nature ) currently assesses the orca 's conservation status as data deficient because of the likelihood that two or more killer whale types are separate species . Some local populations are considered threatened or endangered due to prey depletion , habitat loss , pollution ( by PCBs ) , capture for marine mammal parks , and conflicts with human fisheries . In late 2005 , the Southern Resident Killer Whales , the population that inhabits British Columbia and Washington state waters , were placed on the U.S. Endangered Species list .

Wild killer whales are not considered a threat to humans , but there have been cases of captive orcas killing or injuring their handlers at marine theme parks . Killer whales feature strongly in the mythologies of indigenous cultures , with their reputation ranging from being the souls of humans to merciless killers .

= Taxonomy and evolution =

*Orcinus orca* is the only recognized extant species in the genus *Orcinus* , one of many animal species originally described by Linnaeus in 1758 in *Systema Naturae* . Konrad Gessner wrote the first scientific description of a killer whale in his " Fish book " of 1558 , based on examination of a dead stranded animal in the Bay of Greifswald that had attracted a great deal of local interest .

The killer whale is one of 35 species in the oceanic dolphin family , which first appeared about 11 million years ago . The killer whale lineage probably branched off shortly thereafter . Although it has morphological similarities with the pygmy killer whale , the false killer whale and the pilot whales , a study of cytochrome b gene sequences by Richard LeDuc indicated that its closest extant relatives are the snubfin dolphins of the genus *Orcaella* .

= Common names =

English @-@ speaking scientists most often use the term " killer whale " , although the term " orca " is increasingly used . Killer whale advocates point out it has a long heritage . Indeed , the genus name *Orcinus* means " of the kingdom of the dead " , or " belonging to Orcus " . Ancient Romans originally applied orca ( plural orcae ) to these animals , possibly borrowing it from the Greek ????? , which referred ( among other things ) to a whale species . Since the 1960s , " orca " has steadily grown in popularity ; both names are now used . The term " orca " is euphemistically preferred by some to avoid the negative connotations of " killer " , and because , being part of the family Delphinidae , the species is more closely related to other dolphins than to whales .

According to some authors , the name killer whale is a mistranslation of the 18th century Spanish name asesina de ballenas which means literally whale killer . Basque whalers would have given it such name after observing pods of orcas hunting baleen whales .

They are sometimes referred to as " blackfish " , a name also used for other whale species . " Grampus " is a former name for the species , but is now seldom used . This meaning of " grampus " should not be confused with the genus *Grampus* , whose only member is Risso 's dolphin .

== Types ==

The three to five types of killer whales may be distinct enough to be considered different races , subspecies , or possibly even species ( see Species problem ) . The IUCN reported in 2008 , " The taxonomy of this genus is clearly in need of review , and it is likely that *O. orca* will be split into a number of different species or at least subspecies over the next few years . " Although large variation in the ecological distinctiveness of different killer whale groups complicate simple differentiation into types , research off the west coast of Canada and the United States in the 1970s and 1980s identified the following three types :

**Resident :** These are the most commonly sighted of the three populations in the coastal waters of the northeast Pacific . Residents ' diets consist primarily of fish and sometimes squid , and they live in complex and cohesive family groups called pods . Female residents characteristically have rounded dorsal fin tips that terminate in a sharp corner . They visit the same areas consistently . British Columbia and Washington resident populations are amongst the most intensively studied marine mammals anywhere in the world . Researchers have identified and named over 300 killer whales over the past 30 years .

**Transient :** The diets of these whales consist almost exclusively of marine mammals . Transients generally travel in small groups , usually of two to six animals , and have less persistent family bonds than residents . Transients vocalize in less variable and less complex dialects . Female transients are characterized by more triangular and pointed dorsal fins than those of residents . The gray or white area around the dorsal fin , known as the " saddle patch " , often contains some black colouring in residents . However , the saddle patches of transients are solid and uniformly gray . Transients roam widely along the coast ; some individuals have been sighted in both southern Alaska and California . Transients are also referred to as Bigg 's killer whale in honor of cetologist Michael Bigg . The term has become increasingly common and may eventually replace the transient label .

**Offshore :** A third population of killer whales in the northeast Pacific was discovered in 1988 , when a humpback whale researcher observed them in open water . As their name suggests , they travel far from shore and feed primarily on schooling fish . However , because they have large , scarred and nicked dorsal fins resembling those of mammal @-@ hunting transients , it may be that they also eat mammals and sharks . They have mostly been encountered off the west coast of Vancouver Island and near Haida Gwaii . Offshores typically congregate in groups of 20 ? 75 , with occasional sightings of larger groups of up to 200 . Currently , little is known about their habits , but they are genetically distinct from residents and transients . Offshores appear to be smaller than the others , and females are characterized by dorsal fin tips that are continuously rounded .

Transients and residents live in the same areas , but avoid each other . The name " transient " originated from the belief that these killer whales were outcasts from larger resident pods . Researchers later discovered transients are not born into resident pods . The evolutionary split between the two groups is believed to have begun two million years ago . Genetic data indicate the types have not interbred for up to 10 @, @ 000 years .

Other populations have not been as well studied , although specialized fish and mammal eating killer whales have been distinguished elsewhere . In addition , separate populations of " generalist " ( fish- and mammal @-@ eating ) and " specialist " ( mammal @-@ eating ) killer whales have been identified off northwestern Europe . As with residents and transients , the lifestyle of these whales appears to reflect their diet ; fish @-@ eating killer whales in Alaska and Norway have resident @-@ like social structures , while mammal @-@ eating killer whales in Argentina and the Crozet Islands behave more like transients .

Three types have been documented in the Antarctic . Two dwarf species , named *Orcinus nanus* and *Orcinus glacialis* , were described during the 1980s by Soviet researchers , but most cetacean researchers are skeptical about their status , and linking these directly to the types described below is difficult .

Type A looks like a " typical " killer whale , a large , black and white form with a medium @-@ sized white eye patch , living in open water and feeding mostly on minke whales .

Type B is smaller than type A. It has a large white eye patch . Most of the dark parts of its body are medium gray instead of black , although it has a dark gray patch called a " dorsal cape " stretching back from its forehead to just behind its dorsal fin . The white areas are stained slightly yellow . It feeds mostly on seals .

Type C is the smallest type and lives in larger groups than the others . Its eye patch is distinctively slanted forwards , rather than parallel to the body axis . Like type B , it is primarily white and medium gray , with a dark gray dorsal cape and yellow @-@ tinged patches . Its only observed prey is the Antarctic cod .

Type D was identified based on photographs of a 1955 mass stranding in New Zealand and six at @-@ sea sightings since 2004 . The first video record of this type in life happened between the Kerguelen and Crozet Islands in 2014 . It is immediately recognizable by its extremely small white eye patch , narrower and shorter than usual dorsal fin , bulbous head ( similar to a pilot whale ) , and smaller teeth . Its geographic range appears to be circumglobal in subantarctic waters between latitudes 40 ° S and 60 ° S. And although nothing is known about the type D diet , it is suspected to include fish because groups have been photographed around longline vessels , where they reportedly prey on Patagonian toothfish ( *Dissostichus eleginoides* ) .

Types B and C live close to the ice pack , and diatoms in these waters may be responsible for the yellowish colouring of both types . Mitochondrial DNA sequences support the theory that these are recently diverged separate species . More recently , complete mitochondrial sequencing indicates the two Antarctic groups that eat seals and fish should be recognized as distinct species , as should the North Pacific transients , leaving the others as subspecies pending additional data . Advanced methods that sequenced the entire mitochondrial genome revealed systematic differences in DNA between different populations .

Mammal @-@ eating killer whales were long thought likely to be closely related to other mammal @-@ eating killer whales from different regions , but genetic testing refuted this hypothesis .

The identified seven ecotypes in isolated ecological niches . Of three orca ecotypes in the Antarctic , one preys on minke whales , the second on seals and penguins and the third on fish . Another ecotype lives in the eastern North Atlantic , while the three Northeast Pacific ecotypes are labeled the transient , resident and offshore populations , as discussed above . The research supported a proposal to reclassify the Antarctic seal- and fish @-@ eating populations and the North Pacific transients as a distinct species , leaving the remaining ecotypes as subspecies . The first split in the orca population , between the North Pacific transients and the rest , occurred an estimated 700 @, @ 000 years ago . Such a designation would mean that each new species becomes subject to separate conservation assessments .

= = Appearance and morphology = =

A typical killer whale distinctively bears a black back , white chest and sides , and a white patch above and behind the eye . Calves are born with a yellowish or orange tint , which fades to white . It has a heavy and robust body with a large dorsal fin up to 1 @.@ 8 m ( 5 @.@ 9 ft ) tall . Behind the fin , it has a dark grey " saddle patch " across the back . Antarctic killer whales may have pale grey to nearly white backs . Adult killer whales are very distinctive and are not usually confused with any other sea creature . When seen from a distance , juveniles can be confused with other cetacean species , such as the false killer whale or Risso 's dolphin . The killer whale 's teeth are very strong and its jaws exert a powerful grip ; the upper teeth fall into the gaps between the lower teeth when the mouth is closed . The front teeth are inclined slightly forward and outward , thus allowing the killer whale to withstand powerful jerking movements from its prey while the middle and back teeth hold it firmly in place .

Killer whales are the largest extant members of the dolphin family . Males typically range from 6 to 8 metres ( 20 to 26 ft ) long and weigh in excess of 6 tonnes ( 5 @.@ 9 long tons ; 6 @.@ 6 short tons ) . Females are smaller , generally ranging from 5 to 7 m ( 16 to 23 ft ) and weighing about 3 to 4 tonnes ( 3 @.@ 0 to 3 @.@ 9 long tons ; 3 @.@ 3 to 4 @.@ 4 short tons ) . The largest male killer whale on record was 9 @.@ 8 m ( 32 ft ) , weighing 10 tonnes ( 9 @.@ 8 long tons ; 11 short tons )

, while the largest female was 8 @. @ 5 m ( 28 ft ) , weighing 7 @. @ 5 tonnes ( 7 @. @ 4 long tons ; 8 @. @ 3 short tons ) . Calves at birth weigh about 180 kg ( 400 lb ) and are about 2 @. @ 4 m ( 7 @. @ 9 ft ) long . The killer whale 's large size and strength make it among the fastest marine mammals , able to reach speeds in excess of 56 km / h ( 30 kn ) . The skeleton of the killer whale is of the typical delphinid structure , but is more robust . Its integument , unlike that of most other dolphin species , is characterised by a well @-@ developed dermal layer with a dense network of fascicles of collagen fibers .

Killer whale pectoral fins , analogous to forelimbs , are large and rounded , resembling paddles . Males have significantly larger pectoral fins than females . At about 1 @. @ 8 m ( 5 @. @ 9 ft ) the male 's dorsal fin is more than twice the size of the female 's and is more of a triangular shape ? a tall , elongated isosceles triangle ? whereas hers is shorter and more curved . Males and females also have different patterns of black and white skin in their genital areas . Sexual dimorphism is also apparent in the skull ; adult males have longer lower jaws than females , and have larger occipital crests .

An individual killer whale can often be identified from its dorsal fin and saddle patch . Variations such as nicks , scratches , and tears on the dorsal fin and the pattern of white or grey in the saddle patch are unique . Published directories contain identifying photographs and names for hundreds of North Pacific animals . Photographic identification has enabled the local population of killer whales to be counted each year rather than estimated , and has enabled great insight into lifecycles and social structures .

Occasionally a killer whale is white ; they have been spotted in the northern Bering Sea and around St. Lawrence Island , and near the Russian coast . In February 2008 , a white killer whale was photographed 3 @. @ 2 km ( 2 @. @ 0 mi ) off Kanaga Volcano in the Aleutian Islands . In 2010 , the Far East Russia Orca Project ( FEROP ) , co @-@ founded and co @-@ directed by Alexander M. Burdin and Erich Hoyt , filmed an adult male nicknamed Iceberg .

Killer whales have good eyesight above and below the water , excellent hearing , and a good sense of touch . They have exceptionally sophisticated echolocation abilities , detecting the location and characteristics of prey and other objects in their environments by emitting clicks and listening for echoes , as do other members of the dolphin family .

The mean body temperature of the orca is 36 to 38 ° C ( 97 to 100 ° F ) . Like most marine mammals , orcas have a layer of insulating blubber ranging from 7 @. @ 6 to 10 cm ( 3 @. @ 0 to 3 @. @ 9 in ) thick beneath its skin .

The heart beats at a rate of about 60 beats / min when the orca is at the surface , dropping to 30 beats / min when submerged .

= = Life cycle = =

Female killer whales begin to mature at around the age of 10 ( reaching peak fertility around 20 ) , which consists of periods of polyestrous cycling with noncycling periods of between three and 16 months . Females can often breed until age 40 , after which comes a rapid decrease in fertility . Orcas are not the only animals to go through menopause and live for decades after they have finished breeding . The lifespans of wild females average 50 years , with a maximum of 90 years . An exception is Granny ( J2 ) , who is the oldest known orca , estimated to be 103 years old .

To avoid inbreeding , males mate with females from other pods . Gestation varies from 15 to 18 months . Mothers calve , with usually a single offspring , about once every five years . In resident pods , births occur at any time of year , although winter is the most common . Mortality is extremely high during the first seven months of life , when 37 ? 50 % of all calves die . Weaning begins at about 12 months and completes by the age of two . According to observations in several regions , all male and female pod members participate in the care of the young .

Males sexually mature at the age of 15 , but do not typically reproduce until age 21 . Wild males live around 29 years on average , with a maximum of about 60 years . One male , known as Old Tom , was reportedly spotted every winter between the 1840s and 1930 off New South Wales , Australia . This would have made him up to 90 years old . Examination of his teeth indicated he died around

age 35 , but this method of age determination is now believed to be inaccurate for older animals . One male known to researchers in the Pacific Northwest ( identified as J1 ) was estimated to have been 59 years old when he died in 2010 .

Captive killer whale lifespans are typically significantly shorter , usually less than 25 years ; however , numerous individuals are alive in their 30s , and a few have reached their 40s . Killer whales are unique among cetaceans , as their heads become relatively shorter as they age , i.e. , the orca 's caudal section enlongates more @-@ so relative to its head .

= = Range and habitat = =

Killer whales are found in all oceans and most seas . Due to their enormous range , numbers , and density , distributional estimates are difficult to compare , but they clearly prefer higher latitudes and coastal areas over pelagic environments .

Systematic surveys indicate the highest densities of killer whales (  $> 0 \text{ @.} @ 40$  individuals per  $100 \text{ km}^2$  ) in the northeast Atlantic around the Norwegian coast , in the north Pacific along the Aleutian Islands , the Gulf of Alaska and in the Southern Ocean off much of the coast of Antarctica . They are considered " common " (  $0 \text{ @.} @ 20 \text{ ? } 0 \text{ @.} @ 40$  individuals per  $100 \text{ km}^2$  ) in the eastern Pacific along the coasts of British Columbia , Washington and Oregon , in the North Atlantic Ocean around Iceland and the Faroe Islands . High densities have also been reported but not quantified in the western North Pacific around the Sea of Japan ( in very limited areas and more abundant on the side of Primorsky Krai ) , Shiretoko Peninsula and off Kushiro ( Resident and Transient groups began colonizing in these areas possibly after in 2000s ) , Sea of Okhotsk , Kuril Islands , Kamchatka and the Commander Islands and in the Southern Hemisphere off the coasts of South Australia , off the coast of northern to southern Brazil and the tip of southern Africa . They are reported as seasonally common in the Canadian Arctic , including Baffin Bay between Greenland and Nunavut , and around Tasmania and Macquarie Island . The northwest Atlantic population of at least 67 individuals ranges from Labrador and Newfoundland to New England with sightings to Cape Cod and Long Island .

Information for offshore regions and tropical waters is more scarce , but widespread , if not frequent , sightings indicate the killer whale can survive in most water temperatures . They have been sighted , for example , in the Mediterranean , the Arabian Sea , the Gulf of Mexico and the Indian Ocean around the Seychelles . In the Mediterranean , killer whales are considered " visitors " with the exception of one small population which lives in the Strait of Gibraltar . Except for northeastern basins from Black Sea , records have been among almost entire basin including Aegean and Levantine basins such as off Israel . A distinct population may also exist in Papua New Guinea . Distributions and abundances in other Asian waters are very unclear , only with sightings time to time have been reported , such as off Phuket and Mergui Archipelago .

Population structure in mid to lower latitudes of the North Pacific is unclear especially in coastal waters . Large concentrations are known to occur north of the Northern Mariana Islands and in the Gulf of Sendai , and repeated sightings are reported off Bali , the east coast of Taiwan , Ryukyu Islands , Izu Islands , in Tsushima Strait , and Izu Peninsula . The modern status of the species along coastal mainland China and its vicinity is unknown . Recorded sightings have been made from almost the entire shoreline ; from Bohai and the Yellow Sea in the north to the Zhoushan Islands in the east and the Vietnam coast in the south .

In the Antarctic , killer whales range up to the edge of the pack ice and are believed to venture into the denser pack ice , finding open leads much like beluga whales in the Arctic . However , killer whales are merely seasonal visitors to Arctic waters , and do not approach the pack ice in the summer . With the rapid Arctic sea ice decline in the Hudson Strait , their range now extends deep into the northwest Atlantic . Occasionally , killer whales swim into freshwater rivers . They have been documented 100 mi ( 160 km ) up the Columbia River in the United States . They have also been found in the Fraser River in Canada and the Horikawa River in Japan .

Migration patterns are poorly understood . Each summer , the same individuals appear off the coasts of British Columbia and Washington . Despite decades of research , where these animals go

for the rest of the year remains unknown . Transient pods have been sighted from southern Alaska to central California .

### == Population ==

Worldwide population estimates are uncertain , but recent consensus suggests an absolute minimum of 50 ,000 . Local estimates include roughly 25 ,000 in the Antarctic , 8 ,000 in the tropical Pacific , 2 ,250 ? 2 ,700 off the cooler northeast Pacific and 500 ? 1 ,500 off Norway . Japan 's Fisheries Agency estimated 2 ,321 killer whales were in the seas around Japan .

### == Feeding ==

Killer whales are apex predators , meaning that they themselves have no natural predators . They are sometimes called the wolves of the sea , because they hunt in groups like wolf packs . Killer whales hunt varied prey including fish , cephalopods , mammals , sea birds and sea turtles . However , different populations or species tend to specialize and some can have a dramatic impact on certain prey species . Those that feed on mammals may not even recognize fish as food . This specialization in diet and hunting is another reason to suggest that the orca is in fact several species , as discussed above .

### == Fish ==

Fish @-@ eating killer whales prey on around 30 species of fish . Some populations in the Norwegian and Greenland sea specialize in herring and follow that fish 's autumnal migration to the Norwegian coast . Salmon account for 96 % of northeast Pacific residents ' diet . About 65 % of them are large , fatty Chinook . Chum salmon are also eaten , but smaller sockeye and pink salmon are not a significant food item . Depletion of specific prey species in an area is , therefore , cause for concern for local populations , despite the high diversity of prey . On average , a killer whale eats 227 kilograms ( 500 lb ) each day . While salmon are usually hunted by an individual or a small group of individuals , herring are often caught using carousel feeding ; the killer whales force the herring into a tight ball by releasing bursts of bubbles or flashing their white undersides . They then slap the ball with their tail flukes , either stunning or killing up to 15 fish at a time . The herring are then eaten one at a time . Carousel feeding has only been documented in the Norwegian killer whale population and with some oceanic dolphin species .

In New Zealand , sharks and rays appear to be important prey ; species taken include eagle rays , long @-@ tail and short @-@ tail stingrays , common thresher , smooth hammerheads , blue sharks and shortfin mako sharks . With sharks , orcas may herd them to the surface and strike them with their tail flukes , while bottom @-@ dwelling rays are cornered , pinned to the ground and taken to the surface . Killer whales can induce tonic immobility in sharks and rays by holding them upside down , rendering them helpless and incapable of injuring the whale . Some sharks suffocate within about 15 minutes while the whale holds them still , because these sharks need to move to breathe . In one incident filmed near the Farallon Islands in October 1997 , a 4 @. @ 7 ? 5 @. @ 3 @-@ metre ( 15 ? 17 ft ) female killed a 3 ? 4 @-@ metre ( 9 @. @ 8 ? 13 @. @ 1 ft ) great white shark , apparently after swimming with it upside @-@ down in her mouth and inducing tonic immobility in it . She and another pod member ate the shark 's liver and allowed the rest of the carcass to sink . In February 2015 , a pod of orcas was recorded to have killed a white shark off South Australia . Interspecific competition between the two species is probable in regions where dietary preferences overlap . In July 1992 , two killer whales attacked , killed and fed on an 8 @-@ metre ( 26 ft ) long whale shark , *Rhincodon typus* , in the waters off Bahia de los Angeles in Baja California .

### == Mammals ==

Killer whales are very sophisticated and effective predators of marine mammals . Thirty @-@ two cetacean species have been recorded as prey , from observing orcas ' feeding activity , examining the stomach contents of dead orcas , and seeing scars on the bodies of surviving prey animals . Groups even attack larger cetaceans such as minke whales , gray whales , and rarely sperm whales or blue whales .

Hunting large whales usually takes several hours . Killer whales generally choose to attack young or weak animals ; however , a group of five or more may attack a healthy adult . When hunting a young whale , a group chases it and its mother until they wear out . Eventually , they separate the pair and surround the calf , preventing it from surfacing to breathe , drowning it . Pods of female sperm whales sometimes protect themselves by forming a protective circle around their calves with their flukes facing outwards , using them to repel the attackers . Rarely , large killer whale pods can overwhelm even adult female sperm whales . Adult bull sperm whales , which are large , powerful and aggressive when threatened , and fully grown adult blue whales , which are possibly too large to overwhelm , are not believed to be prey for killer whales .

Prior to the advent of industrial whaling , great whales may have been the major food source for killer whales . The introduction of modern whaling techniques may have aided killer whales by the sound of exploding harpoons indicating availability of prey to scavenge , and compressed air inflation of whale carcasses causing them to float , thus exposing them to scavenging . However , the toll on great whale populations by unfettered whaling had possibly reduced their availability as prey for killer whales , and caused them to expand their consumption of smaller marine mammals , thus contributing to their decline as well .

Predation by orcas on whale calves in high productivity , high latitude areas has been hypothesised to be the reason for great whale migrations to low productivity tropical waters , to reduce the risk of attacks on the highly vulnerable calves due to lower density of orcas in these waters .

Other marine mammal prey species include nearly 20 species of seal , sea lion and fur seal . Walruses and sea otters are less frequently taken . Often , to avoid injury , killer whales disable their prey before killing and eating it . This may involve throwing it in the air , slapping it with their tails , ramming it , or breaching and landing on it . Sea lions are killed by head @-@ butting or after a stunning blow from a tail fluke . In the Aleutian Islands , a decline in sea otter populations in the 1990s was controversially attributed by some scientists to killer whale predation , although with no direct evidence . The decline of sea otters followed a decline in harbour seal and Steller sea lion populations , the killer whale 's preferred prey , which in turn may be substitutes for their original prey , now decimated by industrial whaling .

In steeply banked beaches off Península Valdés , Argentina , and the Crozet Islands , killer whales feed on South American sea lions and southern elephant seals in shallow water , even beaching temporarily to grab prey before wriggling back to the sea . Beaching , usually fatal to cetaceans , is not an instinctive behaviour , and can require years of practice for the young . Killer whales can then release the animal near juvenile whales , allowing the younger whales to practice the difficult capture technique on the now @-@ weakened prey . " Wave @-@ hunting " killer whales spy @-@ hop to locate Weddell seals , crabeater seals , leopard seals , and penguins resting on ice floes , and then swim in groups to create waves that wash over the floe . This washes the prey into the water , where other killer whales lie in wait .

Killer whales have also been observed preying on terrestrial mammals , such as deer swimming between islands off the northwest coast of North America . Killer whale cannibalism has also been reported based on analysis of stomach contents , but this is likely to be the result of scavenging remains dumped by whalers . One killer whale was also attacked by its companions after being shot . Although resident killer whales have never been observed to eat other marine mammals , they occasionally harass and kill porpoises and seals for no apparent reason .

= = = Birds = = =

Killer whales in many areas may prey on cormorants and gulls . A captive killer whale at MarineLand discovered it could regurgitate fish onto the surface , attracting sea gulls , and then eat

the birds . Four others then learned to copy the behaviour .

## == Behaviour ==

Day @-@ to @-@ day killer whale behaviour generally consists of foraging , travelling , resting and socializing . Killer whales engage in frequent behaviour at the surface such as breaching ( jumping completely out of the water ) and tail @-@ slapping . These activities may have a variety of purposes , such as courtship , communication , dislodging parasites , or play . Spyhopping , a behaviour in which a whale holds its head above water , helps the animal view its surroundings .

Resident killer whales swim with porpoises , other dolphins , seals , and sea lions , which are common prey for transient killer whales .

## === Social structure ===

Killer whales are notable for their complex societies . Only elephants and higher primates , such as humans , live in comparably complex social structures . Due to orcas ' complex social bonds and society , many marine experts have concerns about how humane it is to keep these animals in captive situations .

Resident killer whales in the eastern North Pacific have a particularly complex and stable social grouping system . Unlike any other mammal species whose social structure is known , residents live with their mothers for their entire lives . These family groups are based on matriline consisting of the eldest female ( matriarch ) and her sons and daughters , and the descendants of her daughters , etc . The average size of a matriline is 5 @.@ 5 animals . Because females can reach age 90 , as many as four generations travel together . These matrilineal groups are highly stable . Individuals separate for only a few hours at a time , to mate or forage . With one exception , the killer whale named Luna , no permanent separation of an individual from a resident matriline has been recorded .

Closely related matriline form loose aggregations called pods , usually consisting of one to four matriline . Unlike matriline , pods may separate for weeks or months at a time . DNA testing indicates resident males nearly always mate with females from other pods. Clans , the next level of resident social structure , are composed of pods with similar dialects , and common but older maternal heritage . Clan ranges overlap , mingling pods from different clans . The final association layer , perhaps more arbitrarily defined than the familial groupings , is called the community , and is defined as a set of clans that regularly commingle . Clans within a community do not share vocal patterns .

Transient pods are smaller than resident pods , typically consisting of an adult female and one or two of her offspring . Males typically maintain stronger relationships with their mothers than other females . These bonds can extend well into adulthood . Unlike residents , extended or permanent separation of transient offspring from natal matriline is common , with juveniles and adults of both sexes participating . Some males become " rovers " and do not form long @-@ term associations , occasionally joining groups that contain reproductive females . As in resident clans , transient community members share an acoustic repertoire , although regional differences in vocalizations have been noted .

## === Vocalizations ===

Like all cetaceans , killer whales depend heavily on underwater sound for orientation , feeding , and communication . They produce three categories of sounds : clicks , whistles , and pulsed calls . Clicks are believed to be used primarily for navigation and discriminating prey and other objects in the surrounding environment , but are also commonly heard during social interactions .

Northeast Pacific resident groups tend to be much more vocal than transient groups in the same waters . Residents feed primarily on Chinook and chum salmon , species that are insensitive to killer whale calls ( inferred from the audiogram of Atlantic salmon ) . In contrast , the marine mammal prey



of transients hear well underwater at the frequencies used in killer whale calls . As such , transients are typically silent , probably to avoid alerting their mammalian prey . They sometimes use a single click ( called a cryptic click ) rather than the long train of clicks observed in other populations . Residents are only silent when resting .

All members of a resident pod use similar calls , known collectively as a dialect . Dialects are composed of specific numbers and types of discrete , repetitive calls . They are complex and stable over time . Call patterns and structure are distinctive within matriline . Newborns produce calls similar to their mothers , but have a more limited repertoire . Individuals likely learn their dialect through contact with their mother and other pod members . For instance , family @-@ specific calls have been observed more frequently in the days following a calf 's birth , which may help the calf learn them . Dialects are probably an important means of maintaining group identity and cohesiveness . Similarity in dialects likely reflects the degree of relatedness between pods , with variation building over time . When pods meet , dominant call types decrease and subset call types increase . The use of both call types is called biphonation . The increased subset call types may be the distinguishing factor between pods and inter @-@ pod relations .

Dialects of killer whales not only distinguish them between pods , but also between types . Resident dialects contain seven to 17 ( mean = 11 ) distinctive call types . All members of the North American west coast transient community express the same basic dialect , although minor regional variation in call types is evident . Preliminary research indicates offshore killer whales have group @-@ specific dialects unlike those of residents and transients .

The vocalizations of killer whales in other parts of the world have also been studied . Norwegian and Icelandic herring @-@ eating orcas appear to have different vocalizations for activities like hunting and traveling .

= = = Intelligence = = =

Killer whales have the second @-@ heaviest brains among marine mammals ( after sperm whales , which have the largest brain of any animal ) . They can be trained in captivity and are often described as intelligent , although defining and measuring " intelligence " is difficult in a species whose environment and behavioural strategies are very different from those of humans .

Killer whales imitate others , and seem to deliberately teach skills to their kin . Off the Crozet Islands , mothers push their calves onto the beach , waiting to pull the youngster back if needed .

People who have interacted closely with killer whales offer numerous anecdotes demonstrating the whales ' curiosity , playfulness , and ability to solve problems . Alaskan killer whales have not only learned how to steal fish from longlines , but have also overcome a variety of techniques designed to stop them , such as the use of unbaited lines as decoys . Once , fishermen placed their boats several miles apart , taking turns retrieving small amounts of their catch , in the hope that the whales would not have enough time to move between boats to steal the catch as it was being retrieved . A researcher described what happened next :

It worked really well for a while . Then the whales split into two groups . It didn 't even take them an hour to figure it out . They were so thrilled when they figured out what was going on , that we were playing games . They were breaching by the boats .

In other anecdotes , researchers describe incidents in which wild killer whales playfully tease humans by repeatedly moving objects the humans are trying to reach , or suddenly start to toss around a chunk of ice after a human throws a snowball .

The killer whale 's use of dialects and the passing of other learned behaviours from generation to generation have been described as a form of animal culture .

The complex and stable vocal and behavioural cultures of sympatric groups of killer whales ( *Orcinus orca* ) appear to have no parallel outside humans and represent an independent evolution of cultural faculties .

( Two species or populations are considered sympatric when they exist in the same geographic area and thus regularly encounter one another . )

= = Conservation = =

In 2008 , the IUCN ( International Union for Conservation of Nature ) changed its assessment of the killer whale 's conservation status from conservation dependent to data deficient , recognizing that one or more killer whale types may actually be separate , endangered species . Depletion of prey species , pollution , large @-@ scale oil spills , and habitat disturbance caused by noise and conflicts with boats are currently the most significant worldwide threats .

Like other animals at the highest trophic levels , the killer whale is particularly at risk of poisoning from bioaccumulation of toxins , including polychlorinated biphenyls ( PCBs ) . European harbour seals have problems in reproductive and immune functions associated with high levels of PCBs and related contaminants , and a survey off the Washington coast found PCB levels in killer whales were higher than levels that had caused health problems in harbour seals . Blubber samples in the Norwegian Arctic show higher levels of PCBs , pesticides and brominated flame @-@ retardants than in polar bears . When food is scarce , killer whales metabolize blubber for energy , which increases pollutant concentrations in their blood .

In the Pacific Northwest , wild salmon stocks , a main resident food source , have declined dramatically in recent years . On the west coast of Alaska and the Aleutian Islands , seal and sea lion populations have also substantially declined .

In 2005 , the United States government listed the southern resident community as an endangered population under the Endangered Species Act . This community comprises three pods which live mostly in the Georgia and Haro Straits and Puget Sound in British Columbia and Washington . They do not breed outside of their community , which was once estimated at around 200 animals and later shrank to around 90 . In October 2008 , the annual survey revealed seven were missing and presumed dead , reducing the count to 83 . This is potentially the largest decline in the population in the past ten years . These deaths can be attributed to declines in Chinook salmon .

Scientist Ken Balcomb has extensively studied killer whales since 1976 ; he is the research biologist responsible for discovering U.S. Navy sonar may harm killer whales . He studied killer whales from the Center for Whale Research , located in Friday Harbor , Washington . He was also able to study killer whales from " his home porch perched above Puget Sound , where the animals hunt and play in summer months " . In May 2003 , Balcomb ( along with other whale watchers near the Puget Sound coastline ) noticed uncharacteristic behaviour displayed by the killer whales . The whales seemed " agitated and were moving haphazardly , attempting to lift their heads free of the water " to escape the sound of the sonars . " Balcomb confirmed at the time that strange underwater pinging noises detected with underwater microphones were sonar . The sound originated from a U.S. Navy frigate 12 miles ( 19 kilometers ) distant , Balcomb said . " The impact of sonar waves on killer whales is potentially life @-@ threatening . Three years prior to Balcomb 's discovery , research in the Bahamas showed 14 beaked whales washed up on the shore . These whales were beached on the day U.S. Navy destroyers were activated into sonar exercise . Of the 14 whales beached , six of them died . These six dead whales were studied , and CAT scans of the two of the whale heads showed hemorrhaging around the brain and the ears , which is consistent with decompression sickness .

Another conservation concern was made public in September 2008 when the Canadian government decided it was not necessary to enforce further protections ( including the Species at Risk Act in place to protect endangered animals along their habitats ) for killer whales aside from the laws already in place . In response to this decision , six environmental groups sued the federal government , claiming killer whales were facing many threats on the British Columbia Coast and the federal government did nothing to protect them from these threats . A legal and scientific nonprofit organization , Ecojustice , led the lawsuit and represented the David Suzuki Foundation , Environmental Defence , Greenpeace Canada , International Fund for Animal Welfare , the Raincoast Conservation Foundation , and the Wilderness Committee . Many scientists involved in this lawsuit , including Bill Wareham , a marine scientist with the David Suzuki Foundation , noted increased boat traffic , water toxic wastes , and low salmon population as major threats , putting approximately 87 killer whales on the British Columbia Coast in danger .

Underwater noise from shipping , drilling , and other human activities is a significant concern in some key killer whale habitats , including Johnstone Strait and Haro Strait . In the mid @-@ 1990s , loud underwater noises from salmon farms were used to deter seals . Killer whales also avoided the surrounding waters . High @-@ intensity sonar used by the Navy disturbs killer whales along with other marine mammals . Killer whales are popular with whale watchers , which may stress the whales and alter their behaviour , particularly if boats approach too closely or block their lines of travel .

The Exxon Valdez oil spill adversely affected killer whales in Prince William Sound and Alaska 's Kenai Fjords region . Eleven members ( about half ) of one resident pod disappeared in the following year . The spill damaged salmon and other prey populations , which in turn damaged local killer whales . By 2009 , scientists estimated the AT1 transient population ( considered part of a larger population of 346 transients ) , numbered only seven individuals and had not reproduced since the spill . This population is expected to die out .

= = Relationship with humans = =

= = = Indigenous cultures = = =

The indigenous peoples of the Pacific Northwest Coast feature killer whales throughout their art , history , spirituality and religion . The Haida regarded killer whales as the most powerful animals in the ocean , and their mythology tells of killer whales living in houses and towns under the sea . According to these myths , they took on human form when submerged , and humans who drowned went to live with them . For the Kwakwaka 'wakw , the killer whale was regarded as the ruler of the undersea world , with sea lions for slaves and dolphins for warriors . In Nuu @-@ chah @-@ nulth and Kwakwaka 'wakw mythology , killer whales may embody the souls of deceased chiefs . The Tlingit of southeastern Alaska regarded the killer whale as custodian of the sea and a benefactor of humans .

The Maritime Archaic people of Newfoundland also had great respect for killer whales , as evidenced by stone carvings found in a 4 @,@ 000 @-@ year @-@ old burial at the Port au Choix Archaeological Site .

In the tales and beliefs of the Siberian Yupik people , killer whales are said to appear as wolves in winter , and wolves as killer whales in summer . Killer whales are believed to assist their hunters in driving walrus . Reverence is expressed in several forms : the boat represents the animal , and a wooden carving hung from the hunter 's belt . Small sacrifices such as tobacco are strewn into the sea for them . Killer whales were believed to have helped the hunters even when in wolf guise , by forcing reindeer to allow themselves to be killed .

= = = " Killer " stereotype = = =

In Western cultures , killer whales were historically feared as dangerous , savage predators . The first written description of a killer whale was given by Pliny the Elder circa AD 70 , who wrote , " Orcas ( the appearance of which no image can express , other than an enormous mass of savage flesh with teeth ) are the enemy of [ other whales ] ... they charge and pierce them like warships ramming . "

Of the very few confirmed attacks on humans by wild killer whales , none have been fatal . In one instance , killer whales tried to tip ice floes on which a dog team and photographer of the Terra Nova Expedition was standing . The sled dogs ' barking is speculated to have sounded enough like seal calls to trigger the killer whale 's hunting curiosity . In the 1970s , a surfer in California was bitten , and in 2005 , a boy in Alaska who was splashing in a region frequented by harbor seals was bumped by a killer whale that apparently misidentified him as prey . Unlike wild killer whales , captive killer whales are reported to have made nearly two dozen attacks on humans since the 1970s , some of which have been fatal .

Competition with fishermen also led to killer whales being regarded as pests . In the waters of the Pacific Northwest and Iceland , the shooting of killer whales was accepted and even encouraged by governments . As an indication of the intensity of shooting that occurred until fairly recently , about 25 % of the killer whales captured in Puget Sound for aquaria through 1970 bore bullet scars . The U.S. Navy claimed to have deliberately killed hundreds of killer whales in Icelandic waters in 1956 with machine @-@ guns , rockets , and depth charges .

= = = Modern Western attitudes = = =

Western attitudes towards killer whales have changed dramatically in recent decades . In the mid @-@ 1960s and early 1970s , killer whales came to much greater public and scientific awareness , starting with the first live @-@ capture and display of a killer whale known as Moby Doll , a resident harpooned off Saturna Island in 1964 . So little was known at the time , it was nearly two months before the whale 's keepers discovered what food ( fish ) it was willing to eat . To the surprise of those who saw him , Moby Doll was a docile , nonaggressive whale that made no attempts to attack humans .

Between 1964 and 1976 , 50 killer whales from the Pacific Northwest were captured for display in aquaria , and public interest in the animals grew . In the 1970s , research pioneered by Michael Bigg led to the discovery of the species ' complex social structure , its use of vocal communication , and its extraordinarily stable mother ? offspring bonds . Through photo @-@ identification techniques , individuals were named and tracked over decades .

Bigg 's techniques also revealed the Pacific Northwest population was in the low hundreds rather than the thousands that had been previously assumed . The southern resident community alone had lost 48 of its members to captivity ; by 1976 , only 80 remained . In the Pacific Northwest , the species that had unthinkingly been targeted became a cultural icon within a few decades .

The public 's growing appreciation also led to growing opposition to whale ? keeping in aquaria . Only one whale has been taken in North American waters since 1976 . In recent years , the extent of the public 's interest in killer whales has manifested itself in several high @-@ profile efforts surrounding individuals . Following the success of the 1993 film Free Willy , the movie 's captive star Keiko was returned to the coast of his native Iceland in 1998 . The director of the International Marine Mammal Project for the Earth Island Institute , David Phillips , led the efforts to return Keiko to the Iceland waters . In 2002 the orphan Springer was discovered in Puget Sound , Washington . She became the first whale to be successfully reintegrated into a wild pod after human intervention , crystallizing decades of research into the vocal behaviour and social structure of the region 's killer whales . The saving of Springer raised hopes that another young killer whale named Luna , which had become separated from his pod , could be returned to it . However , his case was marked by controversy about whether and how to intervene , and in 2006 , Luna was killed by a boat propeller .

= = = Whaling = = =

The earlier of known records of commercial hunting of killer whales date to the 18th century in Japan . During the 19th and early 20th centuries , the global whaling industry caught immense numbers of baleen and sperm whales , but largely ignored killer whales because of their limited amounts of recoverable oil , their smaller populations , and the difficulty of taking them . Once the stocks of larger species were depleted , killer whales were targeted by commercial whalers in the mid @-@ 20th century . Between 1954 and 1997 , Japan took 1 @, @ 178 killer whales ( although the Ministry of the Environment claims that there had been domestic catches of about 1 @, @ 600 whales between late 1940s to 1960s ) and Norway took 987 . Over 3 @, @ 000 killer whales were taken by Soviet whalers , including an Antarctic catch of 916 in 1979 ? 80 alone , prompting the International Whaling Commission to recommend a ban on commercial hunting of the species pending further research . ( Compare with the situation on land , Commercial hunting . ) Today , no country carries out a substantial hunt , although Indonesia and Greenland permit small subsistence

hunts ( see Aboriginal whaling ) . Other than commercial hunts , killer whales were hunted along Japanese coasts out of public concern for potential conflicts with fisheries . Such cases include a semi @-@ resident male @-@ female pair in Akashi Strait and Harimanada being killed in the Seto Inland Sea in 1957 , the killing of five whales from a pod of 11 members that swam into Tokyo Bay in 1970 , and a catch record in southern Taiwan in the 1990s .

= = = Cooperation with humans = = =

Killer whales have helped humans hunting other whales . One well @-@ known example was the killer whales of Eden , Australia , including the male known as Old Tom . Whalers more often considered them a nuisance , however , as orcas would gather to scavenge meat from the whalers ' catch . Some populations , such as in Alaska 's Prince William Sound , may have been reduced significantly by whalers shooting them in retaliation .

= = = Captivity = = =

The killer whale 's intelligence , trainability , striking appearance , playfulness in captivity and sheer size have made it a popular exhibit at aquaria and aquatic theme parks . From 1976 to 1997 , 55 whales were taken from the wild in Iceland , 19 from Japan , and three from Argentina . These figures exclude animals that died during capture . Live captures fell dramatically in the 1990s , and by 1999 , about 40 % of the 48 animals on display in the world were captive @-@ born .

Organizations such as World Animal Protection and the Whale and Dolphin Conservation Society campaign against the practice of keeping them in captivity . In captivity , they often develop pathologies , such as the dorsal fin collapse seen in 60 ? 90 % of captive males . Captives have vastly reduced life expectancies , on average only living into their 20s . In the wild , females who survive infancy live 46 years on average , and up to 70 ? 80 years in rare cases . Wild males who survive infancy live 31 years on average , and up to 50 ? 60 years . Captivity usually bears little resemblance to wild habitat , and captive whales ' social groups are foreign to those found in the wild . Critics claim captive life is stressful due to these factors and the requirement to perform circus tricks that are not part of wild killer whale behaviour , see above . Wild killer whales may travel up to 160 kilometres ( 100 mi ) in a day , and critics say the animals are too big and intelligent to be suitable for captivity . Captives occasionally act aggressively towards themselves , their tankmates , or humans , which critics say is a result of stress . Between 1991 and 2010 , the bull orca known as Tilikum was involved in the death of three people , and was featured in the critically acclaimed 2013 film , *Blackfish* . Tilikum has lived at SeaWorld since 1992 .

A 2015 study coauthored by staff at SeaWorld and the Minnesota Zoo indicates that there is no significant difference in survivorship between free @-@ ranging and captive killer whales . The authors speculate about the future utility of studying captive populations for the purposes of understanding orca biology and the implications of such research of captive animals in the overall health of both wild and marine park populations . The study has been criticised by Dr Trevor Willis , senior lecture in marine biology at the University of Portsmouth , who stated that the study is misleading , " clearly wrong " and indicative of " poor practice " . He said that this is the case because it compares swimming pools to the wild ocean and the extrapolates the survival rates of calves to life expectancy in adulthood .

= = Gallery = =

[Orcinus orca on Wikimedia Commons](#) .