



Orcas are big dolphins, but ancient sailors named them killer whales.

COMMUNITY

The Culture of Killer Whales

With enduring family relations, unique dialects and diets, and huge celebrations for special life events, the orca has evolved through culture, passing tradition from one generation to the next. **By Lori Marino, PhD**

Jennie travels about 75 miles a day with her infant son, her mother, her teenage daughter, a grown son, sister and her 80-year-old grandmother in search of food and to explore, play and socialize. Because of the strong cultural traditions she was born into, she eats a very specific diet, communicates in a dialect unique to her group and socializes mainly within her family. Her daily activities reflect ancient cultural traditions passed down from one generation to the next. Her infant son, just like her adult son, will

stay by her side for the rest of his life. Her daughter and sister will help her in raising her little one through a long childhood. And she will depend upon the experience, accumulated knowledge and wisdom of her grandmother—the matriarch—to make the right decisions when life becomes hard.

Jennie sounds like a person with an extended family group whose members each have a valued role in a society driven by long-standing cultural traditions shaped over generations. This could be a description of you or me. But Jennie just happens to be a person

Orcas are especially prevalent in the waters off the Pacific Northwest and Norway's northern coast.

**DID YOU KNOW?**

The standard dolphin, above, is quite small next to the orca. Both are speed demons, with dolphins clocking 33 miles an hour versus 31 miles per hour for the orca. Dolphins live for 40 to 50 years compared to orcas living 70 to 80 years.

from another species—the orca, better known as killer whales.

Cetaceans (the mammalian order in which orcas belong) evolved from a land-dwelling animal about 50 million years ago; fossils show they gradually adapted to a fully aquatic lifestyle over 10 to 15 million years.

Orcas are actually the largest species of dolphin, a member of the cetacean family Delphinidae within the cetacean suborder Odontoceti (toothed whales). They can grow to 25 feet long and weigh 4 to 6 tons. After a gestation period of 18 months, an infant is born who will take more than 15 years to mature to reproductive age. They are, in their natural habitat, very long-lived, with females sometimes reaching the age of 80 to 90 years or more and males 60 to 70 years of age.

Jennie, a composite female I've created based on the dozens of killer whales studied over the years, lives in the Pacific Northwest of the United States, in a highly complex hierarchical society consisting of different levels of associations and relations—all based on learned cultural traditions. Her community (known as the “southern resident killer whales,” or SRKW to scientists) is actually a large extended family, known as a clan, comprising three pods named J (with 22 orcas), K (17 orcas) and the largest pod, L (34 orcas). Each pod, in turn, is composed of several “matrilines,” subgroups led by older female matriarchs. Individuals within a matriline, like Jennie, her mother, grandmother, sister, daughter and sons are connected by maternal

Young orca females can help out by baby-sitting for the pod before making families of their own.

Orcas of Puget Sound are besieged by the constant roar of industrial noise disrupting echolocation and navigation.

Orcas can hold their breath underwater for up to 15 minutes.

A pod of orcas make their way through their ocean home.

descent. Jennie stays mainly within her matrilineal group but, at times, she socializes with other pods.

A TRAUMATIZING PAST

There are 72 members of the SRKW population living free today, with one in captivity (see sidebar). The clan members have a disturbing history because, from 1965 to 1975, they were routinely culled from Penn Cove, Washington, and taken for use at exhibits at marine parks. Over those years, a third of them were captured or killed, leaving the group decimated as they currently deal with challenges like low levels of their favorite prey, toxic contaminants in the waters, and excess vessel traffic and noise. They remain endangered to this day. Fortunately, most other orca clans are doing better than the SRKW and, when left alone in the wild, manage to thrive.

Even amidst their challenges, about once a year, all three SRKW pods come together in one location into what's known as a superpod. The occasion varies. Typically it looks like a greeting ceremony or a pure celebration of life as the three pods mingle and socialize and play. At other times it may more closely resemble a grief ritual after the loss of one of their own. (In 2018, shortly after a young orca from J pod went missing after a long illness and was presumed dead, all three pods came together in what some have interpreted as a group display of togetherness after the loss.)

Jennie's relationship with her grandmother is vitally important to her survival because, as the matriarch, her grandmother holds the accumulated cultural knowledge of many generations and now, as a female orca "of a certain age," is entirely devoted to helping other members of her family navigate life successfully. You see, orcas are one of the very few mammals who experience



J35, a female member of J pod, is seen on the 17th and final day that she carried her deceased calf in the summer of 2018.

menopause. When female orcas pass through middle age they stop reproducing to concentrate more on helping their children and their grandchildren. This is called the "grandmother effect" and, thus far, it appears only in orcas, beluga whales, short-finned pilot whales, narwhals, sperm whales and, of course, humans.

Cultural differences among separate orca communities stop members who meet up from mingling and mating.

SRKW usually spend their summer in the waters around Washington state and southwest British Columbia. In the winter, they expand their range to find more food because these whales are gastronomic specialists of the highest order, with chinook salmon making up 80 percent of their all-fish diet. This highly specified diet is a cultural tradition, too. And despite the fact that there are other kinds of salmon, other fish and mammals available, these whales are so culturally conservative that, even when chinook salmon are scarce, they will not switch to a more abundant prey. It is as if these orcas see themselves as "the chinook salmon eaters" and their cultural identity depends upon maintaining this dietary habit.

Other orca cultures around the world possess their own dietary specializations. One community off the coast of New Zealand specializes in manta and stingrays, having learned techniques to grab their prey without being stung by their tails.

SONG OF THE ORCA

Individual orcas express their identity through cultural habits, including dialects—sets of calls learned from parents. Each pod uses a distinctive dialect to communicate its social identity. And some aspects of dialects are shared across pods. The more related the pods, the more similar the dialects. In short, the similarities and differences among dialects are a kind of "sound map" of interpod relationships.

The sound repertoire of orcas is as complex as their social

relationships. They make different kinds of sounds—clicks, whistles, pulsed calls—used in various ways and in various contexts. Like other dolphins, orcas navigate through echolocation (sonar), producing high-frequency clicks underwater and processing the echoes that bounce off objects at frequencies from 0.2 to 150 kHz, an order of magnitude faster than human sound processing. Whistles and pulsed sounds are combined with echolocation to create a highly complex acoustic landscape that only orcas fully understand.

Like their diet, the dialect of the SRKW community is unique from other orcas. The cultural differences help them maintain genetic distinctiveness as they choose to mate only within their group.



For orcas, each breath of oxygen is a conscious act. This orca pops up to take a breath and enjoy the sunset.

Indeed, when SRKW members meet up with transient orcas wandering into the very same waters of Puget Sound, they share overlapping territories with non-competing diets. The transient whales travel in smaller pods than the SRKW, range wider and eat only mammals (seals, sea lions, and small porpoises and an occasional otter) instead of fish.

WATCHING A NEW SPECIES EVOLVE

Although we don't know when and how all of these cultural differences emerged, we now have a front-row seat to what some scientists believe is the

evolution of two separate species of orcas, as the SRKW and transients continue to diverge in behavior and

in biological adaptations. Remarkably, these adaptations are all based on behavior choices and learned cultural traditions adopted by each orca community. Most people think that animal biology shapes behavior. But this is an example of behavior actually shaping biology!

Different orca groups across the globe, called ecotypes, express different behaviors throughout a wide range of open ocean and coastal habitats. Each population represents a different culture with a distinct dialect, prey specialization and hunting strategy (many hunt cooperatively like wolves).

Each community of these big-brained, intelligent, emotional and socially complex mammals is unique. Each pod has its own social structure, and each individual orca is irreplaceable.

We know about orca lives from decades of observing them in their natural habitat, coming to know each as an individual, and understanding how that individual relates to other members of his or her social group.

And we know, from studying the orcas who have died, that their brains are over twice as large as expected for their body size, are very complex and the most convoluted on the planet, having more wrinkles on the surface than even humans. (Those wrinkles or convolutions indicate how much neocortex, the higher-order-thinking part of the brain, has become elaborated over evolutionary time.) The fact that orcas have a more wrinkled cortex than humans has thought-

In a sanctuary, captive orcas can explore, swim, dive or be alone in the safety of a space in the natural world.

provoking implications for how intelligent—or “brainy”—they are.

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Born to Be Free

The big brains, wanderlust, close bonding and cultural customs of orcas point to one conclusion: They cannot flourish in concrete tanks in marine parks.

Whether performing or not and whether born in captivity or captured from the wild, orcas in display tanks are deprived of everything they need—space, an interesting environment, challenges, continuity in their family and social life, as well as choice about how to spend their days.

The chronic stress of living in tanks weakens their immune systems and leaves captive orcas vulnerable to well-known opportunistic infections like pneumonia, encephalitis, gastric disorders and candidiasis. These illnesses shorten their life spans considerably, with few living past the age of 25. They also exhibit behavioral abnormalities such as endlessly swimming in stereotyped circles, remaining suspended on the surface of the water, self-harming and hyper-aggression.

The most well-known case of abnormal aggression is that of Tilikum, the subject of the influential documentary *Blackfish*. Tilikum was an orca captured from his homeland in Iceland at 2 years old and transferred in and out of various display facilities over the years when, in 2010 at SeaWorld Orlando, he killed his trainer, Dawn Brancheau. Even before the highly publicized incident, Tilikum had killed two other people in other facilities. In 2017, at the age of 35, he succumbed to bacterial pneumonia.

Although there have been hundreds of cases of captive orcas attacking their trainers, there has never been a single incident of a free-ranging orca seriously harming, let alone killing, a human or another orca. This tragedy underscores the abnormal psychological state of orcas forced to live in concrete tanks. Despite the fact that captive orcas endure physical and psychological harm, there are still 22 orcas in entertainment parks in North America and about 30 to 40 more captured orcas held in tanks in other countries around the world.

Moreover, two orcas in North America continue to live alone, without another member of their species. Lolita at Miami Seaquarium is the last surviving member of the Penn Cove massacre. She has lived without another orca since 1980 in a tank only four times her body

length with two captive Pacific white-sided dolphins. Her previous orca companion, Hugo, died of a brain aneurysm in 1980 after repeatedly slamming his head against the tank walls. Kiska at Marineland Canada has lived alone since 2011, having lost all five of her calves while they were still juveniles.

The high mortality rate is a grim indicator that, despite food and veterinary care, captive orcas die more often and earlier than those in the wild. Surviving means a quality of life one would not wish on anyone.

While it might be tempting to consider releasing these captive orcas, that too would be disastrous; most are either captive-born or have been in the tanks so long they lack the skills to survive. They do not know that live fish are food, and have no family to help them adapt. They have missed the critical

period for learning skills to survive in the open ocean.

But there is an alternative that is part of a growing movement across the world—sanctuaries. There are successful sanctuaries for elephants, big cats, bears, great apes and many other species who are rescued from zoos, aquariums and circuses. An authentic sanctuary is a place where the well-being and independent choices of the residents is the priority—not ticket sales. And in such an environment individuals can flourish.

A handful of cetacean sanctuary projects are now underway around the globe. In 2016, I founded the Whale Sanctuary Project, a U.S.-based nonprofit organization whose mission is to create a permanent seaside sanctuary for captive orcas and beluga whales. The first of its kind in North America, the sanctuary will be in Port Hillford, Nova Scotia, a beautiful cove that will provide a permanent natural home for about eight whales in an expansive 100-acre netted area with lots of depth for diving and other aquatic animals to interact with. The residents will be fed and provided top-quality veterinary care but will enjoy the freedom of making their own choices about what to do on a daily basis for the first time in their lives. To find out more, visit whalesanctuary.org.



Orcas in tanks are so stressed, most of them grind their teeth against surfaces down to the nubs.