Interpreting the Blue Sharks at Underwater World

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October 2nd, 1998: It was an exciting night at Underwater World, one filled with surprise and elation. There was a special, special treat: the surprise arrival of the Blue Shark. The sleek animal made its way around the open water tank, negotiating the long, narrow and crowded space. It was more beautiful than the other sharks in the tank, with gorgeous shiny blue skin on top and pure white skin underneath. The first was joined by a second six days later. At the time, they were the only Blue Sharks on display in the country.

As an interpreter/naturalist at Underwater World in California (now called the Monterey Bay Aquarium), I had heard rumors that a Blue Shark was to be introduced, but I gave up on those hopes when I was discouraged by others in the husbandry department, some of whom said it was not possible and wouldn't happen. The husbandry staff acquires the fish, and they are the fish doctors. They also clean the tanks and feed the fish. The interpretive/naturalist staff at the aquarium help the visitors appreciates and understands the fish and the exhibit. Sometimes the husbandry staff surprises the naturalists with an introduction into the tanks, which keeps the naturalists excited about going to work each day.

A shark in captivity provides an opportunity to work for marine conservation, but there are potential problems as the public may have difficulty seeing animals in captivity. Interpreters at aquariums and zoos have to be prepared to explain the rationale for why an animal is kept in captivity. Questions can come up about how well they are being taken care of, and if they like being in captivity. Interpreting sharks is also controversial because many people are still fearful of sharks due to old misunderstandings. Visitors often ask if we have Great White Sharks at the aquarium and we also need to explain why we don't. Animals serve an important role in zoos and aquariums, but interpreting them can be slippery with a public that has seen both or either movie *Born Free* or *Jaws*.

I will be your guide for this tale about the Blue Sharks at Underwater World, which will show you how to bypass some of the potential problems of interpreting sharks in captivity in particular, but animals in captivity in general. I will also try to add the perspectives of ecology and aesthetic appreciation which can sometimes be more interesting than the dry facts about fish's ages, ranges, sizes and food preferences. I will also show you how to challenge visitors, as an activity, to look at things from a fish's (a

shark is a fish) perspective. Mermaids, mermen, ocean explorers, environmentalists, fish aficionados, divers, interpreters and educators should step inside for this free visit to Underwater World. You will be under 16 feet of water and surrounded by fish almost all local to San Francisco Bay and the nearby ocean. Here is an emotional story, with hopefully some fascinating and amusing parts, but not an amusing story.

The introduction was part of a larger experiment to learn more about the Blue Shark. Because there are not that many deep-sea vehicles, there are many things about sharks that are still a mystery, and we would have a prime view of the Blue Sharks. But would the shark be able to adapt to new conditions? Would it learn to negotiate the turns in the thin tank? Would it eat too much or too little? The open water tank was large: roughly 350,000 gallons of water and 150 feet long, but only about five yards wide on each side of the water surrounded walkway. If they could adapt, we may be surprised by what we would learn. For the meantime they were here to observe and enjoy with the visitors. The Blue Sharks could be a discussion piece about the plight of the sharks, which have been replaced in the oceans by a more dangerous predator: mankind.

Sharks evolved over 400 million years and have tremendously adapted as predators. Some sharks can smell a drop of blood in a billion drops of water. Some sharks have an organ called the Ampullae of Lorenzini that allows them to feel the electric field around them. Some sharks can detect the heartbeat of a fish placed in a plastic box placed under the sand. Since shark teeth are not firmly attached to the jaws, sharks are constantly producing new teeth because they may lose them when they bite prey. And over a lifetime some sharks can produce tens of thousands of teeth. Some sharks have a nictating membrane, an eye covering for when they are about to attack a fish or seal or sea lion or shark or whale. But the shark's reign in the ocean is over. The Blue Sharks, if they could adapt to the tunnels, were safer at Underwater World than in the wild. And if the visitors could bond with these sharks, they would be more likely to care about them.

The roughly six foot long Blue Shark was more sinuous than the comparably sized Seven Gill Sharks in the open water tank. They were also about twice the size of the lesser sharks like the Leopard, Spiny Dogfish and Brown Smooth hound that due to their smaller size fit comfortably in the underwater tunnels. Unlike the Angel Sharks that rest on the bottom, the Blue Sharks are pelagic. They do not normally swim close to the shore like the other sharks on display. The Blue Sharks were a special treat because people were more likely to have seen pictures or video footage of them before their visit. At the entranceway to the underwater exhibit there is a photograph of a Blue Shark caught in a fisherman's net. It looked oblivious

to its danger, but it was feeling the pain. The Blue Sharks grow to be large, and some consider them to be potentially dangerous. But unlike some of the few really dangerous sharks, the Blue Shark is beautiful in an unusual way. Its under skin is so white that its black eyes seem to bulge out at you. And the face is so pure and wild, from such another realm. A couple of times, as a naturalist, I pointed out to the visitors what beautiful eyes they had.

It is worthwhile to try to get visitors to look at fish (sharks are cartilaginous fish) from an aesthetic perspective. Fish are interesting anatomically, some scientists will spend whole careers studying them, but they are also beautiful in their own right. China rockfish look like they belong in pointillist paintings. Sharks are sleek and dynamic swimmers. Most fish are beautiful and many have an intense presence about them. Some of the dangerous sharks are far scarier looking than the Blue. The Tiger Shark looks mean and bulky. You don't admire its eyes. The Great White, which swims out at the nearby Farallones Islands to our west, looks ugly and vicious; their teeth uneven, and jutting out in a many directions. The Blue was beautiful, but it also looked alien and cold. The few dangerous sharks are etched into our psyches by films like *Jaws* and the violent shark footage you see on television. The fears of sharks have made it easy for people not to care about them. Most sharks are actually not dangerous killers. Neither is the Blue Shark, but if provoked, like a number of sharks, it is potentially dangerous. The divers at the Underwater World, who clean the open water tank or shark tank, would be swimming with these and the rest of the sharks.

Underwater World is different from the old fashioned aquarium, because it includes ecological features. There are partial elements of distinct habitats along the two 150 foot long water encapsulated tunnels. There is some ecology in the tanks, some observable interaction between wildlife and their surroundings. You can watch how the fish assemble together, how they interact in groups or behave as loners. There are half a dozen different schools of fish, which each act differently. Unlike most aquariums where you get to see crowded fish in small tanks or huge tanks where you can barely see the fish, at Underwater World you can observe crowds of fish closely. The Walleye Surfperches swim close enough that you can also admire their eyes. The resting Rockfish watch the visitors walk by from ledges along the tank. The Bat Rays and Big Skates swim so close the visitors can see their gills exhale water. Underwater World is a "diver's eye" or "fish's eye" view experience. The acrylic glass is so clear, at times you may not notice where the tank begins and bump your head on the acrylic.

In the first of the two tanks are areas that are reminiscent of the wharf area and the kelp forest. If you decide to ride the movable walkway, you can glide through the exhibit. Closely observing the faces of the fish is

memorable. Sometimes it seems as if they almost have personalities. While discussing things with friends you can imagine that you are "really really" talking about fish. Broadway does not have a tank large enough for a hit play modeled after the fish. The old Rockfish look angry and bitter. Many species of Rockfish rest in their pre-selected spots and often at strange angles. When present, combined schools of anchovies and sardines swim together in large numbers. They sometimes swim in a circle that in the wild allows them to keep an eye out for predators in all directions. The Walleye Surfperch will gather together in groups with upturned snouts. When courting they are surprisingly willing to dance in front of their potential mate. The Senorita Wrasses are elegant and sophisticated in orange. The Black Surfperches have mustaches and corduroy suits. The Rainbow Surfperch are flashier. Turbots, and Starry Flounders can be found resting on the bottom.

The stars of the first tank, the Giant Pacific Octopi, spend most of their time hiding, but when they come out they display how they can change their color and skin texture to camouflage. They hold onto the walls or the sides of the tank, and even occasionally climb over the acrylic that separates the visitors from the water, giving the visitors a view of their many tentacle arms. I tell some young couples that they will be walking through an Octopus's Garden. Myriads of sea stars and anenomes cover the floors and the rocky outcrops. A Bat Ray and a Leopard Shark swim through this tank, but they can only be seen in numbers in the second tunnel: the open water tank. As an activity, you can have visitors imagine that they are fish or sharks. Have them place their arms behind their backs and imagine trying to catch food without the benefit of hands or arms. Sharks have all the senses we have, plus more. They can also sense electricity. After a short lecture about the shark's adaptations as predators, the visitors can imagine they have these extra senses when they walk through the tunnel with their hands behind their backs.

The Blue Sharks were introduced into the open water tank, the tank with close to eighty sharks, and many Bat Rays. But surprisingly, there is also a number of different species of fish found in this tank. There are fewer species of Rockfish, three foot long Lingcods, King or Chinook Salmon, Halibut, golden Kingfish, and more. We explain to the visitors how the sharks are fed well enough that they rarely eat the other fish in the tank. The Jacksmelt that loosely swim in groups have a wide-eyed questioning look as if they are seeking answers for other people's questions or maybe they are lost crusaders. Sometimes one will follow another by hovering over them. Some of the Striped Bass look like they are lost in thought. A school of Chub Mackerel, defying descriptions of this type, swim around the tunnel in a school, back and forth, separating and regrouping. The White Sturgeon

swims around the tank like prehistoric beasts with ridges along their sides that act as sense organs. The Big Skate is surprisingly thin and when they swim upwards over the tank revealing their bellies, they look like part of a Rorschach test. The Bat Rays, black and bulky, have almost a cheerful look. There are also Rockfish that swim in circles, not really marking off territory because they don't stay in one area.

The Blue Sharks are be the fifth type of shark in the open water tank. The Seven Gill Shark with its rounded features grins as it swims through the tunnel. They are considered primitive because they have not evolved as recently as most other sharks that have only five gills. We now pole feed them because when they fed off the bottom they would scrape their noses. The Leopard Sharks look intense and ready for trouble, actually like annoyed mid level managers who work in downtown offices. The Spiny Dog Fish look friendly, like dogs, and the Brown Smooth Hounds more gentle, tan, and elegant. The Leopard Sharks group together and because they have a spiracle, which allows water to flow over their gills while they are stationary, they can rest on the bottom of the tunnel. The Bat Rays also rest in groups in the open water tank. The sharks and rays, due to counter shading, can disappear into or blend with the color of the walls. Because of the length of the tank and the counter shading, sometimes the naturalists need to search hard for the particular fish or sharks to interpret them. On the nights following their introduction I would walk up and down the tunnel trying to find the Blue Sharks so I could point them out. After a visitor has seen these sharks it is easy to explain how most of the 376 or so species of sharks are not ferocious killers. Many visitors are surprised to find out only a few species are known to attack people unprovoked. During a public program or a lecture we can challenge the visitors to think in terms of diversity when considering sharks, rather than just remembering the Great White Shark.

Earlier in 1998 the husbandry staff introduced huge numbers of Salmon fry into the open water tank. We were given these farm raised salmon as a gift from researchers at the local Steinhart Aquarium. The Chinook salmon would be a food source. There were so many that for a time it was hard to notice anything else in the tank. Before the really old Chinook salmons passed on, you could see the whole life cycle, from the huge numbers at birth, to the lesser numbers at the adult stage, to the few old decrepit salmons in their last days. The Chinook salmon, like most fish, don't care for their young and sometimes they eat them. The young ones have grown and have been joined by more Chinook salmon, in a fish will eat fish and shark will eat shark world. Due to human intervention, the exhibit is flexible and adaptive. There is not a fragile balance in these tanks, but we would have to wait and see what would happen with the Blue Sharks. An uncontrollable predator

could cause a lot of damage in the tanks.

The first Blue Shark did not do as well as the second. It would swim slowly around the tank, but every so often it would bump its nose into the wall. The whole body of the shark would shake after the collisions. Then the Blue would re-orient itself and swim down the narrow tunnels again. Later in the evening they would bump into the walls again. But how beautiful they were to watch. It is rare to be able to get so close to a shark, and almost impossible for most people with the Blue Shark in particular. But the size of the tank was a problem. Sharks expend a lot more energy when they are swimming slowly than quickly, because they do not have the opportunity to build up the necessary speed to glide. A further problem was that the Blue Sharks were not eating. The husbandry staff relayed how they were taking special actions to feed them, but they weren't working. A pole with fish on it was lowered into the tank and a slick was made to help induce the feeding, but the Blue Sharks were not biting. They thankfully were, as expected, leaving the divers alone as well.

The other sharks in the tank were accustomed to being fed dead fish. The Grab Bite programs, where the sharks are fed in front of the public, are anti-climatic. The feeding frenzy that the public hopes for is not with the sharks, but with the other fish that swim quickly to eat the krill that is dropped into the tank at the same time as the shark food. It is the Chub Mackerels and the Chinook salmon that are more dynamic to watch feeding. The rest, the sharks, Bat Rays, Big Skates and White Sturgeons eat off the floor of the tank. But the Blue Shark was not eating. The Blue Shark, a far ranging migrator, was not expected by some of the husbandry staff to do well in the tank. Unlike the other sharks they are pelagic and more accustomed to wide-open waters. They are also night feeders, swimming up from the depths to look for squid. Many sharks, including the Great White Shark, had not done well in captivity before. But if we were successful, who knows what we could learn if we could hold the Blues in captivity. Also what an opportunity the Blue Sharks were for the interpreters and marine conservationists. Blue Sharks are the prime choice for "finning" whereby fishermen remove the pricey fins of the shark to sell in Asian markets, and leave the rest of the shark in the ocean. But it was clear, after two weeks that the first Blue introduced was not going to make it. With hope I would watch the shark swim around the tank, it would successfully negotiate some of its turns, and then it would bump its nose into the wall. The Blue developed cuts on its nose and the decision was made to release it into the wild.

Meanwhile the second Blue, a larger female, was doing better. For a while it swam with greater skill around the tank, successfully negotiating the turns.

"There is the only Blue Shark in captivity," I would tell the visitors. For a while I was happy that I would have another shark to interpret to the public. But after a few days off, I came back to work to find that the second Blue had also swam into the walls too many times. The cut on its nose was painful to look at, and it was to be released. The Seven Gills have scraped their noses, but not as badly. And would releasing them into the wild be better for the sharks? Maybe they were prisoners at Underwater World or maybe they were being pampered? Sharks have evolved to be wild, but humans have upset the balance in the ocean.

Underwater World has not been successful with the Blue Shark. Meanwhile we have successfully held the Seven Gill, Leopard, Spiny Dogfish, Brown Smoothound, Angel, Swell, Chain, and Horn Sharks. These sharks are ambassadors from the wild, a reminder that wild creatures that are very different from us share the planet, and need our protection. The presence of sharks at Underwater World helps publicize the extermination of sharks that is taking place in the ocean. Some estimate that close to 100 million sharks are killed each year compared to the annual dozen deaths due to shark attacks. Sharks are hunted for trophies, for their fins, their hides, and to make products we don't need. They also wind up as by catch in fishing nets. Sharks are a challenge to environmentalists because people are afraid of them, and how do you protect something that people are afraid of? How do you counteract the images evoked by *Jaws* and by violent shark footage? The latest research cast sharks in a less dangerous light. When people are able to see sharks and fish up close they are more likely to care about them when they hear they are in trouble. Despite their alienness, the sharks and the fish grow on you. In time you begin to appreciate their unusual features, but it takes more effort than with birds or cute mammals. The failure of the Blues to adapt was a loss for Underwater World, its visitors, for those who work to help protect the sharks, and for those who want to know more about sharks. However, it was also a lesson about attempts to control the wild, in this case a shark with its own evolutionary instincts. These sharks could not learn to swim in the tanks, they could not adapt. There are sometimes difficulties involved in displaying certain species of sharks to the public. Things do not always work out as expected or hoped.

Free the Blue Sharks would be, but the wild was also not benign enough, and the Blues would now have to deal with more dangerous predators in the ocean. With its large fins the Blue Shark is an obvious target for those who want to make fast cash selling pricey shark fins. The Blue Shark continued to be on Underwater World's collection agenda. We hoped that we could find a young Blue Shark that could adapt. If it did not last in the tank we could release it into the wild. One staff member suggested we could introduce sharks in the open water tank for short visits. I hope I have shown you how

to avoid potential pitfalls while facilitating the needed appreciation of sharks and fish. Aquariums are sometimes okay. Thank you for visiting Underwater World. Stop by again if you can. There are many other special treats.

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