The Plight of the Southern Residents

Introduction

When European settlers arrived on the west coast of British Columbia, they mistakenly viewed orcas as competition. Fishermen termed the whales "Blackfish," killing them to protect their fisheries. In 1960, the federal Department of Fishers (DFO) even discussed methods such as "bombing the animals from the air" to get rid of them (A brief history, 2018). The plan never came to fruition, but in 1964, a wild killer whale named Moby Doll was captured as a specimen to display at the Vancouver Aquarium. This event sparked a massive attack on the species to capture them into tanks for exhibiting, and many died in the process. By 1976, capturing orcas was officially banned, and we were left with only 71 Southern Resident whales, plummeting from an estimated 200 before the 20th century (A brief history, 2018).

Killer whales, also known as orcas (*Orcinus orca*), are intelligent creatures with complex social structures. Today, they face even more significant threats such as food scarcity, chemical contaminants and other pollutants, and vessel traffic contributing to sound disturbances (NOAA, n.d.). They travel in small populations and differ genetically in appearance, behaviour, social interactions, and feeding habits. There are three populations in the Pacific Northwest: the residents (fish-eating), the transients (mammal-eating), and the offshore orcas. The Southern Resident killer whales (SRKW) live in the Salish Sea's coastal waters between Canada and the United States. Therefore, they are one of the most easily hunted historical populations (Resident and Transient, n.d.).

Threats - Reduced Prey Availability

The SRKW eat solely salmon, particularly Chinook, and they depend on the rivers flowing into the Salish Sea for spawning. The Columbia River Basin is the largest in the Pacific Northwest, cutting through seven American states and two Canadian provinces. In the 19th century, around 15 to 30 million salmon returned to Columbia, with Chinook as the most abundant species. However, fewer than 70,000 wild spring Chinook returns now (Hawley, 2020). Why is this happening, and what does that mean for our killer whales? Today, more than 400 dams congest the Columbia River Basin (Hawley, 2020). These dams decimate the salmon runs and reduce food availability for orcas by blocking both juvenile salmon migration out to the ocean and adult salmon migration back from the sea to their spawning grounds while increasing fallback impacts (Southern Resident Orcas, n.d.).

A Dam of a Problem in the Columbia River Basin

During the upstream migration process, dams create a challenging environment to overcome. Often, adult salmon would ascend and fall back downstream over the spillways and turbine intakes. This process, termed fallback, can result in injury or death, spawning delays, and inaccurate fishway count. In addition, the fishes that fall back sometimes record more than once, leading to an overestimation, calculated to exceed by 10% (Boggs, 2004). This inaccuracy can lead to severe implications for management. For example, how many salmon we can harvest and the timing of commercial fishing depends on accurate statistics. There may be much fewer salmon available now than we think.

Four dams, in particular, have wreaked havoc in one of Columbia's major tributaries, the Snake River basin, which contains more than 4 million acres of forests, rivers, and streams. Once

producing 2 to 4 million Chinooks every year, but have now rendered the area inaccessible (Southern Resident Orcas, n.d.). To understand the effects on the SRKW, the lack of food and nourishment has created a heart-wrenching situation for killer whale health and procreation. In 2018, a female orca named Tahlequah gave birth to a calf which immediately passed away. For 17 days, she carried her dead baby for hundreds of miles in a "tour of grief" (Hawley, 2020).

The four lower Snake River dams-Ice Harbor Dam, Lower Monumental Dam, Little Goose Dam, and Lower Granite Dam are the prime contestation places for removal because their usage value has diminished over the years. The development of solar, wind, and natural gas energy has supplemented the need for power, but federal agencies and Bonneville politicians continue to refuse and consider removing the Snake dams (Leslie, 2019).

Disturbances to the Southern Resident Killer Whales from Vessel Presence and Noise

The core and critical habitats of the Southern Resident Killer Whales (SRKW) where they feed, mate, survive and thrive are found throughout the Central Salish Sea, precisely around the San Juan and Gulf Islands, into the Central Puget Sound and in winter and spring migrating as far north as Haida Gwaii and southwards towards Monterey Bay (M., 2020). A major driver of the decline in SRKW populations is the increase in traffic of commercial vessels and recreational boats through the orca's habitats that have a multitude of harmful impacts. Including the release of sounds that mask orca whales' bioacoustics, chemical contamination of the ocean, and collisions with pods. Scroll through this map to discover how whale watching, cruise ships, and dcargo vessels individually and cumulatively impact the SKRW as these boats voyage through their territory.

Whale Watching

The concept of whale watching provides an interesting lens to view the relationship between orcas and boats as the whole point is to get scientists and tourists within viewing distance of the whales. Every year, at least 13 million people go whale watching, making the industry worth upwards of $2.1 billion according to the International Fund for Animal Welfare (Marine, 2011). While it is great that an increasing number of people desire to see these magnificent animals in their natural habitat, this influx has imposed some noticeable stresses for the SRKW. The increased boat traffic, even of the smaller Zodiac vessel type common with whale watching companies, impairs their ability to feed, rest and rear their young. It was found that the noise from whale watching boats in the Central Salish Sea masked the range of the SRKW's echolocation clicks by up to 34% or almost 90 meters (Port, 2017) . Since whale watchers are trying to get as close to the orca's as possible, there have been several collisions with whales that can be disastrous for everyone involved. Be Whale Wise has released a set of regulations with specific distances for viewing killer whales. In both Canada and the United States vessels are required to maintain 100 meters distance from all marine animals and 200 meters away from orca's, with a speed under 7 knots while within 1,000 meters of orca's which would be much of the SRKW critical habitat. However, even with these rules in place, it is extremely difficult to manage the ocean and most of the whale watching goes untracked and unnoticed. Using several different whale watching companies, the departure ports were identified with the small boat symbol, small blue squares were placed in sites where whales had been spotted, and larger red squares to visualize the range of the whale watching boats.

Cruise Ships

Since the Central Salish Sea is such a beautiful passage and harbors some of North America's largest ports it is an extremely popular destination for cruise ships. In 2019 more than one million passengers on 288 cruise ships visited Vancouver (Crawford). Other popular cruise ports can be found in Victoria and Nanaimo, British Columbia as well as in Seattle, Port Angeles, Port Townsend, and Anacortes in the Puget Sound off Washington State. These cruises will take passengers as far north as Juneau, Alaska and to the south well beyond the SRKW range of Monterey, California. Studies have found that many cruise ships rely upon "open-loop scrubbers" to adhere to international sulphur-limits that may actually be unintentionally harming the SRKW and other whales. Open-loop scrubbers operate by pumping a mix of water and contaminants into the ocean that contain carcinogenic substances and heavy metals that can cause cancer and other health issues in orcas. WWF found that nearly 35 million tonnes of scrubber wastewater was emitted off the coast of British Columbia, 90% of this discharge coming from cruise ships (Crawford, 2019).

Cargo Vessels

The Salish Sea is host to the most traveled shipping routes in the world, with around 11,000 large vessels traveling through the passage each year (Georgia, 2016). Increased ship traffic will most certainly cause more acoustic disturbances from the frequency of their engines, propellers, and the speed they travel. Killer whale's rely upon echolocation to hunt, navigate and communicate with one and other, so any underwater noise disturbance notably impairs SKRW and other whale's ability to perform basic life activities. It has been found that time for the SRKW to feed was cut by about 20-30% of each whale day (5 hours) due to behavioral response

and click masking (Port, 2017). There are also major concerns considering the influx in oil being transported by cargo ship, which greatly increases the probability of vessel incidents including oil spills. Finally, while collisions between ships and orcas are rare, they will most certainly increase in frequency as more vessels pass through their critical habitats.

Capture Era and its implications

In 1965 an Orca dubbed Namu took the Pacific Northwest by storm. Namu was the first orca to be publicly displayed, and furthermore the first whale that man ever swam with in captivity. As an ambassador for his species, this one whale played a major role in the human perception of orcas as well as the future of his species.

Shamu (Pier 56 Seattle)

Within a year of Namu's display the park owners set out to get him a mate and captured a juvenile female in Penn Cove. This was the first intentional capture of a killer whale and would mark the beginning of a corporate investment in the business of live orca display. The juvenile female did not get along with Namu and was later sold to SeaWorld, where she would adopt the name that would ring in children's ears for years to come. Shamu. Crowds began to grow in San Diego and the demand for killer whales was at an all time high.

Penn Cove

The pacific Northwest is home to a great number of inlets and populations of killer whales that people once believed numbered in the thousands, and for the next 10 years from 1966 to 1976 this area was open season for their capture. Every capture had its troubles, but there is not one more famous than the Penn Cove capture on August 8, 1970.

Superpod (different view mainly looking at superpod)

The Southern Resident killer whales are split into 3 pods denoted J, K, and L. During a regular season these pods are usually seen keeping to their own groups, however on occasion they will come together for a great multitude of purposes including breeding, play, and what appears to some as consultation. This great gathering is called a superpod.

Penn Cove Captures

In the summer of 1970 this phenomenon had occurred in none other than Penn Cove, and to the whales' dismay, captors had prepared what would come to be the largest round up of Orcas this world has ever seen. On August 8th, Namu inc. had effectively corralled nearly the entire population of Southern Resident Killer Whales. They had no way of knowing that this was the case, as this capture in particular helped to drive a government mandated census of the species that would lead to all of the current research being done today.

Introducing Lolita/Tokitae and Understanding Tank Size

Today, only one of the 7 whales captured in Penn Cove is still alive. Her name is Lolita (Tokitae). She was sold to the Miami Seaquarium where she has remained for the past 50 years in one of the smallest Killer whale enclosures made since its inception. Her tank is 420 m^2 around and only 20 feet deep which is about how long Lolita is herself. Perspective is key in understanding how small this enclosure really is. SeaWorld San Diego's current killer whale enclosure is 3640 m^2 which is one of the most advanced facilities as they have held killer whales the longest of any marine park globally.

Tanks in Relativity

And if we look back at Penn cove we can see the size of both of these tanks in comparison to Lolita's capture sight. There are efforts put in place right now to bring

Lolita/Tokitae back to the Salish Sea. https://www.savelolita.org/ Indigenous groups as well as researchers and activists have been in an ongoing legal battle with the Miami Seaquarium to have Lolita retired to a sea pen in the Pacific Northwest.

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