Bay Whaling at Twofold Bay with the Davidson holdouts and their killer whale friends.

A south going current along the east coast of Australia compels the whales travelling north to stay close inshore to minimize its effect. Around Twofold bay (on the SE coast of Australia) killer whales would herd the whales into the bay where they would be killed. The killer whales cooperated with the Davidson family who refused the use of motorboats and continued with whaleboats into the twentieth century. The Orcas would alert the Davidson family to the presence of the whales by breaching and flopping in the Kiah River where the Davidsons lived.

The killer whale known as Old Tom swims alongside a whaling boat, flanking a whale calf. A harpooned whale, not visible here, is towing the boat. Notice that the foremost rower has abandoned his oar and is now the harpooner. (Photos by C.E.Wellings & W.J.Hall, supplied courtesy of the Eden Killer Whale Museum.)

After harpooning and killing, the whale was anchored to allow the Orcas to eat the tongue and lips of the whale. Then a day or two later, the Davidsons would tow the whale to shore to harvest the blubber. It can be seen that some whaleboats used were not very refined. The boat below belonged to the Davidsons, but they did not use the bomb guns when Orcas were involved as it upset them. The Davidsons painted their boat green so that the Orcas could recognize and cooperate with them. The Killers favoured the Davidsons due to their policy of always letting the killers take first share (law of the tongue). The relationship was almost intimate with the orcas recognizing individual Davidsons and vice versa.

Charlie Davidson with harpoons, lances and bomb gun, one harpoon attached to line below for throwing (from inscription on photo 1909). Note the long blades on the oars.

It seems likely that the origin of this cooperative relationship, stems form the beliefs of the Nullica aboriginal people. They formed a significant part of the whaling workforce, and had formed a strong spiritual relationship with the killer whales before the advent of European whaling.

The Davidsons were not greedy and had a subsistence living, harvesting about eight whales a year compared with other stations that harvested seven hundred a year.

Whaleboat Heresy

The whaleboats were dry and rode as gracefully as an albatross. For lightness and form, for carrying capacity, for speed and facility of movement at the word of command, for the placing of men at the best advantage in the exercise of power the whaleboat is simply as perfect as the combined skill of generations of boat builders could make it. (Nimrods of the Sea)

The apparent sleekness of the whaleboat can be deceptive.

In the same vein I was told as a young sea scout that the old eighteen footers on Sydney Harbour had been recorded at speeds of sixty eight miles an hour. And while cruising the Solomon Islands I heard an English planter boast that the native war canoes could make fourteen knots and outpace the government patrol boats. From time to time I have heard claims that the old Greek triremes could make over 7 knots under oars when their speed was more likely less than 4 knots. I guess us old folk, more connected to the past, like to boast that we could achieve things that the young fellas could only dream of. But, hey! we did land on the moon 46 years ago, bet you young fellas couldn’t do that.

In spite of the above declaration, whaleboats were not easy to row, and they were not fast. Whale men could only manage 5 Knots for a short time and the rest of their time was spent at 3-4 knots, lets say 3 1/2” knots. Fortunately whales when cruising travel at 3-4 knots in order to conserve energy for the vast distances they must cover to their breeding grounds.

As a matter of interest I have investigated the speeds that could be maintained for limited and extended times in my Herreshoff rowboat. I found I could row hard round a 1.40 nautical mile course at 4.95 knots and row easily round the same course 3.95 knots, practically the same as the whaleboat. So even though the whaleboat had 5 oarsmen and a long hull with sleek lines it was not faster than the much smaller one-man skiff. This extraordinary coincidence of quite different crafts demands explanation.

Author rowing the course in his Herreshoff rowboat.

The whaleboat was relatively slow because it was heavy by today’s standards. The bare boat typically weighed about 1000lbs. where a modern Australian surfboat of about the same length weighs 500lbs. The whaleboat carried a mast, sail, oars, paddles, bucket, bailing piggin, lantern keg, line tubs, harpoons, lances, boat spade, waifs, drogues and other paraphernalia. When loaded with all this gear the whaleboat, weighed 2000 lbs. So with six crew of say, 170 lbs. each, the total weight would be 3000 lbs. Ignoring the fact that the timbers could be waterlogged and the bilge probably had a few inches of water, the weight being pulled per person is 600 lbs. My rowboat weighs 70 lbs. and I weigh 165 lbs. So I am only pulling 230 lbs., less than half, through the water. Now the performance of the whaleboat starts to look a lot better. The only way the whaleboat could improve would be with a semicircular underwater hull as this would minimize wetted surface, but this is not practical, particularly in light of the fact that it needed to be able to carry sail.

This thirty four foot 6 oared New Zealand bay whaler was: “Not easy to push through the water and the oars were very outboard heavy. They needed big Maoris to row them.” (Anders Theile, Lune River, Tasmania)

According to Ansel (Whaleboats: design and construction) “Another achievement of the builders was a design that was extremely seaworthy but still easily driven without the exhaustion of the crew.” This statement does not gel with the fact that: “A trained crew could pull five miles the first hour and four the second.” In other words the boat was being pulled considerably slower than its displacement speed of seven knots. Most of the effort was being expended on overcoming the friction of the water rather than making waves. The long slender appearance of the whaleboat has deceived observers into believing that the boats row more easily than the fact. The ratio of wetted surface to rower is the prime factor in dictating speed. What we tend to forget is that the beam is more for a multi-oared boat (not for a racing skiff) and consequently the wetted surface per rower is greater. The fine entrance and weight of the whaleboat would however favour the whaleboat rowing into a sea. I have modified an Australian surfboat for 8 rowers and with its fine bow similar to the whale boat it slices neatly and without resistance through large wakes that would cause pounding and slowing in my Herreshoff rowboat.

Two oars per station gives more power per wetted surface area. Even with this inexperienced and unpracticed crew it outpaced all the Herreshoff rowboats.

It is not surprising that the whaleboat was not easily driven, no matter what its design. For starters the boat would need to be about 28 feet (8.5m) long to accommodate the five oarsmen, it's gear and the sweep. The boats also had pretty well vertical sides and a fairly hard turn of the bilge to enable it to stand up to the wind under sail, and carry the heavy load. This combination of length and flattish bottom and weight, added to the wetted surface. When loaded and weighing 3000lbs. including the crew the boats were reasonably deep in the water and consequently experiencing considerable drag because of the friction between the water and the large wetted surface. For those interested I have included the mathematic treatment* of these issues from my article on rowboat design. The interesting conclusion is that to increase speed from 3.5 to 5 knots (40% speed increase) requires three times as much power (200% power increase).

It did not help that the oars were quite heavy being made out of ash (0.7 as dense as water), up to 17' long and of 3" diameter. Such an oar would weigh about 18 lbs. (8 kg.) and absorb a lot of energy in wielding it. When a high speed was required those oars absorbed energy in bending and not all of this energy was returned at the end of the stroke. The blades were also extremely long. Part of the problem of the long thin blade is that a portion of it moves the wrong way through the water. The tip of the blade travels further so that the innermost part of the blade may be travelling slower in the water than the boat speed thus resisting forward motion. A myth has developed that the long thin blade was designed for turbulent conditions. In fact the oars were cut out of a solid plank and, of course, the thin blade did not require so much material to start with. I am speculating that the Viking oars with the wider blades may have been made from saplings with the thicker end of the sapling providing the blade. Another advantage of starting with a sapling is that it could be pretty well guaranteed that the grain would be quite straight.

These were the kind of oars used on Viking ships 900 years prior to the whaleboats. Made of pine they were lighter and the blades were better designed. The width of the blade is known form the slots cut in the side of salvaged wrecks to accommodate the blade. The beam and weight of these boats limited their rowing speed to 2-3 knots.

The boats would certainly have been easier to row with lighter oars and spoon blades. In addition to these problems about 16 pounds (7.4kg.) downward pressure was required to lift the blades out of the water. As well the forward and backward changes of motion of the oar required more energy to overcome inertia, before any work was done pulling the boat through the water.

The ocean whalers generally used sail to approach the whales to save energy and for stealth. The oars made a noise that the whales could hear, and were then said to be gallied (alarmed). Sperm whales swam into the wind when being chased for obvious reasons. When the wind died, and the crew took up oars, the boat was said to be driven by an "Ash Breeze" (The title of the Journal of the TSCA).

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1. **The frictional resistance is proportional to the area in contact with the water and the square of the speed of the boat**. Hence a boat travelling at 4 knots will have four times the resistance of a boat travelling at 2 knots. Since the relative speed is 2 then the relative resistance is $2^2 = 4$. This frictional resistance also increases with the area of boat in contact with the water (wetted surface area).

2. **The power required to row a boat is proportional to the cube of the speed.** At double the speed the boat is covering twice the distance against 4 times the resistance. So four times the force is applied over twice the distance in the same time. Thus relative power to double the speed = $2^2 x2 = 2^3 = 8$. **That is: 8 times the power is needed to row at twice the speed.** This is extraordinary and seems counter intuitive but emphasises the need to reduce wetted surface area.

   This matters little as we normally intend to travel more casually. For instance **it requires very nearly twice as much power to row at 5 knots than 4 knots** ($5^3/4^3$=125/64=1.95). **To travel at 3.5 knots (4mph) we will require only a third of the power required to travel at 5 knots.**