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What Are They Doing Down There?

Famous for their acrobatic leaps and haunting songs, these whales are slowly revealing the mysteries of their underwater behavior.

By Douglas H. Chadwick

Remember when the biggest animals in the world seemed in danger of vanishing? It was during the 1960s and '70s, when commercial hunting had made many of the great whale species so scarce it looked as if the world would be robbed of an entire dimension of wonder.

It wasn't. If you visit the 'Au'au Channel between the Hawaiian islands of Maui and Lāna'i in winter today, you'll find the ocean grown chunky with titans. Humpback whales that weigh as much as 45 tons (41 metric tons) rise and spout everywhere, roll in spirals, slap the surface with fins or tail flukes. They leap with their tails almost clearing the surface while chins reach 40 feet (12 meters) into the sky, then fall back in a KER-WHOMP! that carries for miles.

Reduced to a few thousand worldwide, humpbacks began to rebound after an international ban on killing them went into effect in the 1960s. A soon-to-be completed three-year census dubbed SPLASH, the largest, most intensive humpback whale survey ever undertaken, could put the North Pacific population alone at more than 10,000 and possibly as many as 25,000.

Half to two-thirds of those whales gather around Hawaii from late November into May, especially here in the channel and other parts of the 1,370-square-mile (3,550 square kilometers) Hawaiian Islands Humpback Whale National Marine Sanctuary. For every humpback drawing cheers from whale-watching boats as it raises a splash in the sunshine, many more lie below.

Whales ordinarily come into view only briefly, when they part the ocean's shimmer to breathe. Humpbacks, though more active at the surface than most, still spend about 90 percent of their lives below. What are they doing down there? They roam too widely through rough and remote seas for scientists to follow; it's no wonder the ways of whales, Earth's grandest life-forms, are still steeped in mystery. But out in the wonderfully clear, blue, warm waters of the 'Au'au Channel, investigators have been gathering new clues about a crucial part of the whales' lives: courtship and birth.

Observers from the Whale Trust, a Maui-based foundation for research and education, have found that some of the submerged males are calling out the humpback's famous song, filling the seas with strange and lovely incantations. Some of the females are tending new calves as they pile on dozens of pounds daily and, in a year, double their length on their mothers' rich milk. What no one fully grasped until recently was how many other submerged humpbacks are not cruising, not singing or nursing, but simply hanging out.

"The more we searched, the more humpbacks we found just drifting along with the current at a mile or two an hour, 30 to 80 feet (9 to 24 meters) deep," says photographer Flip Nicklin, a longtime marine mammal observer. "Now when I look out across the channel, I picture this river of whales flowing by, hidden from ordinary view."

They don't seem to be eating either, even though many have migrated 2,500 miles (4,000 kilometers) or more from feeding grounds off Alaska and British Columbia and have a long return journey ahead. Some speculate that the whales roam farther offshore to at least snack now and then, but people who watch humpbacks every day see nary a poop. The animals are apparently living off the layers of blubber beneath their skin. You can do that if you're as huge as a humpback: The ability to gulp prodigious quantities of food and store fat by the ton frees the animals to travel long distances and concentrate on other vital behavior for weeks or months at a time.

The whales hanging out below don't even bother much with breathing. Instead of coming up every 10 to 15 minutes for a series of breaths as busier

humpbacks do, they stay down for half an hour or so, scarcely moving a muscle. "We call them breathholders," Nicklin says. They may be conserving energy for more important activities on the winter range, namely romance.

"Crucifix block," observes Dan Salden, head of the Hawaii Whale Research Foundation, another Maui-based group, which studies humpback social behavior. He's standing on the prow of his boat, Deep Blue, describing a male that has risen vertically almost halfway out of the water and spread its long, winglike pectoral fins to either side, forming the shape of a cross. The move cuts off one of the 10 or 11 other males racing behind from getting any closer to the prize: a female, swimming just ahead of the pack.

Lifting his tape recorder again, Salden announces, "Peduncle throw." A different male swimmer has just whipped the whole muscular, tapering rear of its body—the peduncle, which powers the fluke—high in the air. It causes the animal's front end to swing straight downward, forcing a male that had been hot on its tail to dive to avoid a collision.

Off Deep Blue's port side, several big boys near the head of the group have been veering back and forth, pushing, shoving, ramming, and swiping at each other with fins as they steam across the 'Au'au Channel. Now a trio is swimming parallel while keeping enormous heads lifted high, planing over the waves like fast-moving ships. "Three males motorboating," Salden says, while seawater cascades from the whales' partly opened maws and the volumes of air rushing in and out of their blowholes whistle-roar like factory pipes.

When the trio finally dips beneath the surface, the whales release streams of air from their mouths. One adds a continuous jet from the blowhole. "Bubble trail," declares Salden. "Probably the dominant animal using it as a display." All at once, a male's back rises higher and higher above the water without any visible effort. That's because another male has dived underneath and started lifting him up. What term will Salden, former chairperson of the speech communication department at Southern Illinois University, Edwardsville, use for this?

"Beaching."

Ah. The victim does look as if he had run aground on a hidden shoal.

After taking tail photographs to identify the individuals involved—each humpback has a unique pattern of pigment and scars on the underside—Salden turns to an assistant, Peggy Stap, who has been sitting patiently on the stern clad in a wet suit and oversize fins. "OK," he says. "GO!" And she's overboard, kicking toward a roller derby in the Kingdom of Giants, one hand thrusting a video camera at several hundred thousand pounds of churning behemoths, the other hand held high out of the water to signal the whales' number and direction and also to let us track her more easily from the deck.

A few years ago, Stap operated a greenhouse and ornamental flower business in Michigan. On the last day of a vacation in Maui, she was sightseeing over coral in a glass-bottomed boat when "a mother and calf swam right underneath, looking at us with those eyes," she recalls. Stap went home, sold her business, flew back to Maui, and volunteered to take identification photos from a commercial whale-watching boat. More captivated than ever, she eventually signed on with Salden's crew.

Researchers began referring to fast-moving melees of humpbacks as competitive groups after Salden, Stap, and others found that they almost always consist of a female pursued by a squadron of males. One suitor, known as the primary escort, tends to keep closest. Typically one of the largest males, he stays busy fending off other heavyweights, the secondary escorts. They in turn contend with males trying to get past them. The action can go on for hours at a pace that causes normally white undersides of flukes and fins to flush pink, likely with blood from exertion.

When you have anywhere from four or five to two dozen whales crisscrossing, circling, and diving past each other, it's extremely difficult to keep track of who's doing what. New contestants keep arriving, drawn to the hubbub from surrounding areas, while others peel off or simply lag farther and farther behind as they tire.

Fresh nicks, scrapes, and gouges testify to the serious level of competition. Yet there may be cooperation too, as when two or three males gang up in what looks like an effort to block a female's progress or to push one of the main escorts off course. "I've also seen two males pancake a third," Salden says. "One came up under him while the other lunged onto his back." Are these intentional alliances, or cases of individuals selfishly joining in when others take the initiative, or merely accidents of timing? No one is sure.

Humpbacks are known to collaborate—for example, in rounding up food in their summer feeding grounds. Some work together to drive fish into shining corrals made from the whales' own rising bubbles; they then come up together through the silvery school with mouths agape. At other times they seem to cooperate in herding fish or krill against a shore or even thickets of kelp. One observer saw five humpbacks shoving an ice floe along like a tugboat fleet, perhaps in play. Others have reported small groups hurrying over to drive off killer whales harassing a lone humpback, as if they had made a collective decision to help.

Again, no one is certain about what is actually going on in the animals' large, convoluted brains. But trying to understand mammals in an environment so different from ours is part of the attraction of this ocean frontier. Whales have a way of turning questions about nature into questions about the nature of knowledge and how our human brains interpret the world.

Meagan Jones of Whale Trust knows one thing for sure about humpbacks: Even though they come into the world 12 to 15 feet (3.7 to 4.6 meters) long, with flippers and flukes, they are no exception to the rule that baby mammals love to climb on their moms. A calf will squirm over and under its mother's flippers, or pectoral fins—her modified forelimbs. When she lingers at the surface, it will use her massive back as a playground, lurching up one side and sliding down the other, again and again. An infant that wriggles onto her rostrum, the broad bench formed by the elongated upper jaw, seems happy to perch there like some colossal amphibian equally at home in water or in air, while the mother half shoves, half carries her bulky baby. Some humpbacks have also been seen giving rostrum rides to bottlenose dolphins, occasionally lifting one so high that it resembles a passenger on the flying bridge of a yacht.

Jones focuses on whether the presence of a calf affects female behavior. She has confirmed that females rarely interact with one another in Hawaii. However, the majority of them have at least one male suitor following or, from time to time, angling ahead or closely behind as if to alter her course. More often than not, the course is relatively slow—a different level of intensity than in competitive groups. When a female rests underwater, her visitor stations himself nearby, breaking off to patrol around her now and then, on the lookout for potential rivals.

Females usually give birth every two to three years, because pregnancy lasts 11 months and is followed by up to a year of nursing and care for the developing infant. Although most females with calves don't necessarily participate in mating, Maui researchers find that some do, and males therefore court mothers with young as well as solitary females. But for all an escort's devoted attention, Jones rarely sees any cow showing the slightest interest in return. These slow-moving, undemonstrative females can be tougher research subjects than the splashy groups in which a female is pursued by a crowd of males. Jones spends hours trying to stay near a quiet female (and her calf and escort, if present) and document every move she can see. It's not uncommon for her subjects to slip away into the boundless blue before she can determine a pattern. More often, she will have almost pieced together a pattern when it is interrupted by the arrival of a new male or small band of them, which generally causes the female to flee. Either way, Jones has to start over.

Jones's typical day begins shortly after dawn. Several sunstruck hours later, everyone aboard is operating with a partly heat-melted brain. The trade winds have strengthened, and her little boat is sloshing around between white-capped waves. Time to turn for home, but Jones will be saying, "We were so close before those incoming males wrecked the last session. Let's try just one more two-hour follow." And on it goes until the team pulls into the harbor late again, fully roasted, basted in salt spray, and making plans to do it all again the next day, always in the hope of one shining moment of insight.

One afternoon, 50 feet (15 meters) deep in dazzling azure, a baby humpback rests tucked beneath its mother's flipper, then moves to nestle in its next favorite place: under her throat. A second adult hovers close by. Its darker skin, scratched and scarred, suggests that it is a male.

Jones cuts the boat engine and maneuvers her vessel into position above the whales and slightly to one side. Jason Sturgis of Whale Trust drops quietly off the transom with snorkel gear. A quarter mile (0.4 kilometers) away, a second boat lowers a loudspeaker into the water and begins to play a sample of the very unmusical noises—grunts, glubs, rumbles, sneers, and whines—made by males in competitive groups. Sturgis records the female's response with a video camera.

Since females without calves are the ones most likely to breed, they ought to react differently from females with calves, Jones theorizes. To prove it, she will need this combination of calm water, smoothly functioning equipment, and approachable whales for many more such experiments. During the few I witness, neither type of female seems inspired to approach the sounds. So what are the steps that lead to these standoffish females being chased by a horde of suitors? And where in any of these social sequences does actual mating take place? For now, the humpbacks' mating game remains an enigma—one almost as profound as their song.

Jim Darling has struggled for 25 years to crack the code of the humpback song. The vocalization, uttered only by males, is perhaps the longest and most elaborate known among animals. Its formal structure is built from a succession of themes, or melodies, that have a striking range of tones from piccolo chirrups to low-pitched foghorn blasts. Some scientists say they can detect rhymes. Considering how much time and energy go into producing this submarine aria, most people assumed the purpose must be to lure mates. That theory took a blow in 1997, when Darling, a Whale Trust researcher, and Flip Nicklin discovered that singers in the 'Au'au Channel were drawing not the opposite sex but other males.

Darling and the rest of the Whale Trust team have been using an underwater speaker to play recordings of the song. The first experiments appear to confirm that females aren't attracted to the singing, whereas males seem eager to investigate the source. Maybe the song isn't for wooing but for broadcasting a challenge, as when a bull elk bugles across the mountainsides. If so, you would expect a contest to erupt when another male comes to check out the claim.

Yet when a new male joins a singer, Darling notes, the two whales often circle each other without obvious aggression. They may even swim off together like bachelor buddies, often to join other whales. Perhaps singers are recruiting male allies to help find a female and displace the primary escort at her side. If the female tries to bolt, a fast-swimming, flipper-banging competitive group may then take shape.

Or maybe the songs are far more than simple calls to allies or rivals. Hit tunes and national anthems could be better analogies, for all we know. All the humpbacks within one region, the North Pacific, for instance, sing the same song. Only an expert like Darling can detect minor variations among subpopulations, such as the humpbacks wintering off Hawaii and those off the Philippines. Yet researchers have found that the humpback populations in other parts of the world sing distinctly different songs. The songs also change over time—from one year to the next, and even over a single breeding season.

A decade ago, the humpbacks in the channel ended their song with a rising series of whoops just before coming up for breath. The next year, the finale switched to a series of ribbits. Two years ago the song had only four themes, down from as many as eight in earlier years, and even a novice could pick out a new growly tone dominating a particular section. As of 2006, there were six themes, one with a recently added flourish of four loud squeaks, and the final noises before surfacing were more like a buzz.

Lately, researchers listening in on humpbacks along northern feeding grounds have picked up singing during late autumn and again in spring and even early summer. Navy hydrophones deployed on the sea bottom detect humpbacks singing during their long migrations as well. Could it be that the whales sing to establish their identity as a group or possibly as individuals? That they are telling others about who they are and where they come from? Or sharing lore about the currents and fish and maybe the stars?

Years of study lie ahead. "Why do I do it?" Darling wonders aloud. "Human beings like puzzles. I want to know. Period."

And perhaps the urge to know goes both ways. Nicklin recalls snorkeling some distance from a humpback when it approached within a few yards. Curiosity about humans is not uncommon among humpbacks, especially young ones. But this adult animal gently carried Nicklin toward its eye with a fin. Who's to say this wasn't a case of a fellow big-brained mammal reaching out in wonder and curiosity, as in the electric moments when a chimpanzee or gorilla first touched a researcher's hand?