

Seas Your Future Costa Rica 2022 - Marine Mammal Project Report

By Thomas Stone



Thomas Stone taking a photo of a humpback whale's tail (Photo credit: Sari Ponet)

Introduction:

From 2nd-11th January 2022 I ran a project investigating the diversity and abundance of the marine mammal species that inhabit the Pacific coast of Costa Rica whilst on board the Seas Your Future ship 'The Pelican of London'.

The Pacific coast of Costa Rica is an important area for marine mammals, with at least 27 species being confirmed as present in the region¹. Whilst some population distribution and abundance estimates have been made for a range of cetacean species in Costa Rican waters these studies are infrequent and most surveys reported on occurred at least 15 years ago^{1,2,3,4}. A recent review³ discusses common species and their likely distributions but emphasises that information about the ecology and conservation status for many of Pacific Costa Rica's cetacean species remains unknown. It is therefore important that up-to-date surveys are undertaken to provide data on the abundance and diversity of cetacean species in the waters of Pacific Costa Rica. This project will contribute to this goal and future SYF projects will be able to build on the data collected on this voyage.

Marine Mammal Surveys:

Regular, systematic marine mammal transect surveys were undertaken throughout the voyage. These involved recording effort, weather, GPS and sightings data. It is especially important to carry out systematic transect surveys such as these as unlike incidental observations, it is possible to calculate abundance from these surveys. The absence of marine mammals in an area can be recorded as well as the presence, as a constant lookout specifically for marine mammals is maintained. This means that all the marine mammals present at the surface in an area at the time of the survey can be presumed to have been counted, with this weighted depending on visibility and conditions, and so abundances in an area can be calculated from this.

Table 1:	Survey Sightings		Incidental Sightings		Combined Totals	
Species	No. Sightings	No. Individuals	No. Sightings	No. Individuals	No. Sightings	No. Individuals
Pantropical Spotted Dolphins	14	104	11	48	25	152
Bottlenose Dolphins	2	26	2	11	4	37
Humpback Whales	3	5	2	5	5	10
Sperm Whales	1	1	0	0	1	1
Unidentified Dolphins	1	3	1	3	2	6
Totals:	21	139	16	67	37	206

Table 1: shows the number of sightings and individuals sighted of each species for sightings during survey periods, incidental sightings and a combined total

In total, 32 hours and 2 minutes were spent on survey during the voyage. In this time, 4 different marine mammal species were sighted totalling approximately 206 individuals from 21 separate encounters, or sightings (see table 1 for breakdown). These four species were bottlenose dolphins (*Tursiops truncatus*), pantropical spotted dolphins (*Stenella attenuata*), humpback whales (*Megaptera novaeangliae*) and a sperm whale (*Physeter macrocephalus*).

Some dolphins were also sighted that could not be identified. In addition, 16 incidental sightings were recorded during the voyage totalling 67 individuals (see table 1). These are sightings that took place when we were not actively looking for marine mammals.

Geographic Summary of Sightings:

Below (figure 1) is a map produced showing the ship's route together with all of the sightings that took place during the voyage, including sightings from surveys and incidental sightings, with sightings colour coded by species.

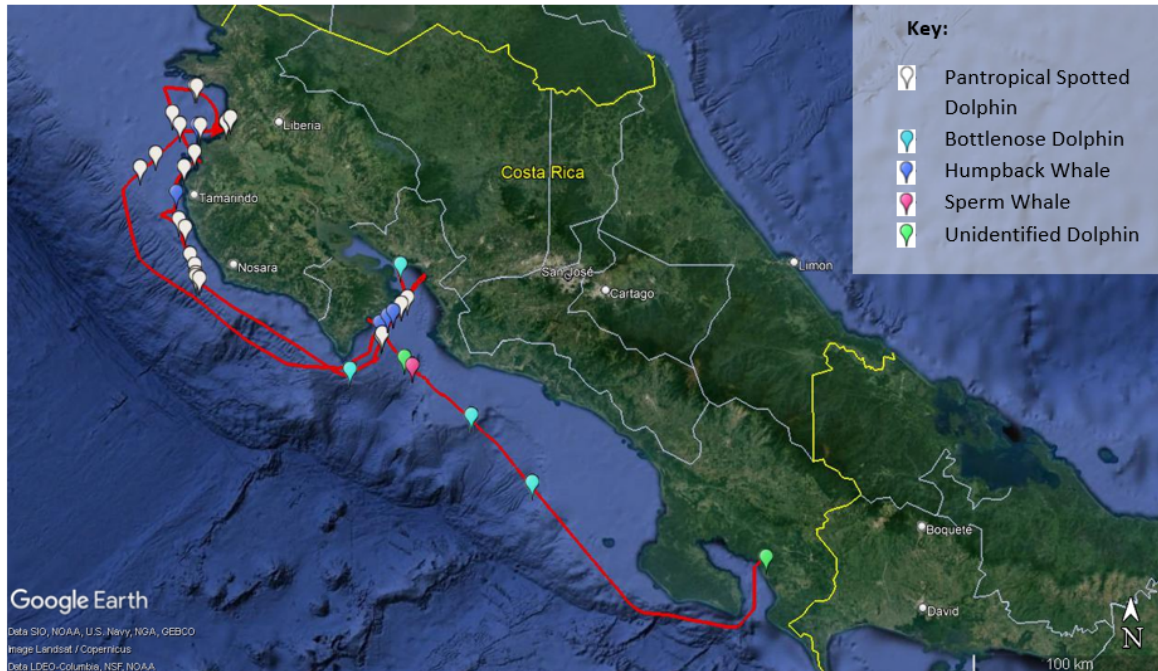


Figure 1: shows a map of the track of our route during the voyage with pins coded by colour where marine mammal sightings were made

The majority of surveying was concentrated in two geographical regions; Northern Pacific Costa Rica in the Tamarindo and Golfo de Papagayo areas (figure 2, below), and between the entrance of Golfo de Nicoya and Cabo Blanco (figure 3, below). This is because these were the regions most time was spent in and in particular during daylight hours.



Figure 2: shows a map of the track of our route during the voyage with pins coded by colour where marine mammal sightings were made for the Golfo de Papagayo and Tamarindo areas

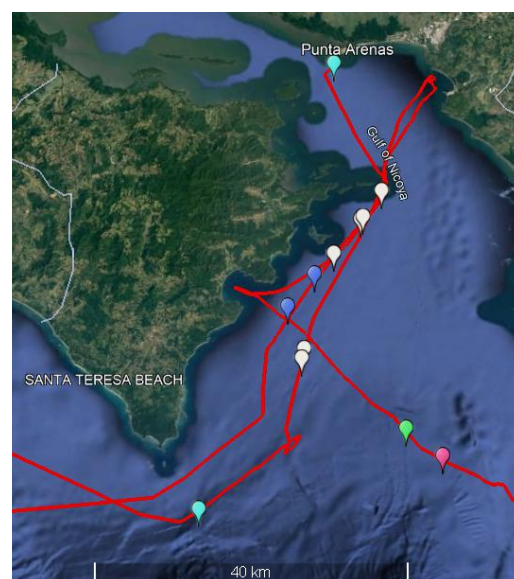


Figure 3: shows a map of the track of our route during the voyage with pins coded by colour where marine mammal sightings were made for the Golfo de Nicoya Area

The results from our surveys generally follow the trend of relative abundance that would be expected from the Pacific Costa Rican coast. The most abundant marine mammal species present off this coastline is thought to be the pantropical spotted dolphin, followed by the bottlenose dolphin and then the humpback whale³. This is the same prevalence as we found from our surveys. Sperm whales are not thought to be very common close to the coast of Pacific Costa Rica and are more commonly seen much further offshore⁴, so it is noteworthy that the sperm whale we spotted was so close to the shore.



The tail of the sperm whale we spotted. Photo credit: Kester Kaufmann



A leaping pod of pantropical spotted dolphins

As well as forming a useful baseline dataset for Seas Your Future to use to compare against data collected in future years to enable longer-term trends to be identified, this survey data has been shared with a range of organisations and researchers at both local and international levels. This data will be used by these organisations and researchers to contribute to important research goals, such as estimating the abundance of marine mammals in the area. This information can then be used to inform important conservation measures.

One thing that is important to note in terms of conditions present during the survey period was that there was a red tide in the area throughout the majority of the voyage. This was initially spotted on the first day we conducted the surveys and was still in the area at the end of the voyage, with a patchy presence. The red tide was identified as being caused by the cyanobacterium *Trichodesmium*. It is possible that the presence of this red tide may have affected the numbers of marine mammals present in the area and thus the frequency of our marine mammal sightings.

Humpback Whale Photo-ID:

The Pacific Costa Rican coast provides an important breeding ground for two separate populations of humpback whales. One population migrates to Costa Rica from the South and the other arrives from the North and this Northern population was the one present in the area during the survey period. Past research has shown that individuals from the Northern population arrive in Costa Rica from locations along the Western coast of North America such as California, Oregon, and Washington⁵. However, the Northern population

has been relatively understudied in recent years³ and so further research into this population is necessary. One of the aims of this project was therefore to obtain photos of humpback whale flukes that could be used for photo-ID to help further understanding of this Northern population. This component of the project was particularly important to Frank Garita, a Costa Rican marine mammal researcher who was on the voyage and whose research focuses on humpback whales.

These dedicated humpback whale searches consisted of visual scanning from those on board the RIB and regular stops to listen for singing humpback whales using a directional hydrophone. Unfortunately, no singing whales were heard during the duration of the voyage.



Thomas Stone listening for singing humpback whales using a directional hydrophone. (Photo credit: Yasmin Deter)

In total we conducted five RIB searches on the voyage, sighting humpback whales on two of these searches and obtaining pictures suitable for photo-ID only on the last day of the voyage on our last survey. This was a sighting of a group of three humpback whales consisting of a mother, escort and calf which were sighted along with an associated pod of pantropical spotted dolphins. An interesting behaviour was observed whereby the dolphins were attempting to steal droplets of milk from the mother humpback whale when she was feeding her calf. The escort, a male whale who stays with the mother and calf to help fend off potential predators with the goal of mating with the mother, is tasked with the job of keeping the dolphins away from the mother during feeding. We were able to approach the group and obtained multiple pictures of photo-ID quality of both the mother and escort which we later matched with whales from an online database.



Humpback whales with pantropical spotted dolphins

Photo-ID Matches:

After the completion of the voyage, images of the tails, or flukes, of the two humpback whales sighted on the last survey were uploaded by Frank Garita to 'Happywhale', an online platform where anyone can share sightings and photos of marine mammals, but with a particular focus on humpback whales. Happywhale uses a machine-learning algorithm to match the uploaded photos to those on its database of previous humpback whale sightings by using the patterns on their flukes.

Excitingly, both of the photos we uploaded came back as matches. At the time of the sighting, the mother had been recorded 17 times, having been first sighted in 1994⁶. The escort had been sighted 3 times in total, twice in 2021 and once in 2022⁷. These whales had both migrated to Costa Rica from California where they have both previously been sighted. They have also both previously been sighted along their migration route off the coast of the Southern tip of Baja California Sur, Mexico. This was the first time the mother had been sighted in Costa Rica since the year 2000 and was also the first time the escort individual had been sighted in Costa Rican waters at all. These ID matches will be useful to researchers studying their migration from the West Coast of North America. The images that were taken of the whales and used for photo-ID are displayed below and a link to their profiles on Happywhale can be found in the references section.



The image of the mother humpback whale used for photo-ID, identified as Whale ID CRC-10995 on Happywhale⁶. Photo credit: Frank Garita



The image of the escort humpback whale used for photo-ID, identified as Whale ID HW-MN0502372 on Happywhale⁷ Photo credit: Frank Garita

Conclusion:

Looking to the future, this project will form an important baseline study which, together with data collected on future SYF voyages, will help contribute to our knowledge of the diversity and abundance of the marine mammals of Pacific Costa Rica. In addition, the results of the surveys will be added to the databases of conservation organisations like ORCA and the photo-ID matches will be able to be used by researchers to increase our understanding of the migration patterns of the Northern population of Costa Rica's humpback whales. Together with data collected elsewhere, this information can help inform important conservation measures to ensure the future protection of Pacific Costa Rica's marine mammals.

References:

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- 2: Fielder, Paul C, Jessica Veneris Redfern, and Lisa Taylor Ballance. 2017. 'Oceanography and cetaceans of the Costa Rica Dome region'.
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- 4: May-Collado, Laura, Tim Gerrodette, John Calambokidis, Kristin Rasmussen, and Irena Sereg. 2005. 'Patterns of cetacean sighting distribution in the Pacific Exclusive Economic Zone of Costa Rica'.
- 5: Oviedo, L, and M Solís. 2008. 'Underwater topography determines critical breeding habitat for humpback whales near Osa Peninsula, Costa Rica: implications for Marine Protected Areas %J Revista de Biología Tropical', 56: 591-602.
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