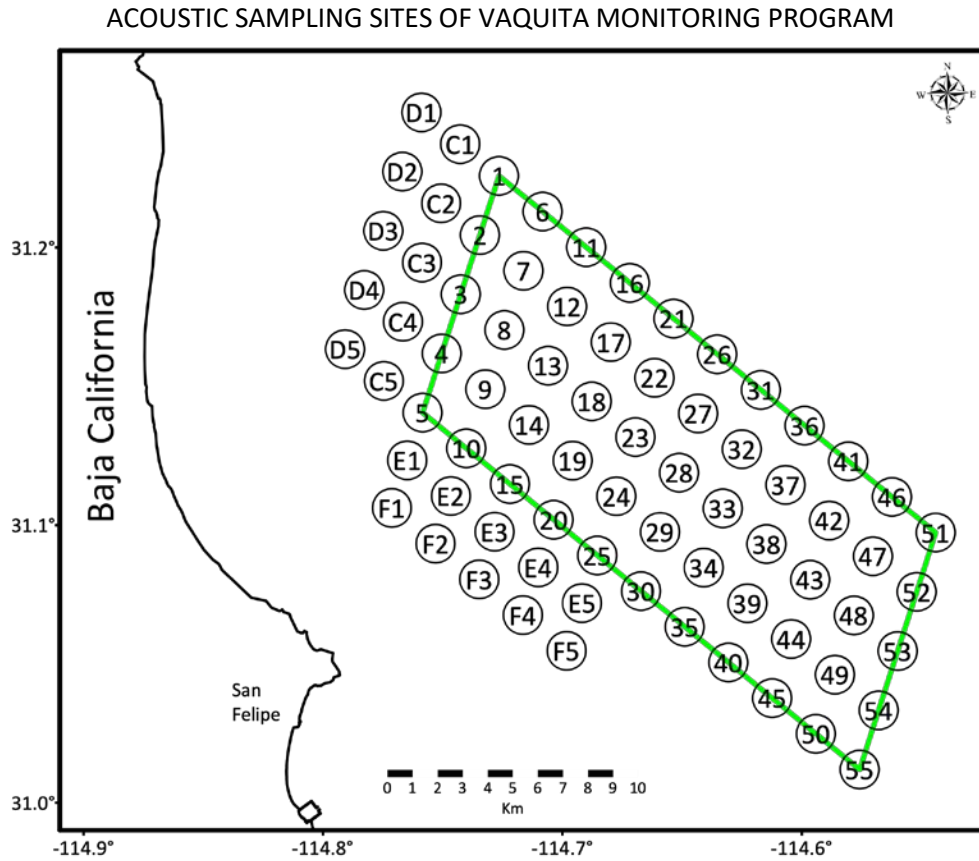


Appendix 1. Map and waypoint locations.

The standard numbered acoustic sampling sites listed below are used as waypoints to direct the ship for photographic identification efforts. Sites with letters (D-F) were added to extend the survey effort outside the Zero Tolerance Area (ZTA) in 2023.



- Numbered circles are reference points corresponding with acoustic sampling sites inside the Zero Tolerance Area.
- The following pages have tables with geographic coordinates of all points in the map, in decimal and degrees/minutes formats.

| Site | Long (d.ddddd°) | Lat (d.ddddd°) | Long (d°m's'') | Lat (d°m's'') | Long (d°m.dddd') | Lat (d°m.dddd') |
|------|-----------------|----------------|--------------------|-------------------|------------------|-----------------|
| C1 | -114.75686 | 31.23448 | 114° 45' 24.69" | 31° 14' 04.13" | 114° 45.4115' | 31° 14.0689' |
| C2 | -114.76535 | 31.21330 | 114° 46' 55.25" | 31° 13' 47.88" | 114° 45.9209' | 31° 12.7979' |
| C3 | -114.77384 | 31.19212 | 114° 46' 25.82" | 31° 12' 31.62" | 114° 46.4303' | 31° 11.5270' |

| | | | | | | | | |
|----|------------|----------|--|--------------------|-------------------|--|---------------|--------------|
| C4 | -114.78233 | 31.17093 | | 114° 47' 56.38" | 31° 10' 15.36" | | 114° 46.9397' | 31° 10.2560' |
| C5 | -114.79082 | 31.14975 | | 114° 47' 26.95" | 31° 09' 59.11" | | 114° 47.4491' | 31° 08.9851' |
| D1 | -114.77282 | 31.24619 | | 114° 46' 22.17" | 31° 15' 46.28" | | 114° 46.3695' | 31° 14.7714' |
| D2 | -114.78131 | 31.22501 | | 114° 47' 52.73" | 31° 14' 30.02" | | 114° 46.8788' | 31° 13.5003' |
| D3 | -114.78980 | 31.20382 | | 114° 47' 23.29" | 31° 12' 13.76" | | 114° 47.3881' | 31° 12.2293' |
| D4 | -114.79829 | 31.18264 | | 114° 48' 53.85" | 31° 11' 57.49" | | 114° 47.8974' | 31° 10.9582' |
| D5 | -114.80678 | 31.16145 | | 114° 48' 24.41" | 31° 10' 41.23" | | 114° 48.4068' | 31° 09.6871' |
| E1 | -114.78169 | 31.12100 | | 114° 47' 54.10" | 31° 07' 15.59" | | 114° 46.9017' | 31° 07.2599' |
| E2 | -114.76373 | 31.10782 | | 114° 46' 49.43" | 31° 06' 28.15" | | 114° 45.8239' | 31° 06.4692' |
| E3 | -114.74577 | 31.09464 | | 114° 45' 44.77" | 31° 06' 40.71" | | 114° 44.7461' | 31° 05.6786' |
| E4 | -114.72781 | 31.08146 | | 114° 44' 40.11" | 31° 05' 53.27" | | 114° 43.6685' | 31° 04.8878' |
| E5 | -114.70985 | 31.06828 | | 114° 43' 35.46" | 31° 04' 05.82" | | 114° 42.5910' | 31° 04.0970' |
| F1 | -114.78852 | 31.10395 | | 114° 47' 18.69" | 31° 06' 14.21" | | 114° 47.3115' | 31° 06.2368' |
| F2 | -114.77056 | 31.09077 | | 114° 46' 14.02" | 31° 05' 26.77" | | 114° 46.2336' | 31° 05.4461' |
| F3 | -114.75260 | 31.07759 | | 114° 45' 09.35" | 31° 05' 39.33" | | 114° 45.1558' | 31° 04.6555' |
| F4 | -114.73464 | 31.06441 | | 114° 44' 04.70" | 31° 04' 51.88" | | 114° 44.0783' | 31° 03.8647' |
| F5 | -114.71668 | 31.05123 | | 114° 43' 00.04" | 31° 03' 04.44" | | 114° 43.0007' | 31° 03.0740' |

| Sites | Lon (dec) | Lat (dec) | Lon (deg-min) | Lat (deg-min) |
|-------|--------------|--------------|------------------|------------------|
| 7771 | -114.74090 | 31.22277 | -114° 44.454" | 31° 13.366" |
| 2 | -114.74939 | 31.20159 | -114° 44.963" | 31° 12.095" |
| 3 | -114.75788 | 31.18041 | -114° 45.473" | 31° 10.825" |
| 4 | -114.76637 | 31.15923 | -114° 45.982" | 31° 09.554" |
| 5 | -114.77486 | 31.13805 | -114° 46.492" | 31° 08.283" |
| 6 | -114.72294 | 31.20959 | -114° 43.376" | 31° 12.575" |
| 7 | -114.73143 | 31.18841 | -114° 43.886" | 31° 11.305" |
| 8 | -114.73992 | 31.16723 | -114° 44.395" | 31° 10.034" |
| 9 | -114.74841 | 31.14605 | -114° 44.905" | 31° 08.763" |
| 10 | -114.75690 | 31.12487 | -114° 45.414" | 31° 07.492" |
| 11 | -114.70498 | 31.19641 | -114° 42.299" | 31° 11.785" |
| 12 | -114.71347 | 31.17523 | -114° 42.808" | 31° 10.514" |
| 13 | -114.72196 | 31.15405 | -114° 43.318" | 31° 09.243" |
| 14 | -114.73045 | 31.13287 | -114° 43.827" | 31° 07.972" |
| 15 | -114.73894 | 31.11169 | -114° 44.336" | 31° 06.702" |
| 16 | -114.68702 | 31.18323 | -114° 41.221" | 31° 10.994" |
| 17 | -114.69551 | 31.16205 | -114° 41.731" | 31° 09.723" |
| 18 | -114.70400 | 31.14087 | -114° 42.240" | 31° 08.452" |
| 19 | -114.71249 | 31.11969 | -114° 42.749" | 31° 07.182" |
| 20 | -114.72098 | 31.09851 | -114° 43.259" | 31° 05.911" |
| 21 | -114.66906 | 31.17005 | -114° 40.144" | 31° 10.203" |
| 22 | -114.67755 | 31.14887 | -114° 40.653" | 31° 08.932" |
| 23 | -114.68604 | 31.12769 | -114° 41.162" | 31° 07.662" |
| 24 | -114.69453 | 31.10651 | -114° 41.672" | 31° 06.391" |
| 25 | -114.70302 | 31.08533 | -114° 42.181" | 31° 05.120" |
| 26 | -114.65110 | 31.15687 | -114° 39.066" | 31° 09.412" |
| 27 | -114.65959 | 31.13569 | -114° 39.576" | 31° 08.142" |
| 28 | -114.66808 | 31.11451 | -114° 40.085" | 31° 06.871" |
| 29 | -114.67657 | 31.09333 | -114° 40.594" | 31° 05.600" |
| 30 | -114.68506 | 31.07215 | -114° 41.104" | 31° 04.329" |
| 31 | -114.63314 | 31.14369 | -114° 37.989" | 31° 08.622" |
| 32 | -114.64163 | 31.12251 | -114° 38.498" | 31° 07.351" |
| 33 | -114.65012 | 31.10133 | -114° 39.007" | 31° 06.080" |
| 34 | -114.65861 | 31.08015 | -114° 39.517" | 31° 04.809" |
| 35 | -114.66710 | 31.05898 | -114° 40.026" | 31° 03.539" |
| 36 | -114.61518 | 31.13051 | -114° 36.911" | 31° 07.831" |
| 37 | -114.62367 | 31.10933 | -114° 37.420" | 31° 06.560" |
| 38 | -114.63216 | 31.08815 | -114° 37.930" | 31° 05.289" |
| 39 | -114.64065 | 31.06697 | -114° 38.439" | 31° 04.018" |
| 40 | -114.64914 | 31.04580 | -114° 38.949" | 31° 02.748" |
| 41 | -114.59723 | 31.11733 | -114° 35.834" | 31° 07.040" |
| 42 | -114.60572 | 31.09615 | -114° 36.343" | 31° 05.769" |
| 43 | -114.61420 | 31.07497 | -114° 36.852" | 31° 04.498" |
| 44 | -114.62269 | 31.05380 | -114° 37.362" | 31° 03.228" |
| 45 | -114.63118 | 31.03262 | -114° 37.871" | 31° 01.957" |
| 46 | -114.57927 | 31.10415 | -114° 34.756" | 31° 06.249" |
| 47 | -114.58776 | 31.08297 | -114° 35.265" | 31° 04.978" |
| 48 | -114.59625 | 31.06180 | -114° 35.775" | 31° 03.708" |
| 49 | -114.60473 | 31.04062 | -114° 36.284" | 31° 02.437" |
| 50 | -114.61322 | 31.01944 | -114° 36.793" | 31° 01.166" |
| 51 | -114.56131 | 31.09097 | -114° 33.678" | 31° 05.458" |
| 52 | -114.56980 | 31.06979 | -114° 34.188" | 31° 04.188" |
| 53 | -114.57829 | 31.04862 | -114° 34.697" | 31° 02.917" |
| 54 | -114.58678 | 31.02744 | -114° 35.207" | 31° 01.646" |
| 55 | -114.59526 | 31.00626 | -114° 35.716" | 31° 00.375" |

Appendix 2. Acoustic results.

VAQUITA SURVEY 2023 REPORT OF THE ACOUSTIC COMPONENT May 9th to 23rd

Because sound is the most efficient form of energy in the sea, cetaceans (whales, dolphins and porpoises) use it to carry out most of their biological activities (Richardson, 1995). These animals produce sound on an ample band of frequencies, from low frequency groans by large whales, human hearing frequency band whistles by dolphins, to narrow band high frequency clicks (NBHF clicks) by porpoises (Richardson, 1995). Porpoises, like vaquita, only emit narrow band high frequency clicks, used for echolocation (Au, 1993) and communication (Sørensen *et al.*, 2018).

Electronic recorders have been used to obtain sounds produced by cetaceans (passive acoustics, meaning that equipment is silent, only recording). In particular, some devices have been designed to identify and store porpoise NBHF clicks (Gillespie and Chappell, 2002; Tregenza *et al.*, 2016). This technology has allowed monitoring of porpoise populations (Carstensen *et al.*, 2006), and even estimating their abundance (Amundin *et al.*, 2022).

The population of vaquita has been monitored with passive acoustic techniques since 1997. Between 1997 and 2007 it was estimated that the population decreased 58.1% (Jaramillo-Legorreta 2008), which translates to an average annual rate of decline of 8.3%.

By 2008 we noted that the sampling design used since 1997, where a single vessel sampled at different points during each survey, resulted in a sample size that was not robust enough to detect changes in population, given the decrease of population size.

As such, the use of autonomous acoustic detectors was tested with the aim to design a sampling grid where several devices could be deployed at the same time, increasing the sampling size (Rojas-Bracho *et al.*, 2010). As a result, the so named C-POD acoustic detector (Tregenza *et al.*, 2016) was selected as the most reliable instrument to implement a new sampling design.

A 46-site sampling design inside the Vaquita Refuge was implemented (Rojas-Bracho *et al.*, 2010; Jaramillo-Legorreta *et al.*, 2016), and formally started in 2011. Between 2011 and 2018 sampling occurred annually and resulted in an estimate of an average annual population decrease of 45% (Jaramillo-Legorreta *et al.*, 2019). Annual sampling continued through 2022 (CICESE 2019, 2021, 2022) with a specific sampling design in the Zero Tolerance Area (ZTA), which is the focus of the 2023 survey (Figure 1, Table 1).

In 2017, the Mexican Government made the decision to attempt to put vaquitas into human care by capturing individuals and taking them to coastal facilities. The endeavor required an efficient way to locate vaquitas with limited resources, limited survey time and the potential for bad weather. We envisioned that acoustic monitoring, as implemented with C-PODs in previous years, could help locate areas where vaquitas were present in almost real-time. The acoustic monitoring was based on the assumption that vaquitas, detected acoustically, spend at least some time in relatively small areas. Data were gathered, analyzed daily and made available to the

visual team in the hours prior to searching for vaquitas (Rojas-Bracho *et al.*, 2019). Given the usefulness of the method, it was used in subsequent surveys where the goal was to have estimates of the minimum number of calves and individuals in the population (Rojas-Bracho *et al.*, 2022), which is also the aim of the Vaquita Survey 2023.

This report details the acoustic monitoring done to inform the visual team where vaquitas were located.

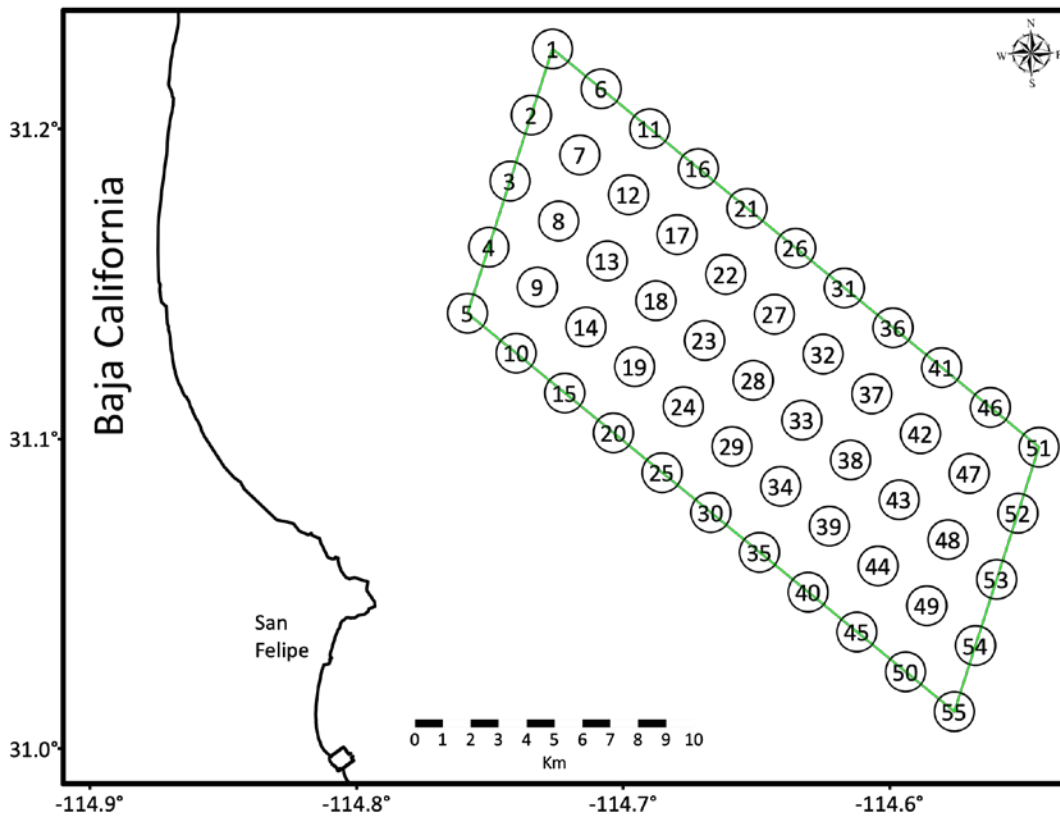


Figure 1. Map showing the Zero Tolerance Area (green polygon) in the Upper Gulf of California, near the town of San Felipe, Baja California, Mexico. The numbered circles show the position of the acoustic sampling sites.

Table 1. Geographic coordinates of the acoustic sampling sites shown in Figure 1.

| Sites | Lon | Lat | Lon | Lat |
|-------|------------|----------|-------|-----|
| 1 | -114.74090 | 31.22277 | -114° | 31° |
| 2 | -114.74939 | 31.20159 | -114° | 31° |
| 3 | -114.75788 | 31.18041 | -114° | 31° |
| 4 | -114.76637 | 31.15923 | -114° | 31° |
| 5 | -114.77486 | 31.13805 | -114° | 31° |
| 6 | -114.72294 | 31.20959 | -114° | 31° |
| 7 | -114.73143 | 31.18841 | -114° | 31° |
| 8 | -114.73992 | 31.16723 | -114° | 31° |
| 9 | -114.74841 | 31.14605 | -114° | 31° |
| 10 | -114.75690 | 31.12487 | -114° | 31° |
| 11 | -114.70498 | 31.19641 | -114° | 31° |
| 12 | -114.71347 | 31.17523 | -114° | 31° |
| 13 | -114.72196 | 31.15405 | -114° | 31° |
| 14 | -114.73045 | 31.13287 | -114° | 31° |

| Sites | Lon | Lat | Lon | Lat |
|-------|------------|----------|-------|-----|
| 15 | -114.73894 | 31.11169 | -114° | 31° |
| 16 | -114.68702 | 31.18323 | -114° | 31° |
| 17 | -114.69551 | 31.16205 | -114° | 31° |
| 18 | -114.70400 | 31.14087 | -114° | 31° |
| 19 | -114.71249 | 31.11969 | -114° | 31° |
| 20 | -114.72098 | 31.09851 | -114° | 31° |
| 21 | -114.66906 | 31.17005 | -114° | 31° |
| 22 | -114.67755 | 31.14887 | -114° | 31° |
| 23 | -114.68604 | 31.12769 | -114° | 31° |
| 24 | -114.69453 | 31.10651 | -114° | 31° |
| 25 | -114.70302 | 31.08533 | -114° | 31° |
| 26 | -114.65110 | 31.15687 | -114° | 31° |
| 27 | -114.65959 | 31.13569 | -114° | 31° |
| 28 | -114.66808 | 31.11451 | -114° | 31° |
| 29 | -114.67657 | 31.09333 | -114° | 31° |
| 30 | -114.68506 | 31.07215 | -114° | 31° |
| 31 | -114.63314 | 31.14369 | -114° | 31° |
| 32 | -114.64163 | 31.12251 | -114° | 31° |
| 33 | -114.65012 | 31.10133 | -114° | 31° |
| 34 | -114.65861 | 31.08015 | -114° | 31° |
| 35 | -114.66710 | 31.05898 | -114° | 31° |
| 36 | -114.61518 | 31.13051 | -114° | 31° |
| 37 | -114.62367 | 31.10933 | -114° | 31° |
| 38 | -114.63216 | 31.08815 | -114° | 31° |
| 39 | -114.64065 | 31.06697 | -114° | 31° |
| 40 | -114.64914 | 31.04580 | -114° | 31° |
| 41 | -114.59723 | 31.11733 | -114° | 31° |
| 42 | -114.60572 | 31.09615 | -114° | 31° |
| 43 | -114.61420 | 31.07497 | -114° | 31° |
| 44 | -114.62269 | 31.05380 | -114° | 31° |
| 45 | -114.63118 | 31.03262 | -114° | 31° |
| 46 | -114.57927 | 31.10415 | -114° | 31° |
| 47 | -114.58776 | 31.08297 | -114° | 31° |
| 48 | -114.59625 | 31.06180 | -114° | 31° |
| 49 | -114.60473 | 31.04062 | -114° | 31° |
| 50 | -114.61322 | 31.01944 | -114° | 31° |
| 51 | -114.56131 | 31.09097 | -114° | 31° |
| 52 | -114.56980 | 31.06979 | -114° | 31° |
| 53 | -114.57829 | 31.04862 | -114° | 31° |
| 54 | -114.58678 | 31.02744 | -114° | 31° |
| 55 | -114.59526 | 31.00626 | -114° | 31° |

METHODS

Sampling design

The study area was the ZTA, where the sampling design was composed of 55 sites (Figure 1). The original plan was to replace acoustic detectors daily (C and F-PODs – the replacement for C-PODS, which are no longer made), download data, analyze it and create a report for the visual team’s use the next day. Replacement of detectors during the afternoons facilitated this in as close to real time as possible. Due to weather conditions some days replacement occurred in the morning.

Some sites were selected for deployment based on recent knowledge of vaquita acoustic activity in the ZTA (CICESE, 2021, 2022).

For the first deployment 35 sites were selected (see Annex), although we were not able to deploy at sites 11 and 15 due to circumstances out of our control.

Acoustic devices deployment and replacement

C-PODs and F-PODs were used to gather vaquita acoustic information (<https://www.chelonia.co.uk/>) and prepared according to the manufacturer's instructions. The F-POD clock was set to local time on all devices. We set memory cards, inserted batteries and started pods a few hours before deployment or replacement for each sampling period.

Simple moorings, consisting of a main rope connected to an anchor at one end, and a buoy at the other, were used to fix detectors at the selected sampling sites. A loop to attach the detector to the rope is located 10 meters from the buoy. Holes in the cap of pods were used to attach them to the rope.

Every day windy.com was consulted for the weather forecast to decide on the likelihood of deployment. When conditions looked promising GPS units were programmed with the sites to deploy, replace or retrieve moorings or detectors. In addition, logging sheets were prepared to record date, time and serial number of pods (clearly visible near the cap) for deployment or retrieval at each assigned site.

The deployment, replacement and retrieval was done by a group of artisanal fishermen from San Felipe with over ten years of experience doing this job. Hours before setting out in boats (called pangas) fishermen were provided with moorings, acoustic detectors, GPS units, logging sheets and fuel. During initial deployment and final retrieval three boats were assigned to complete the task. During the replacement of detectors in most cases two boats were assigned to complete the task.

Data management

Every day that acoustic detectors were replaced or retrieved, memory cards were extracted to download data using the cpod.exe and fpod.exe pc programs provided by the manufacturer, depending on the type of device that gathered the data. At the time of downloading, times in files were checked against logging sheets, to assure consistency. Sometimes data were corrupted and unreadable, those data were lost. The KERNO algorithm, available in cpod.exe and fpod.exe programs, was used to identify potential clicks emitted by vaquitas. Both devices produce a primary file containing all the clicks identified during sampling (CP1 and FP1 files respectively). KERNO produces files (CP3 and FP3 files respectively) containing only clicks of four types: NBHF, other cetaceans, sonar and other events. NBHF is the acronym for Narrow Band High Frequency, the type of clicks produced by porpoises (like vaquita) and some species of dolphins. Once type 3 files are created by KERNO, these are reviewed for the presence of vaquita-like click series by analysts. A program named C-POD Analizatron, coded by the research group at CONANP, is used to review CP1/CP3 files. The files produced by F-POD are reviewed with the fpod.exe program. Click series identified as NBHF that do not have parameters that fit vaquita (as judged by the analysts) are deleted from the file. Finally, another program named C&F P3 Extractorum, also coded by the CONANP research group, is used to extract vaquita detections

from the CP3/FP3 files. This program can extract information from a set of files stored in a folder. It creates separate files for several metrics, including click series, detection positive minutes and acoustic encounters, among others. With this information we created reports with a map to show the position and number of encounters, and a table with the site, times and duration of each encounter. A brief narrative was included in each report to describe the findings and provide guidance to the visual team. The seven acoustic reports provided during the survey can be read in the Annex at the end of this document.

Problems during the survey

The first deployment of acoustic detectors occurred on 9 May, at the beginning of a neap tide period which coincided with the clam dive-fishery inside the ZTA. (Previously this fishery was likely responsible for some lost moorings, see CICESE 2021 and 2022). On the first detector replacement period 11 May there was a loss of 10 moorings. This same day the observers on the visual team saw three detectors floating at the surface and were able to retrieve two of them (see the first acoustic report in the annex).

We decided not to redeploy moorings in places where they were lost, given that the neap tide period was just starting. One mooring was lost in each of the next two sampling periods, and three were lost in the fourth. During the fifth sampling period we were able to redeploy moorings in sites with previous losses because this was during the spring tide period when the clam dive-fishery stops because the currents are so strong diving is dangerous. Fishing activities with nets typically resumes at this time, though we observed little fishing activity inside the ZTA during the spring tide period. We believe this is a testament to the deterrent power of the 193 concrete blocks with hooks deployed by the Mexican Navy. As such, it made the deployment of acoustic detectors relatively safe. In fact, during the next three sampling periods only two moorings were lost, both at the margins of the ZTA, which shows that it is now safer to deploy equipment inside the ZTA during spring tides.

On 23 May a new neap tide period began and we chose to retrieve all the moorings and complete the acoustic monitoring portion of the survey. All acoustic information was summarized for the visual team to use for the remainder of the survey.

During the fifth replacement period, and the final retrieval (reports 6 and 7 in the annex), a couple of moorings were found, which were reported lost in previous deployments. The acoustic encounters found in these acoustic detectors, together with the ones in the detectors found floating in the surface during the first sampling period, are reported in Table 2 for the period they were actually detected.

OVERALL FINDINGS

- Figure 2 shows a synthesis of vaquita acoustic monitoring during the survey. Circle size shows sampling effort and circle color shows average encounter rates.
- Acoustic effort is summarized in Table 2.
- A total effort of 371.57 days was conducted at 35 of the 55 sites of the sampling grid.

- The average effort per sampled site was 10.62 days, with a minimum effort of 1.3 days and maximum of 14.0 days.
- A total of 61 acoustic encounters of vaquitas were identified at 14 of the 35 sites with sampling effort.
- The average encounter rate was 0.178 enc/day, with 0.445 enc/day at sites with acoustic encounters, with a minimum rate of 0.073 enc/day and a maximum 1.077 enc/day.
- Vaquitas were acoustically active in the western region of the ZTA between sites 1 and 20, with highest detection rates around sites 7, 12, 13 and 18. Fourteen of the 16 visual sightings (88%) were in this region (yellow dots on Figure 2).
- Acoustic encounters at site 28 indicate the presence of vaquitas in the central and eastern portion of the ZTA, but at noticeably lower rates.
- The 1 minute sighting (#5) near site 34, and the 49 minute sighting (#9) between sites 44 and 50 show that the absence of acoustic detections does not always indicate the absence of vaquitas. However, the numerous yellow dots on Figure 2 show resights of #9 which was confounded by the presence of a small bottlenose dolphin that surfaced in quick succession next to the vaquita. In this unusual situation identification between the two was difficult and many of the resights are likely the bottlenose dolphin.
- The constant acoustic activity of vaquitas in the western border of the ZTA, together with sightings of groups outside the zone to the west, indicates the urgency to extend the ZTA in order to protect the current habitat of vaquita.
- For vaquita surveys, with such a reduced population, acoustic monitoring results applied in near real time was a reliable tool to assist visual efforts.
- We observed, as seen previously, that the clam dive-fishery operates during neap tide periods, which corresponded with the loss of moorings. On the contrary, sampling during spring tide periods looks promising for future surveys.
- The deterrent force of the concrete blocks with hooks deployed by the Mexican Navy in the ZTA allowed us to adapt our sampling strategy and resume acoustic effort during spring tides. We still need to work out the best strategy for deployment during neap tides.
- We recommend not only to extend the ZTA to the west, but given the deterring power of the blocks with hooks, to increase the number of blocks in that area and at the borders of the entire ZTA.

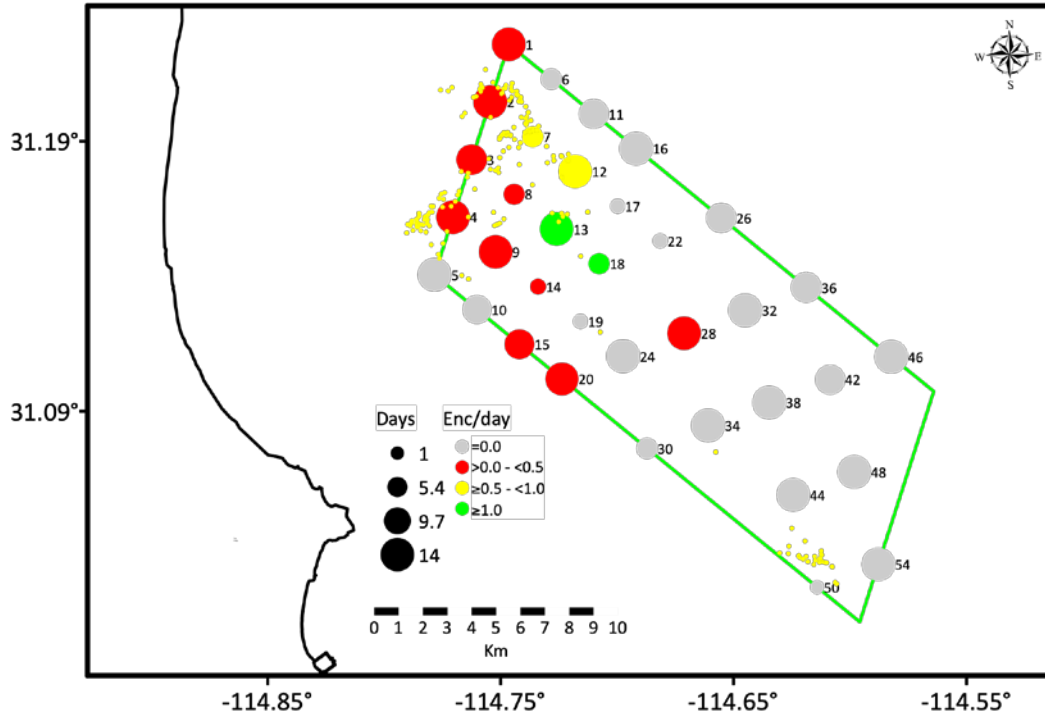


Figure 2. This map shows a synthesis of acoustic monitoring during Vaquita Survey 2023. The ZTA is the green polygon. Colored circles show the results of acoustic detections of vaquitas during the survey. The size of the circles indicate the sampling effort and color the acoustic detection rates. Yellow dots show the position of all 16 sightings and include all resights during sightings.

Table 2. Summary of acoustic monitoring effort.

| Days in May 2023 | | Acoustic detectors deployed | Acoustic detectors lost | Approximate effort/site (hours) | Acoustic encounters of vaquitas | Activity of the period | Additional events during the period |
|------------------|----|-----------------------------|-------------------------|---------------------------------|---------------------------------|------------------------|---|
| 9 | 11 | 33 | 10 | 60 | 5 | First deployment | |
| 11 | 12 | 26 | 1 | 24 | 5 | Replacement 1 | New deployment at 2 sites and 1 redeployment |
| 12 | 15 | 25 | 1 | 38 | 3 | Replacement 2 | 1 redeployment |
| 15 | 17 | 25 | 3 | 50 | 6 | Replacement 3 | 5 redeployments |
| 17 | 19 | 27 | 1 | 46 | 16 | Replacement 4 | |
| 19 | 21 | 26 | 0 | 48 | 13 | Replacement 5 | New deployment at 2 sites and 4 redeployments |
| 21 | 23 | 32 | 1 | 48 | 13 | Final retrieval | |
| TOTALS | | 194 | 17 | 314 | 61 | | |

OCCURRENCE OF SIMULTANEOUS ACOUSTIC DETECTIONS DURING THE SURVEY

Acoustic encounters of vaquitas were compared to look for simultaneous detections that would indicate the presence of more than one group of vaquitas in the ZTA. Acoustic encounters were sorted in order of date and time of detection. The difference in time and distance between consecutive encounters was calculated between different sites. To obtain accurate measurements of distance between sites, geographic coordinates were projected to UTM, so simple trigonometric calculations could be done. We used the differences in distance and time to calculate the swimming speed needed to move between sites if the same group of animals moved between them. These same calculations were made to compare between every two encounters and additional calculations every three encounters. In that way all possible simultaneous detections were found, according to the criteria defined below.

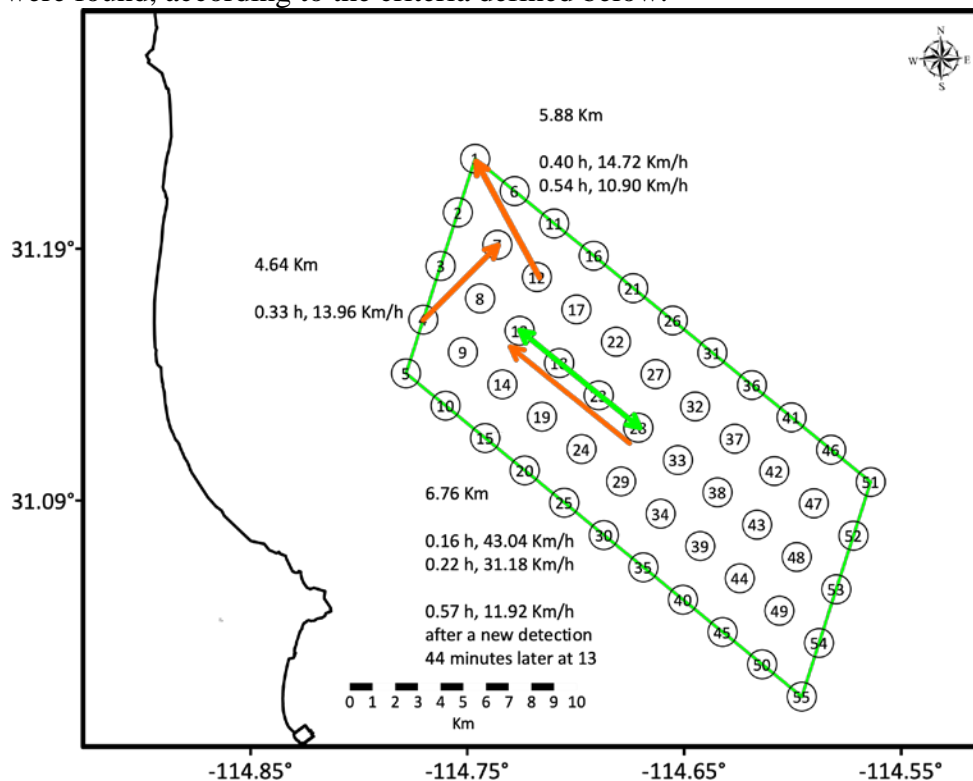


Figure 3. Arrows show the sites where simultaneous detections were found (green for certain and orange for highly probable events), and arrow heads show the direction of needed movement. Between sites 13 and 28 two events occurred in opposite directions. Text beside arrows show the calculations of difference in distance, time, and resulting speed.

Kastelein *et al.* (2018) measured swim speed of harbor porpoises (*Phocoena phocoena*) under controlled conditions in a pool. Under quiet conditions porpoises swam at average speeds of 4.3 Km/h, while under noisier conditions they were able to sustain speeds around 7 Km/h during 30 minute periods. In the wild Otani *et al.* (2000) reported average harbor porpoise speeds of 0.9 m/s (3.24 Km/h) with 90% of recorded speeds under 1.5 m/s (5.4 Km/h). The maximum speed recorded was 4.3 m/s (15.48 Km/h), though the authors mention reports up to 6.2 m/s (22.32 Km/h). The majority of the time porpoises swam at speeds under 6 Km/h.

Given the information above, we used the criteria that if calculated speed was over 20 Km/h, simultaneous detections occurred with certainty. If speed was over 10 Km/h simultaneous detections occurred with high probability.

Two cases of certain simultaneous events were found between sites 13 and 28 (green double head arrow in Figure 3, highlighted in green in Table 3), with calculated speeds over 30 Km/h. The third case between the same sites was found to be highly probable. Two more highly probable cases occurred between sites 1 and 12, and between sites 4 and 7 (Figure 3, highlighted in yellow) in the Table 3).

Table 3. Acoustic encounters sorted by date and time, to identify simultaneous acoustic detections.

| Site | Date | Start | End | | LonUTM | LatUTM | Km | h | Km/h |
|------|----------|----------|----------|--|--------|---------|------|-------|-------|
| 12 | 09/05/23 | 17:55:08 | 17:56:36 | | 717913 | 3451274 | | | |
| 13 | 09/05/23 | 21:30:26 | 21:56:33 | | 717152 | 3448909 | 2.48 | 3.56 | 0.70 |
| 12 | 10/05/23 | 19:03:43 | 19:03:44 | | 717913 | 3451274 | 2.48 | 21.12 | 0.12 |
| 1 | 10/05/23 | 19:27:43 | 19:30:26 | | 715191 | 3456491 | 5.88 | 0.40 | 14.72 |
| 2 | 11/05/23 | 09:46:09 | 09:48:13 | | 714430 | 3454126 | 2.48 | 14.26 | 0.17 |
| 3 | 11/05/23 | 18:21:36 | 18:23:41 | | 713668 | 3451761 | 2.48 | 8.56 | 0.29 |
| 12 | 11/05/23 | 19:58:03 | 20:02:24 | | 717913 | 3451274 | 4.27 | 1.57 | 2.72 |
| 1 | 11/05/23 | 20:34:48 | 20:34:48 | | 715191 | 3456491 | 5.88 | 0.54 | 10.90 |
| 4 | 11/05/23 | 23:57:50 | 00:11:00 | | 712906 | 3449397 | 7.45 | 3.38 | 2.20 |
| 3 | 12/05/23 | 01:07:52 | 01:10:35 | | 713668 | 3451761 | 2.48 | 0.95 | 2.62 |
| 2 | 12/05/23 | 20:24:18 | 20:24:21 | | 714430 | 3454126 | 2.48 | 19.23 | 0.13 |
| 2 | 14/05/23 | 13:16:07 | 13:16:08 | | 714430 | 3454126 | | | |
| 8 | 14/05/23 | 20:05:00 | 20:07:00 | | 715410 | 3450335 | 3.92 | 6.81 | 0.57 |
| 13 | 15/05/23 | 15:46:24 | 15:46:35 | | 717152 | 3448909 | 2.25 | 19.66 | 0.11 |
| 8 | 15/05/23 | 23:52:00 | 23:52:00 | | 715410 | 3450335 | 2.25 | 8.09 | 0.28 |
| 13 | 16/05/23 | 05:27:15 | 05:29:18 | | 717152 | 3448909 | 2.25 | 5.59 | 0.40 |
| 13 | 16/05/23 | 18:26:59 | 18:26:59 | | 717152 | 3448909 | | | |
| 13 | 17/05/23 | 02:35:21 | 02:38:39 | | 717152 | 3448909 | | | |
| 13 | 17/05/23 | 08:22:24 | 08:24:39 | | 717152 | 3448909 | | | |
| 3 | 17/05/23 | 10:11:43 | 10:11:52 | | 713668 | 3451761 | 4.50 | 1.78 | 2.52 |
| 9 | 17/05/23 | 18:24:17 | 18:24:22 | | 714648 | 3447970 | 3.92 | 8.21 | 0.48 |

| | | | | | | | | | |
|----|----------|----------|----------|--|--------|---------|------|-------|-------|
| 18 | 17/05/23 | 19:10:34 | 19:11:11 | | 718895 | 3447483 | 4.27 | 0.77 | 5.55 |
| 18 | 17/05/23 | 20:40:57 | 20:51:13 | | 718895 | 3447483 | | | |
| 12 | 17/05/23 | 23:54:53 | 23:58:02 | | 717913 | 3451274 | 3.92 | 3.06 | 1.28 |
| 12 | 18/05/23 | 02:11:26 | 02:12:20 | | 717913 | 3451274 | | | |
| 18 | 18/05/23 | 03:27:19 | 03:27:19 | | 718895 | 3447483 | 3.92 | 1.25 | 3.13 |
| 28 | 18/05/23 | 05:27:20 | 05:38:27 | | 722381 | 3444632 | 4.50 | 2.00 | 2.25 |
| 13 | 18/05/23 | 06:41:46 | 07:05:36 | | 717152 | 3448909 | 6.76 | 1.06 | 6.40 |
| 2 | 18/05/23 | 13:02:46 | 13:08:48 | | 714430 | 3454126 | 5.88 | 5.95 | 0.99 |
| 13 | 18/05/23 | 14:10:31 | 14:10:32 | | 717152 | 3448909 | 5.88 | 1.03 | 5.72 |
| 13 | 18/05/23 | 16:17:58 | 16:22:08 | | 717152 | 3448909 | | | |
| 28 | 18/05/23 | 16:31:33 | 16:31:34 | | 722381 | 3444632 | 6.76 | 0.16 | 43.04 |
| 12 | 19/05/23 | 00:48:43 | 00:56:33 | | 717913 | 3451274 | 8.00 | 8.29 | 0.97 |
| 9 | 19/05/23 | 01:40:45 | 01:40:45 | | 714648 | 3447970 | 4.64 | 0.74 | 6.30 |
| 12 | 19/05/23 | 02:27:14 | 02:27:15 | | 717913 | 3451274 | 4.64 | 0.77 | 6.00 |
| 13 | 19/05/23 | 07:32:00 | 07:33:00 | | 717152 | 3448909 | 2.48 | 5.08 | 0.49 |
| 8 | 19/05/23 | 15:14:00 | 15:17:00 | | 715410 | 3450335 | 2.25 | 7.68 | 0.29 |
| 8 | 19/05/23 | 15:47:00 | 15:59:00 | | 715410 | 3450335 | | | |
| 7 | 20/05/23 | 01:41:00 | 01:41:00 | | 716171 | 3452700 | 2.48 | 9.70 | 0.26 |
| 13 | 20/05/23 | 04:19:00 | 04:20:00 | | 717152 | 3448909 | 3.92 | 2.63 | 1.49 |
| 13 | 20/05/23 | 07:38:00 | 07:41:00 | | 717152 | 3448909 | | | |
| 13 | 20/05/23 | 12:12:00 | 12:16:00 | | 717152 | 3448909 | | | |
| 8 | 20/05/23 | 14:46:00 | 15:05:00 | | 715410 | 3450335 | 2.25 | 2.50 | 0.90 |
| 28 | 20/05/23 | 18:56:00 | 18:58:00 | | 722381 | 3444632 | 9.01 | 3.85 | 2.34 |
| 28 | 20/05/23 | 20:37:00 | 20:52:00 | | 722381 | 3444632 | | | |
| 13 | 20/05/23 | 20:39:00 | 20:42:00 | | 717152 | 3448909 | 6.76 | -0.22 | 31.18 |
| 13 | 20/05/23 | 21:26:00 | 21:27:00 | | 717152 | 3448909 | | 0.57 | 11.92 |
| 7 | 21/05/23 | 11:06:51 | 11:14:14 | | 716171 | 3452700 | 3.92 | 13.66 | 0.29 |
| 9 | 21/05/23 | 12:00:01 | 12:01:15 | | 714648 | 3447970 | 4.97 | 0.76 | 6.51 |
| 15 | 21/05/23 | 18:03:58 | 18:11:27 | | 715629 | 3444180 | 3.92 | 6.05 | 0.65 |

| | | | | | | | | | |
|----|----------|----------|----------|--|--------|---------|------|------|-------|
| 18 | 21/05/23 | 22:52:18 | 22:59:50 | | 718895 | 3447483 | 4.65 | 4.68 | 0.99 |
| 12 | 21/05/23 | 23:34:56 | 23:48:56 | | 717913 | 3451274 | 3.92 | 0.59 | 6.69 |
| 4 | 22/05/23 | 02:40:33 | 02:41:43 | | 712906 | 3449397 | 5.35 | 2.86 | 1.87 |
| 7 | 22/05/23 | 03:01:41 | 03:50:57 | | 716171 | 3452700 | 4.64 | 0.33 | 13.96 |
| 9 | 22/05/23 | 05:25:05 | 05:25:41 | | 714648 | 3447970 | 4.97 | 1.57 | 3.17 |
| 8 | 22/05/23 | 06:56:24 | 06:56:24 | | 715410 | 3450335 | 2.48 | 1.51 | 1.64 |
| 18 | 22/05/23 | 13:26:11 | 13:37:11 | | 718895 | 3447483 | 4.50 | 6.50 | 0.69 |
| 12 | 22/05/23 | 14:17:31 | 14:17:41 | | 717913 | 3451274 | 3.92 | 0.67 | 5.83 |
| 18 | 22/05/23 | 17:11:41 | 17:12:11 | | 718895 | 3447483 | 3.92 | 2.90 | 1.35 |
| 14 | 22/05/23 | 21:39:11 | 21:42:12 | | 716391 | 3446544 | 2.67 | 4.45 | 0.60 |

Notes: The negative speed calculated between site 28 and 13 on May 22 is because the encounter at site 28 finished later than the start of encounter at site 13, which means that encounters occurred simultaneously.
The calculation of speed compares site 13 on May 22 at 21:26:00 to the encounter at site 28 two lines above.

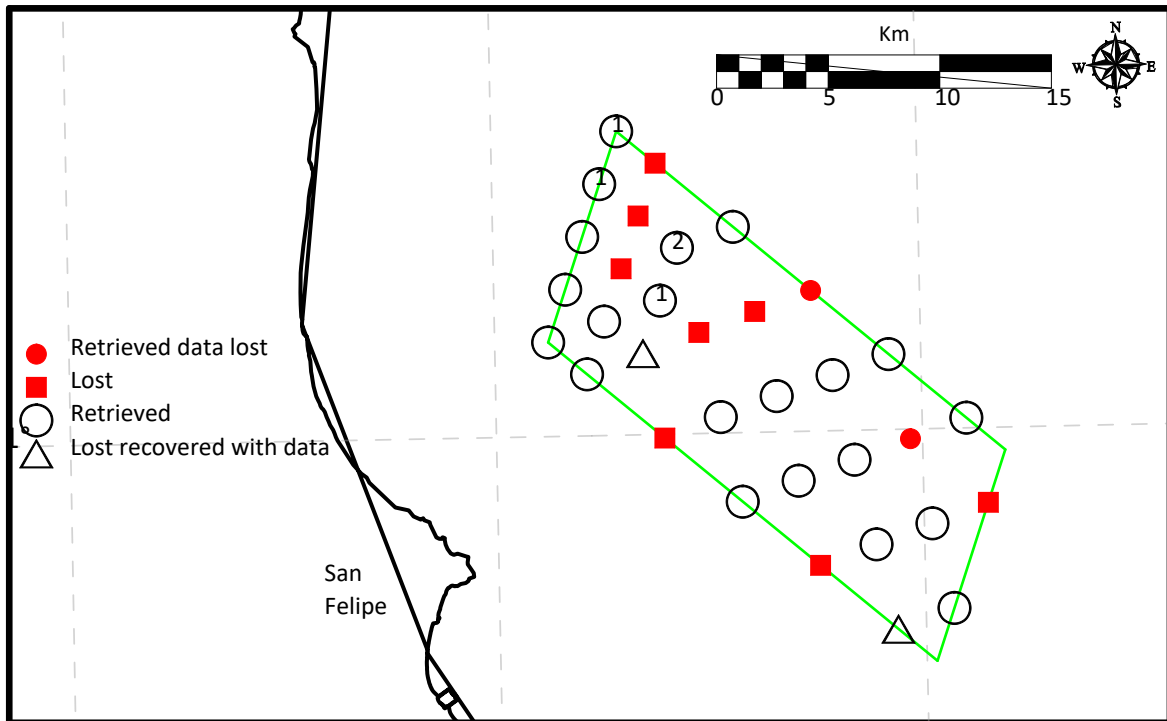
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**ANNEX
ACOUSTIC REPORTS DELIVERED DURING SURVEY**

**REPORT 01 OF ACOUSTIC MONITORING OF VAQUITAS FOR SURVEY 2023
May 9th 6 AM to May 11th 6 PM**



On the morning of May 9th 33 moorings were deployed with acoustic detectors. They were retrieved on the afternoon of May 11th, for a sampling effort of approximately 60 hours per site. Nine of the 33 moorings were lost with the pod. At site 20 the mooring was found but not the pod, potentially the attachment to the mooring failed in this case. For the other nine cases the loss of the mooring was attributed to fishing activities.

Three pods were observed floating on the surface during the visual survey on May 11th, and two of them were recovered. One had been deployed at site 50 and the other at site 14. The one from site 50 recorded data until May 10th 15:16. The one from site 14 recorded data until May 9th 19:31.

Vaquita acoustic activity was detected in 4 out of 23 sites, with a total of 5 acoustic encounters (numbers in circles in the figure above). One encounter each was registered at sites 1, 2 and 13, with two at site 12 (see table below).

Encounters lasted 0.1 to 2.7 minutes, except the one at site 13 which lasted 26.1 minutes.

Acoustic encounters of vaquita

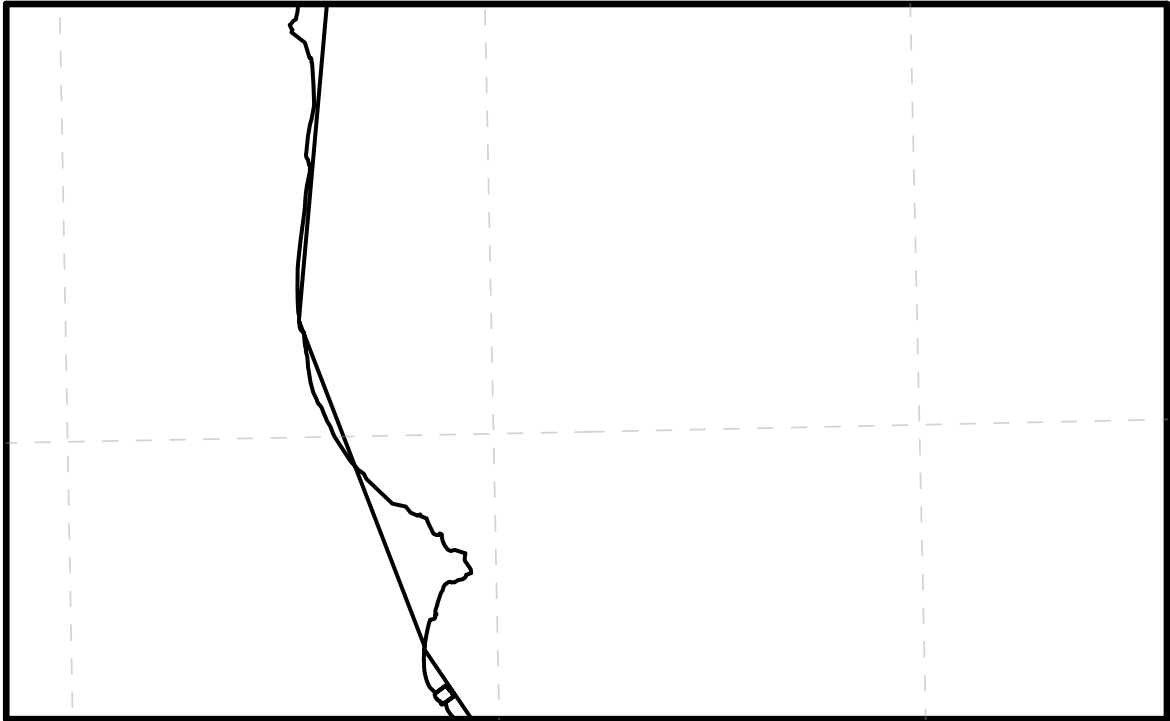
| Site | Start | End | Duration (minutes) |
|------|----------------|----------------|--------------------|
| 1 | 10/05/23 19:27 | 10/05/23 19:30 | 2.7 |
| 2 | 11/05/23 09:46 | 11/05/23 09:48 | 2.1 |
| 12 | 09/05/23 17:55 | 09/05/23 17:56 | 1.5 |
| 12 | 10/05/23 19:03 | 10/05/23 19:03 | 0.1 |
| 13 | 09/05/23 21:30 | 09/05/23 21:56 | 26.1 |

During the visual survey on May 11th, a sighting was reported between 09:02 and 09:48. Using the GPS track of Sirena de la Noche, the sighting occurred near site 12. Interestingly, between 09:46 and 09:48 an acoustic encounter occurred at site 2, about 3.7 Km away. Therefore at least two different groups of vaquitas were in that region of the ZTA simultaneously.

Acoustic activity was detected in the northwestern corner of the ZTA, the area with the highest rates of detected acoustic activity in 2022.

Unfortunately 30% of the moorings were lost in the first deployment. Given the limited resources available to build moorings, no replacements will be attempted until we can observe that conditions are safe. The losses are coincident with clam dive-fishing activity, which occurs during neap tide periods and is not deterred by the blocks placed by the Navy in September 2022. Currently we are under neap tide conditions which end around May 14th or 15th, when the strong spring tide period makes clam fishing unsafe. We will resume deploying acoustic detectors at that time if no fishing activity is observed.

REPORT 02 OF ACOUSTIC MONITORING OF VAQUITAS FOR SURVEY 2023
May 11th 6 PM to May 12th 6 PM



On the afternoon of May 11th we found that 9 out of the 33 moorings deployed on May 9th were lost. In addition, one pod was lost at site 20, although the mooring was in place. We replaced the lost pod, and deployed moorings at sites 11 and 15, so this sampling period started with 26 sites (see figure above).

During this period the mooring at site 4 was lost, and the pod at site 10 was recovered without data. As such, this sampling period is composed of 24 sites, with an approximate effort of 24 hours per site.

Vaquita acoustic activity was detected in 3 out of 24 sites for a total of 4 acoustic encounters (numbers in circles in the figure above). Sites 1 and 12 had one encounter each, and site 3 had two encounters (see table below). The acoustic encounters lasted between 0.1 and 4.4 minutes.

Acoustic encounters of vaquita

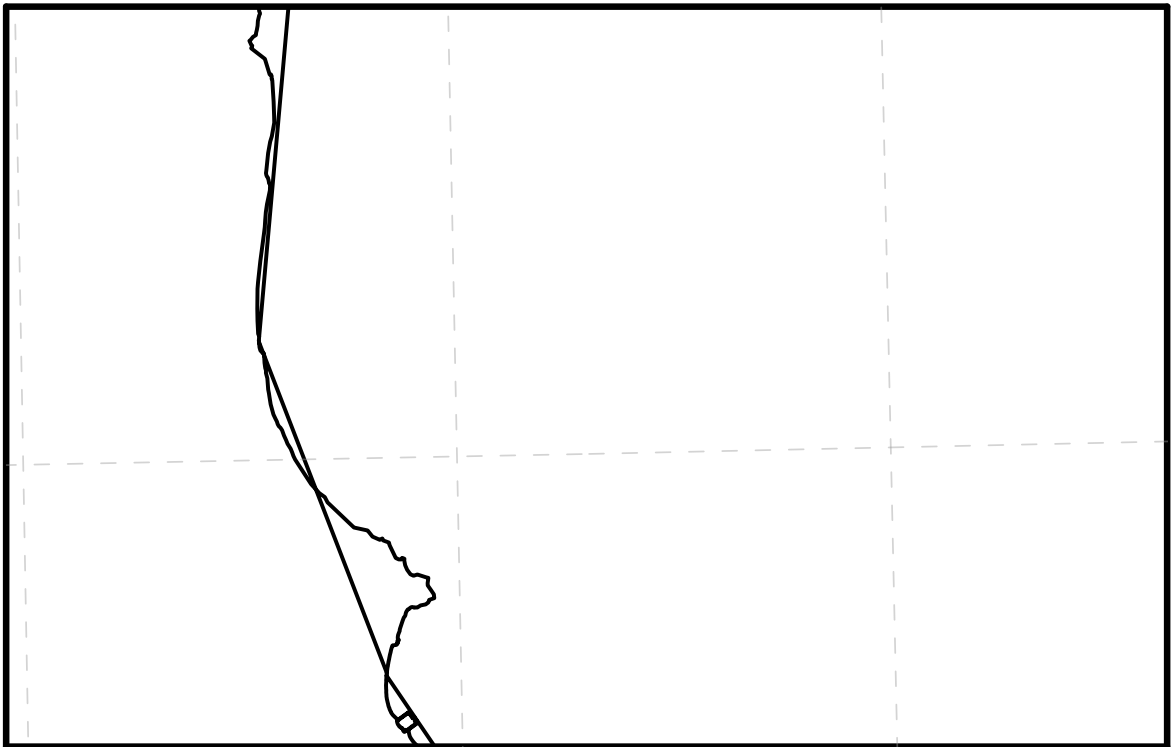
| Site | Start | End | Duration (minutes) |
|------|----------------|----------------|--------------------|
| 1 | 11/05/23 20:34 | 11/05/23 20:34 | 0.1 |
| 3 | 11/05/23 18:21 | 11/05/23 18:23 | 2.1 |
| 3 | 12/05/23 01:07 | 12/05/23 01:10 | 2.7 |
| 12 | 11/05/23 19:58 | 11/05/23 20:02 | 4.4 |

Again, acoustic activity was detected in the northwestern corner of the ZTA, the area with the highest rates detected in 2022. Apparently, the same is true for this survey.

Mooring losses decreased dramatically, likely due to the decision to avoid replacement of those lost during the previous sampling period. It could also be the result of reduced fishing effort during the change of tide period. Both hypotheses need to be tested.

Bad weather conditions are predicted between 14 and 15 May so the next replacement of pods will likely occur on May 16th early in the morning.

**REPORT 03 OF ACOUSTIC MONITORING OF VAQUITAS FOR SURVEY 2023
May 12th 6 PM to May 15th 8 AM**



This sampling period started with 25 sampling sites (see figure above). Just one mooring was lost at site 48. As such, this sampling period is composed of 24 sites, with an approximate effort of 38 hours per site.

Vaquita acoustic activity was detected only at site 2, with 2 acoustic encounters (number in circle in the figure above). Each encounter had a duration of less than 1 minute.

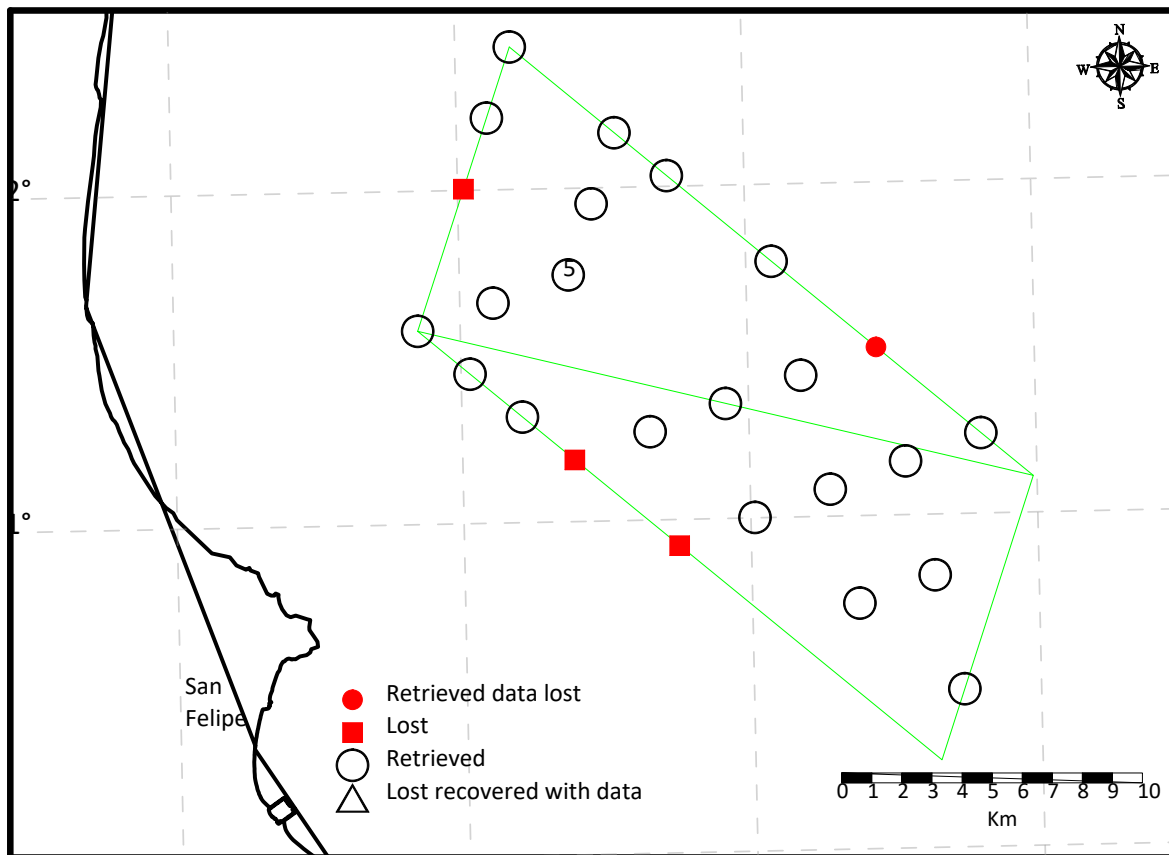
Acoustic encounters of vaquita

| Site | Start | End | Duration (minutes) |
|-------------|----------------|----------------|---------------------------|
| 2 | 12/05/23 20:24 | 12/05/23 20:24 | 0.1 |
| 2 | 14/05/23 13:16 | 14/05/23 13:16 | 0.1 |

Again acoustic activity was detected in the northwestern corner of the ZTA, the area with the highest detections in 2022, and the same continues to be true for this survey. The scarcity of encounters might be attributed to the absence of acoustic detectors where vaquitas could be. Again, just one acoustic detector was lost, although the mooring was in place. It's possible the attachment failed.

We plan to redeploy acoustic detectors at sites where moorings have been lost once the next spring tide period resumes. The concrete blocks seem to be effective in reducing fishing with nets in the ZTA, but they don't deter dive-fishing for clams.

REPORT 04 OF ACOUSTIC MONITORING OF VAQUITAS FOR SURVEY 2023
May 15th 8 AM to May 17th 10 AM



This sampling period started with 25 sampling sites (see figure above). Moorings were lost at sites 3, 20 and 30, and data were lost at site 36. As such, this sampling period is composed of 21 sites, with an approximate effort of 50 hours per site.

Vaquita acoustic activity was detected only at site 13, with 5 different encounters (number in circle in the figure above). The acoustic encounters had a duration of 0.01 to 3.3 minutes.

Acoustic encounters of vaquita

| Site | Start | End | Duration (minutes) |
|------|----------------|----------------|--------------------|
| 13 | 15/05/23 15:46 | 15/05/23 15:46 | 0.18 |

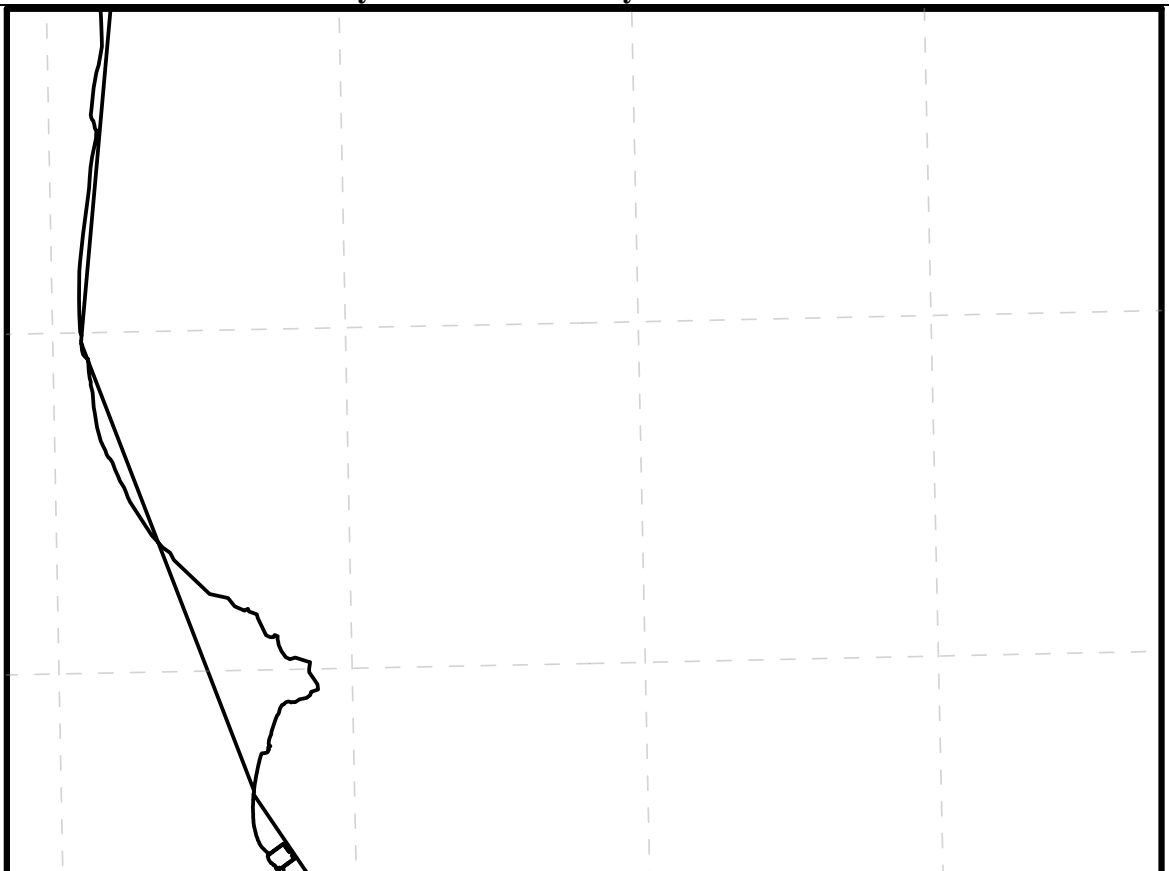
| | | | |
|----|----------------|----------------|------|
| 13 | 16/05/23 05:27 | 16/05/23 05:29 | 2.05 |
| 13 | 16/05/23 18:26 | 16/05/23 18:26 | 0.01 |
| 13 | 17/05/23 02:35 | 17/05/23 02:38 | 3.30 |
| 13 | 17/05/23 08:22 | 17/05/23 08:24 | 2.25 |

Acoustic activity at site 13 was intense, with vaquitas detected on three consecutive days. The time between encounters was short compared to detection rates found in previous years, and shows that vaquitas used the area intensively during this time. This is the area of sighting 2 on May 11th.

Acoustic activity continues to occur in the western portion of the ZTA, but acoustic activity has not yet been found in the eastern portion.

We redeployed acoustic detectors at sites where moorings were previously lost and hopefully we will obtain more data in the next sampling period.

REPORT 05 OF ACOUSTIC MONITORING OF VAQUITAS FOR SURVEY 2023
May 17th 10 AM to May 19th 08 AM



This sampling period started with 27 sites (see figure above), but the acoustic detector was lost at site 26 (though its mooring was in place) so this sampling period is composed of 26 sites, with an approximate effort of 46 hours per site.

An abundance of vaquita acoustic activity was detected this period in the area previously known to have the highest rate of acoustic detections. As with the last report vaquitas continued to be present at site 13, but now extended to sites 2, 3, 9, 12, 18 and 28. Detectors had not been present at site 3 since 15 May, or site 18 since 9 May.

For the first time on the 2023 survey acoustic activity was detected in the central portion of the ZTA at site 28, a location known to have acoustic activity in previous years.

In total 16 acoustic encounters were registered with durations of less than 1 minute to over 23 minutes, and also include two detections of more than 10 and 11 minutes!

Vaquitas were detected four times on three consecutive days at site 12 and three times on two consecutive days at site 18. At site 28 two encounters were identified on a single day. At site 13 three encounters were identified on a single day as well. When coupled with the previous sampling period this shows the preference of vaquitas to stay around site 13 over four consecutive days.

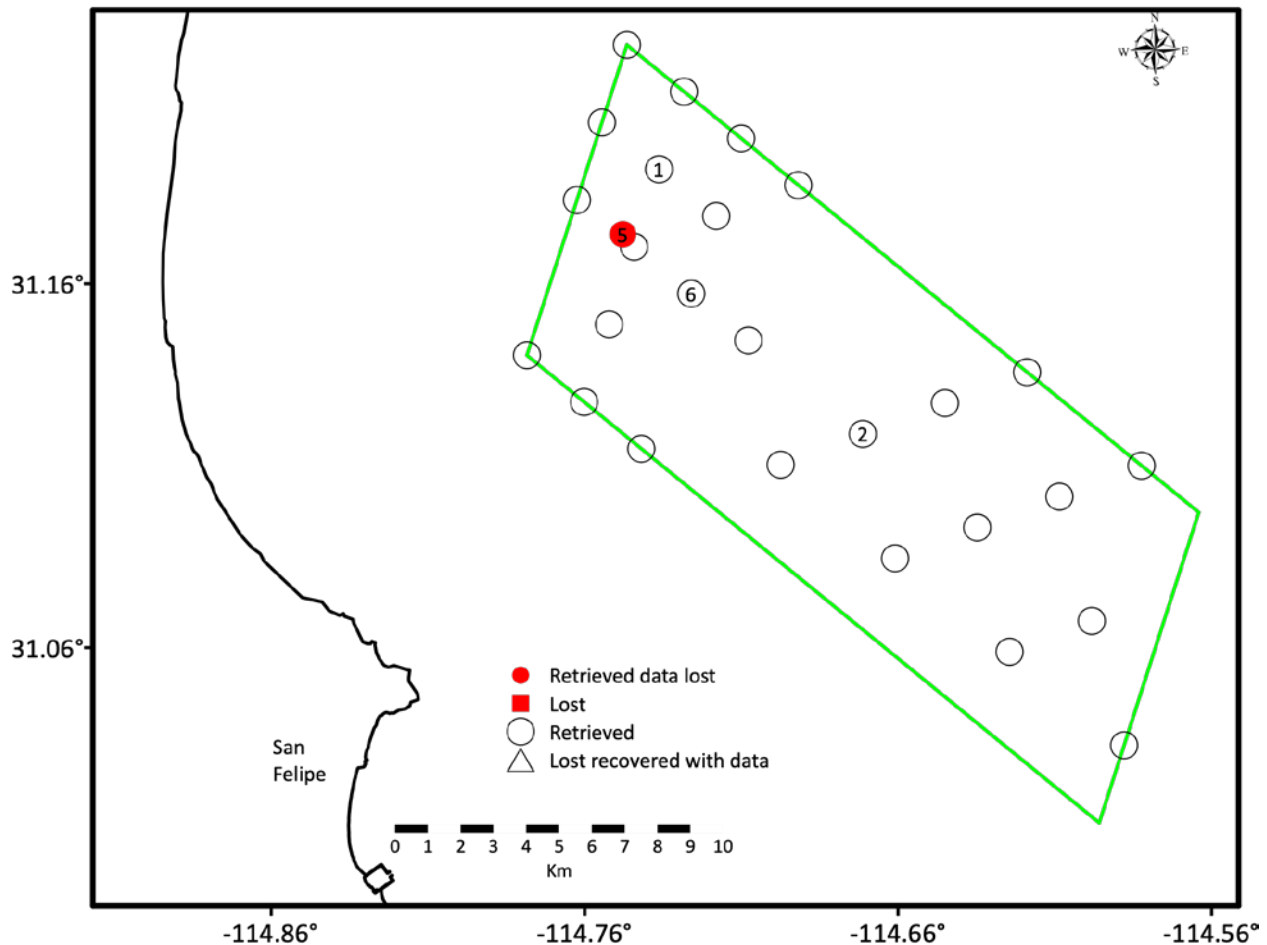
Acoustic encounters of vaquita

| Site | Start | End | Duration (minutes) |
|-------------|----------------|----------------|---------------------------|
| 2 | 18/05/23 13:02 | 18/05/23 13:08 | 6.03 |
| 3 | 17/05/23 10:11 | 17/05/23 10:11 | 0.15 |
| 9 | 17/05/23 18:24 | 17/05/23 18:24 | 0.08 |
| 9 | 19/05/23 01:40 | 19/05/23 01:40 | 0.00 |
| 12 | 17/05/23 23:54 | 17/05/23 23:58 | 3.15 |
| 12 | 18/05/23 02:11 | 18/05/23 02:12 | 0.90 |
| 12 | 19/05/23 00:48 | 19/05/23 00:56 | 7.83 |
| 12 | 19/05/23 02:27 | 19/05/23 02:27 | 0.02 |
| 13 | 18/05/23 06:41 | 18/05/23 07:05 | 23.83 |
| 13 | 18/05/23 14:10 | 18/05/23 14:10 | 0.02 |
| 13 | 18/05/23 16:17 | 18/05/23 16:22 | 4.17 |
| 18 | 17/05/23 19:10 | 17/05/23 19:11 | 0.62 |
| 18 | 17/05/23 20:40 | 17/05/23 20:51 | 10.27 |

| | | | |
|----|----------------|----------------|-------|
| 18 | 18/05/23 03:27 | 18/05/23 03:27 | 0.00 |
| 28 | 18/05/23 05:27 | 18/05/23 05:38 | 11.12 |
| 28 | 18/05/23 16:31 | 18/05/23 16:31 | 0.02 |

Tomorrow May 20th we will prepare moorings and plan to replace detectors in an extended sampling grid on May 21st. The visual team will advise us of any fishing activity which we will consider in regards to deploying acoustic detectors at several more places during the current tidal cycle. We believe that sampling during the current spring tide will be promising in terms of a lack of fishing activity in ZTA.

REPORT 06 OF ACOUSTIC MONITORING OF VAQUITAS FOR SURVEY 2023
May 19th 08 AM to May 21st 08 AM



This sampling period started with 26 sampling sites (see figure above). No acoustic detectors were lost. On the contrary, one mooring with its acoustic detector was found away from its regular sampling site (red point in the map). The mooring was reported lost in the first sampling period at site 8 on May 11th. It was located just about 500 meters from the original deployment

site. Perhaps the anchor did not grasp the bottom well during deployment. This detector was sampling for about 290 hours. At the other 26 sites the approximate effort was 48 hours. Again, plenty of vaquita acoustic activity was detected at site 13 (6 encounters on two consecutive days), one encounter at site 7 and two encounters on a single day at site 28, the second consecutive period of acoustic activity there, which indicates the continued presence of animals in the central portion of ZTA.

On the recovered detector located about 500 meters from its original deployment at site 8, five acoustic encounters were identified with three from the current sampling period over two consecutive days. An acoustic detector was working at site 8 during the same period, with no acoustic detections, which indicates that just a small difference in distance results in important differences in detections. The detections in the recovered device reinforce the continued presence of vaquitas in the northwestern portion of the ZTA.

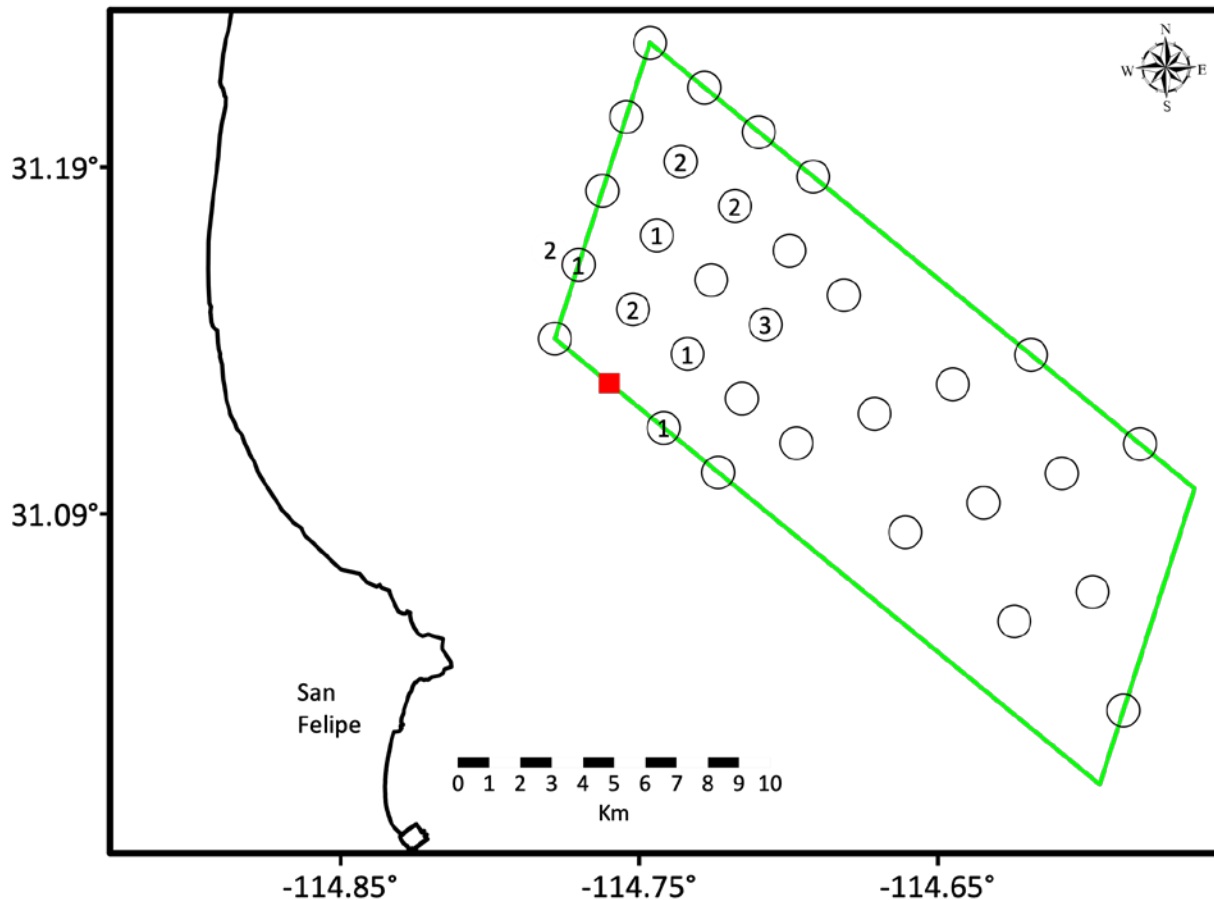
In total 12 acoustic encounters were identified during the sampling period, plus two others from previous days on the recovered detector. The duration of encounters were from less than 1 minute to 18.8 minutes.

Acoustic encounters of vaquita

| Site | Start | End | Duration (minutes) |
|-------------|----------------|----------------|---------------------------|
| 7 | 20/05/23 01:41 | 20/05/23 01:41 | 0.0 |
| 13 | 19/05/23 07:32 | 19/05/23 07:33 | 0.9 |
| 13 | 20/05/23 04:19 | 20/05/23 04:20 | 1.6 |
| 13 | 20/05/23 07:38 | 20/05/23 07:41 | 3.3 |
| 13 | 20/05/23 12:12 | 20/05/23 12:16 | 4.0 |
| 13 | 20/05/23 20:39 | 20/05/23 20:42 | 2.8 |
| 13 | 20/05/23 21:26 | 20/05/23 21:27 | 1.5 |
| 28 | 20/05/23 18:56 | 20/05/23 18:58 | 1.8 |
| 28 | 20/05/23 20:37 | 20/05/23 20:52 | 14.6 |
| | | | |
| 8 | 14/05/23 20:05 | 14/05/23 20:07 | 1.6 |
| 8 | 15/05/23 23:52 | 15/05/23 23:52 | 0.0 |
| 8 | 19/05/23 15:14 | 19/05/23 15:17 | 3.2 |
| 8 | 19/05/23 15:47 | 19/05/23 15:59 | 11.9 |
| 8 | 20/05/23 14:46 | 20/05/23 15:05 | 18.8 |

Today six more moorings were replaced in sites where they were lost which brings the sampling grid to 33 sites. As the spring tide period reaches an end, and given the losses suffered at the start of the survey during the neap tide period, we plan to retrieve all the moorings to avoid further losses. The final acoustic report will be on May 23rd.

REPORT 07 OF ACOUSTIC MONITORING OF VAQUITAS FOR SURVEY 2023
May 21st 08 AM to May 23rd 08 AM



This sampling period started with 32 sites but one mooring was lost at site 10 (see figure above). During this period a mooring that was deployed on May 11th at site 4, but subsequently thought to be lost, was recovered twisted with the mooring deployed at the same site on May 21st. This detector was sampling for about 27 hours. The other 31 sites had roughly 48 hours of effort. Again, it appears that vaquitas use the western part of the ZTA intensively (encounters are numbers inside circles). During this sampling period no vaquitas were found towards the center of the ZTA, a change from the past two sampling periods. Two encounters were detected on the recovered acoustic detector, one from May 11th, the other on May 22nd, which simultaneously detected vaquita along with the acoustic detector it was twisted around that was deployed at the same site two days ago.

In total 14 acoustic encounters were identified during the sampling period, plus the one on 11 May on the recovered detector. The duration of encounters was from less than 1 minute to over

49 minutes and also includes two that were 11 and 14 minutes! These data confirm that vaquitas prefer to use the western portion of the ZTA, although the visual data show that vaquitas also use the eastern portion, but at lower rates.

Acoustic encounters of vaquita

| Site | Start | End | Time (minutes) |
|-------------|----------------|----------------|-----------------------|
| 4 | 22/05/23 02:40 | 22/05/23 02:41 | 1.2 |
| 7 | 21/05/23 11:06 | 21/05/23 11:14 | 7.4 |
| 7 | 22/05/23 03:01 | 22/05/23 03:50 | 49.3 |
| 8 | 22/05/23 06:56 | 22/05/23 06:56 | 0.0 |
| 9 | 21/05/23 12:00 | 21/05/23 12:01 | 1.2 |
| 9 | 22/05/23 05:25 | 22/05/23 05:25 | 0.6 |
| 12 | 21/05/23 23:34 | 21/05/23 23:48 | 14.0 |
| 12 | 22/05/23 14:17 | 22/05/23 14:17 | 0.2 |
| 14 | 22/05/23 21:39 | 22/05/23 21:42 | 3.0 |
| 15 | 21/05/23 18:03 | 21/05/23 18:11 | 7.5 |
| 18 | 21/05/23 22:52 | 21/05/23 22:59 | 7.5 |
| 18 | 22/05/23 13:26 | 22/05/23 13:37 | 11.0 |
| 18 | 22/05/23 17:11 | 22/05/23 17:12 | 0.5 |
| | | | |
| 4 | 11/05/23 23:57 | 11/05/23 00:11 | 13.2 |
| 4 | 22/05/23 02:40 | 22/05/23 02:41 | 1.2 |

As clam fishing resumed after the spring tide period the risk of losing moorings increased. All the acoustic detectors were retrieved 23 May and will not be deployed again as no other period of spring tide will occur before the end of the survey.

Appendix 3. Evidence Dossier.

Evidence Dossier Vaquita 2023

Date: 5/11/23

Sighting #1: Sirena de la Noche only

Photos: N

Videos: N

First time seen: 0758

Last time seen: 0815

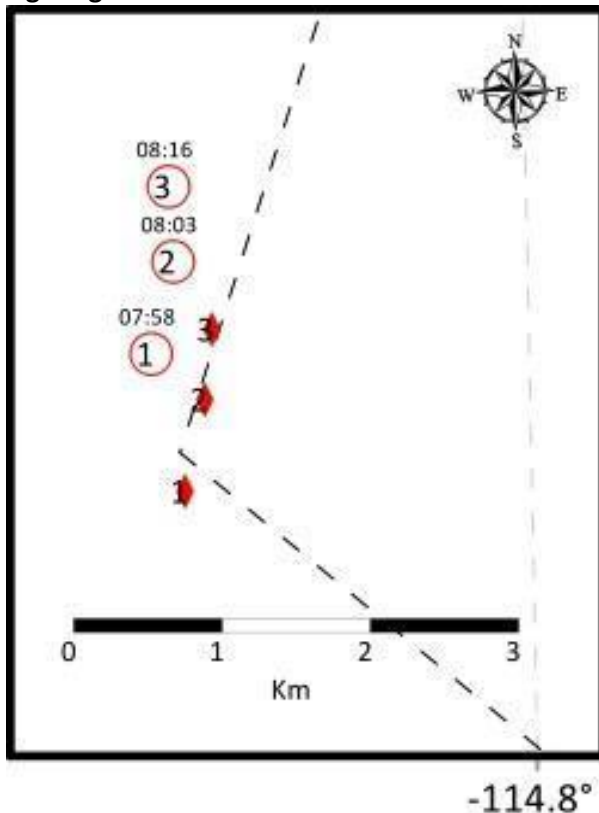
Sighting length: 17 min

Beaufort: 1

Swell: less than 1'

Our first sighting occurred at 0758 on 11 May 2023 in the northwestern portion of the Zero Tolerance Area. Viewing conditions were good – Beaufort 1 with essentially no swell. We had just sped up a few minutes earlier as we made the turn at buoy 5 in order to keep the Sirena de la Noche parallel to the Seahorse, which was on the inside lines. We were approaching buoy 4 when Anna Hall called out that she has a possible vaquita sighting. We sighted animals three additional times (see narratives below). We were unable to find the animals after 0815. We conducted a 360-degree slow searching turn, and then went back on effort at 0836.

Sighting 1



- Map shows the time (hh:mm) when the sighting and resights occurred.

- The animals seem to move in a straight direction towards north. Speed of swimming varied between about 7.5 and 2.5 Km/h.

Sighting #1 - Hall; Sirena

I was on the starboard Marine Mammal Observer position using 7X50 reticle binoculars on the vessel Sirena de la Noche. During my scan I saw a small marine animal just before it submerged. I continued to watch and almost immediately at 0758 h I had another sighting of two small cetaceans that surfaced one after another. I said to our Sirena team, "I need some help". As I was describing to Ernesto where I was looking and what I was seeing, I had another sighting of two animals, and said "Ernesto I think they are Vaquita!" Ernesto was also looking through handheld reticle binoculars and we discussed the sighting location and observations.

The last sighting of the pair was of three to four breaths in a row, before the animals dove and disappeared. The behavior observed was consistent with normally behaving porpoise, and the animals appeared healthy given their distance. The animals were moving away from us, so we never saw a dorsal fin in profile, but the movement, size and colour were consistent with Vaquita. The observation was of two small, dark grey animals that were side-by-side and slow-rolled at the surface, with a smooth rolling forward motion. The second animal surfaced in close proximity to the first animal, while the first animal was still at the surface. The movements of these two animals were synchronized with one surfacing shortly after the first one surfaced. The animals were of a similar size, though the second one that surfaced appeared to be slightly smaller than the first one. I said that this was not a cow-calf pair with a calf from this year but could have been from last year based on the proximity of the animals and the surfacing pattern. The surfacing behaviour was typical of small groups of porpoise.

The initial confidence for the species identification was ~85% because the animals were far away and it was the first sighting of the 2023 survey (and my first Vaquita sighting in several years). The observer team aboard the Sirena de la Noche discussed the observation and compared the observation details against Vaquita and other species that may occur in the area.

With re-sights of this group, and observations of subsequent Vaquita during the observation period today, my confidence in this first sighting was increased to 100% for the species identification. The estimated group size was two to three, with 100% confidence for the observation of two animals as two were seen at the surface together at the same time. It is unknown if the initial sighting was of a third animal that was not re-sighted during the observation, or of one of the two animals that were side by side. However, during the sighting of the pair, neither one of the pair surfaced as a single animal. We continued to search for the animals, but after 30 minutes there were no further re-sights.

My closest observation for this sighting was reticle 0.7 at ~5 degrees right at 0815 h. This was the second resighting for Sighting #1 on the Sirena de la Noche.

*Additional notes on this sighting - Ernesto Vázquez: After the last surfacing of the animals Anna was tracking, I was pointing my handheld binoculars towards the location Anna was having her observations, and I saw a dark body coming out of the surface in a "porpoise/dolphin/sea lion" way of just rolling. It was moving away from the Sirena, just had this detection, no blow nor dorsal fin was detected, it was similar to vaquita in size and colour. My confidence that this was a vaquita sighting is around 50%. But nothing else surfaced in that area as I kept looking for it for another 10 min.

Date: 5/11/23

Sighting # 2: Both, Seahorse then Sirena

Photos: Y

Videos: N

First time seen: 0902

Last time seen: 0948

Sighting length: 46 minutes

Beaufort: 1

Swell: 1

General narrative: Initial sighting of 2 animals was made from the Seahorse on big eyes by Lisa Ballance (see narrative below). The sighting followed by one minute a Navy vessel speeding down our port side. The big eyes are located on the bridge deck. There is a deck above that is called the monkey deck where several observers were scanning with handheld binoculars who also saw parts of this sighting (see narratives by Triana and P. Martinez below). The second vessel Sirena de la Noche is called over. The vaquita(s) changed direction approximately 13 minutes into the sighting. The initial sighting and the first resighting were of two animals. The subsequent resightings were all of only a single individual except for a resight 40 minutes into the sighting of two animals by P. Martinez from the monkey deck (narrative below).

Sirena de la Noche narrative: (referred to throughout the dossier as Sirena) also saw vaquitas and based on the calls of "up" when the vaquitas surfaced as seen on the Seahorse, Hall on the Sirena had two surfacings believed to be simultaneous of the same individual being seen on the Seahorse. See Sirena account below.

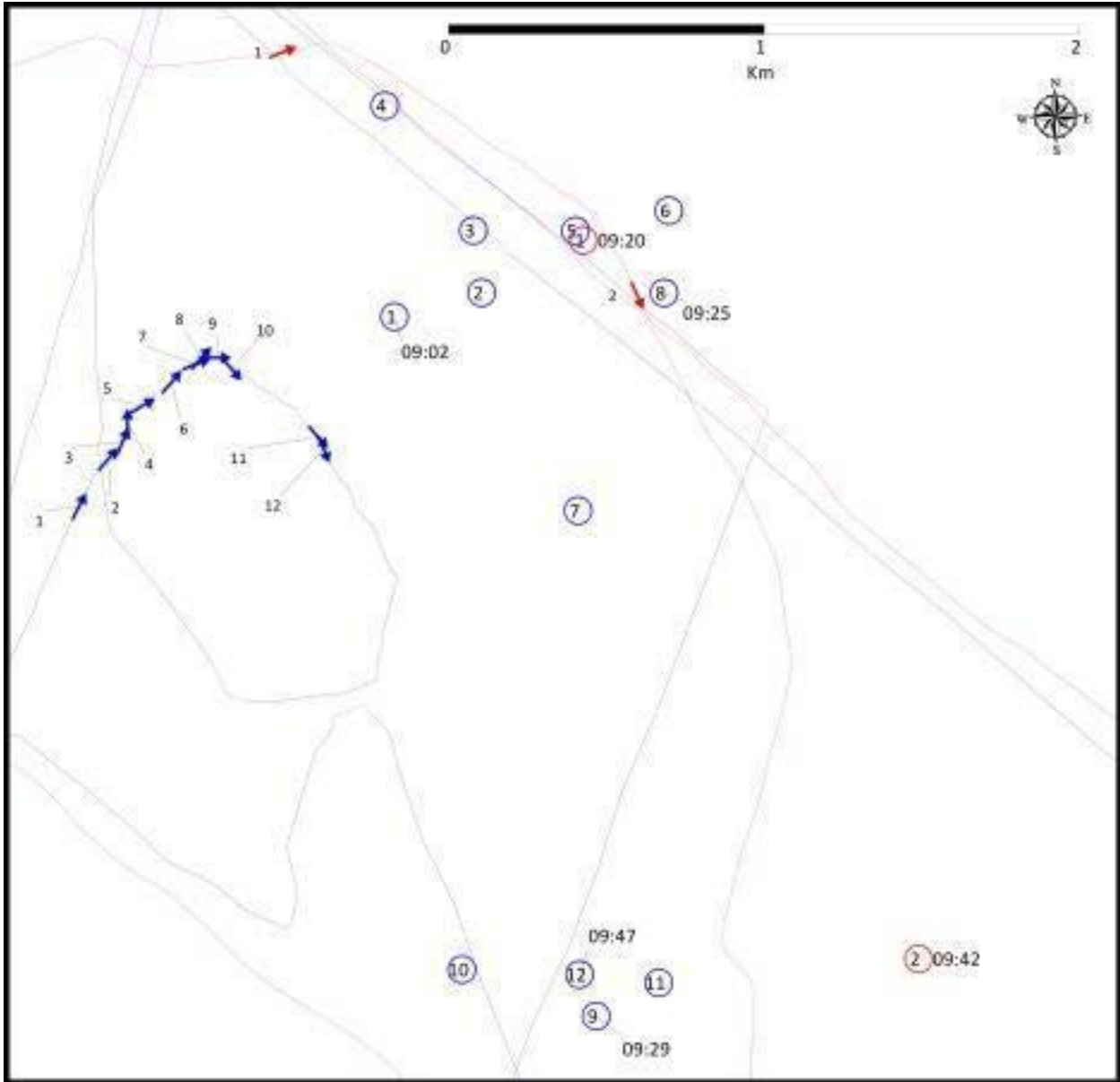
Below is a WinCruz screenshot by Dawn Breese, the recorder during the sighting.



Screenshot of sighting 2. The scale of each ring is 1nm. Open red circles are vaquita sightings with the first sighting in this case being closest to the vessel. The red solid square is the last position of sighting 2. The yellow circles show the path of the Seahorse.

The map below that includes data from both the Seahorse and the Sirena but has inaccurate locations for the Seahorse sightings because the heading data was not recorded frequently enough. Thus, the screen shot best represents what was seen on the Seahorse and the cluster circled in green is in the map below as locations 1-8 in blue (for the Seahorse) and the latter locations (9-12) are circled in yellow. The magenta arrows with numbers correspond to the map below and are locations where 2 vaquitas were observed together. The magenta bracket represents the area where a pair was seen using handheld binoculars from the monkey deck so no exact location is recorded. Corresponding times are: location 1 (9:02), location 2 (9:05), and bracketed area (9:42). Some observers suggested that the original pair of vaquitas could have split into two singletons. The account above shows pairs sighted both early and late in the encounter but does not rule out that the original pair could have split into singletons.

SIGHTING 2 ONBOARD SEAHORSE DURING MAY 11TH



- Distance between resights 8 and 9 from Seahorse (blue circles) is 2.32 Km. The difference in time is 4 minutes. Speed needed to move between sites is 34.8 Km/h.
- Distance between resights 1 and 2 from Sirena de la Noche (red circles) is 2.52 Km (2.76 before correction). The difference in time is 22 minutes. Speed needed to move between sites is 6.9 Km/h (7.5 before correction).
- Arrows represent the position and heading angle of the vessel at the moment of sighting. Blue for Seahorse and red for Sirena de la Noche.
- Circles represent the estimated position of animals sighted (blue for Seahorse and red for Sirena de la Noche).
- Numbers in vessel and sightings symbols identify the relative position of the vessel when the sighting was made.
- Tracks of vessels are colored lines, blue for Seahorse and red for Sirena de la Noche.

Sighting # 2 - Ballance; Seahorse

I was aboard the Sea Shepherd vessel Seahorse and on regular rotation through the big eyes. Sighting conditions were excellent: Beaufort 1, less than 1 foot wavelets and essentially no swell (that I could detect on the big eyes), no glare. On my second shift on the right bigeyes (after a shift on left bigeyes – both 30 minutes) I had a sighting of two animals at about 25 right and 2.5 reticles. My initial view had the animals in the center of my view and the relatively high reticle gave me a great look. The dorsal fin of the animal in the lead was triangular, not falcate. On the second surfacing the triangular fin confirmed vaquita. The animals were close together (within a foot of each other); one (the larger and seemingly a full adult) slightly in front of the smaller – but the latter was not obviously dependent and definitely not a calf of the year. They came to the surface about 3 times – both animals were only simultaneously in view twice – and then, following a relatively high arch, they disappeared under the water. I could not make an assessment of condition (health), as I saw only dorsal fins and a small bit of dorsal surface of the back, but I saw no evidence of compromised condition (based on surface behavior and general speed of movement). Chris Hoefer was on the port big eyes and got on them quickly, as did Bob Pitman, on the aft starboard big eyes. We were able to follow them for about 45 minutes, mostly through regular surfacings spaced about 2-3 minutes apart. They were clearly visible at the surface and strikingly regular in timing of surfacings. They moved consistently at about 90 degrees to the starboard beam of our vessel. After this period, they became more difficult to follow, and there were a number of 10-minute or so periods when we did not see them at all. Also, after the first surface interval, I did not see two animals together again.

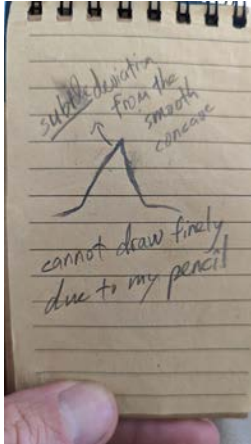
After what seemed like 20 minutes or so, we had lost them, when Felipe Triana called down from the “monkey deck” (1 level above the big eyes) with a sighting. Except for P. Martinez (narrative below) no one saw more than one animal and it moved 90 degrees to the right for the time we were able to follow it, a short period of just 2-3 surfacings as I recall. In my mind, this could have been a different animal from the initial pair (although it was seen about where we thought that pair should have been), or one of the initial pair which may have split up (or not surfacing together). Once we lost them, we did not find them again. We ultimately resumed effort on our trackline.

Pitman narrative: 11 May - Sighting #2 on the Seahorse – After being alerted to Lisa’s sighting (she was on the starboard binoculars on the Seahorse; I was on the third pair, along the right side of the vessel, several m behind Lisa), I was able to find her sighting 4-5 times. She said she saw a pair roll together, but I never saw more than one at a time, although the roll sequences I saw were rather rapid on a couple of occasions and could have been due to two animals surfacing asynchronously. Based on what I heard but not what I saw, there were two animals present. The animal I saw appeared to be adult-sized with a largish dorsal fin.

Sighting #2 - Hoefer; Seahorse

4-5 surfacings heading 10:30 relative to our course (Lisa saw first surface interval very well, and I only got the last roll of that interval); then at least one of the animals sharply turned about 160rt and heading more or less that way for a good 20-25 minutes before slightly turning to rt again and back somewhat toward original sighting area. Two seen initially, one was more furtive and disappeared before the “other” did the about face. More furtive one seemed a smidge smaller, but the one that was followed for 45-50 mins (in total) had fairly unique fin tip, i.e. the very last 5% of the anterior edge was subtly bent forward and produced a straight sharp tip; below that bend the dorsal was the classic very slight, smoothly concave typical. I drew this in my notebook. Most surface intervals were 3, maybe 20% were 4 rolls in relaxed manner with generally the last roll in the interval being slightly higher arched when seen well; when followed more closely early on, the dive times were ~2-3 mins, but later on we either missed

several surface intervals or the one was diving for longer; a couple of other people on monkey deck called out potential sightings near the end of the observation including Felipe Triana, but I couldn't find an animal at the estimated bearing; both animals we saw initially were fairly robust, healthy, forward of the dorsal fin; though, the more furtive animal I didn't see nearly as well as the one that we followed more.



Sighting #2 - S. Martínez; Seahorse

Lisa said that she saw two animals at about 25 right and 2.5 reticles, and she started saying up, up. At 9:06 through a 500mm lens I tried to find the animal(s), the 3rd, 4th and 5th times that they came up to the surface, I took 6 pictures (2, 3 and 2 respectively with 6 and 7 seconds between them). The vaquita(s) were traveling from right to left in front of the bow (90° left), the vaquitas looked adult size, the body condition looked fine, and the dorsal fin was like a triangle, but I couldn't recognize any mark on the dorsal fin or body. Even when I took pictures, I never saw 2 animals at the same time and the quality of the pictures is not good enough to say that they were different animals. After that, moments later Felipe and Pamela had some resightings but I didn't see them again.

Sighting #2 - Triana; Seahorse

I saw a single vaquita porpoise after Lisa had spotted the initial "pair" probably after the 3rd surfacing. Simultaneously as Lisa called out that the animal was up, I was able to get my camera lens on it and photographed at least 4 surfacings (09:06 am) at a fairly far distance (reticle 3 on the big eyes, I was not on big eyes however) and approx. 5 degrees (the vessel was pointed towards it). The vaquita did not look like a calf to me, but I only had looks through my camera lens, it was moving left at a moderate speed, (not very arched, more lateral). Some of the animal's head and most of its dorsal surface including the dorsal fin was exposed above the water. I lost the animal after one of the dives. The big eyes still had eyes on it and mentioned that it had then changed course and was moving to the right. After 17 minutes of not seeing it myself, I re-sighted the vaquita at (09:23 am) approximately 40 degrees RIGHT moving right (this was after some vessel steering to point towards the animal). The big eyes tried to get on it but were not able to, could be due to me giving a rough estimate of the angle bearing naked eye. I was the only one with eyes on it at this moment. I was able to snap a few more photos of a single vaquita (presumably the same individual) at this new course (RIGHT). I believe I saw only three surfacings this time still moving right and at a faster pace (arching to submerge into the water column). This was the last time I saw it. A few minutes after I had lost visual contact of it, Bob resighted it at 60 Right still moving right.

Sighting #2 - P. Martínez; Seahorse

My sighting was from the Seahorse. We were following Lisa's sighting, I was on the monkey deck with Felipe, and I had a camera and binoculars. Felipe was able to take pictures of the sighting. At 0942 ~30 degrees right (1 o'clock direction from our bow) , I was able to observe (with the help of handheld binoculars) two fins that looked vaquita-like, presenting a triangle-shaped dorsal fin a little bit tall not hooked (not falcate), confirming that it wasn't a bottlenose dolphin or another cetacean with a falcate dorsal fin (it was a distant sighting and everything happened so fast) swimming simultaneously to the right of the bow of the boat (between 30° and 50°), they were the same size (neither smaller than the other) confirming that there was no calf of the year present. They made the first dive. Subsequently they reappeared at the surface, and that is when I reported what I had observed, then they dove and disappeared a few seconds later. As a reference, behind them there was a large group of pangas, which I used to indicate more precisely where the individuals were and also use the clock reference for the position, which I indicated was about 1 o'clock.

Sighting #2: Sirena account

Photos: N

Videos: N

First time seen: 0920

Last time seen: 0942

Sighting length: 22 min

Beaufort: 1

Swell: less than 1'

Initial summary: At 0901 on 11 May 2023, the Seahorse calls out a sighting and the Sirena diverts from our position near buoy 3 toward the sighting, which is in the vicinity of the Seahorse and near buoy 7. At 0920 Anna calls out a single animal (resighting 1) from the port side binoculars. Felipe on the Seahorse also calls out a resight a few minutes later. The Sirena sighting seems to us to be a probable resight of the Seahorse sightings as they occur at the described distance and angle from the Seahorse. Neither ship has resighted them for some time so we begin to move closer to what Seahorse thinks is their last sighting. At 0942 Anna calls out a sighting (resighting 2). This occurs at almost the exact time and place as a Seahorse resighting. The animals are nearing 4 dive pangas, near a bird, and swimming to the right. In between the two resightings, all three of us (Anna, Ernesto, and Sarah) see a circle print on the water, radiating out, about 6' in diameter very close to the Sirena. Could this be the near surfacing of a vaquita? Both ships lose the animals and we resume effort at 1020.

Sighting #2 - Hall Narrative- Sirena

I was on the port side MMO position on the vessel Sirena de la Noche. Seahorse had called a sighting over the radio; we were scanning the area that was described for a re-sight. The initial sighting report from the Seahorse was of one to two animals. At 0920 h, I observed a single Vaquita.

At 0942 h, I saw a Vaquita that I considered a re-sight of the animal observed at 0920 h. This sighting was in the direction of the pangas engaged in dive fishing for geoducks and observed through the 7X50 reticle binoculars. This observation was of a single Vaquita in a profile view. The dorso-lateral surface and the dorsal fin were visible above the waterline. The animal was swimming generally westward, and was closer to where the pangas were fishing, but not within the fishing area (i.e., the Vaquita was between us and the pangas, but closer to the pangas than us). There was also a small bird to the left of the surfacing Vaquita which we used aboard the Sirena de la Noche to describe the animals' location. My closest observation for this sighting was resighting #1 at reticle 0.5-0.75 at 110 degrees (binocular bearing) at 0920 h.

S-2



11052023_Seahorse_FT_S02_019_0907_cropped



11052023_Seahorse_FT_S02_023_0923_cropped



11052023_Seahorse_SM_S02_008_0906_CROPPED



11052023_Seahorse_SM_S02_009_0906_CROPPED

Date: 5/11/23

Sighting #3: Sirena only

Photos: N

Videos: N

First time seen: 1407

Last time seen: 1408

Sighting length: 1 min

Beaufort: 2

Swell: less than 1

At 1407 on 11 May 2023, Sirena was on the line between buoy 24 and 19 near the west side of the Zero Tolerance Area. Anna Hall, on the starboard side binoculars, has a sighting of a large and robust animal with a large dorsal fin. Two surfacings, 1 animal, adult size. The animal is notably large and based on size, looked different from the other animals seen today (sighting 1, 2).

Sighting #3 - Hall Narrative; Sirena

At 1407 h, I was on the starboard Marine Mammal Observer position on the vessel Sirena de la Noche. During my scan with the 7X50 reticle binoculars, my attention was caught by what at first looked like a splash or large sparkle on the water's surface. I stopped scanning and focused on that area and moments later saw a Vaquita surface in a profile view with the sun glinting off the dorsal fin. This Vaquita was surfacing higher out of the water than others observed today and had a noticeably large fin that appeared to be quite rounded at the top. This porpoise appeared to be quite rotund. From what was visible through the binoculars, this appeared to be the biggest animal I have seen today. This animal was observed at reticle 1.5 and 320 degrees (binocular bearing).

Date: 5/11/23

Sighting #4: Seahorse only

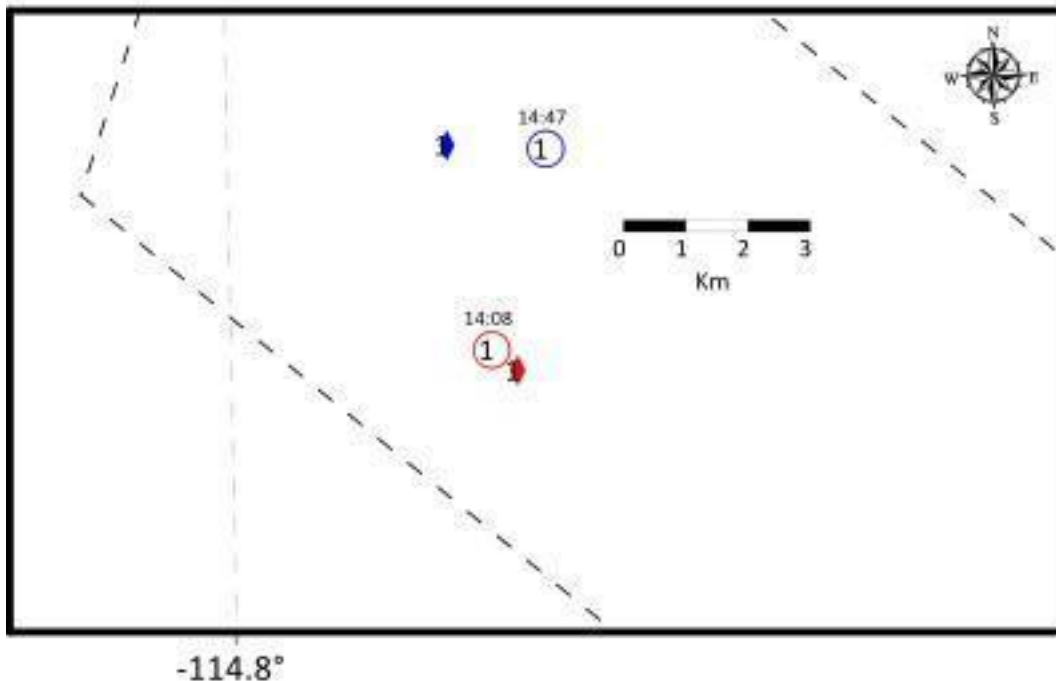
Photos: N
Videos: N
First time seen: 1448
Last time seen: 1449
Sighting length: 1 min
Beaufort: 2
Swell: 1

Only a single surfacing series is seen by Chris Hoefler (narrative below). The Sirena is called over and does a slow box to the left while the Seahorse does a slow box in the opposite direction. No vaquitas are sighted after Chris' original view.

Sighting #4 - Hoefler; Seahorse

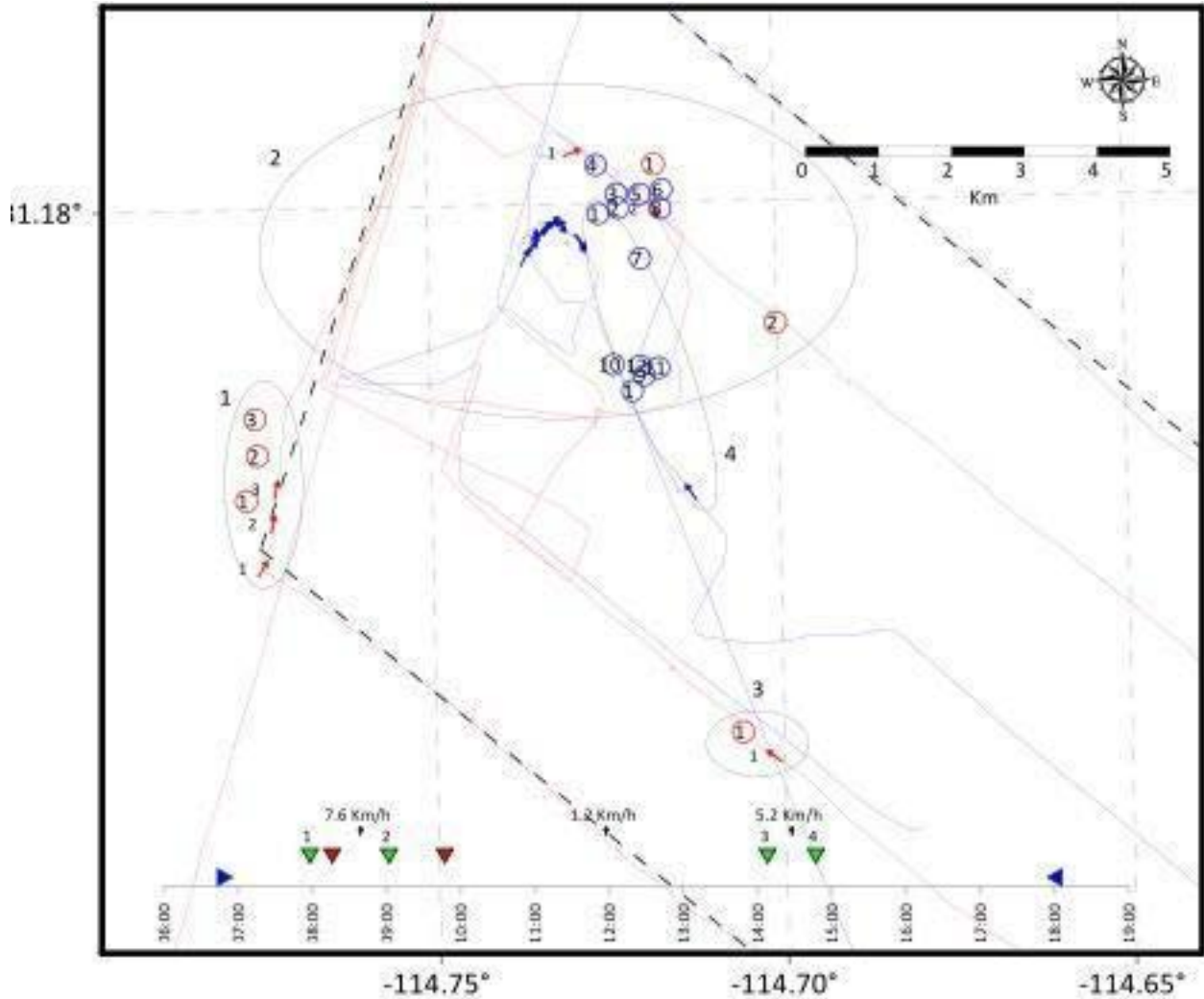
4 degrees right, 2.7 reticles, two quick surfacings, first very low seeming but just got onto the spot with eyes for first roll and saw last half; second nice, very high, very fast and steep arch seen colors, partial dark eye, majority of flank, and all well but much too fast to get fine details on dorsal fin characters. Both surfacings to 0930-0945 relative to vessel course; flank forward very rotund, healthy and full flank seen well with no apparent large scars, injuries, etc.; completely unsure whether this was the same animal as I saw very well on sighting #2; also, seen much too briefly to determine whether or not a calf was present.

Plot of Sightings 3 and 4



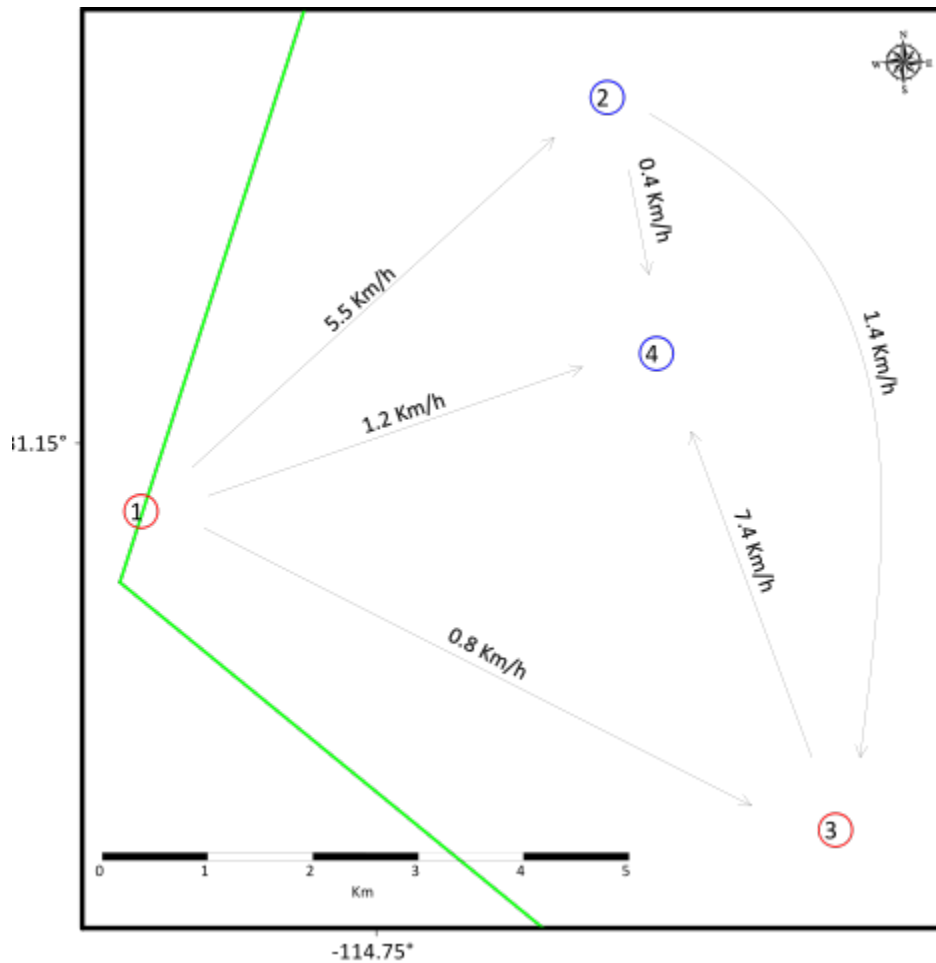
- Both sightings had no re-sightings
- Sighting 3 done aboard Sirena de la Noche at 14:08. Distance to the animals about 500 meters.
- Sighting 4 done aboard Seahorse at 14:47. Distance to the animals about 1,600 meters.
- The swimming speed needed to move between both sites is 5.2 Km.

5/11/23 Summary of all sightings.



- Summary uses reviewed and corrected calculations.
- The headings of the Seahorse were reviewed and fit very well with the DAS file track.
- The position of resightings fit well with reported bearing.
- There are no sightings to the west which fits with the screenshot from WinCruz.
- Sighting 4, from the Seahorse, seems to be in the same relative position of sighting 2, five hours later.
- The vessels are represented with arrows, indicating the heading at the time of the resighting.
- Timeline of all sightings 11 May are incorporated at the bottom of the map.
- Blue triangles indicate the start and end of effort of the day.
- Green triangles indicate the start of a sighting, with a label for the sighting number.
- Red triangles indicate the end of a sighting, with no label. Only the start time is shown when there was no resighting.

- In the map below the arrows indicate the speed needed to move from the last location of a sighting to the first of the next one, calculated as the distance in Km over the time difference in hours.



Jay reports that the sonar has been on the Sirena since the start of the survey and was turned off at the end of May 16.

Date: 5/15/23

Sighting 5: Sirena only

Photos: N

Videos: N

First time seen: 0552

Last time seen: 0553

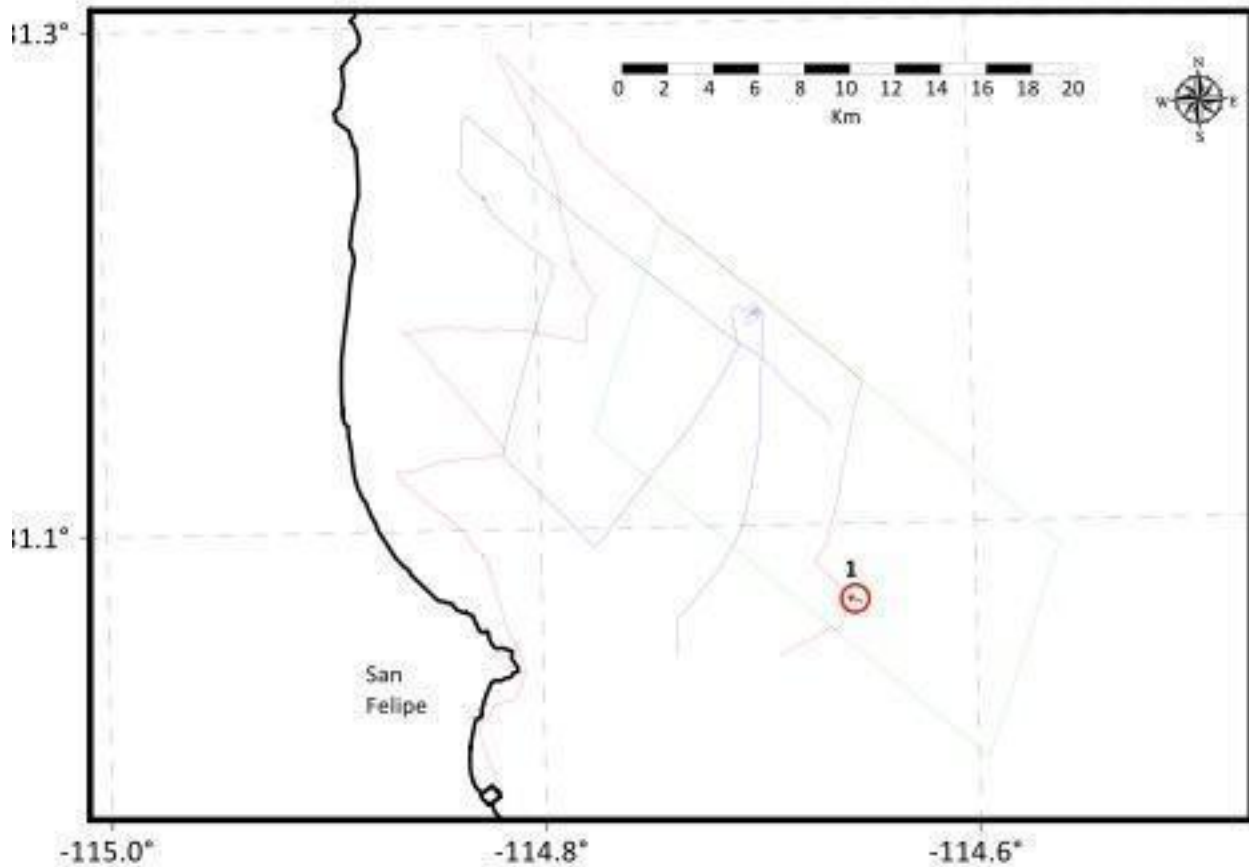
Sighting length: 1 min

Beaufort: 2

Swell: 2-3'

General narrative: On the starboard side between positions 35 and 34. The vaquita was seen only by Anna Hall (see narrative below).

Tracks and sighting (Sirena de la Noche) on May 15th



Sighting #5 - Hall; Sirena

During our transit to Buoy 31, the Sirena de la Noche team was just preparing for the day's effort and sitting on the flying bridge of the vessel. I was sitting on the port side of the seating area and looking out the starboard side of the vessel. Conditions were Beaufort 2 at 0552 h, when a Vaquita surfaced in the waves beside the vessel. I said to the Sirena team, "right there 50 metres from us!", and pointed to where I had seen the animal surface. We all got up, and looked in the direction (~60 right) where I was pointing, and then the animal surfaced again. We reported the sighting to the Seahorse, and tried to get a re-sight. By 0623 h, we were not able to get a re-sight and radioed the Seahorse that we had not seen the animal again. At that time, we then returned to our original transit course. This sighting was brief, however the Vaquita surfaced close to the boat and was moving toward the right. It was at the top of the wave, and its dorso-lateral surface and dorsal fin were out of the water on both sightings. The animal was a dark grey colour (though it was also sunrise), and looked to be of healthy porpoise proportions. This animal was visually observed with no binoculars. The other observers were not able to sight this animal, however, the vessel was moving forward, the animal surfaced very briefly and appeared to be moving the opposite direction to us, and we were so surprised by the sighting, that I was pointing to where the animal was, rather than where it would be surfacing next. Sea conditions were not ideal for porpoise sightings.

Date: 5/16/23

Sighting 6: Both, Sirena then Seahorse

Photos: N

Video N

First time seen: 10:10

Last time seen: 11:02

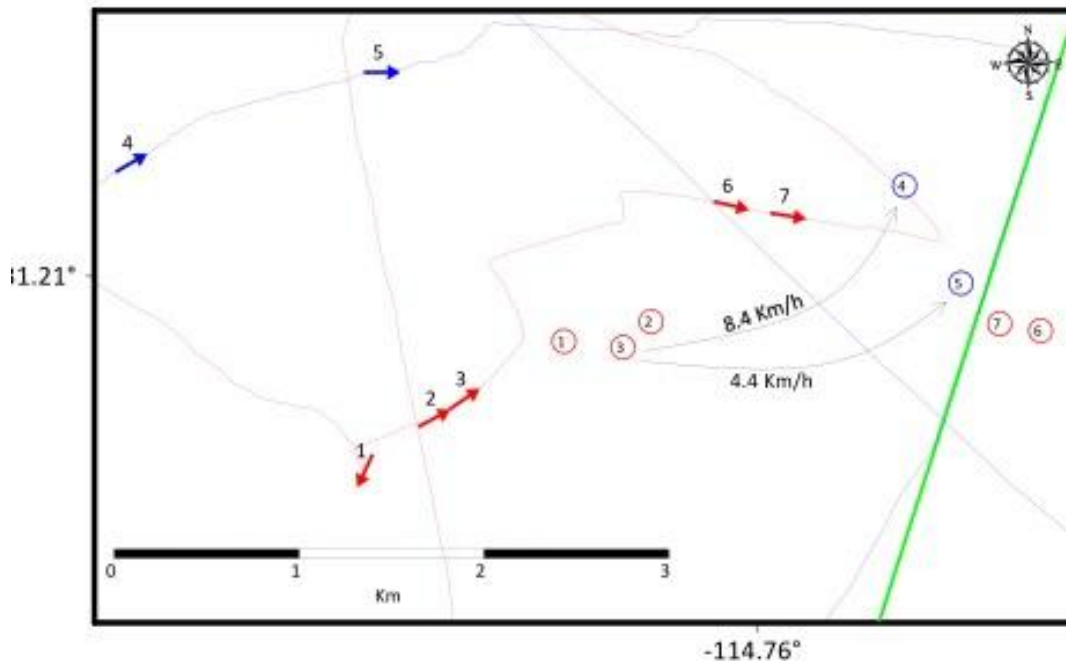
Sighting length: 52 min

Beaufort: 1

Swell: 1

General narrative: First seen by Sirena and then sighted by Seahorse at 10:34 and last seen on Seahorse at 10:47 (13 minutes). There were 4 resightings by the Sirena by multiple observers. The Seahorse had 2 resightings.

SIGHTING 6 MAY 16TH



Sighting 6 on May 16th. Arrows indicate the position and heading of the vessels during the sighting. Circles are the estimated position of the animals during every sequential resighting. Numbers indicate the sequential sighting for vessels and sightings. Black arrows and labels indicate the speed needed to move between positions of resightings 3 and 4 and 3 and 5. Lines are the tracks followed by the vessels (blue for Seahorse, red for Sirena de la Noche). Green polygon is the ZTA.

Sighting #6 - Hall; Sirena

At 1010 h, I was on the port Marine Mammal Observer position on the Sirena de la Noche. During my scan with the 7X50 reticle binoculars, I saw a single Vaquita surface. I focused on the sighting and the animal surfaced two more times. I had three good sightings through the binoculars as the animal swam from left to right in my field of view during the initial sighting. The Navy ship was to the right of the animal (from my perspective). The animal surfaced normally for a porpoise with the typical smooth rolling motion at the surface. Through the binoculars I could see the dark-grey dorso-lateral surface

colour, and a tall grey dorsal fin (taller than a harbour porpoise), but not as tall or falcate as a dolphin. The sighting was in clear conditions and because the animal rolled fairly high at the surface, the sighting was very good. The animal was re-sighted four more times by the Sirena team. Confidence in the species identification was 100%. The end of the search was at 1155 h. My closest sighting was at Reticle 0.5.

Sighting #6 - Barlow; Sirena

I was an off-duty observer when Anna saw the vaquita. I searched to help relocate the animal, and saw a small cetacean surface several times, oriented towards me at 0.5 reticles. The starboard observer saw it at about the same time. I did not see a profile or dorsal fin that would allow me to say this was certainly a vaquita. Anna got a much better look. I never saw more than one animal at a time.

Sighting #6 - P. Martínez; Sirena

We were on the track line D3 to C3, I was on the starboard watch on the Sirena del Mar, it was 1010, and Anna gave the sighting call from the port side observation watch. I followed her directions for the position of the vaquita (bearing 45, reticle 0.5; N31°11.999', W114°46.913'). At 1020 I was able to resight the individual (bearing 54°, reticle 0.5; no photo of ship position) it was vaquita-like with a triangle shaped dorsal fin, swimming to the right of the bow of the boat, which dove again, (behind was a ZTA limit yellow buoy). Two minutes later, at 1022, I was able to observe it again (bearing 60°, reticle 0.8; no photo of ship position) with the same direction of travel. At 1058, but a little farther away from the ship heading towards Consag Rock (bearing 100°, reticle 0.3; position N31°12.780', W114°45.646'), I was able to re-sight an individual once (but not really sure if was the same individual due to the distance, not 100% sure it was a vaquita) heading to the right, after that I didn't see it again.

Sighting #6 - Ballance; Seahorse

We were on effort on regular survey. The vessel Sirena had a sighting and we turned to help. I was on the starboard, aft, high-powered binoculars (bigeyes). We were looking for the Sirena sighting, reportedly a single animal. It had been some time since the sighting, so we on the Seahorse were scanning widely. Sighting conditions were very good to excellent. I had a clear and excellent look at an animal that came to the surface, some distance away (0.5 reticles). Without a doubt, it was a Vaquita because of the triangular, dorsal fin, with no falcate shape. A split second after the first animal came to the surface, a second one followed. It was alongside the first animal but slightly behind it, with the lateral separation between the two less than 10 cm. The animal in the lead appeared to be larger than the animal slightly behind it. The second animal's surfacing roll was more rapid than the first. The animals were swimming on a course 10-20° to the port of our own course, essentially away from us. Although I did not think this at the time, because my mind was focused on detecting and staying with the animals, upon recollection I recall that the position of the two animals was consistent with echelon swimming. The size difference between the two was consistent with a possible mother calf pair. On the first surfacing, I saw these two animals, and some 3 to 5 seconds later, the larger one surfaced again, then, I did not see it. A short period of time later I saw an animal at the surface again on the same course. It came to the surface once, went under for about three seconds, came to the surface again, and then disappeared. We were able to stay on this group for some time, but I had no additional views of more than one animal, nor am I aware that anyone else saw more than one. (Note: at 1200 there is a comment "Lisa's animals were seen 2 times, each surfacing was two breaths.")

Sighting #6 - Pitman; Seahorse. Resight of Lisa's sighting – I saw what was apparently the same animal Lisa saw – it plotted right on top of hers. It rolled over once in a slick, heading away from the boat. We never saw the animal again although we looked for it.

Date: 5/16/23

Sighting #7: Seahorse only

Photos: Y

Videos: Y (drone footage by Sea Shepherd team)

First time seen: 1211

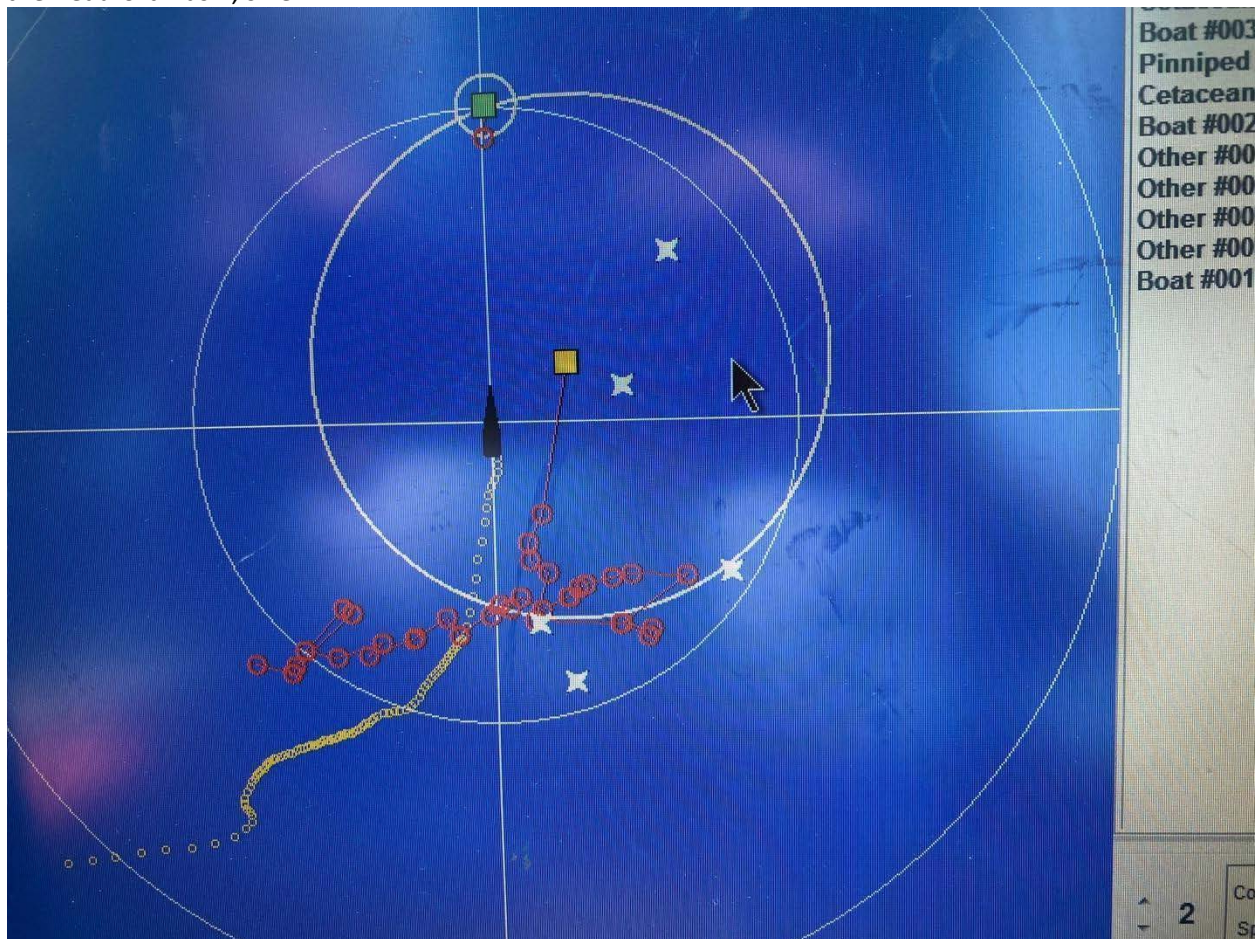
Last time seen: 1352

Sighting length: 101 min

Beaufort: 3 going to 4

Swell: 2

General narrative: For the first 34 minutes there were 6-7 surfacings during each surfacing period. The remainder only 2-3 surfacings were seen during each surfacing period. During the first hour the animal was moving very slowly and in a consistent direction (see screenshot of WinCruz). The animal was in a foam slick and stayed in the slick but circled back around 12:54. After about an hour, the Sirena was close and coincidentally or not, the animal picked up speed and moved away (became more distant) from the Seahorse. We were unable to get the Sirena on this sighting but by the time they were close, the Beaufort was 4, swell 2'.



Screenshot of sighting 7. The red circles are all sighting 7 except two locations shown as a gold square and a green square at the top of the screen. The white crosses are positions of the Sirena at several different times. The gold circle centered on the gold square is where WinCruz estimates the vaquita could be given the time since that sighting assuming a 5 nautical mile per hour swim speed.

Sighting #7 - Hoefer; Seahorse

Very steady, very, very slow travel to 1330 relative roughly to SW often along a long, persistent slick with foam; >10 surfacings with 6-7 rolls always relaxed, very slow rolls partially exposing beak/melon each interval on a few rolls; inter-surface intervals about 2-3mins; no calf seen throughout a good hour of observations; as boat Sirena de la Noche was directed over to the area, the animal abruptly changed surface behavior to only 2-3 rolls/surface interval and changed course twice; few surfacings to NW somewhat back toward the area originally in then about face, crossing over original area and heading roughly south; prior to this change to more evasive behavior, the vessel's drones took some footage and were fairly low near the Vaquita course; despite this the animal/s didn't change behavior until the Sirena was within about 1km of projected course from my perspective; excellent look at fin on first, very consistent animal, and had a classic clean, triangular base, and slight, concave anterior terminating in rounded tip, dropping almost vertically with slight nick about 15% down (the nick was only noticeable in the drone footage); after "reaction" the few surfacings I saw before passing bigeyes to Ernesto seemed like a different animal with slightly larger, slightly more erect dorsal fin; BOTH fins I saw were definitely not the funky-tipped dorsal fin seen on Balance's sighting number 2 on 11 May.

Sighting #7 - Ballance; Seahorse

I saw this animal only once, concurrent with a resighting that Bob Pitman had made. Pitman saw this animal many times and reported that it seemed to be remaining in a foam line, possibly working it, perhaps, feeding. The Beaufort was 3-4 and the sea surface had Langmuir lines running in the direction of the wind. I saw the animal at the surface as Pitman called its location. It seemed to be a relatively small animal, with a triangular fin. The surfacing was quick, and the animal seemed to arch over hard though I saw no back behind the dorsal fin. The light and the water were such that my polarized glasses allowed me to see the animal underneath the water for perhaps 10 to 15 seconds. Then it disappeared. I did not see it again, although others continued to do so.

Sighting #7 - Pitman; Seahorse

I joined the sighting several minutes after it began on the 3rd pair of binoculars. The boat was consistently oriented so that I was able to view the animal throughout the entire sighting. After about an hour on the unshaded binoculars in the hot sun, I switched to the port pair under the awning (replacing Felipe). Only one animal at a time was visible throughout the sighting, and there is a slight possibility that there were more than one animal present, surfacing asynchronously, that seems very unlikely given the amount of time we observed this animal at the surface. Early on we observed perhaps a dozen or more surfacings; the animal was not obviously swimming forward but seemed to be interested in breathing but staying in the same general area. It clearly seemed to be feeding and we saw it resurface numerous times in the same general area. The plot on the map showed some linear movement, but it was slow progress. In addition, it was often sighted close to what appeared to be a foam line on the water – either a small front or a wind-generated Langmuir line. We have seen this in the past with porpoises seemingly interested in these features for a prolonged period. After the Sirena moved in to try to photograph it, it seemed to move away from them, and we subsequently resighted it next to another, more distant foam line. The Sirena approached again and it moved off even further. After that, we saw another porpoise, one last time much further away and swimming rapidly away. This could have been a different animal or the same one – hard to tell. We pursued it but never saw it again. When we observe with the big-eyes from a distance, they seem to let us watch for a longer period of time, than when a boat moves in for a close approach, in which case they often move off or just disappear. The original sighting was almost certainly a single animal; the last sighting had what I would guess was a 30% chance of being a different animal.

Sighting #7 - Triana; Seahorse

I was on the portside big eyes observing in the shallow area just outside of the north part of the Zero Tolerance Area. At 12:08:40 I spotted a tall dorsal fin at 48 left at 4 reticles. After seeing this the second time, I hailed Chris who was on the right side big eye to look and help me identify the animal. After a few minutes at 12:11:11, Chris was able to get eyes on the animal, and was immediately confident it was indeed a vaquita porpoise. We were seeing a single animal swimming at a fairly calm pace towards our right. Several surfacings were observed (6-7 surfacings at a time) simultaneously between Chris and I as we called out to the recorder each time the animal was “up” while giving angle and reticle readings of the re-sights. At the time, the Sirena was not close by but was notified of our sighting and they began to steam towards the general area of the sighting. The porpoise did dive into the water column a few times and would remain submerged for 3-5 minutes generally before being re-sighted, still moving in the same left to right direction and at a “cooperative” pace. This allowed us to stay with the animal for 101 minutes and even get photos and drone footage of the animal. The vaquita seemed like a healthy adult animal, and it’s almost positive that it wasn’t traveling with a calf. There could have been another vaquita that was sighted nearby according to other accounts, but this is to be determined. I did not see more than one animal at a time at the surface, but Chris distinguished some features on the dorsal fin on one of the animals that was different from the original. When the Sirena got close to the animal, they weren’t able to sight it, and this is when I noticed the animal changed its swimming behavior. Now the animal only surfaced up to 3 times at a time and would last more than 6 minutes underwater before being re-sighted again. Some of the surfacings were just of the very tip of the dorsal fin, it seemed that the animal was evading the boats. I stayed on the big eyes for over an hour following the vaquita with the help of Chris. During one of the longer dive times, I switched off with the rotating observers, and they continued to monitor the sighting.

S-7



16052023_Seahorse_DS_S07_0232_1239_CROPPED

Date: 5/19/23

Sighting #8: Seahorse only

Photos: N

Videos: N

First time seen: 0727

Last time seen: 0728

Sighting length: 1 min

Beaufort: 4

Swell: 3'

General narrative: Multiple Vaquitas were seen during one surfacing series very close to the ship between Cpod locations 13 and 18.

Sighting #8 - Hoefer; Seahorse

Beaufort low 4, cloudy, but some sun poking through which allowed good contrast during this observation; no calves apparent but very choppy to see them.

At 07:26 or about 10-15 seconds after that, Barlow picked up the extremely close group and I asked for his angle/reticle as there was no recorder present. He stated 92 port, 12 reticles. I instantly panned over and was blocked by his position for the first 1-2 surfacings (he stated there was more than one, at least three and that their fins were aligned at this time); shortly thereafter I scanned behind and in the narrow field between him and the bridge bulkhead; at this point about 30-40 seconds after his initial sight, I picked them up and instantly saw three dorsal fins in a near triangle shaped formation at 94 port, 13 reticles; at this point they were so close I could see the darkish bodies below the fins below surface line and chop, and I got a most excellent look at two fins (the shapes, etc.) plus more importantly I saw very clearly a dark shape just subsurface within a body length (but clearly separate) of the three interactive animals milling around each other; this shape was off just to the S of the group, and I'm 90% sure it was a fourth Vaquita! (the size of the shape was essentially the same as the three at the surface; after this surfacing event, I saw one more surfacing of at least two animals at the edge of my field of view partially blocked by the bridge; they were still milling interactively around each other within about 1-1.5 body lengths. Both Jay and I got off the bigeyes at this point to try to get a F8 and F2 entered, but Jay beat me to WinCruz, and then I scanned naked eye briefly with no success; I then ran into the bridge to get my camera as the vessel was turning 90 to port; one brief sighting of a single animal was reported by Pitman on the monkey deck before the turn. The two fins I saw well: one was very triangular, upright, sharklike and had the funky tip, slightly angled forward to produce a sharp point, i.e., fairly sure 80% that the animal was the same one as I saw during Sighting #2. The other fin was quite large, broad-based and sharklike as well, and it seemed clean to me, no major nicks, scars, etc...but I didn't get a good read on it as well as the other more recognizable fin which I focused on more closely. Despite being very confined during this sighting, I got a clear look at several active animals, i.e., there may have been another animal or two present occulted by the bridge or the port side bigeyes and observer (Jay).

Sighting #8 - Barlow; Seahorse

Beaufort 4, overcast.

I was just completing a 25x scan of the port side from the bow towards the beam when something caught my eye low in my field of view. I saw at least 3 dorsal fins at the surface at the same time, all oriented in the same direction (heading away from the ship and slightly forward). My initial perception was a group of sharks, but then I saw a vaquita head. The animals were moving very slowly. Their dorsal fins were alternately exposed and obscured by the swell, but they seemed to be logging at the surface. Two animals were in-line and the third was off to their left. The initial angle was 92 degrees left and the

reticle was about 12 (they were so close that different animals were at different reticles). I saw 2 additional surfacings after the first look, but they could still be seen underwater between surfacings. Based on their surfacings, I felt there may have been 4 animals present, although I never saw more than 3 at the surface at the same time. I heard that Chris was on them, so I entered an F8 and an F2 in WinCruz before we turned (Barb, the recorder, was talking to the bridge crew). I never saw them again after returning to the port bigeyes. We initiated a turn to port and slowed down. I continued to search, initially with the port big eyes and then with 7x binos as we went over the same area twice. They were not seen again. The three animals that I saw best were clearly not calves of the year. I think I would have been able to see a calf if it were present.

Sighting #8 - Pitman; Seahorse

I was on the deck above the big eye deck (monkey deck) and I heard Jay shout that there were vaquitas (three!) at 92 left and 12(!) reticles. I quickly scanned back and forth on that side of the ship with the handheld binoculars as we came about and slowed; I got one quick look at a lone dorsal fin traveling fast behind and away from the ship. Not surprising due to the Beaufort 4-5 conditions. That was the last we saw of them.

Date: 5/20/23

Sighting #9: Both, Sirena then Seahorse

Photos: Y

Videos: y

First time seen: 0619

Last time seen: 0708

Sighting length: 49 minutes

Sirena sighting time 0619-0708 (49 min)

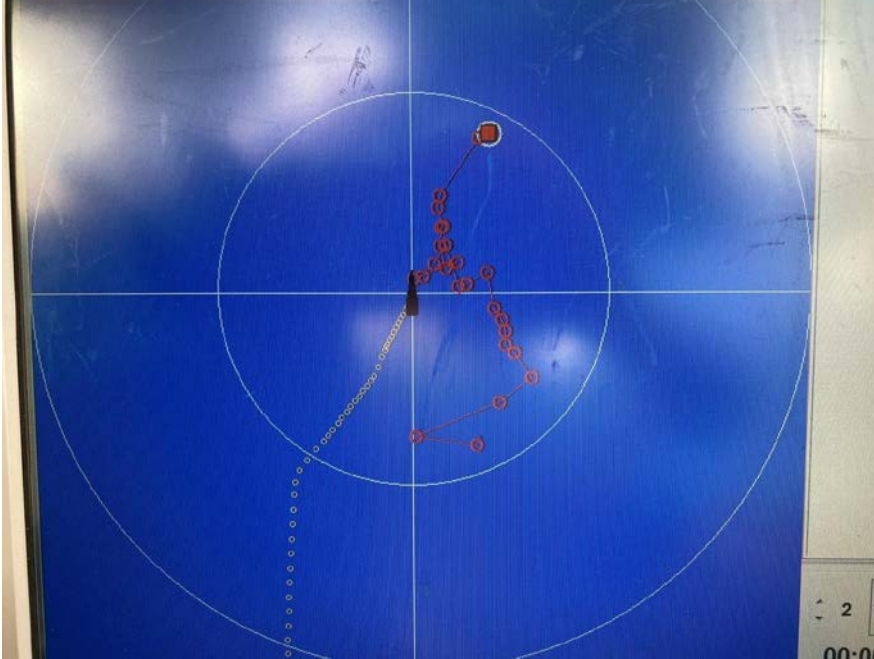
Seahorse sighting time 0623-0652 (29 min)

Beaufort: 1

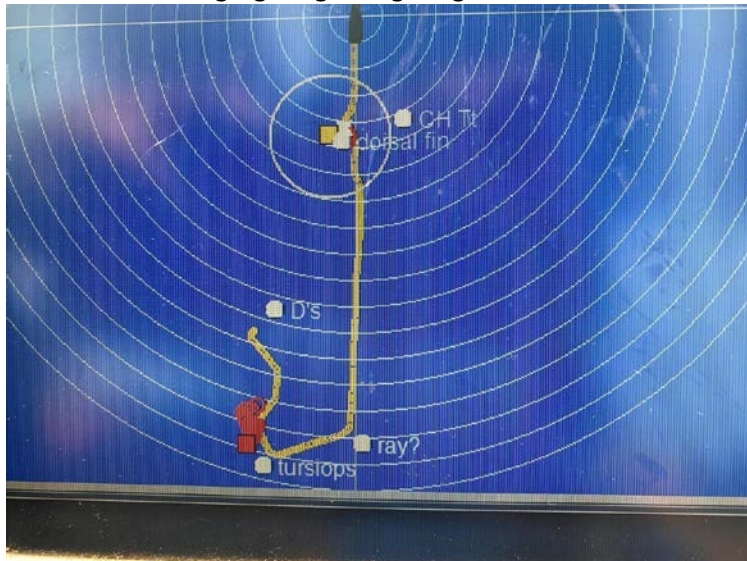
Swell: 1

General narrative: The Sirena sighted 2 animals and called the Seahorse over. The Seahorse picked up the sighting at 6:23 and stayed back to guide the Sirena in for good photos. The screen shot shows consistent directional movement of sightings from the Seahorse. Photos were taken from both ships and drone footage was obtained. There were simultaneous 'ups' called by both vessels but the closer Sirena sees 2 animals and the Seahorse only sees one animal. The Sirena went back on effort at 7:00, then saw an individual at 7:02 and again at 7:08, as they moved back to the trackline. After the sighting, the Sirena observers reviewed the photographs and discovered that this animal was a Tursiops. After resuming effort on the Seahorse, Chris has a Tursiops at 0708 that was entered as an object, and Sirena also later notes a Tursiops in the area. Screenshot shows this.

Final screenshot for sighting 9 from Seahorse. White rings are 1 nm.



Screenshot showing sighting 9 at the bottom and a Tursiops seen by Chris at 7:08 just after going back on effort following sighting 9. Sighting 10 is also seen near the top of the screen.



Sighting #9 - Vázquez; Sirena

I was on effort on the port side of the Sirena and I detected a cetacean with the characteristics of a vaquita that moved from left to right at a moderate speed. This animal was small in size, its dorsal fin was wide at the base and pointy at the tip with a slight arch at the back (slightly falcated), I remember that it was not as triangular as the typical vaquita species. At this moment it was not possible to observe its head, only the dorsal portion. It was coming to the surface in cycles of 3-4 breaths and periods underwater of 1-3 minutes.

A change in direction was observed and a few seconds later another appeared on the surface behind it moving in the same direction. The dorsal fin of this second animal was more triangular and typical of what can be seen in a vaquita. Both individuals were approximately the same size. This happened only

once (they moved in the same direction, with the same cycles of surfacings, they dove almost at the same time).

Observations of these animals were made somewhat difficult by the position in which they emerged on the surface, in addition to the fact that they were close to the glare of the sun. At some point we directed the boat to reposition and have better light and position to get better photos (put the animal(s) on the right side of the Sirena).

It was already difficult for me to identify which of the two we began to follow, once one of them was seen again and we followed it, several breathing cycles later we saw two animals again on the surface, one of them moving to the right and the other to the left almost in front of the Sirena, we followed the one that moved to the left, as it came out close to the boat at -90 degrees. Shortly after turning and following it, we were given the instruction to stop following them, as we had already obtained enough photos from both the Sirena and the Seahorse. There was also video footage from a drone. As we moved away from the last relight location, we again saw a single animal heading towards Consag Rock. Later, in reviewing the photographs, it was not very clear if one of the observed individuals could be a bottlenose dolphin (*Tursiops truncatus*). I am sure that both were the same size, and that at least one of them was a vaquita (100% sure) because in one of the moments in which it came to the surface in its first breath, I had the opportunity to see its head and I did not see the presence of a rostrum like that of bottlenose dolphin. There has been some discussion about the ID of the second animal, I reviewed photos by Felipe Triana and Sergio Martínez, and to me they both look like vaquitas based on dorsal fins and size. Both presented behavior similar to that shown by vaquitas when coming up to breathe and when submerging in a dive. They were possibly feeding.

Sighting #9 - Triana; Sirena

On the Sirena, Southern portion of the ZTA, we had just done half an hour of effort when Ernesto, on the port side observer position, called out that he had a sighting off the port bow at about 1 reticle on the handheld binoculars. I quickly scanned over to locate the animal, and was able to spot it as well. I saw two cetaceans one right after the other moving at a moderate pace towards the right. The animals were close enough to see naked eye, so I decided to give up the binoculars and attempt to get photographs. Ernesto and Pamela along with some of the boat crew had eyes on the animals calling "up" and I was able to catch them with my camera lens. I initially photographed animals just right of the strong glare at 06:24. It was about 2 surfacings, one animal at the surface moving right, but only some of the dorsal fin was exposed before I lost it on a dive. A few moments later, Ernesto and other observers still had eyes on the animal and guided me towards it, the cetacean had moved quite a bit still towards the right, and the boat repositioned to point towards it. I remember seeing a footprint that looked like the animal was still moving right when Ernesto cued me to another animal that was moving left. This is where it seems that the two animals split up. Now I was following an animal that had some distinguishing characteristics on the dorsal fin, easily seen on photos (deep scarring). Through the lens, this animal was behaving just like a vaquita, (arching), not interested in the boat, moving away from us. Upon further inspection of the photos, it turns out that at least the last animal we were following, was a bottlenose dolphin. It is possible that the first animal initially seen by Ernesto was a vaquita, however none of my photos are convincing enough to prove that 100%. I believe Ernesto saw a vaquita because of his description of the head.

Sighting #9- P. Martínez; Sirena

On the boat Sirena de la Noche, I was off effort, when at 06:24 am Ernesto, who was on the port side watch, reported a sighting of a vaquita at bearing 110, reticle 1 (position N 31°02.155', W 114°38.155'), so I took the camera to take pictures. Subsequently there was talk of two individuals, a bottlenose dolphin and a vaquita, however, I was only able to take pictures of a single individual, vaquita-like,

ahead to the morning sun glare, so it was a little bit difficult to completely identify the animal. The individual had several appearances until the notice to abandon the sighting was given and we left at 06:51 am.

Sighting #9 - Hoefler; Seahorse

I was on break during the sighting, but took up my camera and handhelds asap; the Sirena was reporting several surfacings off her bow about 0.5 kms, and seemed to be tracking at least one of the animals quite well; with the 7X binos I got decent looks at three surface intervals while the Sirena was still down sun and closing in on the animal/s; this animal was small in overall mass with a proportionately large dorsal fin and very hard to track, i.e. I am sure it was a Vaquita; animal/s seemed to consistently travel and with similar subsurface interval times but reacted a bit as Sirena got closer and closer; bigeye observers will have a better sense at when the reaction took place; also, interestingly there was a lone Tursiops seen by several, and reported by Triana to have been photographed during the Vaquita follow; as Sirena got closer, the Vaquita was harder to pick up for me and more squirrel-ish, so I switched to my camera and got poor images during three different surface intervals the next time I could pick up "the Vaquita" via my camera viewfinder; while taking these frames I couldn't characterize the animal well; however, I did see a larger animal surface as I noticed the Sirena coming within about 200-300m of the area; upon reviewing my frames, most fin/back combos seem bulkier and Tursiops like; also, very shortly after resuming effort, I was on the starboard bigeyes and I picked up a lone as Tursiops which was low rolling consistently toward the ENE, roughly toward Rocas Consag; this direction of travel was essentially the same as the animal I photographed near the end of Sirena's sighting; Perhaps the only OK image of the actual back/dorsal combo during this sighting was frame 4202; shows what I saw early on through handhelds, i.e. small back under large fin; the fin was noticeably falcate, somewhat more pointed, rather than rounded, at tip.

Sighting #9 - Ballance; Seahorse

This was initially spotted by observers on the Sirena; they reported two animals. Visibility conditions were excellent: low Beaufort 1, swell, less than 1 foot, no glare. I was on big eye binoculars on the Seahorse. I was able to track an animal from shortly after it was initially cited to when we voluntarily left it some 45 minutes later, because we had collected adequate data including photo identification shots. I only saw one animal the entire duration of the sighting. It was the size of a full adult, with a broad-based, triangular dorsal fin. I could detect no indication of any compromised health based on behavior and the small amount of body that was visible. For most of the sighting, it swam in the same direction at what appeared to be (for the animal) a leisurely rate of about 4-6 kt, almost as though in directional travel. Many, if not most of the surfacings consisted of 2-3 breaths, followed by a short period below the water of 1-2 minutes. The behavior was fairly regular through time. On occasion, the animal showed a bit of an arch on the last surfacing of a given surface interval. I also saw two or three surfacings throughout the entire track where the animal came to the surface more rapidly, almost as though it was chasing prey. The Sirena got quite close on occasion, and coincident with what seemed to be its closest approach, the animal changed course by about 90° and appeared to swim in that direction for a few minutes, then it swam in a course 180° to that. This change in direction from the previous directional travel was an indication of a possible response to one or both of our vessels.

Sighting#9 - Bonilla; Seahorse

I was on effort on the starboard big eyes when the Sirena reported a sighting of two animals. I was able to spot one animal for three or four surfacings, the animal was 4 or 5 reticles away. Sea conditions were ideal, and I had good visibility. I was able to see only one animal during all respirations. I noticed that the animal changed directions abruptly between some surfacings. It looked like an adult-size animal. I didn't

notice any particular characteristics in the fin, it had a wide base and was not falcate. When the Sirena came closer to us and then passed between us and the vaquita, the animal seemed to move faster to the left, it was harder to spot afterward. We decided to leave it after almost an hour.

Sighting #9 - Pitman; Seahorse. Sirena called us over for a vaquita sighting. We picked it up straight away and over the next 29 minutes observed the animal probably a couple dozen times as it slow-rolled and appeared to stay in the same area: feeding. Throughout the sighting, observers on the Seahorse saw only a single animal, and that would have been our estimate. However, we heard at least twice from the Sirena that there was a pair surfacing together. In retrospect, after looking at the photos of the single animal, it was clearly a Tursiops. Confusion on this sighting: was there a pair of vaquita with a single Tursiops nearby? A Tursiops associated with a single vaquita? Or maybe a pair of Tursiops.

Sighting #9 - S. Martínez; Seahorse

After Ernesto (on Sirena de la Noche) said that they have a vaquita sighting, I tried to find it on the starboard big eyes, a few seconds later I found it at bearing 56 right and reticle 3, traveling parallel to the starboard side of the Seahorse and around 45° left from Sirena de la noche. I saw one (possible adult) vaquita, in good body condition, it had a triangular dorsal fin a little rounded at the top. After that I switched places with Bob, and I went to the monkey deck to take pictures from there. We have several resightings of that animal.

S-9



20052023_Sirena_CG_S09_0920_0650_CROPPED



20052023_Sirena_FT_S09_0626_Cropped_



20052023_Sirena_FT_S09_0651_Cropped_



20052023_Sirena_FT_S09_0652_Cropped_

Photos of bottlenose dolphin from sighting 9. Drone footage appears to be vaquita (consensus by group).

Date: 5/20/23

Sighting #10: Both, Seahorse then Sirena

Photos: Y

Videos: Y 10:13 drone on it

First time seen: 1009

Last time seen: 1024

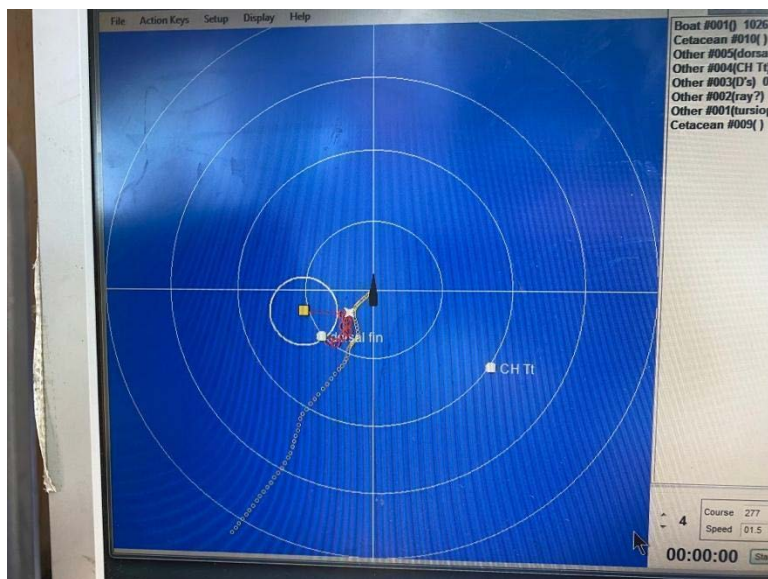
Sighting length: 15 min

Beaufort: 0

Swell: 1

General narrative: The sighting by the Seahorse was seen for multiple surfacings with the animal moving in a partial circle and apparently undisturbed by the ship (see Screenshot). The Sirena had a single sighting (see P. Martinez narrative below). After reviewing photographs that showed this animal to be 'clean' (no nicks or scratches likely to make it identifiable), we decided to take advantage of the excellent viewing conditions and to continue on the survey.

Final screenshot of sighting 10 showing the U-shaped movement pattern of the vaquita.



Sighting #10 - Pitman; Seahorse

Originally sighted a dorsal fin rolling directly toward the vessel. Had to be vaquita but I did not see it again for several minutes. We called Sirena over and stayed with the animal as it apparently remained feeding for the duration of the sighting: slow rolling, little or no swimming, 1-2 quick breathes at the surface and then it disappeared for a few minutes. Only one animal seen the entire time, and the regular surfacing interval reinforced the impression of a single animal.

Sighting #10 - Hoefler; Seahorse

I was on break. Both Pitman and the Sirena noted initially a fin, but the Sirena was much too far away for naked eye or handhelds according to Pitman's possible Vaquita position, despite this Pamela assured me today (21 May) that what she saw from the Sirena was most likely in the same area/time as this sighting; ~2 mins later, Pitman confirmed Vaquita in very close distance to his earlier possible Vaquita; we then turned a bit to port for better views and instructed the Sirena to come over; the animal/s continued for several surfacings to the right roughly parallel to the coast and with the incoming flood tide; almost always reported as slow relaxed rolling but just 2-4X/surfacing from what I could gather from the bigeye chatter and through my camera lens; at this point I and Sergio both took images of the animal's right flank; the images are a bit far but show a slight droop at the tip and suggest maybe a knick on the posterior edge; I never heard whether Sirena's possible fin was ever seen again. This sighting

could easily have involved two animals due to the angle, Sirena's brief unidentified fin, and the general brevity of the observation. Image below is my only decent frame during Sighting 10.



Sighting #10 - Ballance; Seahorse

This was initially sighted by Robert Pitman on *Seahorse* from the port big eye binoculars. Visibility conditions were excellent (Beaufort 1, flat seas, good light). I was on the starboard, aft big eye binoculars but the animal was largely on the port side of the vessel so out of the field of view of these bigeyes for most of the sighting. I had only one view of the sighting, only a single time, and only of a single animal swimming away from us. Bob had a much longer track with the animal, possibly feeding in the foam line.

Sighting #10 - S. Martínez; Seahorse

I was off effort, on the monkey deck, when Bob had a sighting, after a couple of minutes I took some pictures of a single animal, traveling from left to right in front of the ship. The vaquita had a triangular dorsal fin with no scars and the body condition looked good.

Sighting #10 - Bonilla; Seahorse

I was on the Starboard big eyes when I heard Bob calling a sighting, I was able to see a single animal coming towards us. In most of my resights the animal was coming toward us, so I couldn't have a very good visual of the fin. The color and size was consistent with a vaquita. The animal was surfacing quickly. the animal looked healthy. I didn't notice any particular features in the fin.

Sighting #10 - P. Martínez; Sirena

I was doing my starboard watch, and at 10:10, the Seahorse reported a sighting and immediately I looked towards the ship and I could see a fin, it was at 0.5 of reticle, so it was a little far away near the Seahorse. At that same moment I gave a sighting report on the Sirena de la Noche and we headed towards the ship, however, we did not resight it.

S-10



20052023_Seahorse_CH_S10_4234_1014h_CROPPED - best surfacing

Same vaquita (3 pictures)



20052023_Seahorse_SM_S10_015_1013_CROPPED



20052023_Seahorse_SM_S10_016_1013_CROPPED

Date: 5/20/23

Sighting #11: Seahorse only

Photos: Y

Videos: Y

First time seen: 1355

Last time seen: 1516

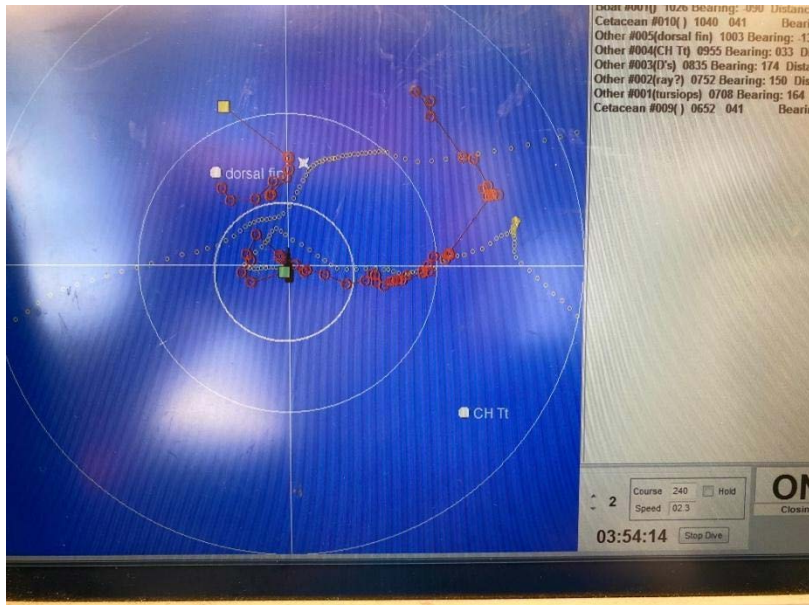
Sighting length: 81 min

Beaufort: 3

Swell: 1

General narrative: Sergio notes immediately in the sighting that one of the animals appears smaller. The Sirena is far away exploring the very shallow waters to look for areas where mothers and young calves may be found. Instead, the Seahorse finds a mother and calf close to where the previous sighting (that did not include a calf) was (Sighting #10). Observer narratives will contain details of behavior but general movements can be seen on the screenshot below. There was no conclusive disturbance to these animals despite approaching to obtain photographs and videos. The approach was sufficiently close to see the vaquitas with naked eye (a treat for all on board).

Screenshot of Sighting #11 with Sighting #10 also visible above. The vaquitas in Sighting #11 moved in a large U from right to left on the screenshot and then doubled back on their path just before we lost them at the position of the green square.



Sighting #11 - S. Martínez; Seahorse

Beaufort 3 Swell 1, 13:55 I was on the starboard big eyes (Seahorse) when I saw one vaquita at Bearing 42 right and reticle 0.8, This animal (with a tall dorsal fin and, good body condition) came to the surface 4 times going parallel (from left to right) to the boat. But when it went down the ship turned a little to the right and I lost the vaquita. A few seconds later I saw a small dorsal fin or the tip of a dorsal fin, but it was going from left to right so I said that maybe it was a calf, but I was not completely sure about it. At that moment Lisa also saw the animal, and she said also, that it looks like a calf. After that Lisa saw the mother and calf pair and then I switched places with Bob and I went to the monkey deck to take some pictures. We have many resightings separated from 3 to 5 minutes and we got some pictures from those animals. In some of the resightings, we saw the small animal in the calf position and in some others the calf was separated from the mom around one body length. Also, in some resightings, we saw the calf separated from one adult by maybe 3 or maybe 4 meters, so some observers said that it was possible a third animal (an adult). We spend almost one and a half hours with them.

Sighting #11 - Ballance; Seahorse

This was initially sighted by Sergio Martinez from Seahorse on the starboard big eye binoculars, less than one reticle on the starboard side of the ship. I was on the port bigeye binoculars and spent the rest of the sighting there (1.5 hrs). Conditions were excellent despite the fact that much of the sighting occurred during a Beaufort three. Swell height was low enough so that the sea was relatively flat. This was a mother-calf pair, evident almost from the beginning by the small size of the second animal. Just a few minutes into the sighting it was clear that we had a mother-calf pair because of the size difference between the two animals, their close proximity, often with the calf in echelon position, and their simultaneous surfacings or, on occasion, with the calf surfacing a split second after the mother. Although the two animals were almost always together, on a very few occasions, we saw them separated by about one body length of the adult, after which time they immediately came back together again. For this reason, we suspected it was not a neonate, although it was a very small animal. The dorsal fin looked almost entirely dark, and the dark around the face was evident on many surfacings. Occasionally, the calf surfaced by bringing its entire head out of the water, but more commonly, we just saw the dorsal fin upon surfacing.

There was a conspicuous foam line on the water surface. I believe it ran from north to south, but the map associated with re-sightings will confirm this. The animals swam on the west side of the foam line the entire 80 minutes we were with them. We never saw them cross the foam line although Bob saw them surface directly in the foam line on a single occasion. The mother calf-pair was frequently close to groups of rays, which were quite common in the area. This happened so often that I found myself wondering about a possible advantage of avoiding predation by hiding amongst the rays.

Rather than swim consistently in one direction, we frequently saw the pair surface heading in one direction, then disappearing under the water and a second or two later, coming to the surface facing in a direction opposite from the previous surfacing. They did this many times, leading us to believe that they were simply milling in the same area. However, the map based on what turned out to be a high number of re-sightings indicated that the animals were moving, remaining approximately the same distance from us for the first hour or so.

Near the end of our time with them, perhaps the last 30 minutes or so, we attempted to get closer for better photo identification data. We were able to come closer than 16 reticles on a number of occasions. Despite that the foam line came very close to the ship on the close approaches near the end of the sighting, we never saw the animals cross that foam line.

On one single sighting, I saw two animals with faces out of the water and headed largely towards us, but swimming so that their paths would cross each other at a 90° angle or so. On that single occasion, both animals looked like adults. My mind assumed that the calf was simply at an angle where it appeared anomalously large.

Sighting #11 - Hoefler; Seahorse

I was on break again, and quickly placed myself next to Pitman with my camera to get good angle estimates. Below is a brief summary of my image processing. The bigeye observers and recorder can describe their behavior, travel, surface interval characteristics, etc. much better than I can. Though, on a handful of surfacings I noticed what was likely two adult-sized animals (especially considering that the calf was extremely difficult to pick up at the moment of rolling through my camera lens), and on others the calf was often not in "calf position". My images show that there are two different adult (or very near adult-sized) dorsal fins; these animals were apparently surfacing alternately and mostly fooled all of us despite the very prolonged observation involving dozens of surfacings; also the calf at least three frames (i.e. three surface intervals) is seen 1-3 body lengths away from mom, and at least one image I think is of the calf and the second animal with a more sharply-tipped, slightly falcate dorsal fin. First frame CJH_4243 @ 14:02, last frame CJH_4494 @ 15:17, I noted personally: maybe two adult fins? before looking at my images.

Initial notes on my worthy images follow: One of best together 4477 @ 15:10; 4371, face of mom plus calf in opposite direction; 4434, appears as two adults or one full adult and one at least near adult together; 4461 thru 4471 great series of more pointed, sharp dorsal single animal rolling three times toward us and clearly no calf; Then 4475 to 4479 show ma/calf typical formation with ma's dorsal more rounded, sharklike; 4484 again shows the sharp, higher fin plus a near full size fin just behind?; 4488 ma/calf @ 15:17:19, then one second later 4489 (15:17:20 time on camera) rolled the sharp finned one exact same area apparently just 1-1.5 body lengths behind mom/calf.

Image CJH_4493 at 15:17:24 (below): a more sharply pointed, falcate animal with presumably the calf?



Image CJH_4478 at 15:10:22 (below); the broad, slightly round tip dorsal fin of the animal which I think (for now) to be the mother; the other two frames for this surfacing no calf is apparent.



Image CJH_4371 (below); the presumed mother exposing the entire beak/head while the calf is swimming seemingly in the opposite direction.



Sighting #11 - Pitman; Seahorse

Sergio sighting of our first confirmed cow/calf pair. It was immediately obvious that this was a cow/calf pair – the calf was apparent with almost every surfacing. It was quite small but not a neonate. It still lunged at times when it surfaced – seemingly still a bit spastic and was almost always right next to its mother in cow/calf formation. It could have been a few weeks old. Our observer group has recently had some discussion about whether we might be missing some cryptic calves, but after this sighting I don't think so. The calf stayed with the mother almost all the time but occasionally bolted away for a meter or two but then came right back. Throughout the entire sighting, we saw only the cow/calf pair, but at one time, shortly after we saw the cow/calf surface, a dorsal fin rolled over 4-5 m away, and it seemed a bit too far to have been the mother, because it meant that the c/c pair was separated by further than they had been seen anytime during the sighting. I suggested at the time that there might be a third animal, but we saw no evidence of a third animal again during the sighting. I would have discounted the possibility, but apparently drone footage of the event shows a third animal. In hindsight, it appeared that when the calf bolted from its mother, it was possibly toward this purported third animal – potentially a sibling or a suitor for the mother. During the entire sighting, the animals stayed on our side of a conspicuous foam line and almost seemed unwilling to cross it as they traveled somewhat parallel to it. At one time, the pair turned around and traveled in the opposite direction and was traveling right in the foam line but did not cross it. They were clearly responding to the presence of this feature, for whatever reason. Drone footage and camera images need to be examined to confirm third individual, and these images should also be compared to sighting #13 (q.v.) for possible match.

Sighting #11 - Bonilla; Seahorse

I was on the Starboard aft big eyes when I heard that we had a sighting, I could find the animals quickly and it was very clear that there were 2 animals together. By the second or third surfacing, we all noticed that one of the animals was smaller. It appeared to surface mostly every time with the mom. Always in

the calf position. Both animals remained in the same general area in relation to a foam line in the water. I had good visual, but a good part of the sighting happened on the left side of the ship, So I couldn't follow the animals all the time. I didn't notice any particular feature in the fin of any of the animals. The whole time I saw the mom and the calf in the same frame, I don't recall having a single animal swimming by itself.

Date: 5/21/23

Sighting #12: Sirena only

Photos: N

Videos: N

First time seen: 0927

Last time seen: 0928

Sighting length: 1 min

Beaufort: low 3

Swell: 2-3

Sighting #12- P. Martínez; Sirena

I was on the Sirena de la Noche heading to buoy 13. I was off effort and at 09:28 am I could see with my naked eye the body and dorsal fin of an individual swimming on the right side of the boat heading north. It dove, so I grabbed the handheld binoculars and saw it surface again, and could confirm that it was indeed a cetacean with a vaquita-like dorsal fin. I gave the sighting report with bearing 40°, reticle 1 (position N 31°09.991, W 114°44.294). It looked adult size. Immediately the boat stopped to return to the position where I had observed the individual but unfortunately I couldn't find it again.

Sighting #12 - Mesnick; Sirena

I was on the starboard handheld binoculars and caught a glint of light at 20°, such as that on a dorsal fin or body of a marine mammal, and saw it again a moment later. Viewing conditions were compromised (B2/low B3) and as I considered whether this was a light on a wavelet or an animal, Pamela sighted an animal at 40°, which makes sense as the Sirena was transiting along the trackline. I only caught a glimpse of what could be a single individual and direction is consistent with that of Pamela's observation.

Date: 5/21/23

Sighting #13: Seahorse only

Photos: Y

Videos: Y

First time seen: 0928

Last time seen: 0957

Sighting length: 29 min

Beaufort: 2 that went to 3

Swell: 3

General narrative: Sighting nearly simultaneous with Sirena sighting but in clearly different locations. The two big eye observers both saw two animals with one being smaller. When the sighting was entered, it was immediately apparent that something was wrong with WinCruz as the sighting did not plot on the map. Despite attempts to correct, the computer was not useable for this sighting and details are given in Dawn Breese's notes though no map can be reconstructed since the heading of the ship could not be recorded. The ship was close to Cpod site 2 throughout the sighting. Photos and good drone footage were obtained.

Sighting #13 - S. Martínez; Seahorse

Felipe saw two vaquitas at 9:28. I was waiting to start at the port position, and when he had the sighting I went to the monkey deck to take pictures. The pair was traveling slowly from left to right and we had many resightings, in almost all of them I saw two animals separated by 3 or 4 meters between them. In one of the resightings they came close to the port side of the bow and then they went away towards the starboard side and we lost sight of them.

Sighting #13 - Triana; Seahorse

I was on the port side big eyes when I spotted two vaquita porpoises approximately 55 left at 3 reticles. The animals were actually about 100 meters in front of a c-pod buoy (C-pod 2). The animals were initially slowly moving parallel in the same direction as the Seahorse. One animal seemed smaller than the other and they were within 1-2 body lengths from one another. I tried to get Lisa on them as fast as I could but the big eyes weren't matching correctly. Thankfully only after a few moments, Lisa was able to get on them. We both observed the animals at the surface together simultaneously for many surfacings (at least 6) and we both noticed they were swimming in the same direction as each other still at a fairly calm pace. The Seahorse turned to port so that the training big eyes could see them. The animals looked healthy and the lighting was great to notice coloring around the eyes and mouth, it looked like they had a tan/grey hue to them. After the turn, the animals were almost directly ahead of the vessel about 500 meters approximately. I saw several more surfacings of the two animals before I was asked to rotate with Bob so that I could attempt photo ID. Now it was Lisa and Bob on the big eyes and I was on the bow waiting to re-sight them with my camera lens. I overheard one of Lisa's resights and was able to get some photographs of at least one animal. I still noticed two animals but was not able to get them both in frame because they were beginning to swim in different directions and would frequently change course. The drone was above them and was able to take some aerial footage of the two animals, confirming a cow calf pair. The vaquitas actually swam towards the Seahorse at one point and that was the closest we saw them (approx 300 meters) from the vessel and a few degrees off the port bow. They were visually lost and unfortunately not re-sighted after that.

Sighting #13 - Ballance; Seahorse

I was on the Seahorse, surveying on the starboard pair of big eye binoculars. Sighting conditions were good: a Beaufort 2 with 3 foot swell, and no glare in the direction of the vessel's course. Felipe Triana had a sighting of two animals on the port side of the vessel at 9:28AM from the port bigeye binoculars. I was able to locate them a few minutes later and tracked them essentially until we lost them just before 10:00 AM.

My initial sighting and many subsequent sightings were of two animals. And on the first series of sightings, both animals were tightly together, within 10 cm of each other, and one was noticeably smaller than the other. The smaller animal swam slightly behind the larger and appeared to be in echelon position. I saw this pair together, and in this same position with the apparent size difference clearly visible on many occasions during the subsequent tracking period. This small animal was almost certainly a calf, but not a neonate. There were times, however, when I saw two animals simultaneously at the surface that were separated from each other by a greater distance, 2-3 adult body lengths apart. I saw this formation two or three times. Each time, the animals were swimming straight away from the ship, so it was difficult to assess size of either animal. However, it did not appear that one was larger or smaller than the other on these occasions. By the end of the sighting, I can say with 100% certainty that there were at least two animals. There may have been three.

Behavior - the animals swam at a speed of approximately three kts throughout the sighting. They would surface 3 to 4 times in succession, with about three seconds between each surfacing, then go below the water, and remain under for 2 to 3 minutes before surfacing again. They did not appear to be traveling. Instead, they appeared to remain roughly in the same location. They frequently changed direction, moving for one to several surfacings in one direction, then, on the next surfacing, swimming in the opposite direction. Only on one occasion did I hear another observer refer to a quick roll at the surface, and only on one occasion a referral to a high arch; I saw neither. The water was greenish brown, and we were about 2 miles away from a line that separated this water from more blue water to the east. There were a great many rays in the area (singles and small groups), to the point where it became challenging at times to focus on the Vaquita because the rays fin tips looked so similar when they broke the surface of the water.

We got very close to the animals near the sighting's end, so close that the big eye binoculars had no horizon visible in their field of view, and the focus was blurred due to close proximity. At this same time, multiple observers detected the animals with unaided eye, and we were able to track them for several minutes. I would estimate the closest approach at 300 m. During this time, Felipe Triana was able to get good photo identification data, and the drone collected video.

Ultimately, after the animals got so close to us, we lost them. I did not get the impression that they were reacting to the ship. Instead, I believe we lost them simply because they were so close to us and we lost the ability to track from a distance.

Sighting #13 - Pitman; Seahorse

Felipe sighted a pair of vaquita together on the port side big eyes, and we turned so that I could have a look from the 3rd pair of starboard aft big eyes. The pair swam fairly close together for several surfacings, changing directions, and rolling over hard - they appeared to be feeding. At one time the two animals surfaced about 4 body lengths apart and appeared to be adults of about the same size. Most of the time though they surfaced close together – rather like a c/c pair, and at least a couple people thought that there was a calf present that was somewhat smaller than its mother. B. Taylor reported that drone footage from the sighting showed a small calf swimming awkwardly. Her description seems somewhat similar to the c/c sighting we had yesterday with the still somewhat spastic calf; she also said that the calf in the drone footage seemed very young, although at least a couple of us thought that today's calf was noticeably larger than yesterday's. Photos from this group should be checked to see if 3 animals were present and also compared to sighting #11 to see if it could have been the same group (#11 and #13 were both seen very close to C-pod buoy #2 in less than 24 h and both suspected to have 3 individuals present).

Sighting #13 - Taylor; Seahorse

During the computer crisis, I saw the vaquitas naked eye and then through binoculars. I saw 3 surfacings of an adult with a small individual in calf position that matched the size and behavior of a calf. On 2 of these surfacings there was a rapid surfacing of an adult sized vaquita in what seemed to be 1-2 body lengths behind where the mother and calf surfaced. I never saw three at the surface at once. This observation was close to the time we lost the vaquitas when they were very close to the ship and big eye observers said they were too close for big eyes.

Sighting #13 - Breese; Seahorse

I was taking notes from observers in my green notebook because we lost GPS. I was looking where the animals had been coming up and at 0953:20, ~ 300 meters away (estimated by eye to be the edge of the standard seabird survey zone) at about 35° left I saw two different vaquitas surface. The first one surfaced with a slow fairly high roll to the left. A split second later approximately 1.5 body lengths to the

right the second one surfaced with a slow fairly high roll to the right. Both animals identified as vaquita by their dark gray color, rounded faces, and tall, triangular, dorsal fins that were broad at the base, not falcate. I observed that surfacing with my handheld 10 x 42 binoculars. I did not see them again. The drone was still flying at that time and other people saw them after that lined up with C pod buoy #2 in the background, but I did not see those surfacings.

S-13



21052023_Seahorse_SM_S13_033_0953_CROPPED



21052023_Seahorse_DS_S13_0460_0946_CROPPED_2

Same
vaquita



21052023_Seahorse_CG_S13_1362_0951_CROPPED



21052023_Seahorse_SM_S13_037_0953_CROPPED

S-13



21052023_Seahorse_SM_S13_038_0957_CROPPED

Maybe calf?



21052023_Seahorse_CG_S13_1311_0932_CROPPED

Date: 5/22/23

Sighting 14: Seahorse only

Photos: N

Videos: N

First time seen: 0916
Last time seen: 0917
Sighting length: 1 min
Beaufort: 1
Swell: 2

General narrative Seahorse: Lisa Ballance's narrative will relate the only view of this sighting as the animal(s) were quickly obscured by a passing Navy vessel. The Sirena was called over to help search but the animal(s) were never relocated.

Sirena: The Seahorse radios a sighting over to the Sirena at 0916, which we put into our navigation system. Viewing conditions were very good (Beaufort 1, swell 1-2'). We steam over to the location, a procedure that turns out to work quite well was giving and receiving sighting locations from the Seahorse to the Sirena de la Noche. Both ships search, but there are no resights. Sirena de la Noche returns to effort at 0959. Total time Sirena is searching: 43 min.

Sighting #14 - Ballance; Seahorse

I was on the starboard, big eye binoculars, aboard Seahorse. Visibility conditions were good to excellent, with the sun behind us, Beaufort 2, about 6 knots of wind, and 2 foot swell. The water was greenish brown with bands of slick water running from northeast to southwest. I saw a Vaquita roll up with a high arch, directly in the middle of one of these bands of slick water, approximately 1.2 reticles in front of the ship. The animal was swimming on a course of 280 relative to our bow. I had a good look at the triangular, dorsal fin and a bit of the back as the animal arched up and disappeared beneath the water surface. It was distant, but the light was excellent on the light gray dorsal fin. Without a doubt, Vaquita. A few seconds after the animal went below the surface, the large Navy vessel towing a Navy panga crossed in front of our bow between us and the location where the animal had been sighted. We resumed our search once the Navy vessel had passed, about one minute later, when our view was restored. We were unable to locate the animal again.

Date: 5/22/23

Sighting #15: Seahorse only

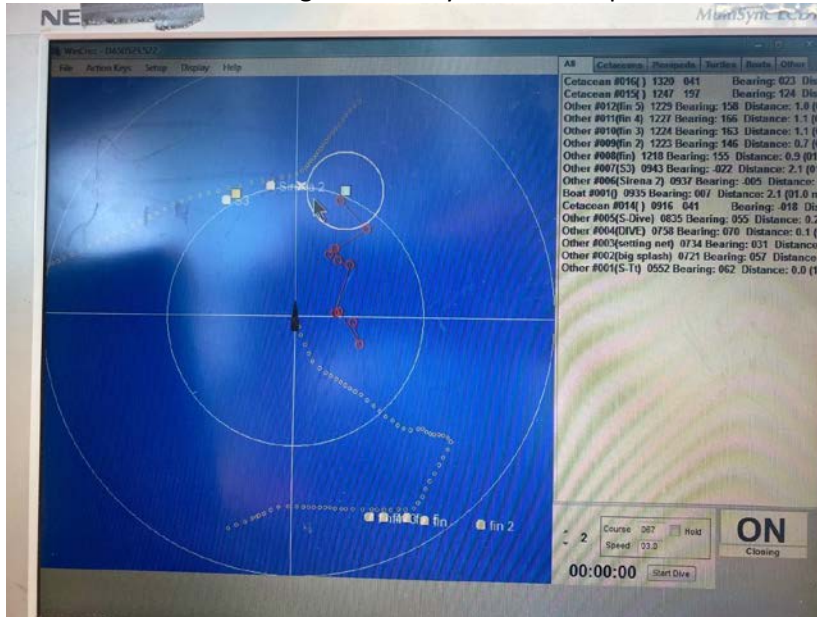
Photos: N
Videos: N
First time seen: 1219
Last time seen: 1229
Sighting length: 10 min
Beaufort: 2
Swell: 3

General narrative: This sighting was always the knife-edge of the dorsal fin so a positive species identification was not possible. Several observers saw the dorsal fin and felt it was plausible that it was a vaquita so the event was given an official sighting number. The Sirena was called over but only saw the sea lions that were also noted by observers on the Seahorse.

Sirena: The Seahorse radios over that they have a sighting but the animals are not resighted. Sirena de la Noche enters the sighting location and steams over to assist in the search for the animals (1233). While the search for the animals goes on, a sea lion swims in the wake of the Seahorse but no cetaceans are

resighted. Sirena de la Noche returns to its trackline at 1248. Viewing conditions are moderate for vaquita, Beaufort 2 and swell 2-3'.

The screenshot below shows the resights of Sighting #15 as "fin" because it was initially input as an object and then edited to be a sighting once S. Martinez gave some probability that it was a vaquita. The 'fin' moved in a straight line away from the ship.



Sighting #15 - S. Martinez; Seahorse

I was on the third big eyes (starboard aft) and at 12:18, Bearing 21 and reticle 1.5, I saw from behind a tall dorsal fin going away from us, I only saw the fin, not a body for maybe a second or two. After the second time that I saw it, I called Felipe and told him the position and that I think there was a 50-50% chance it was vaquita. A couple of minutes later I saw it again (same characteristics of previous sighting) and in that moment Felipe (at the starboard side big eyes) and Andrea (port side big eyes) saw it. We spent some minutes trying to find it again, and even the Sirena de la Noche came close to help us, but we did not find it again. Sirena's observers said that they saw a sea lion, but I'm 100% sure that what I saw was not a sea lion.

Sighting #15 - Bonilla; Seahorse

I was on the port big eyes and heard that Sergio saw a fin far at 1.5 reticles, going away from us. After some time, at reticle 4.5 I saw a fin coming either towards us or going away. I saw the animal twice. The fin was tall and pointed. I'm not sure it was a vaquita, but I am sure it was a cetacean. We didn't see the animal again.

Sighting #15 - Triana; Seahorse

I was on the starboard big eyes, Sergio was on the starboard aft training big eyes when he called out that he saw a suspicious fin at 21 right and 1.5 reticles. It took me quite a bit to catch the animal at the surface, but when I did, I saw what looked like a dorsal fin swimming away from us. Not much of the animal besides some of the dorsal fin was exposed. I observed a total of 5 surfacings of the animal swimming at a fast pace, but never saw any other part of the body. I would give this a 65 percent chance of being vaquita because I didn't actually see other parts of the body. The behavior was very vaquita like though as the animal was frequently diving into the water column like a vaquita does.

Date: 5/22/23

Sighting #16: Both, Seahorse then Sirena

Photos: Y

Videos: Y

First time seen: 1255 Seahorse (~14:05 Sirena)

Last time seen: from both 1424

Sighting length: 89 min

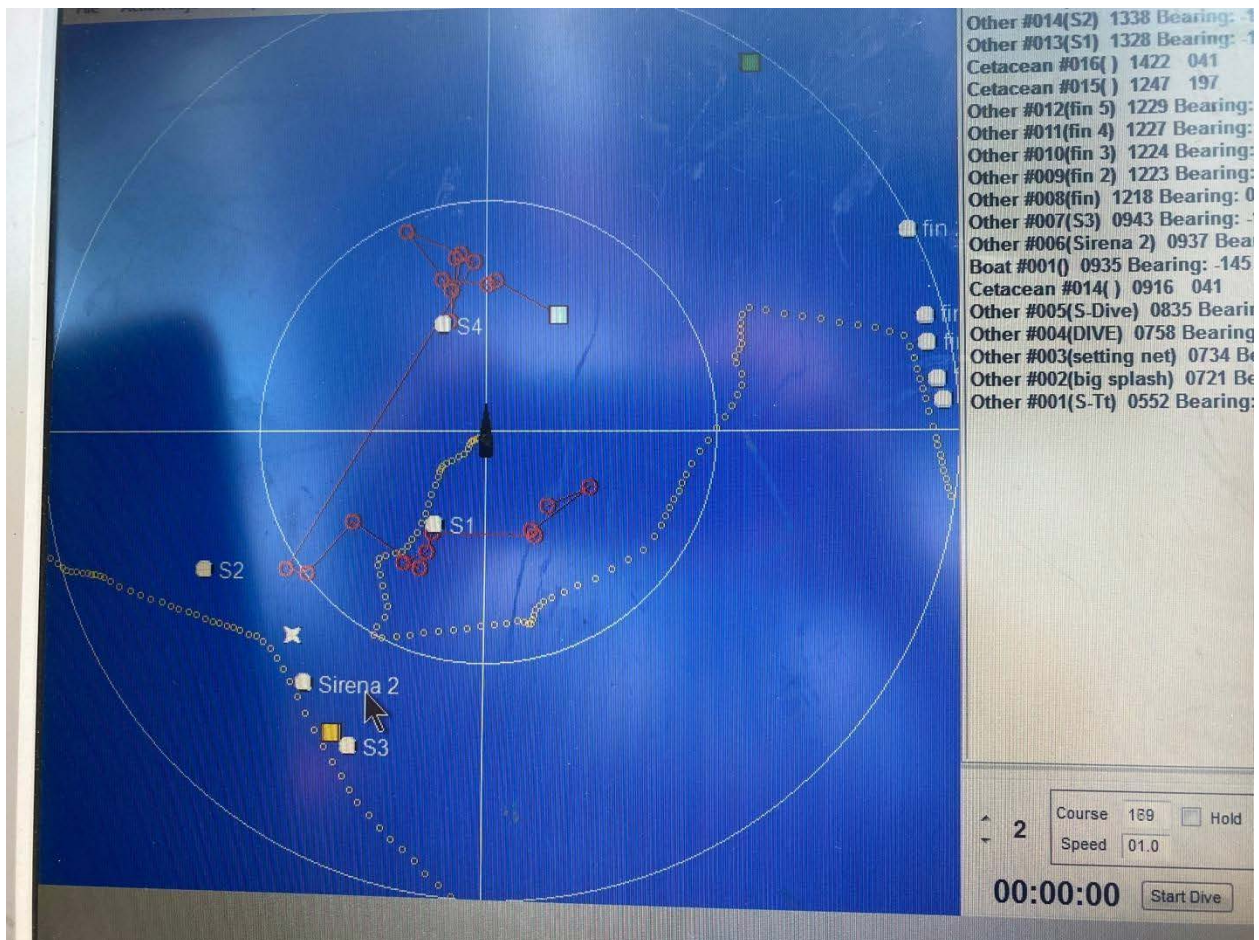
Beaufort: 2

Swell: 3

General narrative: This sighting can be described in three periods. First) 12:55 to 13:20 we followed animals whose resighting pattern was zig zagging such that we wondered if there could be two groups, i.e., they weren't up in anticipated locations based on their travel pattern. The Sirena looked, but was not able to pick them up during this period. Second) 13:20 to 13:49 we lost them and went back to our regular search. Third) 13:49 to 14:24 we picked them up again and chose to enter it as a resighting, not a new sighting. Therefore, at least some observers thought there could have been two separate groups in the first zigzag period 1 and the later observations in the third period could be either a resighting of the vaquitas in period 1 or an additional group independent of the earlier surfacings in period 1. During the 3rd period the resights were clumped and more predictable and the Sirena was able to find them. There are photos from the Sirena and drone footage during this time. Overall, they moved in a wide clockwise circle, ending up approximately ½ nmi from where they began at 12:55. (See screenshot)

Sirena: The Seahorse radios over a sighting at 1258. The Sirena steams to a couple of different resight locations, but we do not see the animals. Sirena begins to return to effort at 1348. However, a moment later (1350), the Seahorse radios the location of another (re-sighting) and Sirena heads over to this location (although this could be the same or different animals; see map). When the Sirena de la Noche comes to steerage at the second sighting location, the capitan (!) calls out that he sees an animal directly in front of the boat. The animals are steadily moving along a slick, away from the Sirena, in a wide arcing circle, rolling low, and continually moving away. All Sirena photographers obtain photos, although closest approaches were at a distance of 200-250m. We are with the animals from approximately 1405-1427, but then lose sight of the animals. Seahorse has one additional resight, but the animals are not sighted again. After a quick review of the photos, it appears that dorsal fin images were obtained of what we think are all individuals in the sighting. We return to effort at 1440. Sirena is with the animals for about 22 min.

In the screenshot, Period 1 is all the red circles below the horizontal white line, the period 2 gap is the



long red line that crosses the horizontal white line and period 3 is the cluster of red circles with S4 representing the position of the Sirena when the photos and drone footage was obtained.

Sighting #16 - Pitman; Seahorse

Originally, I saw a single animal roll: it appeared larger than a Tursiops with a robust body and a small, triangular dorsal fin; the combination was very suggestive of *Mesoplodon peruvianus*. I missed the next roll, but Lisa saw it and said she saw something very similar. I did not see anything like this for the rest of the sighting and am not sure what to make of it. Next, I saw a single animal roll some distance away,

followed shortly by a cow/calf pair of vaquitas. For the next 25 min we tracked them through numerous surfacings, with both animals usually close together in echelon formation. As we tracked them, their surfacings were a bit erratic, forming, seemingly, a zig zag pattern. In retrospect, I was probably seeing the pair and another animal: Lisa reported seeing three animals together at least once during the sighting, and I believe 3 animals were photographed/videoed, also. The calf was noticeably small and stayed close to the mother but bolted short distances from her side at times and returned immediately. They did not seem to be too skittish about the ship, but also seemed to maintain a distance of 1000 m or so. We called the Sirena in to try to approach for photographs. Shortly afterward the vaquitas disappeared and it wasn't until 29 min and ~1.3 nautical miles later that we encountered another cow/calf pair and, apparently, another third animal. Seems likely that it was the same group, but the time and distance measurements should be checked as well as the photos for matches. We need to compare images from this sighting with #11 and #13 to see if any or all these sightings were the same or different – they seemed remarkably similar in terms of location, behavior, and group composition.

Sighting #16 - Ballance; Seahorse

I was on the starboard aft big eye binoculars aboard the Seahorse. We tracked this sighting, initially made by Bob Pitman on the port big eye binoculars, for about an hour and a half. My view was compromised by the ship (these binoculars have a view to the port only to 10° left of the bow), and media personnel for much of the sighting but I can confirm that I saw the animals on numerous occasions in different types of light and distances ranging from half a mile to one reticle. They were definitely Vaquita, definitely a cow-calf pair, and definitely another adult animal. It was on only one occasion, but very clear when I saw three animals surface together simultaneously in the same field of view for my big eye binoculars. The mother calf pair were side-by-side, very close together, almost touching with the calf on the mother's right side, and a third animal the size of an adult beside the mother, on her left side and slightly behind her.

Sighting #16 - Triana; Seahorse

I was off effort while Bob and Andrea were on the big eyes and Bob had a sighting of vaquita not too long after sighting 15. When Bob shouted out one of the surfacings, I was able to catch them on the hand held binoculars exactly where he was looking. I saw a dorsal fin with a glint of sunlight reflecting from it. The animal looked like it was moving right. Andrea handed the big eyes to me at this moment. Now it was Bob and I on the big eyes. Once on the big eyes I was able to notice two animals at the surface simultaneously. After following them for a while, they seemed like they were zig zagging or we could have possibly been following two separate groups (more than two animals). The Sirena was called and eventually found the animals. They got close enough to observe 3 animals. After following them for over an hour we lost visual sighting when they were between the Sirena and the Seahorse. There was a pair that looked like there was a calf but the calf is not a newborn, due to the size of the body in the pictures.

Sighting #16 - P. Martínez; Sirena

We were on track to line 5, when we received a sighting call from the Seahorse at 12:58 pm of a mother and calf vaquita, so we headed towards the ship. They had a resighting at 13:10 pm and provided us with the position (N 31°10.61, W 114°44.86) and we headed that direction. After a mile and a half, Captain Oscar gave the re-sighting call and we were able to observe them (vaquita-like with a triangle-shaped dorsal fin) ahead of us swimming to the right. I was only able to observe two individuals. A minute later I was able to observe them again going the same direction. They surfaced two more times and after that we didn't see them again. During this time we were able to photograph them.

Sighting #16 - Hoefer; Sirena

I only observed the very end of this sighting, as it was observed from the Seahorse initially. They reported maybe two different groups/pairs and one "calf". As the Sirena finally came on to at least one of the 'groups' just to the S of the 2, 3, 7 hotspot with a reported mom-calf involving an unequivocal new/young calf of the year; when we (Sirena observers) got onto them they were tight together around some slicks; at least initially it seemed like they wanted to stay in the strong slick area but they became obviously evasive after or during the second surfacing interval; their surfacings became more erratic, only 2-4 rolls, faster rolling, and generally higher arching; despite this, we managed to photograph partially three more surface intervals; the second of the intervals I saw quite well as I had my viewfinder placed on essentially the exact spot of surfacing; hence, I obtained a tight series of frames that clearly show three different animals (images follow) close together; the triangular-finned one on a slightly different course, but the more classically-finned adult and the juv/subadult were traveling in the same direction; we lost them then after those three surface intervals, but the Seahorse bigeyes picked them up briefly between that vessel and us; at this point, all aboard the Sirena scanned intensely in all directions with no joy. Gomez, the Sea Shepherd photographer, Ernesto, and Pamela all obtained images as well as I did; mine show clearly three animals (three distinct fins); two of which appear as full adults, and one appears as a juvenile/sub adult that is definitely not a "calf of the year"; Ernesto and I discussed briefly, and we think it is more than 6 months old; thereafter, the Sirena headed for the marina due to increasing Beaufort and engine repairs pending.

**Ernesto Vazquez narrative: I agree with the description made by Chris Hoefer. His narrative fully describes what I observed.*

**Sarah Mesnick narrative: I too agree that Chris Hoefer's narrative fully describes what I observed and heard on the Sirena de la Noche. After navigating to the last resight location of the Seahorse, I was recorder and my views of the vaquitas were naked eye or with handhelds. I did not see the calf but repeatedly heard that one was present. I observed two adult-sized animals on at least three surfacings. I was interested in the close proximity of the individuals and how they stayed tightly together as they traveled along a slick line. The animals maintained a distance of about 200-250 from us, traveling away, and seemingly becoming more evasive over the course of the sighting. In addition to the "mother-calf/juvenile/subadult" pair, is this additional adult individual a suitor, other adult female, or offspring from the previous year (per Anna's observations of harbor porpoise)? The animals swam tightly together throughout the sighting. Animals seemed robust and in good body condition.*

Photos and descriptions by Hoefer:

IMAGE (below): One full adult with apparently clean dorsal; slightly convex anterior edge, fairly vertical, appearing unmarked, posterior edge (in other image, the dorsal tip seems to have a slightly flattened edge just forward); the 'younger' animal shows a dorsal about 50-60% mass of the adult, but the body size seems easily between 60-75% of the adult...



IMAGE (below): this is the more 'classically' shaped Vaquita fin; shark-like; slight concave forward, but very vertical posteriorly; slightly flattened tip



***the series just below shows, I believe, as clearly as was possible during this sighting, the three Vaquita surfacing close together; the juv/subadult is a bit confusing, because my camera's frames/sec capacity is inadequate; however, I saw clearly through the camera viewfinder three individuals rolling in tight sequence. This "classic" individual, in images above, is in the middle of the pack (in this series).

IMAGE SERIES (below): First two frames show the triangular dorsal rolling away to about 4 o'clock; the third image shows the tip of triangular dorsal plus the presumed adult (with classic fin) popping up between the two; the last image shows the juvenile/subadult behind rolling in same direction as the middle adult, i.e. to about 2 o'clock.





S-16



22052023_Sirena_CH_S16_4600_1419h_CROPPED - best body shot of shark finned adult



22052023_SIRENA_EV_S16_1635_1418_CROPPED



22052023_SIRENA_EV_S16_1626_1417_CROPPED

↔
Same
vaquita

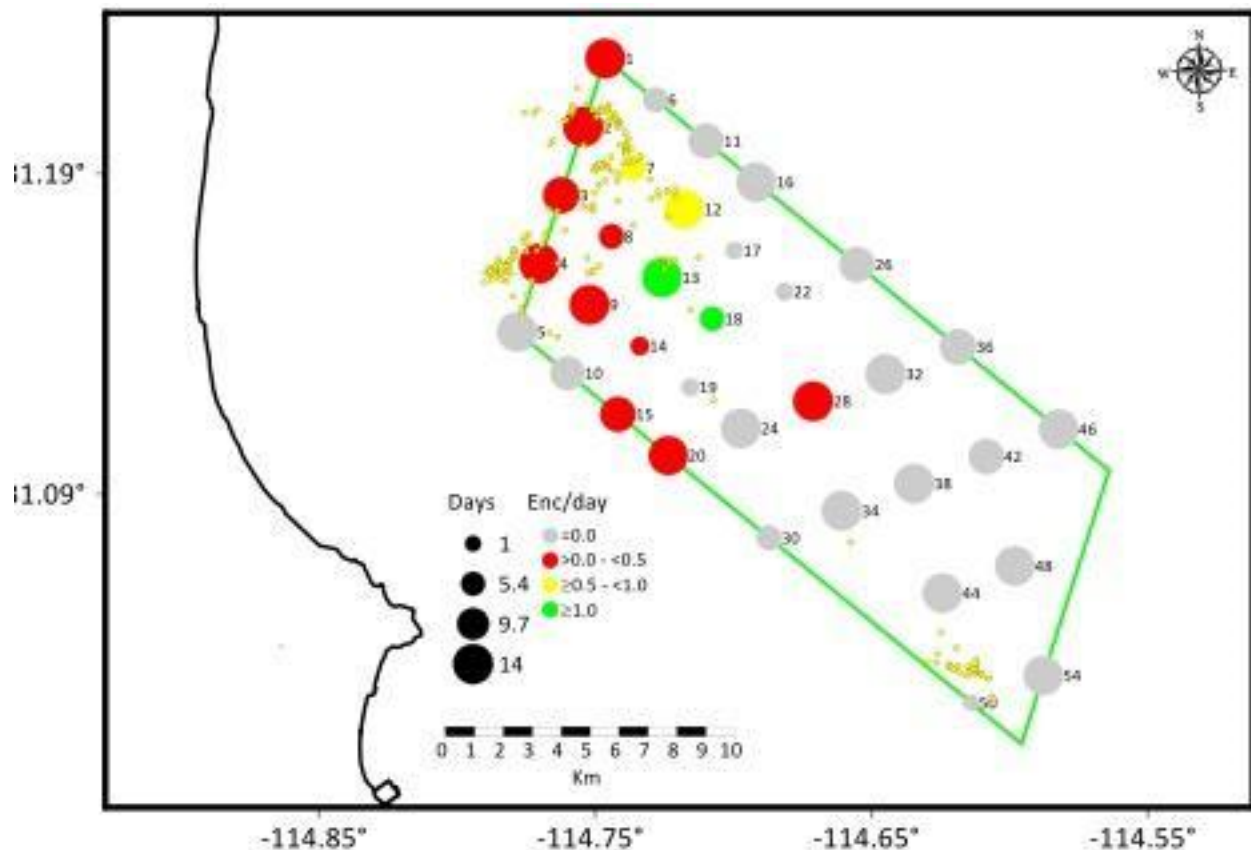


22052023_SIRENA_EV_S16_1621_1414_CROPPED

Summary Evidence

There were 16 sightings that plausibly contained vaquitas (Table 1)

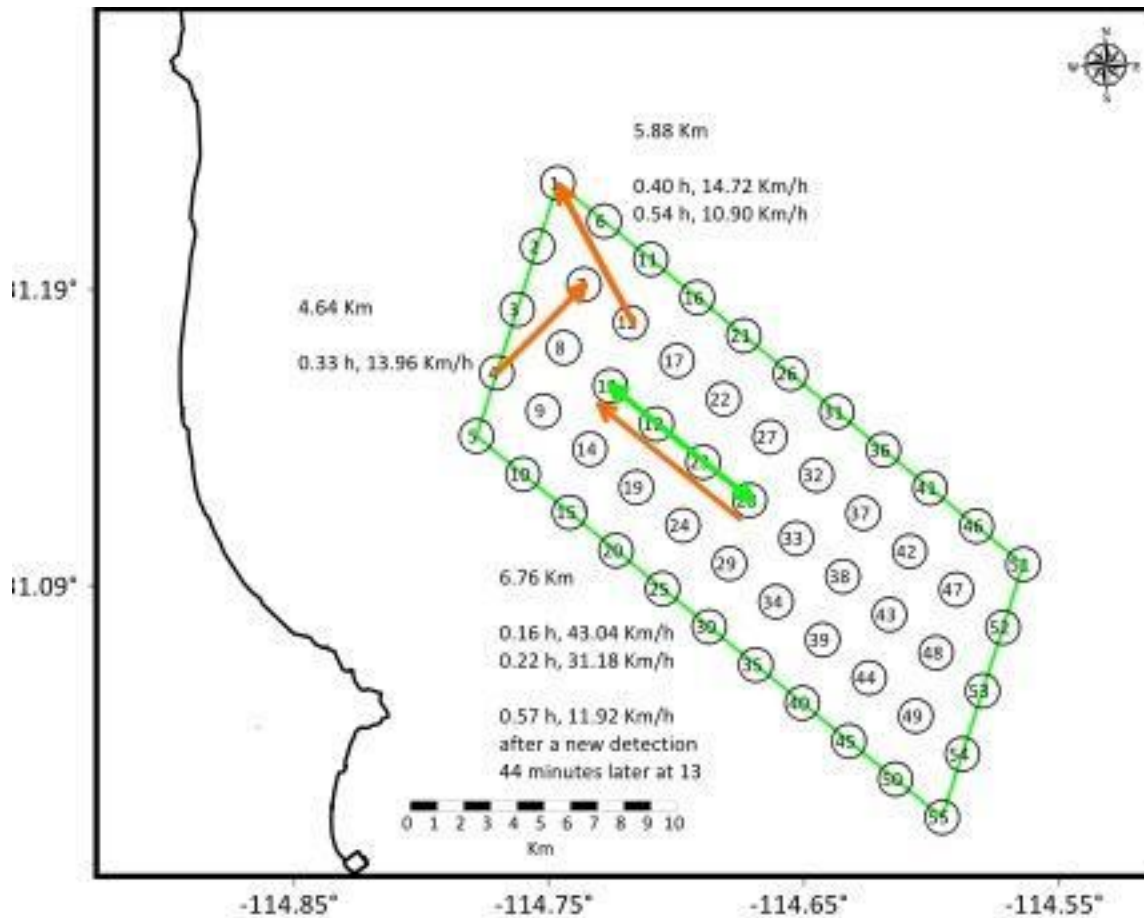
Daily effort was based in part on data provided from acoustic detections, summarized in the Figure below. Nearly all acoustic detections were in the northern half of the ZTA, there were fewer detections in the southern half.



- The map above shows a synthesis of vaquita acoustic monitoring along the survey. Circles show sampling effort (size of circles) and average encounter rates (color of circles).
- A total effort of 371.57 days of effort were applied in 35 of the 55 sites of the sampling grid.
- The average effort per site was 10.62 days (not counting sites with zero effort), with a minimum effort of 1.3 days and maximum of 14.0 days.
- A total of 61 acoustic encounters of vaquitas were identified in 14 of the 35 sites with sampling effort.
- The average encounter rate was 0.178 enc/day, and 0.445 enc/day accounting only for sites with acoustic encounters.
- The minimum encounter rate was 0.073 enc/day (not considering zeros) and the maximum 1.077 enc/day.
- The western region of ZTA, between sites 1 and 20, is where vaquitas are acoustically more active, which corresponds with visual sightings of vaquitas (Yellow/black dots on the map).

- The sightings around sites 34, 44 and 50 show that the absence of acoustic detections is not indicative of the absence of vaquitas.
- In the western portion of the ZTA there is a stratification of detection rates, with the area around sites 7, 8, 12, 13, 17 and 18 forming a rectangle of the highest encounter rates.
- Acoustic encounters at site 28 are indicative of acoustic activity and presence of vaquitas in the central and eastern portions of ZTA, but at significantly lower rates.
- The constant acoustic activity of vaquitas in the western border of the ZTA, together with sightings of groups outside the area to the west, indicates the urgency to extend the ZTA in order to protect the current habitat of vaquita.
- According to acoustic information, vaquitas tend to stay in, or visit regularly, some areas of the ZTA. This likely reinforces that some areas of the ZTA are beneficial for their biological activities.
- For vaquita surveys, with such a reduced population, acoustic monitoring applied in nearly real time is a reliable tool to assist visual efforts.
- As previously known, it was observed that the clam dive fishery operates during neap tide periods, which resulted in the loss of acoustic moorings. Sampling during spring tide periods looks promising for future surveys.
- The concrete blocks with hooks deployed by the Mexican Navy in the ZTA is indicative of their strong deterrent force. It is forcing us to change our sampling strategy and resume effort during spring tides. We still need to work in an index of neap tide to decide the best days of deployment.
- Also, given their deterring power, it is recommended not only to extend the ZTA to the west, but to increase the number of blocks in that area and the borders of all the ZTA.

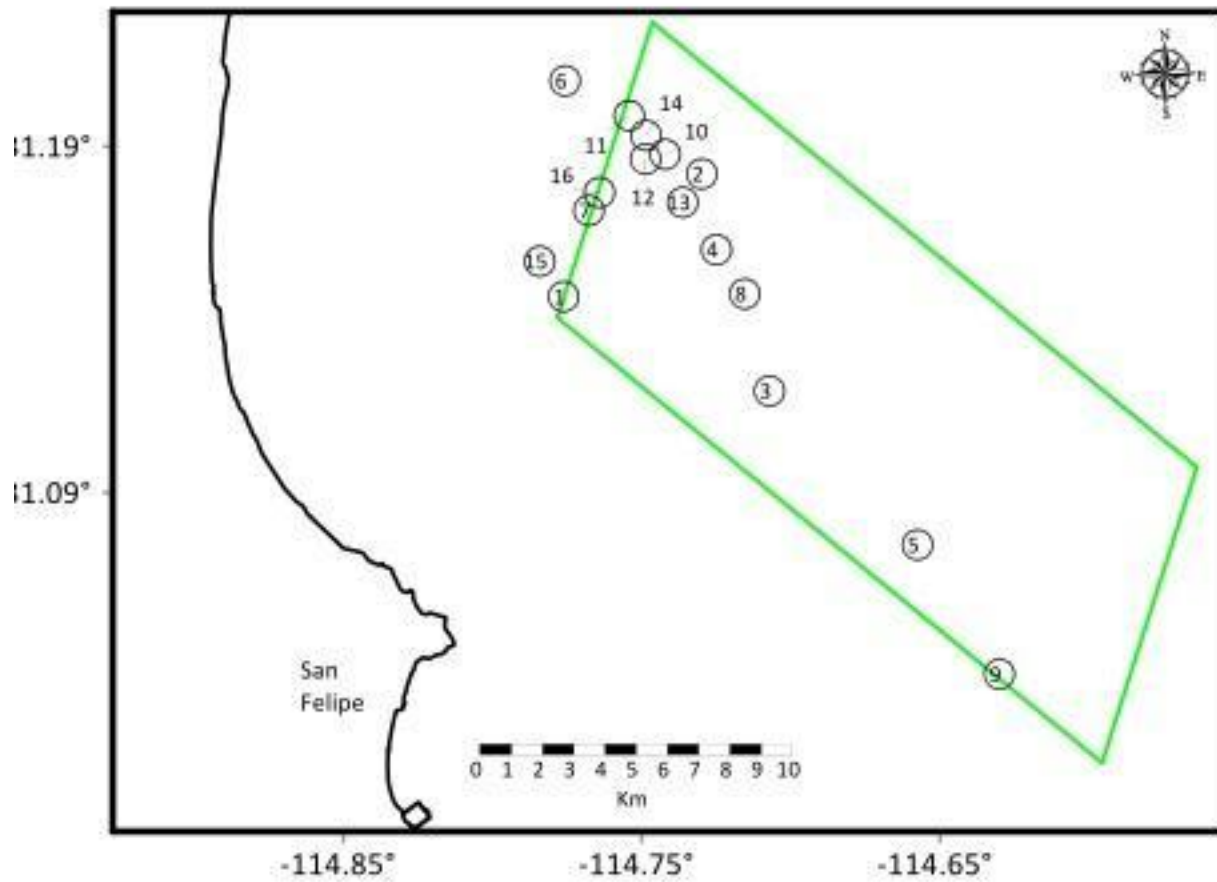
Several instances were found where acoustic detections indicated multiple groups and these are summarized in the map below.



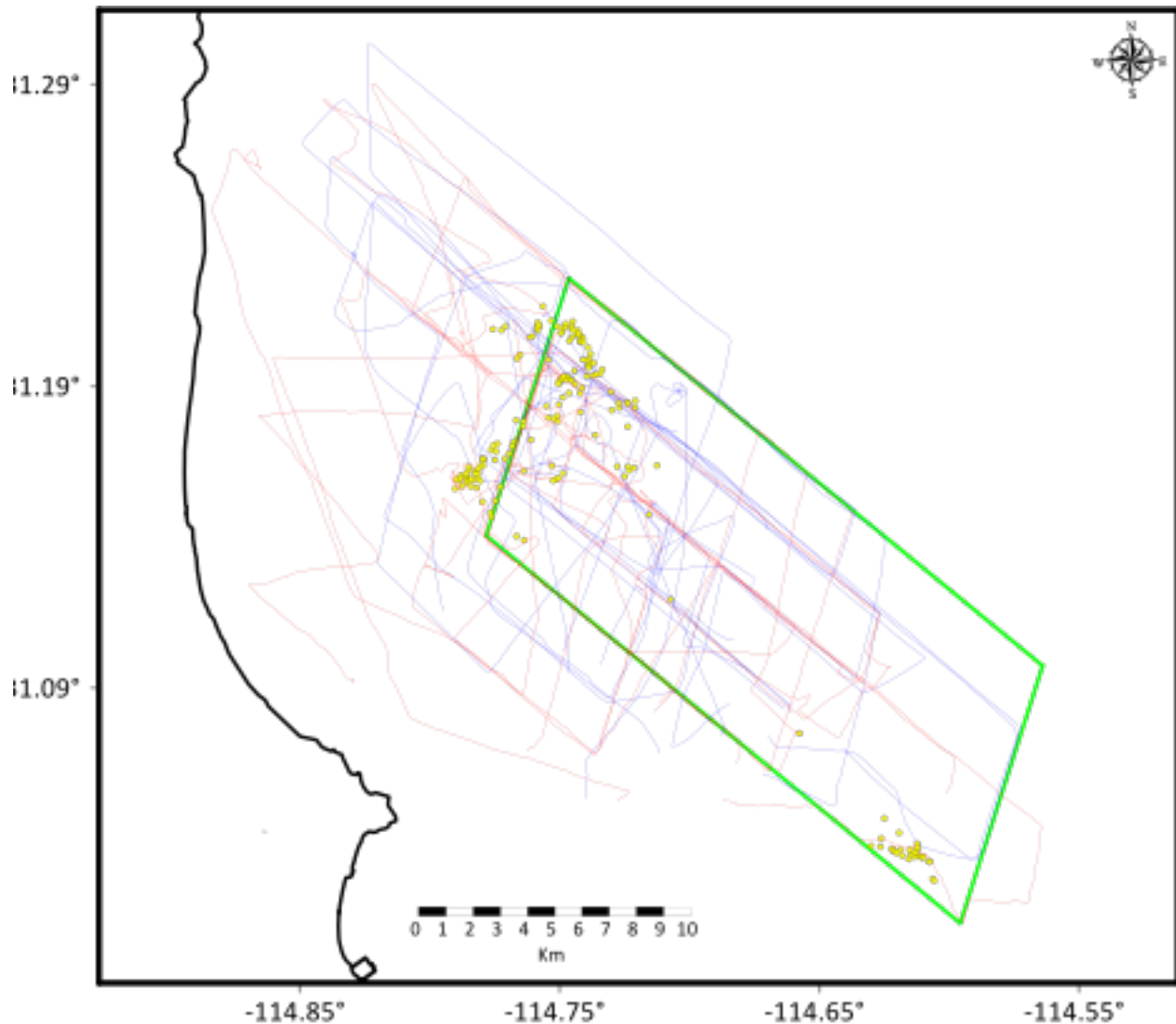
- Arrows indicate the needed movement between two sites with acoustic encounters for the group to be the same. The arrow indicates direction of movement needed.
- The text boxes give information about movements. The top is the distance between sites. The lines below show the difference in time between acoustic detections and the speed needed to move between sites.
- There are two cases for simultaneous detections at sites 1 and 12, two for sites 13 and 28, and one for sites 4 and 7.
- According to Kastelein *et al.* (2018) harbor porpoise swim at average speeds of 4.3 Km/h under quiet conditions and 7 Km/h under noisy conditions, under controlled conditions in a pool. In the wild, Otani *et al.* (2000) report average speeds of 3.24 Km/h, with 90% of measurements recording speeds lower than 5.4 Km/h. They found a maximum speed of 15.48 Km/h, although authors mention other reports with speeds of 22.32 Km/h. However, the evidence shows that porpoises swim at relatively low speeds much of the time, under 6 Km/h.
- Our criteria are that, if calculated speed is over 20 Km/h, simultaneous detections occurred with certainty (green arrow). If speed is over 10 Km/h simultaneous detections occurred with high probability (orange arrows).

Summary data for the 16 sightings are given in Table 1 below.

| Sighting # | Date in May | Vessels | Duration (min) | Photos | Videos |
|------------|-------------|----------|------------------|--------|--------|
| 1 | 11 | Sirena | 17 | N | N |
| 2 | 11 | Both | 46 (22 Sirena) | Y | N |
| 3 | 11 | Sirena | 1 | N | N |
| 4 | 11 | Seahorse | 1 | N | N |
| 5 | 15 | Sirena | 1 | N | N |
| 6 | 16 | Both | 52 (13 Seahorse) | N | N |
| 7 | 16 | Seahorse | 101 | Y | Y |
| 8 | 19 | Seahorse | 1 | N | N |
| 9 | 20 | Both | 49 (29 Seahorse) | Y | Y |
| 10 | 20 | Both | 15 (1 Sirena) | Y | Y |
| 11 | 20 | Seahorse | 81 | Y | Y |
| 12 | 21 | Sirena | 1 | N | N |
| 13 | 21 | Seahorse | 29 | Y | Y |
| 14 | 22 | Seahorse | 1 | N | N |
| 15 | 22 | Seahorse | 10 | N | N |
| 16 | 22 | Both | 89 (22 Sirena) | Y | Y |



The initial location of the 16 vaquita sightings between 11 and 22 May 2023. The Zero Tolerance Area is the green polygon.



The ship tracklines and sightings (including resights) are shown in the map above.

- Between 11 - 24 May 2023 the tracks followed by Seahorse are shown in blue lines, Sirena de la Noche tracks are shown in red lines. Sightings of vaquitas (including first and following resights for all sightings) are shown with yellow dots. The Zero Tolerance Area (ZTA) is the green polygon.
- The Seahorse traveled 670.6 Km in 92.5 hours of effort. The Sirena de la Noche traveled 704.9 Km in 83.7 hours of effort.
- During 11 days of the survey, both vessels traveled 1,375.5 Km during 176.2 hours of effort.
- A total of 16 sightings were made on 7 of the 11 survey days (63.6% of survey days).
- Two days had a single sighting, five days had multiple sightings, and four days had no sightings.

VAQUITA SURVEY 2023
IDENTIFIED INDIVIDUALS FROM PHOTOGRAPHY

The focus of this document is the recognition of the same individuals seen in more than one sighting during the 2023 survey. Marginal photo quality can allow for within-season distinction between individuals, even if it does not provide enough detail to identify individuals to a level for which ID photographs could be compared between years.

Photographs of vaquita were obtained from 6 of 16 sightings in 2023. The first 3 photo'd sightings (2, 7, 10) are described below, with detailed photo illustrations to follow on the latter 3 sightings (11, 13, 16).

Sighting #2 – Two animals photo'd. One unique individual had a wide-based dorsal fin. This individual was not photo'd again in subsequent days. The other individual was generic in appearance and could have been photo'd again.

Sighting #7 – A single animal photo'd and indistinguishable from other photo'd sightings. Could have been photo'd again or not.

Sighting #10 – A single animal photo'd and indistinguishable from other photo'd sightings. Could have been photo'd again or not.

SIGHTING #11 – mother calf pair, right sides



SM_018_14:10



SM_022_14:22



AT_001_14:36



AT_003_14:37

Note the darker pigmentation on the top portion of the mom's dorsal fin and the white smudgy area below the fin (yellow arrows).



SM_026_14:49



CH_4377_14:43

SIGHTING #11 continued – 2nd adult & unknown individual, right sides



SM_028_14:56

2nd adult with pointier dorsal fin on the right; unknown individual on the left.



CH_4434_14:56

2nd adult with pointier dorsal fin on the left; unknown individual on the right.

SIGHTING #11 continued – left sides



Different dorsal fin shapes between mom & 2nd adult (yellow arrows).

CH_4477_15:10

Mom in front, dorsal fin of calf behind.



CH_4478_15:10

Mom dorsal fin. Next frame in photo sequence after one above.



CH_4493_15:17

2ND adult on the left; unknown individual on the right. While smaller than the adult, in most photos the unknown individual appears larger in size than the calf.

SIGHTING #13, right side



sighting #13 but drone documented m/c pair.

SM_026_14:49,sighting

SM_037_09:53, sighting #13
This photo is presumed mom. No confirmed photos of calf from

SIGHTING #13 continued, left side

Compare to sighting #11, mom



#11



AT_001_14:36, sighting #11



SM_039_09:57, sighting #13

This photo may be a 2nd adult in sighting #13, but ID can not be determined due to angle of photo. But it does not look like left side of mom on previous slide.



CH_4484_15:17, sighting #11

Compare to 2nd adult from sighting #11, below. This is not a confirmed match, but rather a represents the possibility of a 2nd adult in #13 that also might be the same 2nd adult from #11.

SIGHTING #16, mother/calf pair, right sides



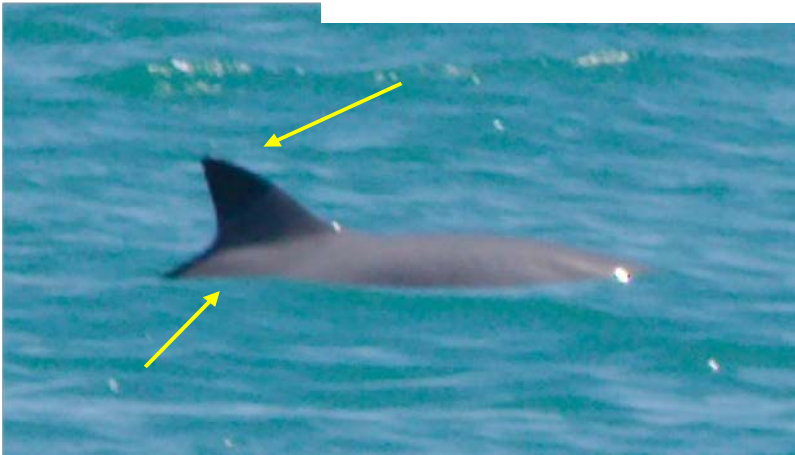
CH_4576_14:14



CH_4577_14:14

Mom in front and right. (Next frame in photo sequence after one above.)

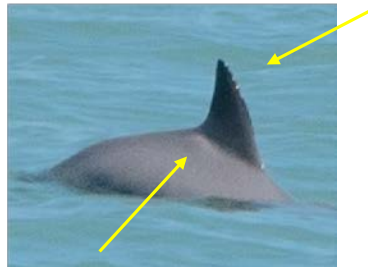
COMPARISON OF MOM FROM SIGHTING #16 TO #11 & #13



EV_1626_14:17, sighting #16



SM_026_14:49.
sighting #11



SM_037_09:53
sighting #13

Appendix 4. Details of the Expert Elicitation

Expert elicitation is a means by which available data can be combined with expert judgements, to temporarily fill a knowledge gap, via the development of probabilistic distributions. Specifically, expert elicitation is a formal technique, first developed in the 1950s and 60s (Brown 1968, O'Hagan et al. 2006), now widely applied in ecology and conservation where there is a relative lack of data but an urgent need for conservation or management decisions (Runge et al. 2011, Martin et al. 2012). Specifically, Morgan (2014) indicates: *“Expert elicitation should build on and use the best available research and analysis and be undertaken only when the state of knowledge will remain insufficient to support timely informed assessment and decision making”*. Martin et al. (2012) describe how this technique can be used to access substantive knowledge on particular topics held by experts and such techniques have been discussed and used widely recently (e.g. MacMillan and Marshall 2006, Aspinall 2010, Knol et al. 2010, European Food Safety Authority 2014, Sivle et al. 2015), including in the assessment of risks from climate change (Lenton et al. 2008) and future sea level rise (Bamber and Aspinall 2013). The technique can also be used to translate and combine information obtained from multiple experts into quantitative statements, while minimizing bias in the elicited information, and ensuring that uncertainty is accurately captured. The formal process of expert elicitation aims to address many of the well documented problems, heuristics and biases that arise when the judgements of only a few experts are canvassed or where expert knowledge is sought in an unstructured matter (Kynn 2008, Kahneman 2011, Morgan 2014). In the field of marine mammals, a number of elicitations have been conducted in recent years involving the project team and seeking to improve the methods for marine mammal issues (Booth et al. 2016, Tollit et al. 2016, Booth and Heinis 2018, Booth and Thomas 2021).

The objective of an expert elicitation is to construct a probability distribution to accurately represent the knowledge and beliefs of an expert or group of experts regarding a specific Quantity of Interest (QoI). For each QoI, which has a true but unknown value, 'X', each expert is asked to provide their individual judgements of X using a number of parameters. In the current case, X is a discrete variable (the number of unique animals seen) and so this was done using the “roulette method”. In this method, experts are allocated a fixed number of counters (“probs”) and allocate these among values of X in a way that describes their belief about the relative probability that the different values of X are true. For example, if each expert was allocated 40 probs and an expert believed there was a 10% chance that X=1, 50% chance X=2, 40% chance X=3 and no chance of any other values, they would allocate 4 probs to X=1, 20 to X=2 and 16 to X=3. One important aspect of the elicitation is defining plausible limits on X – i.e., values where it is theoretically possible for the true value of X to lie outside these limits, but that the expert would regard it as extremely unlikely that X was outside this range. Experts completed the initial elicitation exercise independently, using an Excel spreadsheet and submitting responses online.

After this first stage of independent elicitation, there was then a group stage where the goal is to derive a consensus distribution. Experts are invited to justify their individual judgements, particularly those that were divergent, to ensure that the range of judgements had been discussed openly. Following this, the group was asked to reach a ‘group consensus’ judgement (in the form of a probability distribution, again in this case using “probs”). It is important to note here (and stated clearly to experts), that there was no expectation that the experts would reach complete agreement on a probability distribution for our QoI. That is because it is unlikely that there is one single distribution that would be accepted as perfectly representing the opinion of all experts. Instead, experts are asked to discuss and agree upon a distribution representing the reasoned opinions of a theoretical external observer, called a Rational Impartial Observer (or RIO), who was party to all of the information and discussions that had taken

place. The RIO would not have identical views to any one of the experts but would instead find some merit in all the differing arguments or justifications – and give some weight to each.

The expert group discussed and agreed to provide their judgements for the following QoI:

1. How many unique individual vaquita were sighted during the 2023 survey (including adults, juveniles and potential calves)?
2. How many unique individual calves (only) were sighted during the 2023 survey?

To avoid linguistic uncertainty, the definition of a calf for the purposes of the elicitation was:

While calves are biologically defined as less than one year old, age cannot be determined in the field. Therefore, inferences about whether an animal is a calf is determined through a combination of size (as compared to the other member of the pair) and behavior. Size can be both small and only slightly smaller than the adult. The dorsal fin may appear only slightly smaller. Because of this, the behavior is also key. Dependent calf behavior is to surface within one body length and slightly behind the mother. With more time observed with a pair in this conformation (larger individual in the lead followed by a smaller individual within a body length), confidence that the pair is a cow/calf increases.

Between May 27 and May 30, experts read the full Evidence Dossier and considered the photographs and videos. Experts allocated 40 “probs” to each of the two questions above prior to the elicitation meeting. Len Thomas and Cormac Booth did initial analysis of these data. A 4 hour zoom meeting was held on May 31 and the process outlined above was followed.

Experts discussed the main possible mechanisms or drivers for their differing views of the number of calves sighted. The main drivers were regarding the true number of animals in a group (which experts agreed was affected by the length of the sighting) and the potential for resighted animals (particularly given the intense spatial coverage of the survey). Critically, experts were comfortable eliminating 0 as a potential lower plausible value (this discounts the possibility that no calves were seen during the survey). Experts had varying judgements regarding the upper plausible limit, but agreed that a RIO would agree that 5 calves was a plausible value – but with very low belief that this was the true number of calves sighted. This was due to a widespread belief that there were a significant number of resights during the surveys (in part due to the intensive spatial coverage of a small area during the surveys together with observing the same photographically identified mother/calf pair in 3 sequential days). Experts agreed that a RIO would conclude that 1 or 2 were the most likely integer values for the true number of calves, with approximately equal belief. There was a 10% chance of 3 or more calves.

Similar rationale existed in the expert’s individual judgements of the true number of unique vaquita sighted during the survey. Experts agreed that a RIO would judge, based on the discussions, that it was implausible that the true number of vaquita sighted was less than 5 or more than 17, and that the most likely values were between 9 and 11. The RIO distribution indicates a 65% belief that the true number of unique vaquita sighted was 10 or more which compares with a 71.8% belief in 2019.

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Appendix 5. Training of local participants.

The *Seahorse* and *Sirena de la Noche* welcomed nine local young professionals from San Felipe as trainees during the survey. Participation was coordinated by Sea Shepherd and Valeria Stephanie Towns, director of Conservación de Pronatura Noroeste. The trainees represent a number of local organizations and lived experience in local fisheries and fishing families, as well as professional experience as biologists, lawyers, teachers, fisheries monitors, and fishery business entrepreneurs (Table 1). Each trainee participated in one to three days of survey effort on either one or both survey vessels (Table 1). Training was conducted ad hoc by the observers and survey coordinators while at sea.

In general, each trainee received a summary of the survey design and an introduction of the combination of visual and acoustic methodology. On the *Sirena de al Noche*, the trainees were put into rotation on handheld binoculars and surveyed the port and starboard rear quarters while also joining in with operations when a sighting was made. They learned about vessel operations, navigation around sightings, helped to track vaquitas, and observed record keeping. On the *Seahorse*, trainees joined off-effort observers on the “monkey deck” where they surveyed for vaquita with handheld binoculars. They received short trainings in operating the big eyes, when available, and reporting a sighting based on the object’s location. When sightings were made, they participated in observations and tracking.

Going forward, five names were recommended for additional training based on their high level of interest (Table 1). Discussion with the survey coordinators and experienced observers agreed that developing a core team of local vaquita observers would be a valuable next step, as they can take advantage of days of low sea state conditions to conduct additional visual observations and photo-identification work. In addition, a number of the same people will be working with PescaABC fishermen to service the acoustic detectors, so they will have the opportunity to conduct visual effort with each acoustic monitoring trip. To start, additional training could be done in La Paz where several experienced observers reside, and long-time observer Ernesto Vasquez also expressed interest in developing/conducting training in San Felipe. Important would be the opportunity to spend time observing porpoises in San Francisco Bay or in British Columbia with Anna Hall, where new observers could develop their own “search image” and familiarity with porpoise biology and behavior. Eventually, others could be invited to join.

Opportunities to build local expertise requires dedicated time, funding and personnel. A plan for embarking on this effort would be valuable for both continuing vaquita observations in non-survey times and for socializing information and enthusiasm for the species locally. One of the greatest joys we experienced on this year’s survey was seeing trainees who had grown up in fishing families of San Felipe see vaquita for the first time with their own eyes. Their joy, tears, and excitement are contagious.

Table 1. Trainee participation in vaquita survey, vessel, and number of days. Asterisks indicate trainees recommended for additional training.

| Name | Vessel (days) | Affiliation and expertise |
|---|---|---|
| Felipe Ignacio Rocha González | <i>Sirena</i> (1) | PescaABC - Field Coordinator. Biologist with master's degree. |
| Amanda Avitia Avila* | <i>Sirena</i> (1) and <i>Seahorse</i> (2) | PescaABC – Project and Administrative Coordinator. Community psychologist and community college instructor. |
| Catalina Carpio Cota (“Katy”)* | <i>Sirena</i> (2) and <i>Seahorse</i> (3) | PescaABC - Community Monitor. Lifetime of experience in a local fishing family, in local fisheries, and multiple years of experience in fisheries monitoring; co-founder of Mujeres Acuícolas del Mar de Cortez and currently working in oyster mariculture. |
| Nadia Edith Alcantar Fernandez* | <i>Seahorse</i> (1) | PescaABC - Community Monitor. Lifetime of experience in a local fishing family, in local fisheries, and multiple years of experience in fisheries monitoring; co-founder of Mujeres Acuícolas del Mar de Cortez and currently working in oyster mariculture. |
| Mariana Edith Alcantar Garcia* | <i>Sirena</i> (1) and <i>Seahorse</i> (1) | CAT (Cetacean Action Treasury) and Rescatando la Pesca en el Alto Golfo - marine mammal net disentanglement project. Lifetime of experience growing up in local fishing family; recent high school graduate. |
| Georgina Castro Proal (“Gina”)* | <i>Seahorse</i> (1) | PescaABC - Science Coordinator. Biologist with master's degree; seafood marketing and distribution. |
| Jessica Guadalupe Espinoza Higuera (“Jessie”) | <i>Sirena</i> (1) | MAREM (Monitoreo Administrativo Regional de Especies Marinas) and Rescatando la Pesca en el Alto Golfo - fisheries monitor and administrative coordinator in joint campaign (MAREM and PescaABC) to promote sustainable fishing practices. |
| Anabel Espinoza Higuera | <i>Seahorse</i> (1) | MAREM (Monitoreo Administrativo Regional de Especies Marinas) and Rescatando la Pesca en el Alto Golfo – fisheries monitor. Lawyer with lifetime of experience growing up the local fishing community; leading efforts in Congress to get insurance for fishermen; working in joint campaign (MAREM and PescaABC) to promote sustainable fishing practices. |

| | | |
|-------------------------------|---------------------|---|
| José Antonio Romero Soberanes | <i>Seahorse</i> (1) | Lifetime of experience in renowned local fishing family and local fisheries; interested in projects related to the environment, conservation, and vaquita; expertise in identification of local marine species. |
|-------------------------------|---------------------|---|

Appendix 6. Monitoring of illegal fishing activity in the ZTA.

In SSCS Operation Milagro, monitoring the Zero Tolerance Area (ZTA) for illegal fishing activity takes place 24 hours a day when the vessel Seahorse is in the area.

Counting the small vessels in the ZTA and surrounding areas is carried out by visual observations with binoculars and radar observations every hour. The radar is set at a range of 8 nautical miles, and it allow us to note the exact coordinates of the small boats and monitor their activity. With the help of drones, cameras and binoculars, we verify the type of activity being conducted and can record the identification numbers and names of each small boat.

In between this hourly counting, the area continues to be monitored for fishing activity and every event is recorded. A screenshot of the radar is also taken when every counting is done and whenever illegal fishing activity is detected. The small boat activity is mainly divided in net fishing (with gillnets), potential net fishing, and divers; the latter are fishermen targeting clams (they are anchored and do not pose a risk to vaquitas). Small boats transiting the ZTA are counted separately.

During the vaquita survey operations, sometimes the counting was not possible to be performed with radar observations because it was switched off for safety reasons or during vaquita sightings. Likewise, some hourly counts were done from the north area outside of the ZTA, so the center and south part were not fully visible.

Listed below is a summary of the small boat (panga) activity seen during each day of the survey:

10/05/23 No survey operations day. No panga activity.

11/05/23 Maximum accounted for 21 diving pangas in the ZTA's center; half were visually confirmed.

12/05/23 Maximum accounted for 19 diving pangas in the ZTA's center; a third of them visually confirmed. Two potential net fishing pangas at night.

13/05/23 No survey operations day. We came across a panga with a net in the water and one Navy boat already there, retrieving the net from one side. Maximum accounted for 14 diving pangas in the ZTA's center.

14/05/23 No survey operations day. One diving panga.

15/05/23 After survey operations finished for the day, we spotted one panga that was stationary in the ZTA leaving, and then saw they had flags on board and were throwing overboard fish and rays. Maximum accounted for 3 diving pangas, and 3 potential net fishing pangas.

16/05/23 After survey operations finished for the day we identified a panga with a net in the water just in the border of the ZTA, we contacted the Navy, and they came and retrieved the net from one side. One potential net fishing panga was in another location at the same time as the net fishing event.

17/05/23 No panga activity.

18/05/23 No survey operations day. We saw a panga with two nets in the water, we contacted the Navy and they confiscated one of the nets and part of the other one.

19/05/23 No panga activity.

20/05/23 No panga activity.

21/05/23 After survey operations finished for the day, we came across one panga pulling a net, but they finished shortly after and left the area before the Navy arrived. One potential net fishing panga in the morning.

22/05/23 Maximum accounted for 8 diving pangas and 1 potential net fishing pangas.

23/05/23 Maximum accounted for 13 diving pangas in the ZTA's center; most of them visually confirmed.

24/05/23 Maximum accounted for 17 diving pangas in the ZTA's center.

25/05/23 Maximum accounted for 14 diving pangas in the ZTA's center.

26/05/23 No survey operations day. No panga activity.

All gillnet fishing events but the last one took place in the south area of the ZTA (the one of the 21st was in the west) and were all reported and concluded.

In the ZTA buffer zone (which is the area one nautical mile off the ZTA's boundaries), we recorded at least 12 different pangas with gillnets, most of them in the northwest of the ZTA.

Daily reports are available at: <https://seashepherd.org/milagro/illegal-fishing-vessel-report/>

Appendix 7. Technical description of ZTA monitoring for ghost nets.

To inspect the water column and ensure that no nets are trapped in the 193 blocks installed by the Mexican Navy, the Seahorse monitors the ZTA using the latest addition of a WASSP F3 multi-beam sonar, with its swath covering about two and a half times the depth. The WASSP F3 has an adjustable frequency range (136-184kHz) but has been locked to 180kHz on the Seahorse. We consulted with Dr. Jay Barlow, an expert in marine mammal acoustics, to minimize any potential impacts on vaquitas. Because the ZTA is shallow, the chosen 180kHz is able to detect nets, yet the sound attenuates at a distance less than the expected distance vaquitas would use to avoid the sound of the ship. Thus, the impact of the transducer on marine life is minimal and not a threat to the Vaquita.

The TimeZero software is an integrative tool that merges information of all systems onboard. The Seahorse crew monitors sonar data using different views to detect the blocks and possible nets entangled on the hooks. There are different ways to detect an object underwater. Figure 1 shows a Sonar section (Figure 1), Figure 2 a Multi-sounder, and Figure 3 shows 3D mapping.

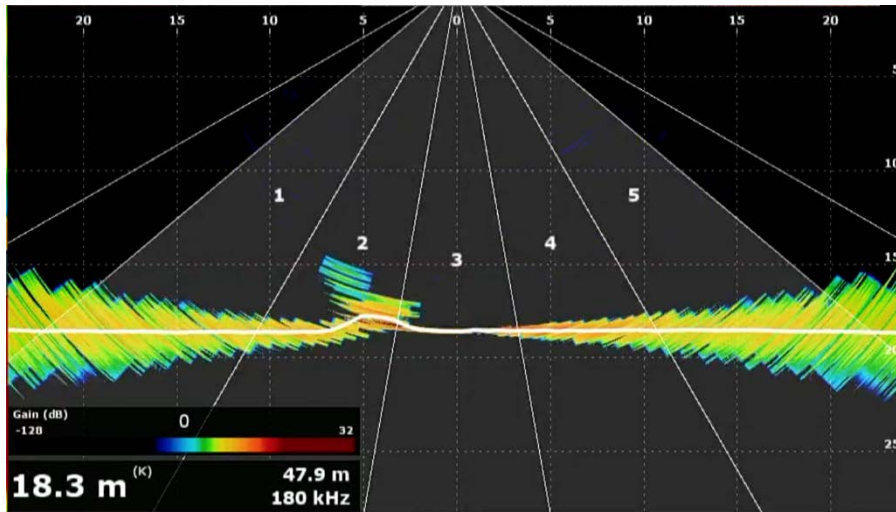


Figure1. Sonar sections of WASSP F3, showing a block in zone 2.

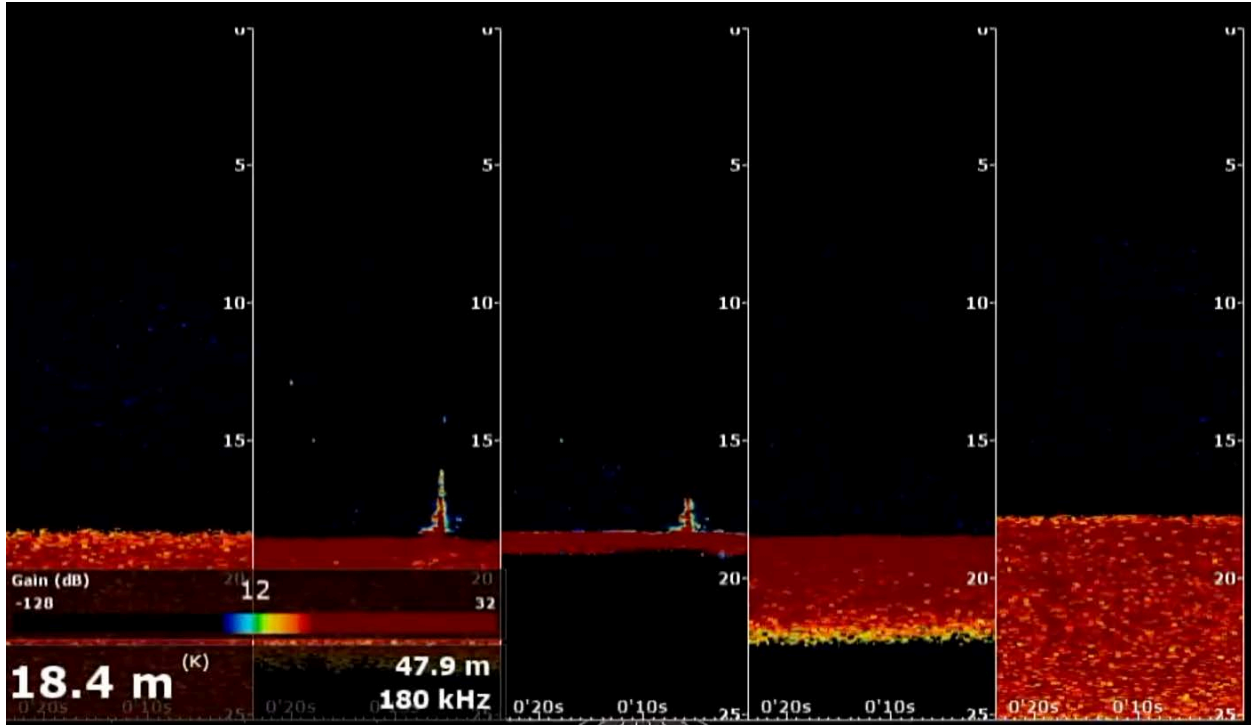


Figure 2. Multisounder showing a block.

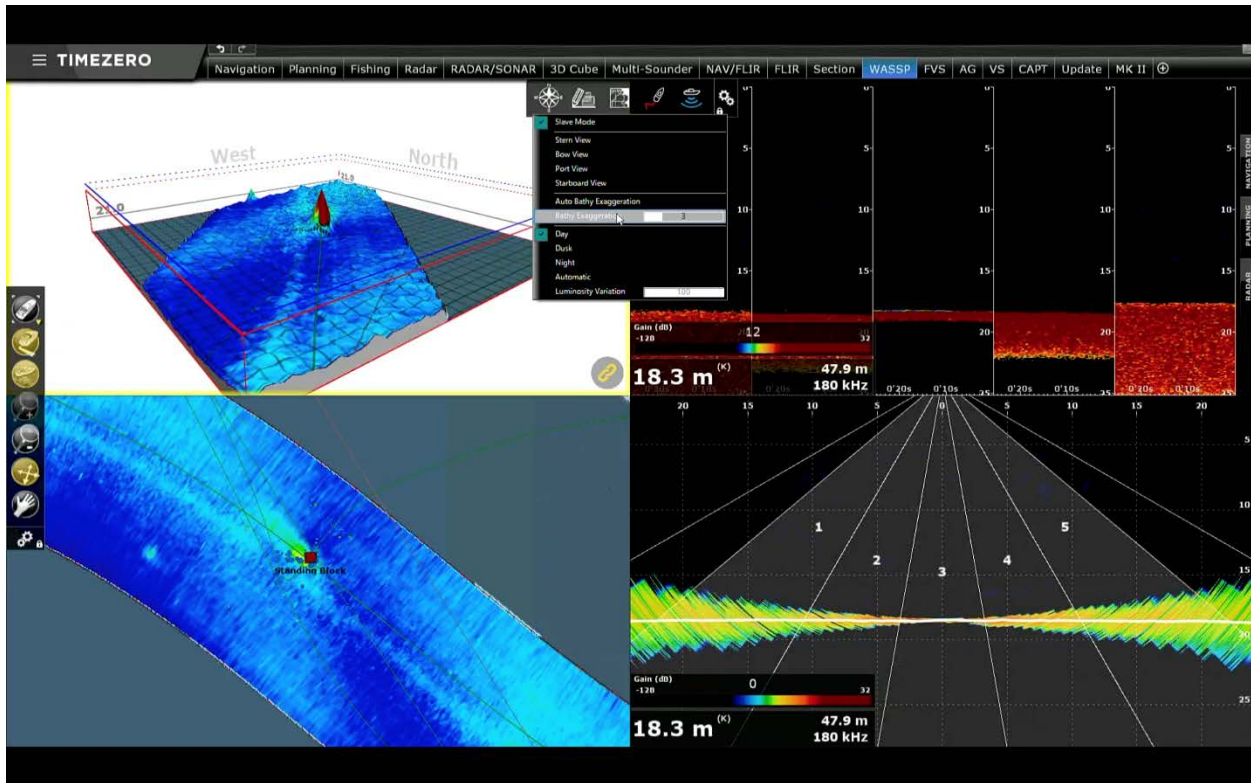


Figure 3. 3D Mapping tool in the upper left corner of the graph.

An echo processing called "fish targets" allows the crew onboard the seahorse to see in 3D objects that are not considered sea floor by the software. The hook of the blocks is a good example and can be seen

in Figure 4 as little blue "bubbles." The size and color of these "bubbles" gives a quick idea of the depth and size of the object.

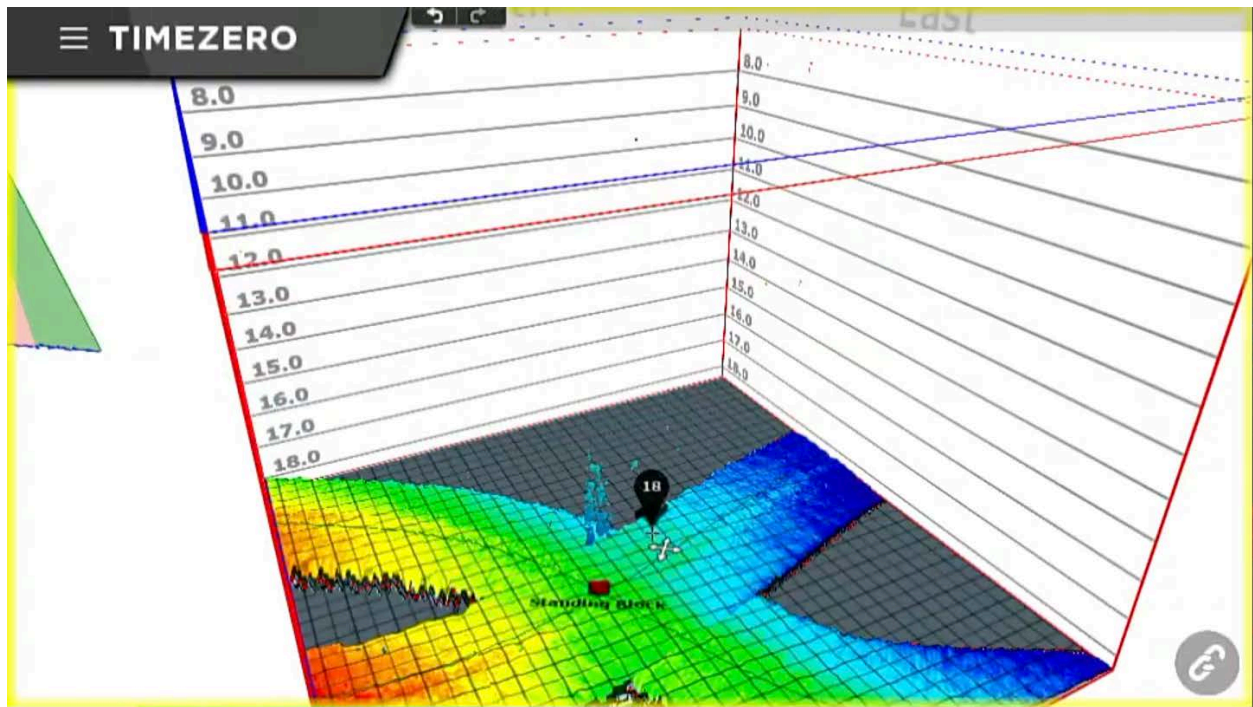


Figure 4. "Bubbles" showing the details of a block.

Since the arrival of the Seahorse to the ZTA, the crew of the Seahorse has spent hundreds of hours monitoring the area and surrounding waters using the WASSP F3, as can be seen on the history map (Vaquita Survey 2023 Main Report, Executive Summary, Figure 3).