MYSTICETUS
PSO & LEAD PSO
USER GUIDE

Table of Contents

AUDIENCE

This document is intended to support daily data acquisition, QA/QC tasks, and daily reports via OnCloud that's required of PSOs and Lead PSO. Unless there are an abundance of sightings in any given day the QA/QC process shouldn't take more than 10 – 20 minutes. Generating the

daily report via OnCloud requires an internet connection and should take another 10 minutes to accomplish.

OVERVIEW

Quality Data Pipeline

During QAQC, we review the Mysticetus file and identify errors. QAQC is done 3-6 times, the final 2 times are optional, depending on project. This document details only on the bolded items below.

End-of-shift by PSO in the field (check for blanks, quick review of all new rows)

End-of-day by the Lead PSO (same as PSO, but also first formal QA)

Daily by the Project Manager

Daily by the data analyst assigned to the project (*some projects or teams may not have this step)

After the survey while creating charts, tables, and maps for the final report (*some projects or teams may not have this step)

DATA

Data collected by PSOs is disseminated via the internet to your customers, the regulators, vessel operators, other vessels in your area to share sightings, and to alert many parties in the case of sentinel, injured, entangled, or dead animals. Timely entry of data will go a long way in preventing ship strikes by nearby vessels. This information obviously cannot be shared until it has been entered into Mysticetus.

Mysticetus also informs you of nearby drones or unmanned vessels that will be operating in your area. This information will allow you to protect the vessel from critical and potentially catastrophic damage due to collisions with these objects.

The role of the PSO and lead PSO (or MMO, depending on project) is the start of the lengthy process of data review, analysis and eventual reporting to your client and the federal government. The quality of the data has a role for future environmental policy as well. Errors are easiest to catch at the beginning of the data flow (point of capture) and fix which is by you.

Reliable data requires quality data collection at the source. The nature of data collection and the need for PSOs to keep their eyes on the water is challenging when combined with entering timely, accurate data into Mysticetus.

It is critical that data leaving the boat be as perfect as possible.

PSOS

You are responsible for ensuring your data collection is accurate. At times during your shift, you may be unable to enter all the details into Mysticetus – this is the challenge of finding balance between data entry and keeping eyes on the water.

At the end of your monitoring shift, you are responsible to review the data entry during your shift to correct any errors and omissions. In general, no field should be left blank – instead use NA or None as appropriate.

LEAD PSOS

Lead PSOs not only have all the responsibilities of PSOs (they are one), but they also are responsible to review the daily data collection, transfer the GPX data file from the Garmin device and ensure all media files are uploaded. After your review and perform quality assurance, data files are automatically transferred by Mysticetus to the onshore team for further QA, review, and reporting.

During Lead PSO QAQC process the Mysticetus file is reviewed for identifiable errors. Mysticetus formally audits this event and provides documentation to those further downstream (e.g. onshore personnel; PM, Data Analysts, Report Writers).

FEEDBACK COMMUNICATION

Feedback goes opposite the data flow, back towards the field

We are all human. Sometimes life gets crazy out there and 33 whales decide to hang around the boat all day. Entering perfectly clean data in real time is not always an option at the time of the sighting. We still need to get the data right – to support reporting requirements, alert nearby vessels, and inform onshore observers.

PSOs are responsible to walk the balance beam of entering data while keeping eyes on the water. As a reminder, detection alerts can only be shared between boats and with shore personnel if they have been entered – this sharing has already prevented numerous vessel strikes and will continue to do so. At the end of a shift, PSOs need to review data they have entered for consistency, accuracy and to fill in any remaining blanks or unfilled data fields.

Lead PSOs have the same responsibilities, plus more. They perform the first formal (audited) QA step at the end of each day. Not only do they perform a quick scan review for blanks and "doesn't make sense" entries, but they also run formal analysis tools, upload GPX files from the Mysticetus supplied handheld GPS, and provide feedback to PSOs on errors that could be corrected sooner.

The goal is to find and fix errors as close to the source (e.g. at the point of entry) as possible – when that does not happen, this becomes a "Training Moment" for the person upstream. For example, if a data analyst finds an error, they will work with the project manager to figure out what happened and fix the process. PMs will work with Lead PSOs. Leads PSOs will work with their team to figure out what happened and how to fix it moving forward.

We engage and encourage **Continuous Process Improvement** (CPI): one where we identify errors, fix them, document the fix, teach, and train the person upstream, then try again.

Fixing data at the time of collection represents the most efficient place to do so. This has been demonstrated time and again where data collection is underway. This is where memory of events is most complete. PSOs are asked, by regulation, to collect many data points for effort and sighting records both. We know that this distracts your dedication to keeping “eyes on the water” and attempt to help this problem through working with developers and regulators to streamline wherever possible. This is not always enough thus we employ the watch dogs and provide opportunity to finish entering data at the end of a shift.

Through Mysticetus OnBoard watchdogs and our OnCloud dashboard we’ve employed automated sentinels to help catch and indicate errors while tracking data progression throughout the data collection processes. These are provided to assist the creation of consistent data day to day and keeping the data flowing on and off the vessel.

DETAIL OF DAY TO DAY

GPS TRACKING

Accurate GPS tracking is critical for data collection. Without it the collected data is essentially worthless.

There are two PSO GPS devices on each ship. The GlobalSat BU-353-S4 USB GPS (aka “hockey puck”) is plugged into the laptop. This GPS device automatically records GPS coordinates and stores the information in Mysticetus.

The second connection is a backup, handheld Garmin eTrex. Lead PSOs are responsible for uploading the track from this daily to Mysticetus then clearing the track from the Garmin GPS. How to do this is described further below.

Data Collection Time Periods

Data is collected daily in 24-hour periods for 24/7 operations, or over the course of a single day for daylight-only operations. PSOs are responsible to ensure the Mysticetus data collection application is closed at the end of a 24-hour period (or earlier if data collection is, for example, daylight only). The exception to this is if an observation day is shorter due to anchoring, docking, or leaving dock.

Data collection happens in UTC (computers are configured to run in UTC). Data collection is stopped and restarted at midnight UTC.

Mysticetus saves several intermediary files throughout the day, typically at 2-hour intervals to the cloud and 3-minute intervals to in-field storage (e.g. SD cards in computers). Mysticetus then saves a final file at the end of the data collection period. These files are automatically uploaded to the Mysticetus cloud. These files are a valuable source of information about what happened and when – useful to check if PSOs and Lead PSOs performed the appropriate QA tasks in the field.

FILE NAMES

Each survey has a standard file naming syntax generated by Mysticetus. The filename includes the station id (typically vessel name plus Vis or PAM) and the date and time from the final time stamp in the file.

As the file progresses through the QAQC process, each team member appends their initials to the filename and eventually the data is signed off as complete by the project manager. By the end of the process, the filename will appear as:

MinnowVis-2021-03-26-2359-Final-Edited-MA-DS-[GR].Mysticetus

File saving itself is further discussed in this document. There is a lot going on in this file's name. Let's unpack the naming structure below:

MinnowVis is the boat name and station. Station is typically either titled Vis for Visual observer's station or PAM for PAM observer's station. Occasionally other names are seen such as 'IR' for the remote infrared camera station.

2021-03-26-2359 is the date/time stamp of the save. Note that Mysticetus will save the file itself in the correct folder, even if the file was saved after midnight.

Final represents the final save of the data collection day, based upon UTC

Edited-MA indicates that the file has been edited by someone with the initials "MA". If multiple people edit the Final (end of day) file, then there will be multiple initials indicating the subsequent edits (e.g. "MA-DS-ABC-PD").

[GR] represents the signing off the data by the appropriate person in your organization, typically by an onshore project manager within 72 hours of the data being collected. This signed off data is what is presented to the regulators.

.Mysticetus is the filename extension. Like what someone would see with a .pdf or .docx file.

MYSTICETUS AUTOMATIC GEO-FENCING AND GPS-DRIVEN PROJECT SWITCHING

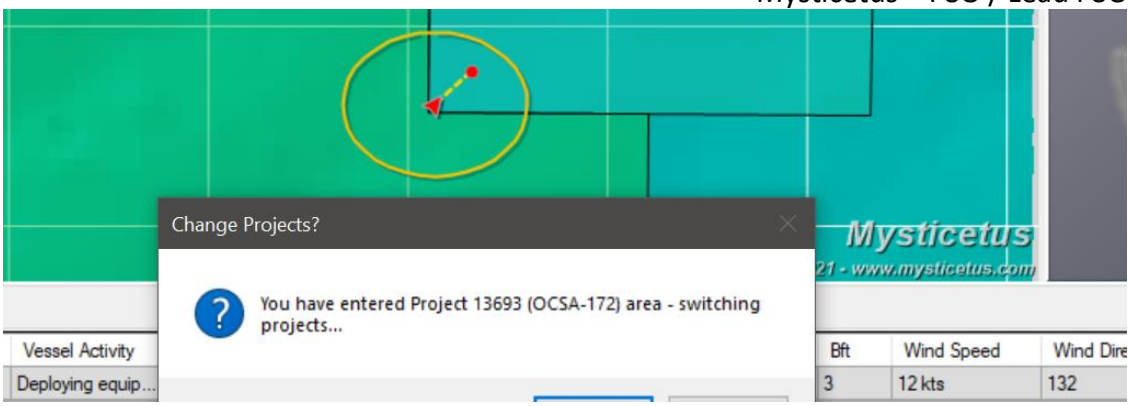


Figure 1 Project change notification by Geofencing feature

To improve efficiency, vessels sometimes allocate work to multiple projects (BOEM lease areas, NOAA IHAs, corporate work zones, etc.) in a single day. This feature is, typically, rarely used.

We have seen instances where vessels may switch projects with every survey line. It is ***critical*** to assign totals of marine mammal shutdown time, take counts, vessel activities, etc. to the correct project for legal, accounting, and planning purposes.

Automating the project switching task minimizes the potential for data collection errors. Errors from simple fumble fingers (e.g. assign a take to the wrong project) and timing errors are eliminated – PSO's can stay focused on the water and not worry about the mundane, repetitive project switching tasks.

It is challenging in general for observers to accurately audit (timestamp) when a vessel crosses into a particular geo-spatial region of ocean and keep an eye on the water. Hence the difficulties to record the project switchover precisely.

Mysticetus 2021 solves this by automatically switching between the appropriate projects when the vessel enters each project's work zone.

At the switchover, the previous project's data is saved, tallied, and uploaded - and then the new project parameters (exclusion zones, mitigation protocols, etc.) are enabled. All accounting (vessel activities, PSO effort, GPS track line, marine life mitigations, shutdown tallies, etc.) is automatically applied to the correct project based on GPS, without risk of human error.

Pro Tip: This new feature is much deeper than simply Switching Projects. Mysticetus can trigger ANY action when a vehicle crosses a GeoFence, including sending email or text messages, logging specific audit data, sending alerts to nearby vessels or onshore project managers, etc.

END, START OF DAY, AND DURING THE DAY (24-HOURS) PROCEDURES

These instructions assume the project is already underway with the Mysticetus laptop set up in safe, stable location with reliable internet access.

At midnight UTC, the Lead PSO QAQC's the data from the previous day and the new day of data collection begins. Below are basic steps to follow at the start of a new 24-hour day to collect data correctly.

The following is a high-level summary of the required steps at the start of each 24-hour period (details follow)

Daily Startup

1. Log in to Windows with Login to Windows with user **PIN** (we put this number in QA paperwork)
2. Click the Mysticetus Icon on the desktop to start Mysticetus Data Collection
3. Wait for GPS (green ball, GPS Clock has a time).
4. Click Sync PC to GPS Clock
5. Set camera clock to match PC clock
6. Add First Effort Record
7. Verify that tracking had continued while Editing (i.e. no cut-outs)

During the day

8. Every 30 minutes update ship's state and sea state
9. *Review the Mysticetus map for critical animal alerts in your area of operation
10. *Review the Mysticetus map for alerts of unmanned vehicles and buoys

11. *Check for alert emails

    *If your vessel has onboard internet

End of day

Daily Shutdown

12. Add final Off Effort entry, Exit Mysticetus Data Collection (Final Save)
    a. For Western Atlantic Operations we've add a hot key to do this: **ALT+Shift+O**
    b. As of 2021 this is done automatically when you commit the daily, end of data collection day final save.
    c. End of day is for PSOs is defined as midnight UTC.
13. Perform QA/Editing of that final save file for the, now, previous day's data in the Mysticetus Editor mode. This process is further detailed in this document. The basic steps are:
    a. Open the Final Save file and perform the necessary edits to fix erroneous errors and missing data.
    b. Review the map for sightings that don't make sense such as being greater than 5 miles from the vessel's track or onshore and fix.
    c. Save the Final save as an edit file.
14. Upload GPX file from handheld GPS, then clear tracks on GPS while in editor mode.
15. Exit Mysticetus (Final Save) and restart computer. Restarting the computer clears any issues that may 'creep' into the operating system. It's a precaution that has proven merit.
    a. NOTE: If your vessel does not have internet (common near shore) start Mysticetus in editor mode onshore where it is connected to the internet and data will upload automatically.
16. Generate your daily report via OnCloud as directed by your project manager.

a. NOTE: As of 2023 we will be updating how daily reports are generated and will update this document and notify active vessels as appropriate of any procedural changes.

GARMIN ETREX

Accurate tracking is critical for the overall accuracy of data collection. This device and the information it collects is used if the USB GPS device loses signal for significant periods during its data collection. Day-to-day use is discussed elsewhere in this document.

GARMIN ETREX SETUP

1. Setup and turn on the backup Garmin eTrex handheld GPS unit:
    a. Press and hold the “Light” button.
    b. Verify satellites are visible. The icon on the GPS unit’s map will flash with “?” when no satellites are found.
2. One-time task:
    a. Check Setup -> Tracks and verify:
    b. Track Log: Record, Show on Map
    c. Record Method: Time
    d. Recording Interval: 15 seconds

3. Check the battery level on the Garmin handheld GPS:
    a. Replace batteries if the power level is less than half remaining. Your employer will have provided you rechargeable batteries.
    b. Do not leave the yellow Garmin handheld GPS plugged into a computer for power – this disables GPS data tracking on the Garmin.
    c. You *can* plug the Garmin into a wall outlet with the appropriate 5v DC adaptor (such as a cell phone power adapter). Remember to verify that the GPS is tracking.
    d. **NEVER plug a Garmin handheld into an Apple Macintosh computer**. Macintoshes fill up the Garmin with various system indexing files. These files renders the Garmin useless aka "bricks" the device. The net effect is the Garmin will stop recording track lines. Only plug the Garmin into a power adapter or the Mysticetus supplied Windows PC when it's time (end of day task) to upload the GPX file.

WHEN RESETTING THE ETREX MIGHT BE REQUIRED

There are a few instances in which it is necessary to perform a full reset on an eTrex 10/20/20x/22x/30/30x/32x models, including the following:

- Not receiving a satellite signal
- Restoring the factory default settings
- Not functioning properly – such as not recording track data correctly
- Low memory can't be fixed by normal means (below)

The information and steps below will walk you through backing up your data and resetting.

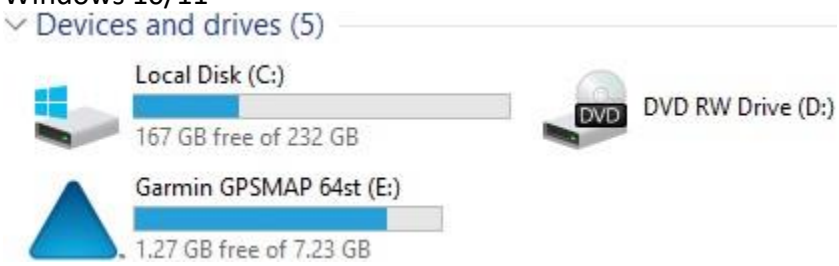
BEFORE RESETTING THE ETREX

Performing a full reset can cause user data loss. User data is waypoints, routes, tracks, and geocaches. Try the below steps to eliminate unwanted data prior to attempting to reset the device in the next step.

If removing data is desired to eliminate corrupt data or free up space, first try –

1. Connect the Garmin device to the computer.
2. Press the Windows key + E on the keyboard to open Windows Explorer/File Explorer.
3. Select This PC (instructions for Windows 10 & 11 only).

4. Open the Garmin drive listed.
   Windows 10/11



5. Open the Garmin folder.
6. Open the GPX folder.
7. Select the file(s) you wish to delete.
8. Press Delete on the keyboard.
   - Confirm you wish to permanently remove these items if prompted.

Your device will no longer display the deleted files.

PERFORMING A FULL RESET OF THE ETREX

On rare occasions deleting data from the eTrex per the above guidelines does not fix the functional issues preventing the GPS to resume capturing of track data. In these rare cases the next logical step is to reset the eTrex per the below steps. After performing the steps below the Garmin will need to be configured again per the above Garmin Setup instructions.

1. Power the eTrex off
2. Press and hold both **Menu** and **Enter**
   How to Use the Enter Button - Enter is pressing down on the center of the thumb stick. It is important that the thumb stick does not move to any side, as this will prevent the reset from working.

3. Press and release **Light/Power**
4. Wait to see; *Do you really want to erase all user data?* then release **Menu** and **Enter**

Figure 2 Full Reset of the ETrex

5. Select **Yes**
6. You will need to reset tracking to be time based at 15 seconds.

The eTrex is now reset. You will want to take the device outside in a clear view of the sky for a minimum of 20 minutes to re-acquire satellite data.

MYSTICETUS LAPTOP SETUP

These instructions typically apply to Mysticetus supplied turnkey systems. They are applicable for any computer in use.

1. Find a safe place for data collection PC, access to power and GPS hockey puck will have a view of Satellites (near a window). A six-foot USB extension cable is supplied with turnkey systems that Mysticetus may have provided. The extension cable should give sufficient reach to get the GPS a view of the sky.
2. Verify the USB GPS, the hockey puck is plugged into the laptop.

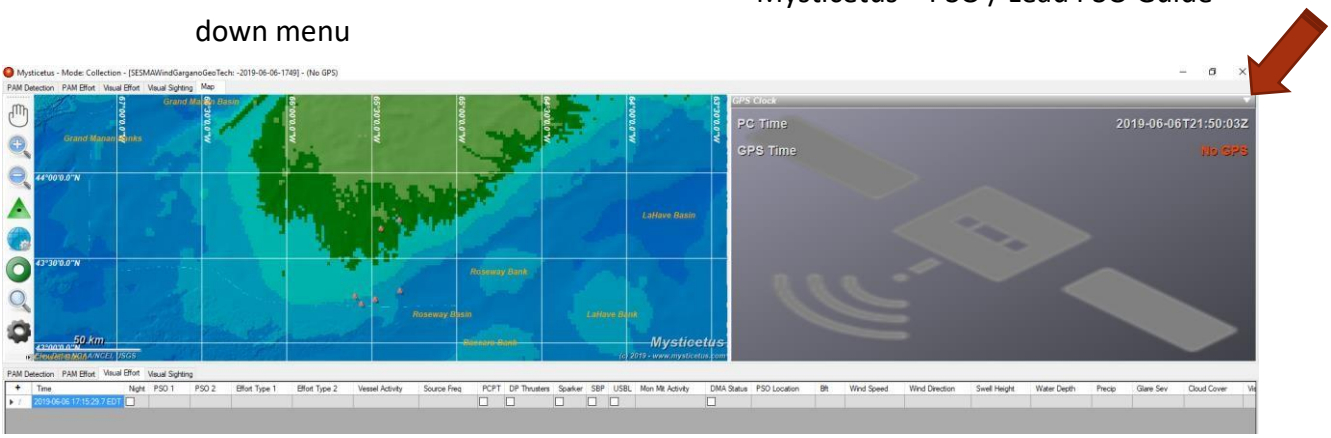
3. Verify the memory device, either a SD card or USB thumb drive, is in place in the laptop.
    a. Confirm in the laptop's File Explorer that the memory device is named "MYSTICETUS", or data will not be written to it. This is how we configure our turnkey systems.
4. Turn on the Data Collection laptop and Garmin handheld GPS unit.
5. Login to the correct Windows account (not the Mysticetusops@mysticetus.com one) with user **PIN (32336580)**
6. Click the Mysticetus Data Collection Icon on the desktop.
7. Wait for GPS ball to turn green indicating it has a signal as seen below. Do not defeat this functionality by choosing the "SERIOUS Risk" option while the ball is red! This wait, at times, might take a few minutes.

8. Click "Sync with GPS" once a day, select the Mysticetus Ops account and enter the admin PIN 32336580 when prompted for admin access (Ops account is required by Windows 10/11 to update clock).
9. Update the clock on camera(s) and any other devices. Internal clocks on 35mm cameras are notoriously unreliable. Use the same time zone as Mysticetus, UTC.

TROUBLESHOOTING THE HOCKEY PUCK GPS

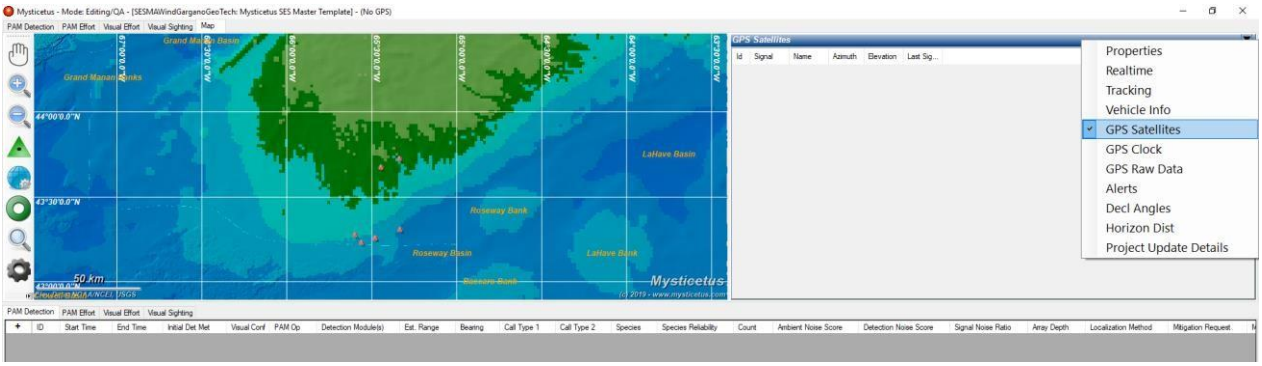
1. A solid red light on the "hockey puck" GPS unit means it is still acquiring a signal. The light flashes red when it has obtained the signal.
2. Check for satellites in the Mysticetus Data Panel
    a. Click the little white arrow at the top right corner for the Data Panel drop

down menu

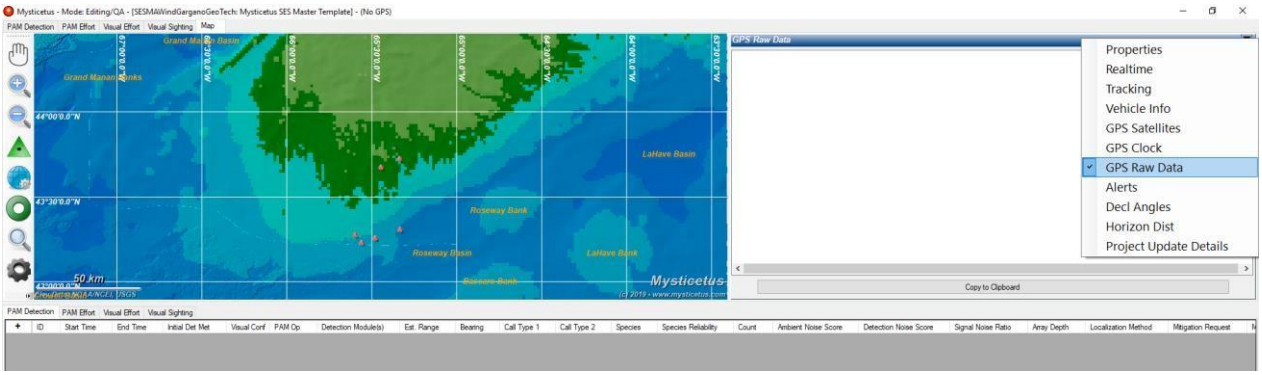


b. Click on “GPS Satellites"

Figure 3 Getting more data about the GPS



3. Check the “GPS Raw Data” or “GPS Satellites”. The Raw Data window should show NMEA 0183 data streaming. The GPS Satellites window will display a summary of satellites it can see. You typically need at least three “Good” signals to get a fix. Move the “hockey puck” if necessary, to get a better view of the sky.



4. Un-plug and Re-plug in the GPS to the same USB port. If you change USB ports you will have to restart Mysticetus after performing a temporary save.
5. When running, select Realtime in the Data Panel:

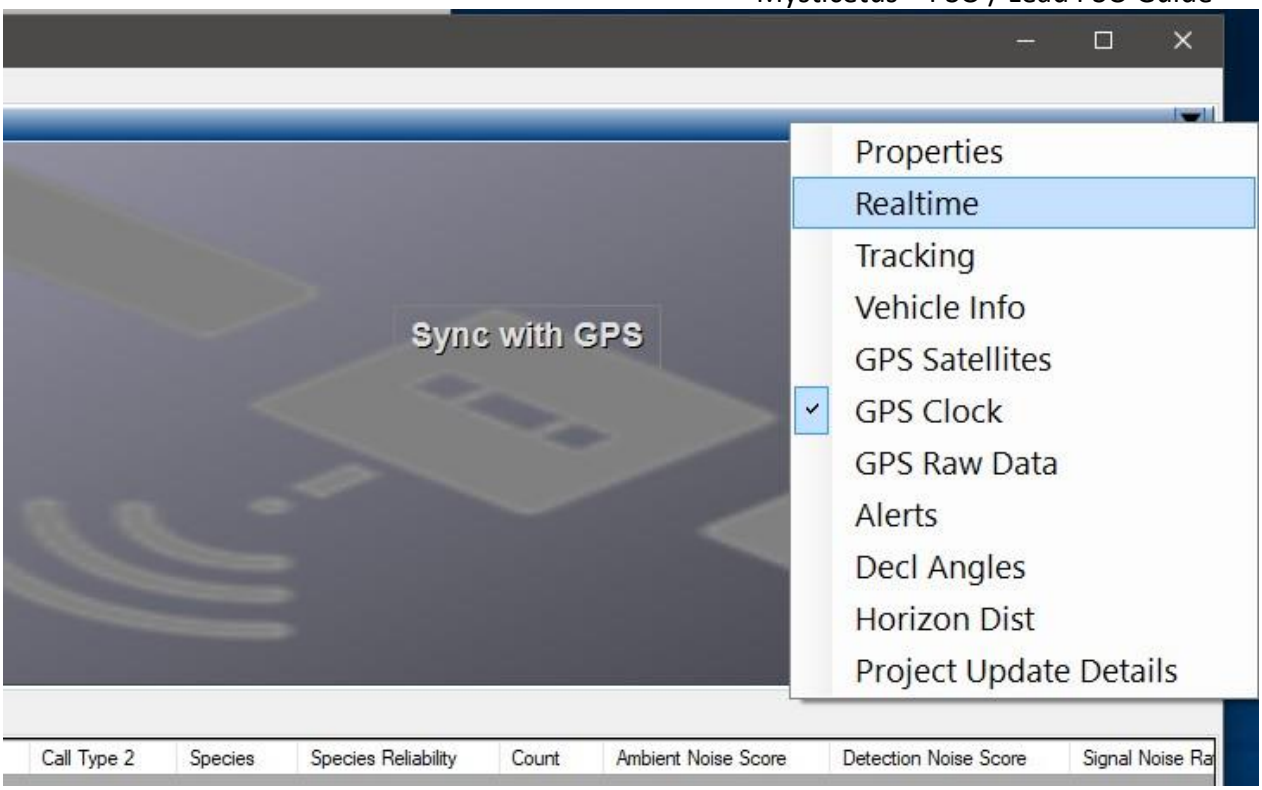


Figure 4 Drop down options

6. This will display the Realtime window. It will be Green when the GPS is working.

7. When Mysticetus has properly obtained satellite information the red ball in the upper left-hand corner will also turn green.
8. We do advise keeping the watchdogs visible once you are confident that the hockey puck GPS is functioning correctly.

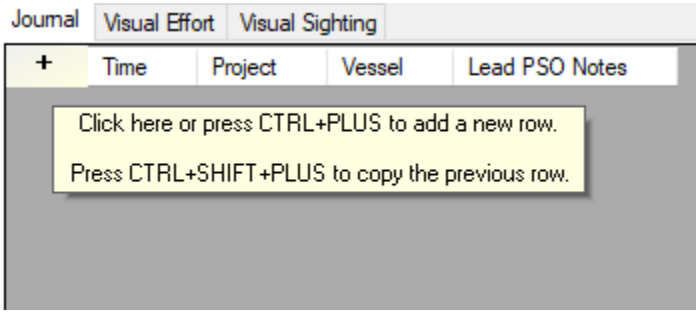
FIRST ENVIRONMENTAL / EFFORT RECORD

Once the Mysticetus data collection laptop is running, and the hockey puck GPS is operational – the first step for the day is to enter the first "Effort Row". Mysticetus will prompt you to do this. Populate this first record immediately and prior to any sightings.

We have implemented a couple of short cut keys to support creating new rows. To experienced users of Mysticetus these short cut keys changed in December 2021 due to requirement changes by Microsoft Windows. These are preconfigured by us in our turnkey systems and the below steps can be ignored as of 2022.

- CTRL+PLUS to add a new row.
- CTRL+SHIFT+PLUS to add a row and copy the values.

You can also see this by pointing the cursor at the little plus and it will remind you:



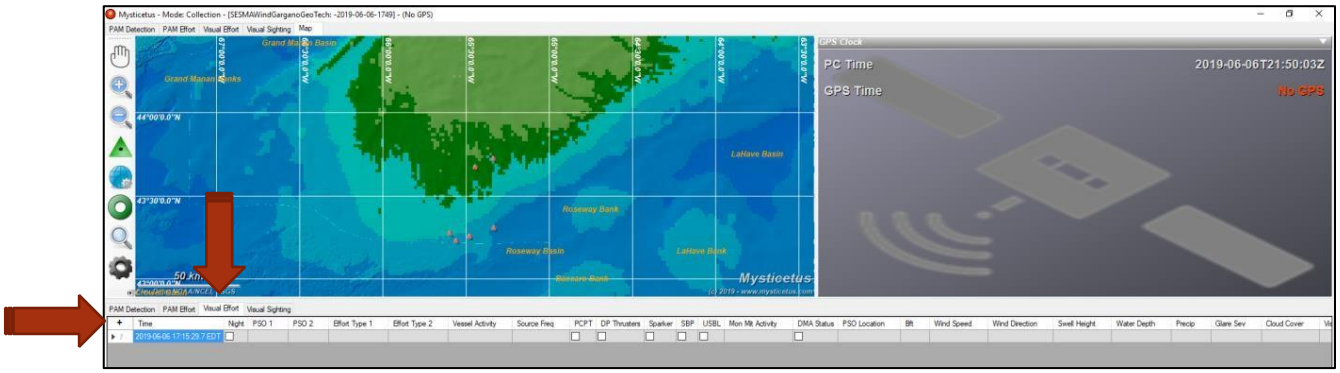


Figure 5 The first effort record of the new day

MAP TRACK LINES

Track line color is important. It indicates the effort state your vessel is in. The template can be set up to show different colors for different effort states to give a visual cue. Typically the only two colors in use is Red or blue.

A red trackline indicates the vessel is off effort. If the ship is underway and the trackline is red that indicates theirs is something not set up correctly in the template and the state is not understood in Mysticetus. This problem, too, can show itself in the GIS analysis with numbers way out of range such as time being crazy big. This must be flagged to your project manager for correction!

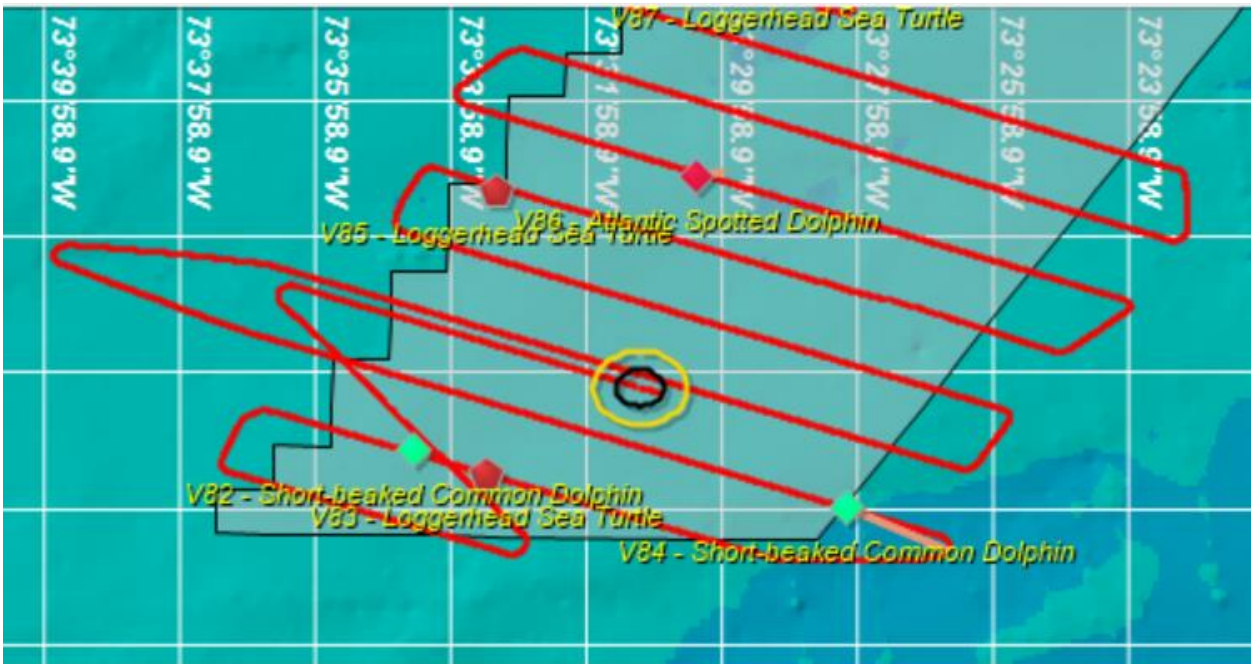


Figure 6 Red track lines indicates an unknown or off-effort state.

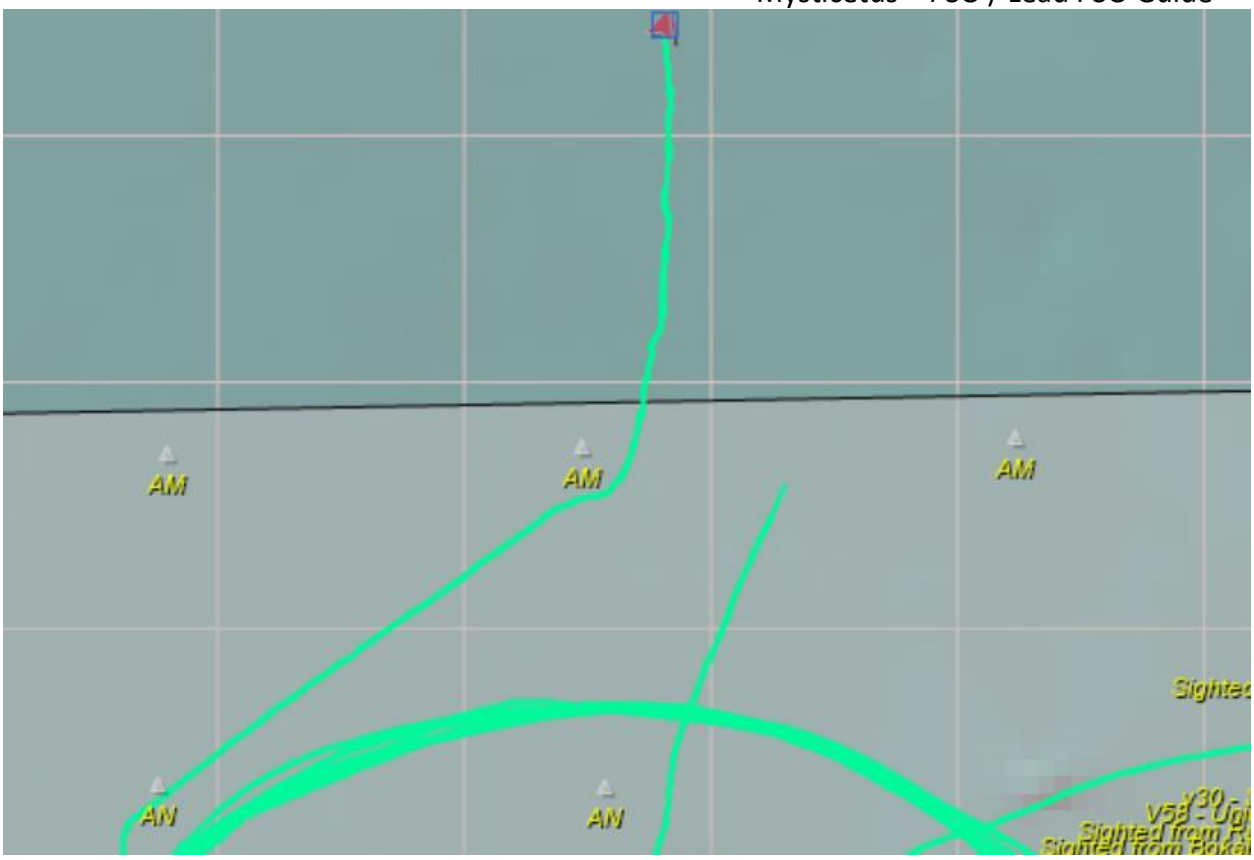


Figure 7 Correct color of track lines

JACK UP RIG OPERATIONS

JACK UP RIGS INTRO

Jack up rigs are vessels with legs that reach down to the seafloor and raise and lower the working platform to different elevations above the water surface. This is done for a few reasons, including precise position of the vessel, and elevating the boat above inclement weather.

Figure 8 Pictured above is a typical jack up rig deployed.

Animal distance estimates based on reticle or inclinometer readings are based on:

1) The elevation of the deck surface, and
2) Observation deck offset, and
3) PSO eye height

These three elements are critical in animal distance estimation and calculations from reticle binoculars.

As a jack up rig might be moved up and down, this changes the Observation Deck height.

It is critical that the jack up rig height is updated by the observer every time it changes. Mysticetus keeps track of this Platform Altitude Offset value and applies it to all distance calculations.

REMINDER - OBSERVATION PLATFORMS AND PSO EYE HEIGHTS

As a reminder, when converting binocular reticle values to distance, precise altitude of the binoculars above the water is critical. Mysticetus adds Deck Height (also known as Observation Platform), PSO Eye Height, and the current Jack Up Rig Altitude Offset - and then applies the appropriate mathematical equations to convert reticle values to distance.

JACKUP RIG ALTITUDE OFFSET

PSOs inform Mysticetus whenever the jack up rig changes altitude. This is typically accomplished by pressing CTRL+P and entering the value. Mysticetus will update the rig's altitude and use this value until the PSO changes it again.

- PSO eye height is already entered into Mysticetus by your project manager
- Observation Deck height (above water) is entered into Mysticetus by your project manager
- Altitude Offset as the jack up rig is moved up and down is provided by ship's crew and entered in by the observer.
- Click 'ctrl+p' to open the offset dialog, enter the jack up **elevation altitude in meters** then press 'OK' or the Enter key on the keyboard.

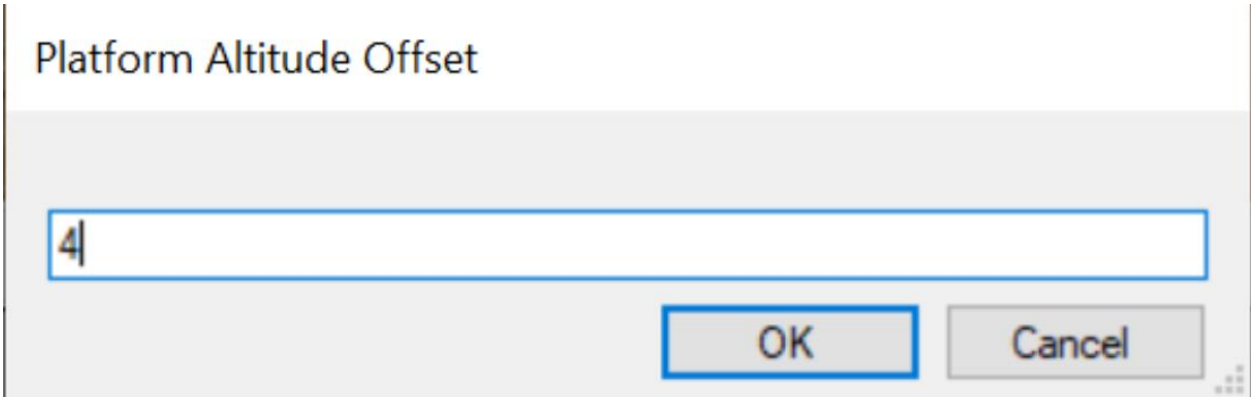


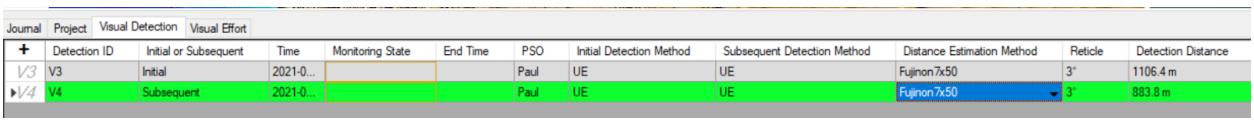
Figure 9 Setting platform offset

[Example...note that changing the altitude changes the distance for the same reticle value across two sightings]

ALTITUDE ENTRY MATTERS!

The below example shows the dramatic differences in estimated distances for a simple, 4-meter offset.

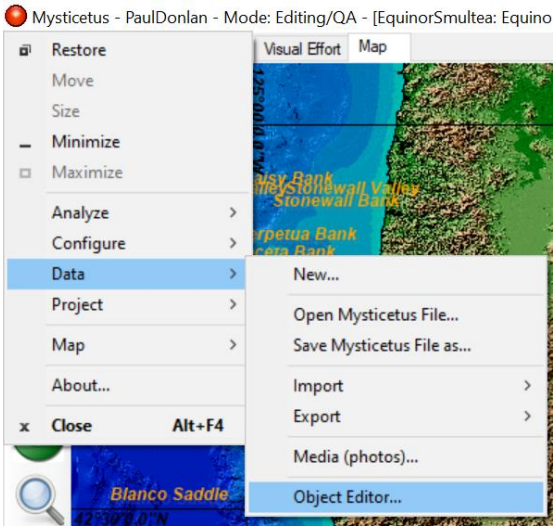
1) The first entry is with a rig altitude offset of 4 meters
2) The second entry is with a rig altitude offset of 0 meters.
3) Note here without the correct value the error in this example is ~25% (!!)



ALTITUDE OFFSET EDITING IN OBJECT EDITOR

The value can be edited later in the Object Editor if, say, the PSO team got a bit behind and didn't change the value precisely on time. Any such fixes should be done no later than the final, end of day QA/QC on your data.

Click the ball -> Data -> Object editor,



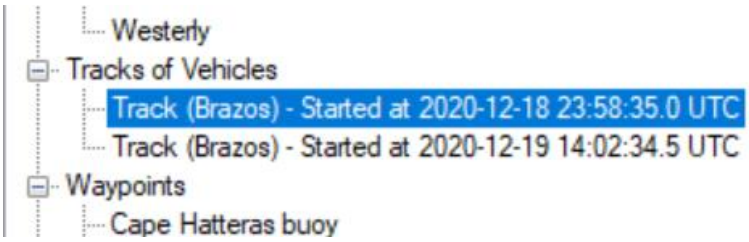


Figure 10Finding data records for editing.

Then select the vehicle's track. You can choose the rows to change, right click on the Altitude Offset column header and choose Set Altitude Offset for Selected Rows. Mysticetus will automatically apply that value for that given timeframe, and update any Sighting distances during that time frame, appropriately.

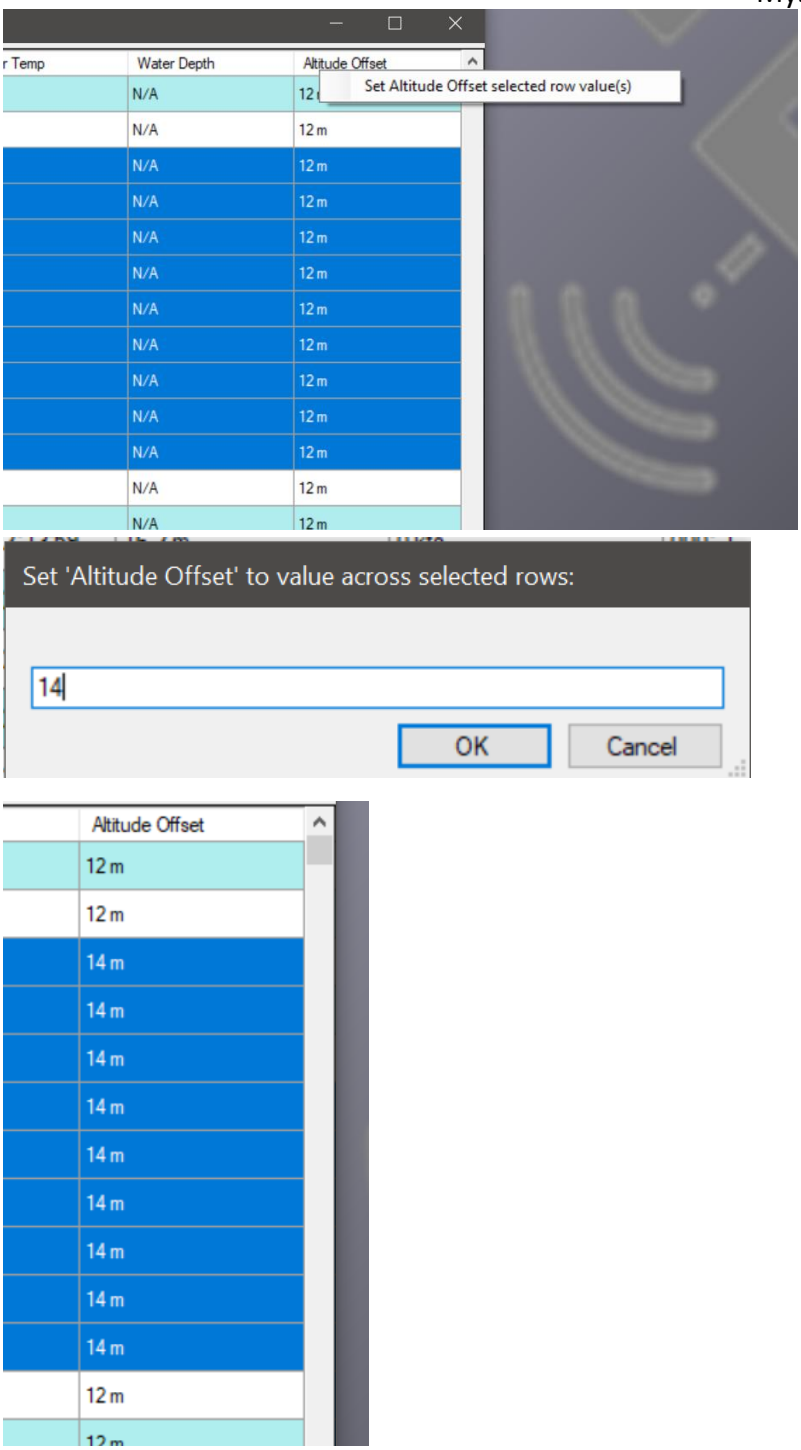


Figure 11 Editing and reviewing platform offset values.

When you are finished editing your platform heights you need to recalculate the values. Mysticetus requires this anytime you are editing fields from what was originally recorded.

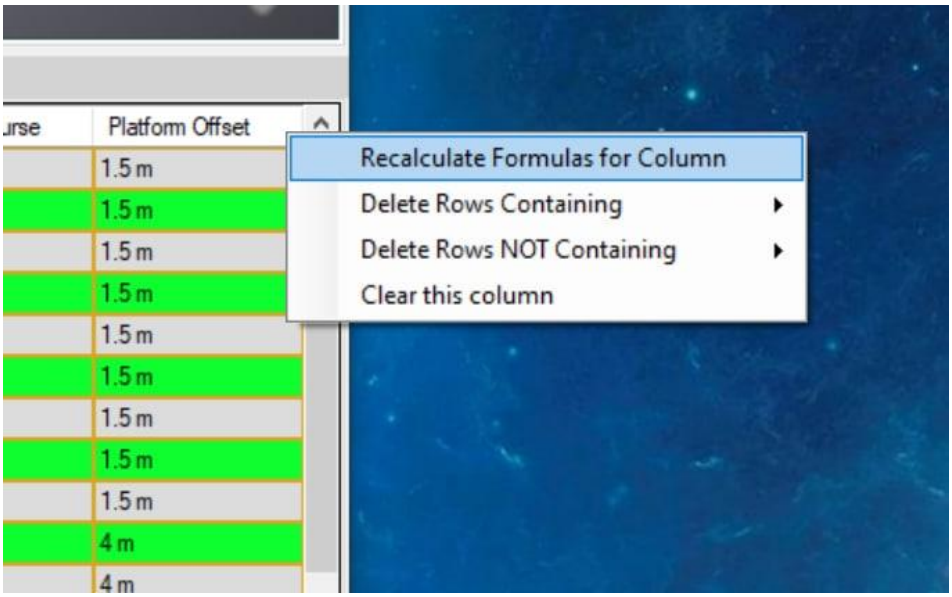


Figure 12 Recalculating data.

COMMUNICATIONS PANEL STATUS - THE WATCHDOGS

For 2020 we've added a communications panel to show the status of all connected external environments for your operational use of Mysticetus. Not all listed environments below may be a part of your operations. Below is a list of the watchdog functions and their respective meaning of import.

NOTE: DO NOT IGNORE THE WATCHDOGS

The watchdogs are there to keep you appraised of the overall health of your project in an immediate sense. They watch internet communication status of a broad range of data providers such as NOAA. They also keep an eye on your immediate project health including GPS status, GPS tracks, and Project Sync status with the cloud.

Figure 13 Mysticetus "Watchdogs".

Sync with GPS button updates the laptop's internal clock to GPS time. Laptop internal clocks tend to drift over time. Sync with GPS should be done daily.

Com ports is related to the relationship between your active laptop and items plugged into it.

a. Com ports – this represents anything plugged into the laptop computer, most typically the USB GPS. Typical failure is a bad cable or a device that is not plugged into a functioning (sometimes they fail too) USB port on the laptop computer.

The below services are dependent upon two principal factors: data from provider and a proper internet connection onboard your vessel.

b. Gliders and Buoys – depending on your operation sighting data from independent listening glider and buoy operators. Typical failures are loss of feed from provider or loss of internet.

c Mysticetus alerting system – this system alerts nearby vessels and onshore personnel of both sightings being shared between nearby vessels to your vessel and onshore personnel in the case of critical events. Typical failure is due to loss of internet services.

d Mysticetus (cloud) project sync status – Mysticetus cloud system will not sync if internet access is constrained or unavailable, red indication states your local data is not fully sync'd with the cloud. Typical failure here is due to loss or excessively slow internet connections.

e Mysticetus Command Center sync status – All data is communicated with Mysticetus's common observation platform which is provided to the prime contractor. This platform allows the prime contractor to have an all-up view of all their operations' states.

f NOAA DMA alert status – Mysticetus consumes and displays to observer stations the current DMAs. Mysticetus displays only active DMAs and relies on NOAA to provide this data. Typical failure is NOAA feed failing or loss of internet.

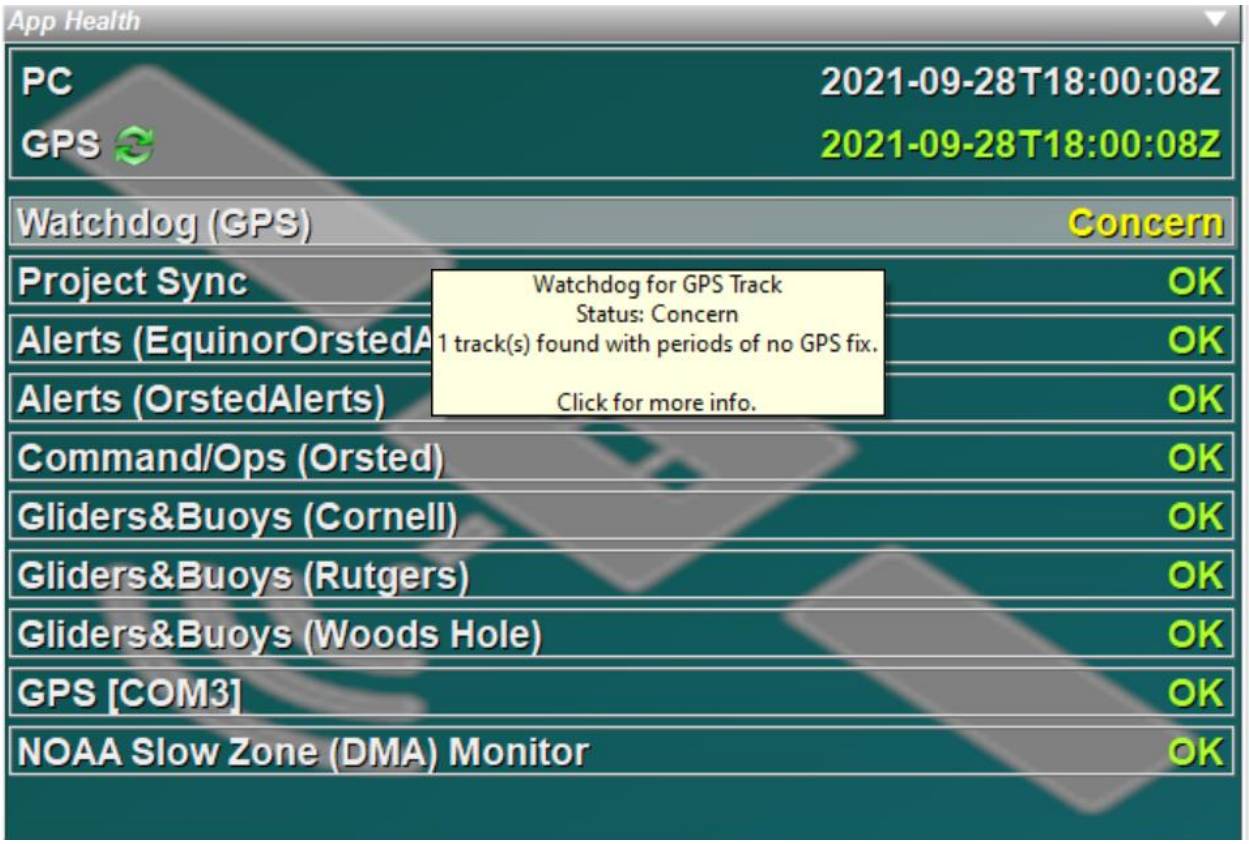


Figure 14 GPS watchdog showing some possible gaps in coverage.

DURING THE PSO SHIFTS

The number one priority is to keep your eyes on the water, and a balance must be struck between that task and entering data.

Many people watch the data stream from Mysticetus, each day, in real-time. This includes project managers from the PSO company, mangers at vessel companies, and even C-level executives at prime clients.

PSOs must perform a challenging balancing act between keeping eyes on the water and entering data as soon as practical, especially for “critical” sightings.

Sightings of critical species such as *North Atlantic right whales* must be entered as soon as possible to alert nearby vessels.

Sightings of injured, entangled, or dead animals also must be entered as soon as possible to allow Mysticetus to alert onshore personnel. These latter events trigger all manner of on-shore process with the government; providing early heads-up alerts to on-shore administrators is critical.

Mysticetus also displays animal sightings in a web-based Command Center. This web page is viewed regularly by many people, from project managers through energy company CEOs. It is not unusual for a PSO project manager to get an email from a client executive wondering why Boat X has not seen whales today while nearby Boat Y has seen 8 of them. (Answer can only be Boat X has not entered them yet).

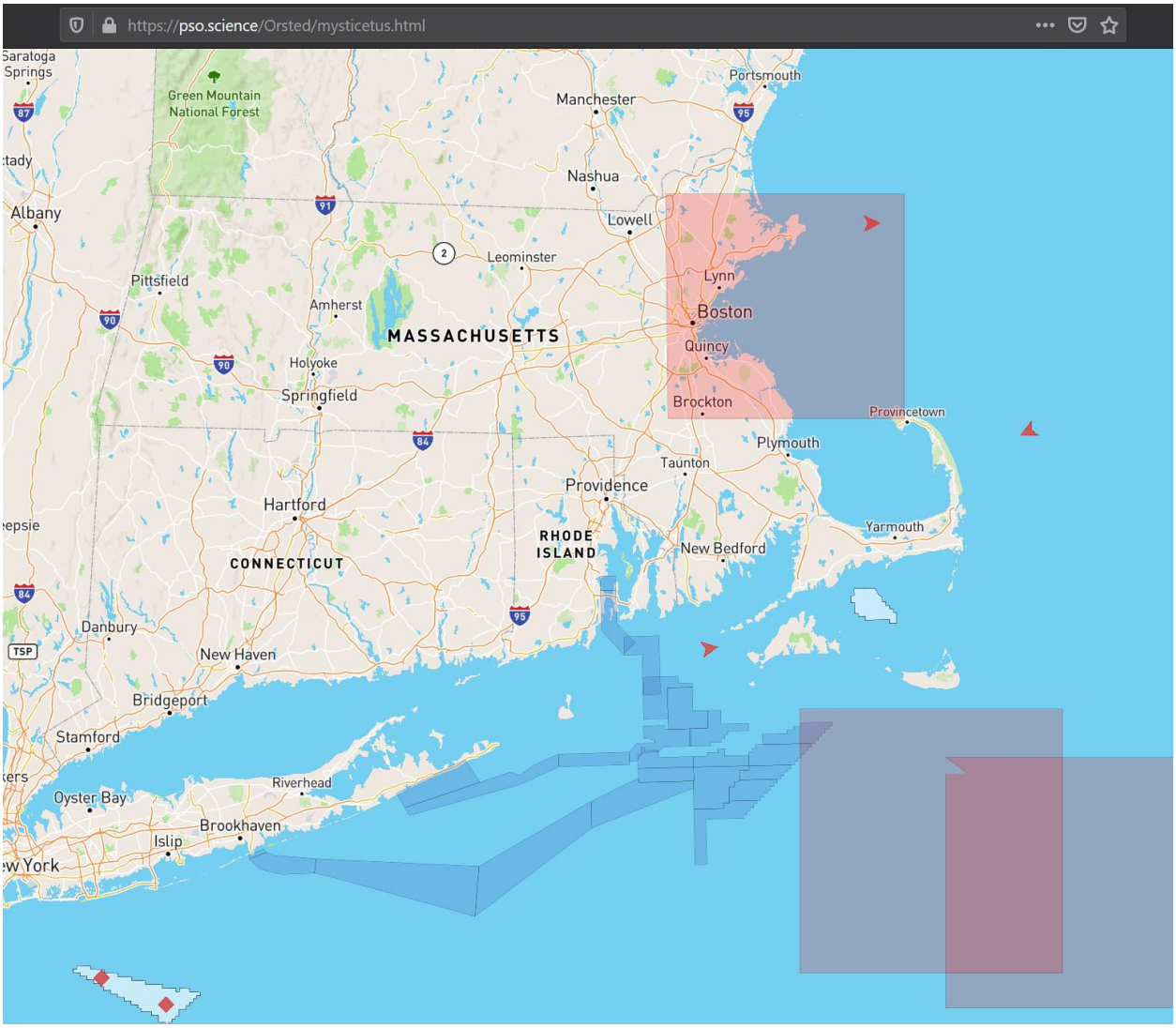


Figure 15 Mysticetus Command Center tracks all vessel activities.

The number one priority is to keep your eyes on the water, and a balance must be struck between that task and entering data.

If unable to get to the computer, keep notes (timed to the second via your watch, which has been synchronized to GPS time) on paper and enter as soon as practical. Note that shared alerts only fire on other boats when you enter the sighting data – timely entry help prevent ship strikes.

Enter key data into Mysticetus and if time or sighting activity does not permit for complete data entry, keep a notebook to record information and enter details at the end of your shift.

As stated, it is a balance between keeping eyes on the water, directing mitigation actions, and doing just enough data entry to share critical information to the potentially dozens of people "watching you".

Do not close the Mysticetus data collection application until day's end (generally midnight UTC). If for some reason you need to in the middle of a day (this is highly unusual) – please see details in appendix for temporary shutdown.

END OF SHIFT RESPONSBILITIES

At the end of the PSO's shift, each PSO is required to review, and quality check their data collection. This is to check for empty or blank fields, incomplete effort reporting, and erroneous sighting information (such as unrealistic animal location relative to vessel track).

1. No data field should be blank. Select NA or None if not applicable.
    a. If none of the available data items in the drop-down fields are appropriate, notify your LEAD PSO for training or to communicate with the Project manager to make an adjustment to the Mysticetus template.
2. As appropriate, enter comments in the "Notes" fields to communicate to the reporting team, project manager and data reviewers.
3. Double check the BFT values – does this make sense with the wind speed and swell heights?
4. Correct any data entry errors (due to selecting the wrong value or missing the entry of a value)

END OF DAY

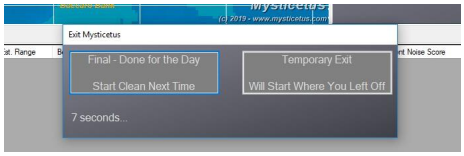
Generally, each day is a 24-hour period starting and ending at midnight UTC. Shortly before midnight follow the end of 24-hour period procedures listed below. Other projects run only during daylight hours (or similar). The processes still apply.

END OF 24-HOUR PERIOD

The day starts and ends at 00:00 UTC. The laptops are set up on UTC time zone to provide reference. Mysticetus Time Stamps are based on the laptop Time zone setting – don't change this from UTC.

MYSTICETUS DATA COLLECTION LAPTOP

1. Enter the final record on the "Visual Effort" tab (press Alt+V until the appropriate tab is selected, then press Shift+Alt+Plus to create a new row and copy down fields).
    a. Complete all data entry for the row
    b. Select the "Effort Type 1" = "OFF" to indicate the end of day.
    c. Enter in the "Notes" field any detail information and indicate this is the End of-Day.
2. Shut down Mysticetus by clicking the "X" at top right corner to close Mysticetus.
3. Select "Final – Done for the Day"
    a. When Mysticetus is shut down on the data collection laptop you will have an option to choose between "Final – Done for the Day" and "Temporary Exit" options. Chose Final if you are not timely Mysticetus will default to final save. Final save marks the day's file as final. Next start of Mysticetus will mark a new day.



    b. If you erroneously chose "Temporary Exit" then restart Mysticetus then close it using the "Final" option.

OBTAIN HANDHELD GPX DATA AND PERFORM DAILY QA/QC

1. Start Mysticetus Editor
2. Plug the Garmin handheld GPS into the laptop.
3. Wait until the Garmin finishes "Saving all tracks and Waypoints" and the computer chimes showing it is connected to the PC. This can take 30 seconds or longer.
    a **Note 1: Garmin will not charge when connected to the laptop.**
    b **Note 2: Garmin will not record track when connected to the laptop.**

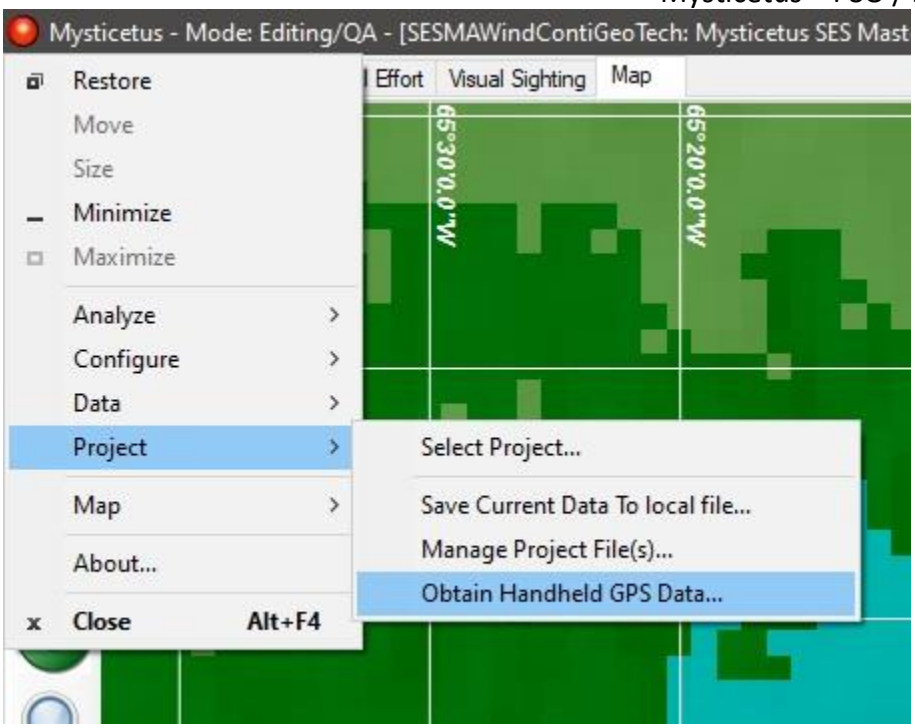
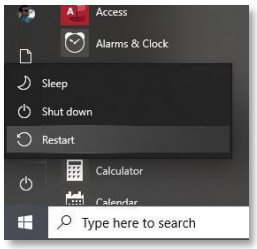


Figure 16 Uploading GPS data to Mysticetus.

4. In Mysticetus click the main menu ball icon and select **Project** > **Obtain Handheld GPS Data**…
5. Wait for the process to complete (should only take a few seconds)
6. Unplug the Garmin from the laptop.
7. **Delete the daily track** on the Garmin by selecting on the Garmin menu **Setup** > **Reset** > **Clear Track**

   a. **NOTE 1:** Daily track must be deleted, or Garmin memory will fill up and then stop recording new tracks (bad!)
8. Perform End of Day Lead PSO QA (see below for details)
9. Restart Mysticetus in Data Collection mode.

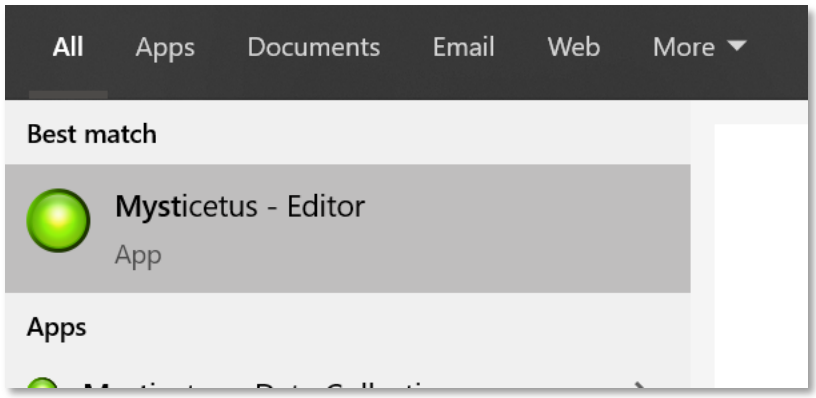
10. Restart via the **Start of day (24-hours)** procedures above



END OF DAY LEAD PSO DATA QA/QC

At the end of each day, the lead PSO reviews the **final data file** (the one with "Final" in its name) for quality assurance. This operation is performed in the Mysticetus Editor, after the Data Collection has been Exited and Final Save has been selected.

Begin by starting the Mysticetus Editor:



Note: Do not use Mysticetus – Editor (Admin)! That is for your project manager.

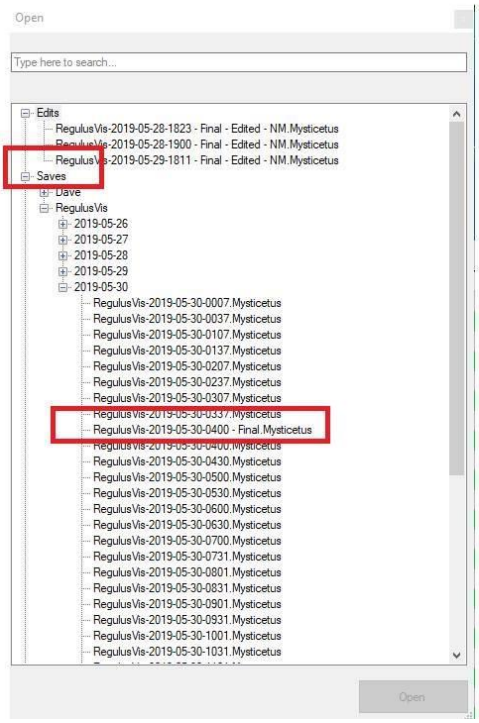
END OF DAY QA/QC

Review the day's data, looking for blank cells, that every mitigation request has a subsequent response, unusual species, odd GPS tracks, unlikely weather combinations, etc. Clarify any questions with the PSO who entered the data.

1. If not already running, start Mysticetus Editor.
    a. If you do this with the laptop computer you've been using all day, then leave the hockey puck plugged in during the below steps.
    b. Mysticetus will continue to collect track data which will be integrated into the new day's records.
2. Go to the Mysticetus main menu to retrieve the final data file:
    a. **Data -> Open**

Figure 17 Opening the "Final Save" file for editing.

3. Navigate to "Saves" and select the Mysticetus file marked "Final" for the day to be reviewed, the click "Open". (Note that this file may have been saved in the next day's folder, if the shutdown happened after midnight UTC – go look there if necessary)



4. Import any photos of sightings. This is in **Data -> Media**. Make sure to select the time zone the camera is using (this should be UTC, but that setting is commonly missed). Browse to where the photos are, then press **Process Files.**

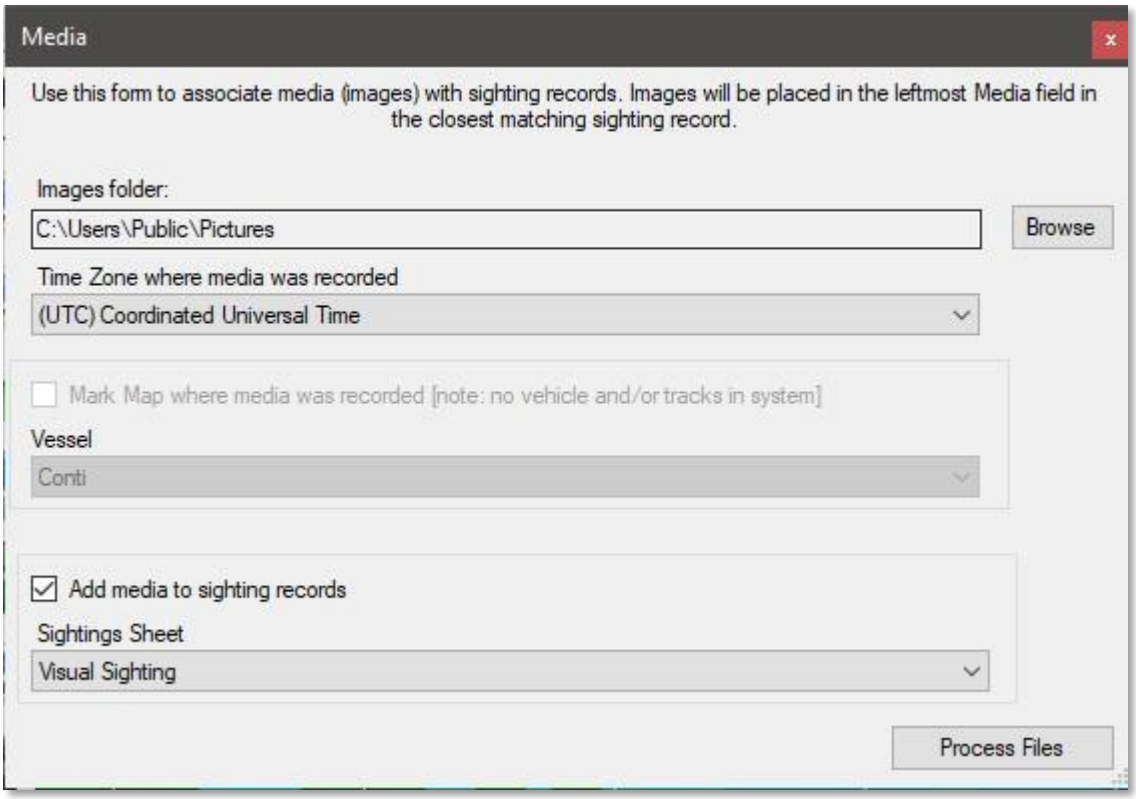
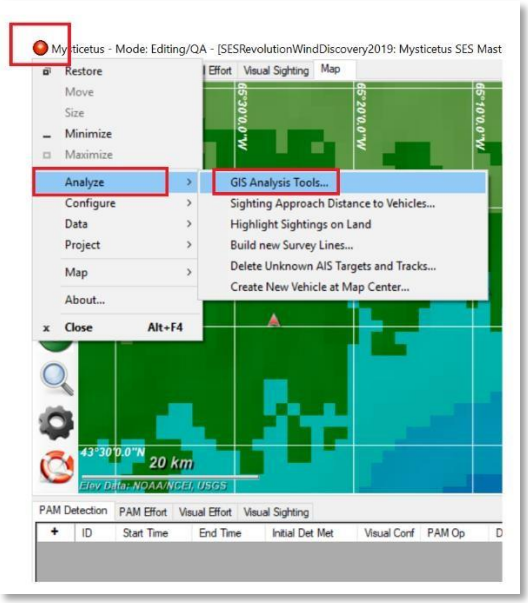


Figure 18 Uploading Photo Media to Mysticetus

a. Run the Mysticetus GIS Analysis tools reports for an initial QAQC. Select: **Analyze -> GIS Analysis Tools** …



b. Check the boxes next to the GIS Analysis reports to run

i. For example: Inside 500m-Sighting Details, Visual Effort Detail, Visual Sightings Details and Visual Sightings Summary (etc.)

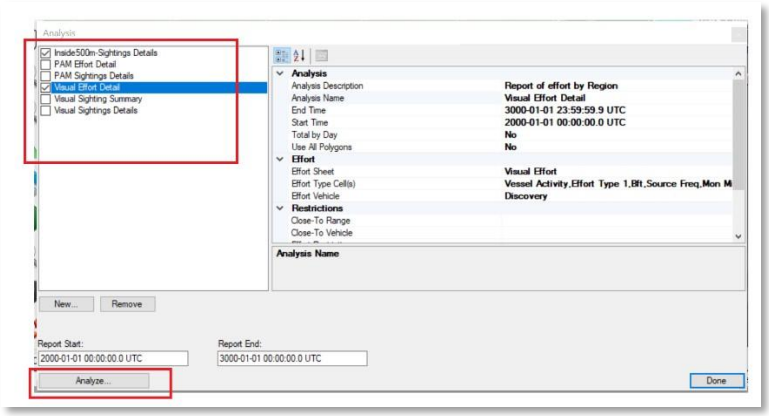


Figure 19 Performing the GIS analysis.

c. Click “Analyze”

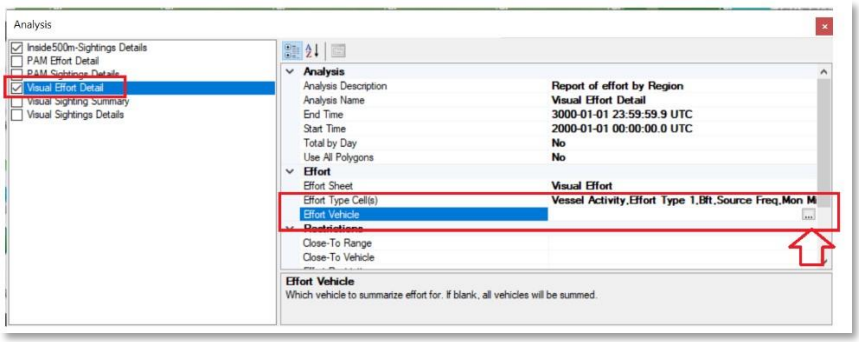
5. The “Note” box this is an area for you to communicate to the On-shore team any items of interest or concern. Examples could be lost GPS service, Mysticetus was accidently shut down during the day, or any missing data entry data values from the drop downs. This is dependent on the survey and client needs.

   a. Analysis tool creates several CSV files. This effort takes a few seconds to run.

   b. If it appears its ‘hanging” or does not complete in a minute two items

      i. Lost internet access or

      ii. The effort vehicle isn’t selected. iii. Close the dialog and return to the menu option for the analysis tools.



iv. For the PAM and Effort detail reports ensure the Effort Vehicle has your Vehicle selected. If missing, go to the right-hand side for the Ellipse … and select your vehicle.

c. Open each CSV file, Mysticetus laptops use Libre Office to support this.

d. Review each CSV file for indicators or possible issues. Keep in mind, you can customize the values reported. Below are a few examples of items to check:

i. View total time on effort – does this make sense (any time not equal to 24 hours is an issue for 24/7 projects

ii. Are GPS tracks missing? iii. Does the sighting information make sense?

iv. Are there any data fields with blanks/Missing data?

e. Click "Done" to close analysis tool window.

6. Finally, save the QA/QC'ed file. Go to the Mysticetus main menu and:

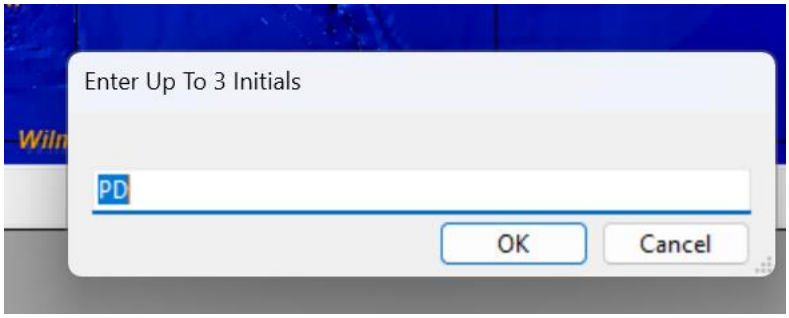
a. Select **Data -> Save -> Save Edit to 'project name', which is Testing2 in this example below**

Figure 20 Saving your edited file correctly

Do not save to the two that are x'd off, they are for special use by dedicated research projects not relevant to offshore wind environmental mitigation data collection. These two options are only available in the Advanced Editor mode which should not be used on board a vessel unless instructed to.

b. For the edited save:

i. Enter your initials in the offered window:



Enter your initials here.

ii. Do this even if you don't make changes to the data (i.e. data was perfect). Adding your initials to the save indicates you performed these QA steps.

iii. This naming convention indicates to the onshore team you have reviewed and approved the quality of the data.

iv. If you perform multiple saves, you will see your initials with a number in braces PD [2].

v. Select **OK** to save the file.

vi. The Data Analysts and your Project Manager will be looking for this file the next morning.

c. Final save filename example: "MinnowVis-2021-03-26-1624-**Final**-Edited-MA.Mysticetus"

i. In this example, "MA" are the initials of the Lead who performed the QA/QC.

DAILY DATA AND GPX FILE BACKUP

This step applies if there are supplied external hard drives for a secondary back up storage (Mysticetus recommends this and can help PSO providers set this up). If appropriate, back up the Mysticetus Editor laptop to the external hard drives each day after the completion of the daily QAQC efforts.

1. Plug in the backup hard disk.
2. Click on Backup.cmd file if supplied. It will run automatically. If it is missing call us.

QA/QC PROCEDURES

This is more detail on what to look for in the Lead PSO QA QC step.

ISSUES TO LOOK FOR IN DAILY GIS ANALYSIS REPORTS

The Mysticetus Analysis tools will rapidly point out any <blank> or <unknown> fields.

These entries indicate a blank field in the Mysticetus file.

Effort reports display distance and hours of effort, sometimes broken down by geo-polygon (such as lease area or work zone). The total hours in an effort report should not exceed ~24 hours. If the report displays more than 24 hours, confirm there is an OFF-Effort row for the day.

Mysticetus will intentionally count hours all the way to the year 3000 if you miss your last Off Effort row and show that you spend over 8,000,000 hours On Effort to point out this error:

	A	B
1	Bft	Overall_Totals
2	GPS Track coverage of effort: Complete	
3	2019-12-29 23:59:58.2 to 2019-12-30 23:59:59.8 UTC	
4		
5	Overall Length (m) - from Highland Eagle Track	183881.61
6	3	73205.25
7	4	20776.24
8	5	13755.22
9	6	33769.47
10	7	42375.43
11		
12	Overall Time - from 'Visual Effort'	8590587:58:41
13	3	7:40:47
14	4	1:49:17
15	5	8590571:24:52
16	6	4:10:43
17	7	2:53:01
18		
19		

Figure 21 Looking for out of scope values in GIS analysis data.

Does the information in the analysis reports make sense? This is where your expertise and project requirements come in. These files are a summary of the day's efforts. Looking for…

1. Missing & Incomplete data
2. BFT ranges or time in certain values that do not make sense.
3. Animal sightings that do not make sense for the region.
4. Missing GPS track coverage
5. Overall time for visual effort that is Greater than 24 hours. This generally indicates either a missing OFF Effort row or PSOs did not shut down Mysticetus.
6. Overall time effort of less than 24 hours. Verify this makes sense. Did the Vessel dock and wasn't out for a 24-hour period or did the PSO crew shut down Mysticetus for the day prematurely?
7. Overall effort time(s) wildly out of scope such as the image above. Was an off-effort row added at the end of the day? If so, contact your project manager as there may be an issue with your project's template configuration. Templates often change year to year.

REVIEW FOR ALL TABS

Review all Tabs (PAM Detection; PAM Effort; Visual Effort and Visual Detection)

a. Review, looking for anomalies. Check for blanks; go back to the Mysticetus user interface and fill in any blank cells there.

b. Is there any data omitted? o not leave any fields blank. looking for blank cells, make sure all are filled.

    i. If not, put an explanation in the notes (example: equipment down, didn't write down, etc.)

c. Look for inconsistent times.

    i. If times look off, note that Mysticetus uses whatever time the laptop is set to run. For example, if times in Mysticetus need to be in UTC, set the laptop's time to UTC.

2. Visual Effort

a. Do not leave any fields blank. Make sure all are filled. Use NA where appropriate.

b. Read notes, fix typos in data entry and in the notes field.

c. Make sure the "Night" box is checked for all nighttime hours.

d. Make sure DP thrusters are checked for any time that the thrusters are on, or the correct equipment is noted as operating.

e. Check that bearings and headings are entered correctly.

f. Check that reticles and distances are appropriate.

g. Look at the map to check for odd vessel track lines.

h. Review Beaufort entry. Does it make sense with conditions, Wind Speed and Swell Height? If outside the parameters – enter a note.

i. Review Vessel Activity – is the correct activity entered and is the transition from each activity accurate? If value Other (See notes) is used – ensure there a clear and detail description in the note field.

j. Effort Type 1 and 2 – are these accurate? For the final row for the day – is there an OFF-effort type 1?

3. Visual Sighting
    a. Review the sighting records and attach any photos from the day to the proper sighting.
    b. Look for inconsistent times.
    c. Ensure that for every Mitigation request there is a Mitigation response.
        i. Both data fields are required for a sighting.

CERTAIN UNUSUAL SITUATIONS

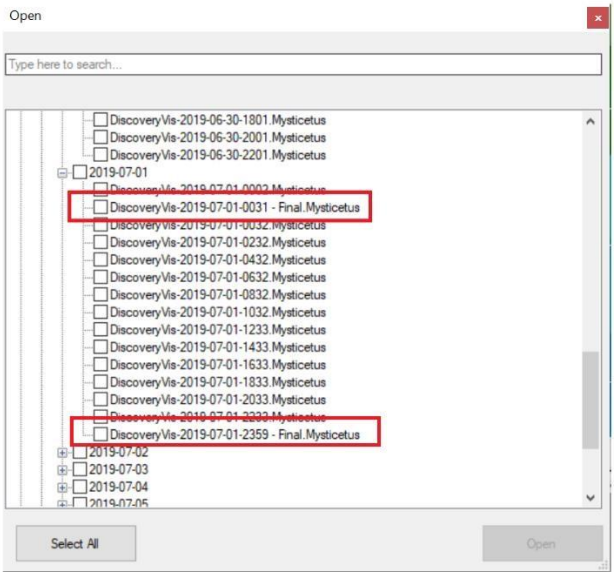
TEMPORARY EXIT

A temporary exit is used if you are not done for the day but there is a need to close or restart Mysticetus. This may occur when you need to leave the bridge for safety reasons, or a software update must be taken. Mysticetus will pick up where you left off when you restart it. This is an unusual event.

Figure 22 Choosing temporary exit.

DID NOT SELECT TEMPORARY EXIT

If Mysticetus data collection is shut down during the day and you did not select temporary exit, Mysticetus will automatically create a FINAL data file for the day. This can lead to two Final files being created. This condition **MUST** be avoided unless instructed. The final save files will need to be combined by the lead PSO. A final save wipes the "slate" clean and Mysticetus starts from fresh.



Two indictors show this.

1. When you restart Mysticetus, the Visual Effort tab will not have any data.
2. During the QAQC process at the end of the day, you'll see two files
3. When this occurs Select Both data files during the QAQC process.
4. Continue with QAQC process as outlined above.

MYSTICETUS ONCLOUD DASHBOARD AND DAILY REPORTS

Mysticetus has automated data management via their cloud hosted service called Mysticetus OnCloud. OnCloud allows you to view your daily collected data's progress through the defined progression of QA/QC steps for data flow and automatically generate your daily report.

WHAT IS THE ONCLOUD DASHBOARD

Mysticetus OnCloud maintains a dashboard that tracks compliance with the QA/QC steps required to marshal customer data into OnCloud. The project managers will have access to this dashboard to monitor the completion of major tasks. As a Lead PSO you care about the following indicators in OnCloud for your assigned vessel. If you do not have an account for OnCloud contact your project manager.

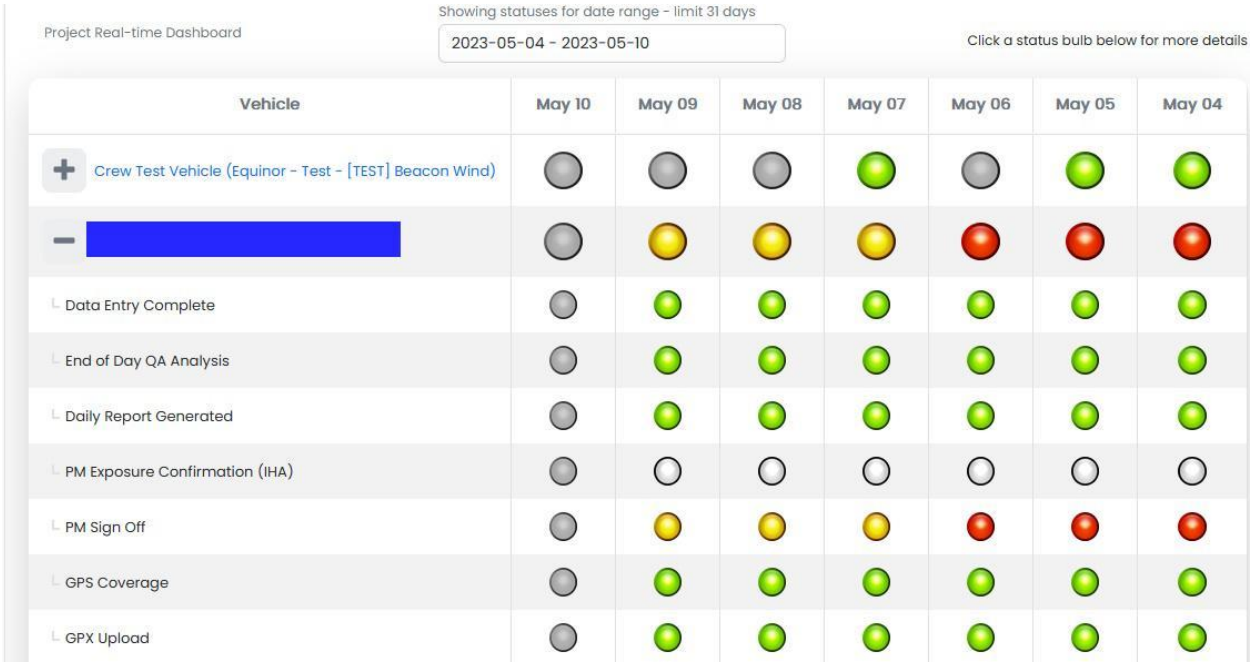
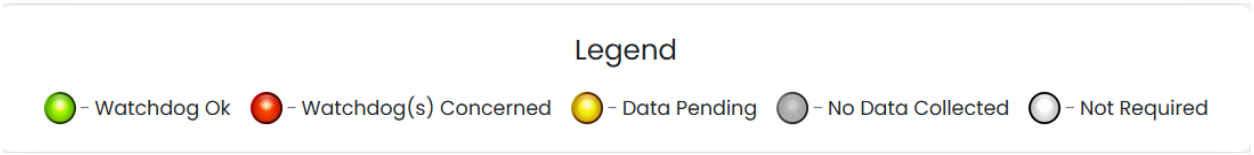


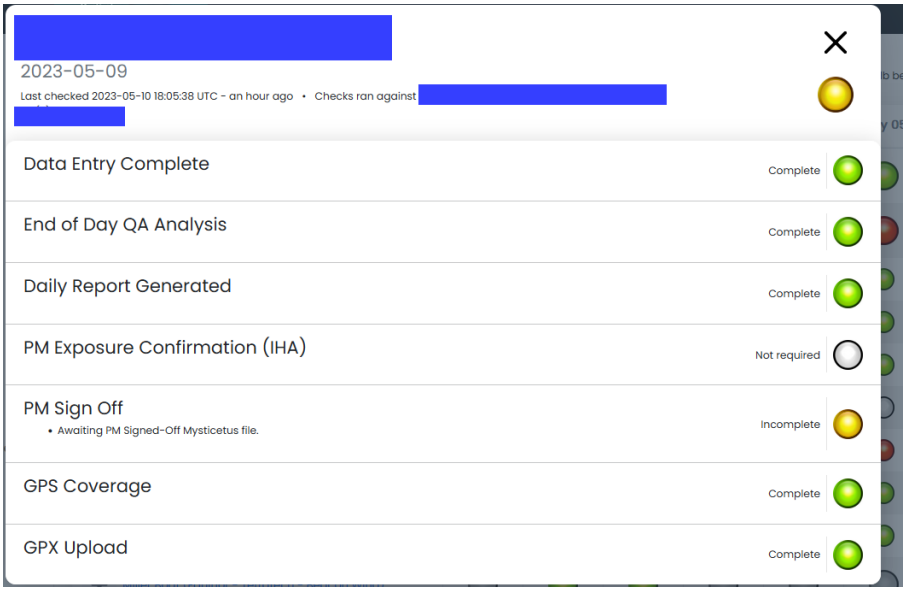
Figure 23 Mysticetus OnCloud data dashboard.

Typical dashboard appearance of a live project, the Mysticetus test project. The colored balls give status immediately. Green is good, yellow is pending, red needs follow up by the project manager.

Hovering the mouse cursor over the concerned watchdog gives status.



A legend is provided to define the meaning of the respective colored balls aka “Gumballs”.



Clicking on a gumball gives an expanded view of the day’s status and the last filename that was processed by Mysticetus OnCloud.

The checks you, as a lead PSO, are responsible for are **bold red** below. The remaining tasks are typically handled by the project manager.

Defining the checks in OnCloud –

Data Entry Complete – This verifies a final, end of day save has been created by the PSO team.

End of Day QA Analysis - This verifies the lead PSO has run the Mysticetus Analysis tools to look for obvious mistakes in the data and that the lead PSO has reviewed the final save of the day then saved it off an 'edited' file.

Daily report Generated – This verifies that the lead PSO or project manager has run the daily report in Mysticetus OnCloud.

PM Exposure Confirmation – Verifies that the OnCloud IHA take tracker also referred to as the IHA suspected take tracker table is up to date for the given day.

PM Sign Off – Refers to the project manager reviewing the edited file for final corrections and has saved it as a 'signed off' file. This is the data the Offshore wind developer will hand off to the appropriate regulatory agencies as required by permit.

GPS coverage – looks for obvious holes in the GPS track. Gaps larger than about two minutes will require fix up by the project manager.

GPX upload – Verifies the daily upload of the backup GPS data, with a GPX file extension, has been uploaded by the lead PSO. The GPX file is used by the project manager to fix any gaps in the collected data. This is a critical backup to data value.

AUTOMATICALLY GENERATING DAILY REPORTS

Selecting the OnCloud reports engine, below, starts the process of generating your daily report. Also available to your program manager is the ability to generate other report types. As lead PSO you typically will only be concerned with generating daily reports.

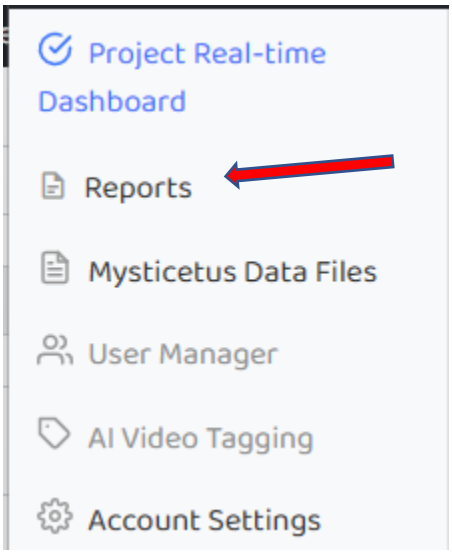
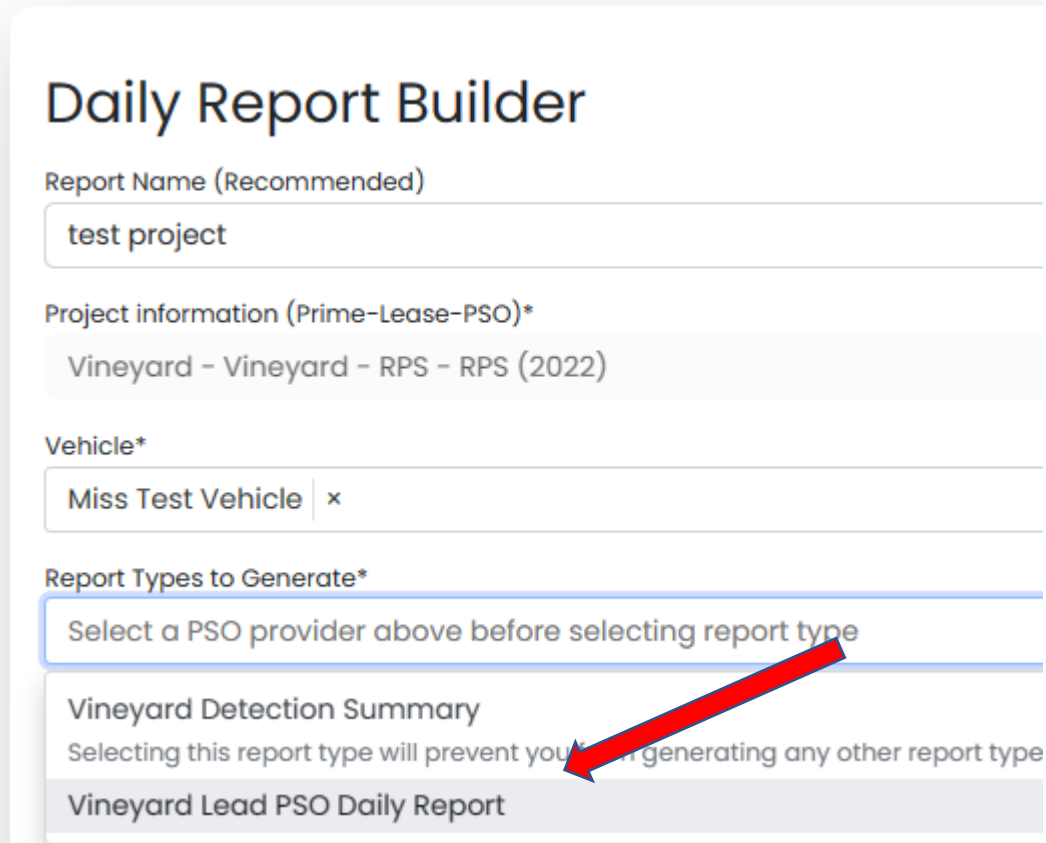


Figure 24 Where to find Daily Reports in OnCloud

Daily reports have a few steps need to be followed:

1) Name the report per your employer's standards.

   a. We suggest project name or abbreviation, vessel name, data, daily report are all in the title.
2) Indicate you want the Lead PSO Daily Report.
3) Pick the correct date.
4) Generate and download the report.
5) Review report for correctness.
6) Send it to the correct recipients as defined by your employer.



Note: other report types may be listed. Coordinate with your project manager on their use as they might be actionable for you.

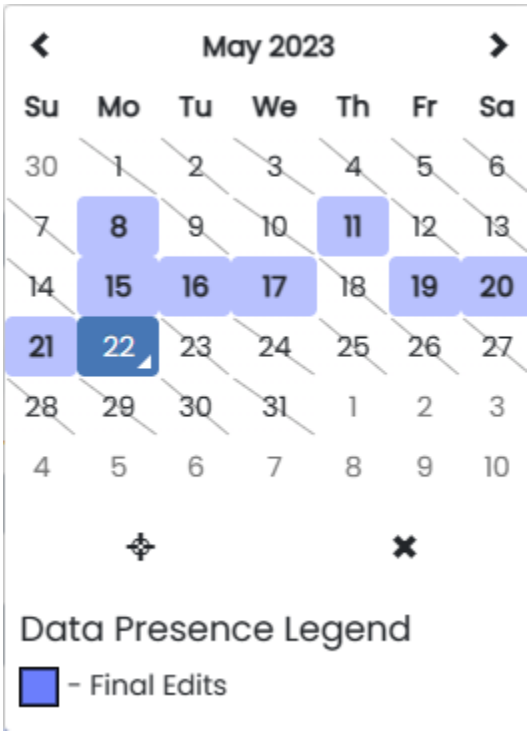


Figure 25 Daily Report date selector.

If the date that you need to generate the report for is missing, indicated by a calendar date with a slash through it), there is typically one of two reasons:

- ✓ You have not reviewed your final report and saved the edited file. This is a prerequisite. The OnCloud dashboard will indicate whether this has been received.
- ✓ The final edited file has not fully been transmitted from the vessel you are on and propagated into OnCloud. This can take between 5 and 30 minutes. If your internet onboard is particularly bad it could take an hour or more. Again, the dashboard will indicate receipt success.

Failing this contact your project manager or us if you've been put in direct contact.

Once you've named your report and have specified that you want the Lead PSO Daily Report you'll need to pick the correct date then run and download the report. Review the report. For missing or incorrect data please email your project manager with a copy of the report and issues noted for forwarding to Mysticetus.

RETURNING GEAR TO MYSTICETUS

MYSTICETUS LAPTOP SHIPPING CONTAINERS

Mysticetus uses 8-gallon Rubbermaid "Action Packer" containers for shipping the laptops and electronic equipment between projects and Mysticetus. It is designed to carry up to 3 laptops and associated electronic gear. There has never been equipment damage when the packer is properly filled and sealed during shipping.

WHAT IS IN THE PACKER

Each packer will contain all contracted electronic components for your project. It will also have Mysticetus QA sheets used to prep the laptops. Most importantly the **QA sheets contain all account passwords necessary for logging onto the supplied computers.** A shipping manifest is provided as well. Use the shipping manifest to validate all supplied gear is returned to Mysticetus at project's end. Checking off by initialing the list items indicating they're packed.

The packer has been modified with foam of various densities to protect the contents during shipping. Low density foam lines the walls of the black container and its floor. The Grey lid also has low density foam affixed to assist in securing the load during the physical rigors of shipping. In between the electronic components shipped are pieces of grey ½ inch thick high-density foam to protect the electronic components from damaging each other. If your packer was used to only ship two laptops then an additional, 1 inch thick, piece of foam is provided as a spacer mimicking the space otherwise taken by a third laptop. Note: The foam is critical to safe shipping and is expensive to replace. Don't lose the foam.

Filling the packer should be done in this order:

1) Laptops separated by foam pieces.
2) Miscellaneous gear on top of laptops separated by foam piece.
3) Place a final piece of grey foam over the various loose electronics and power cords.
4) Put the shipping manifest on top of the final piece of foam after verifying all contents
5) Secure the packer for shipping per the below guidance

HOW TO PROPERLY SECURE THE SHIPPING CONTAINER

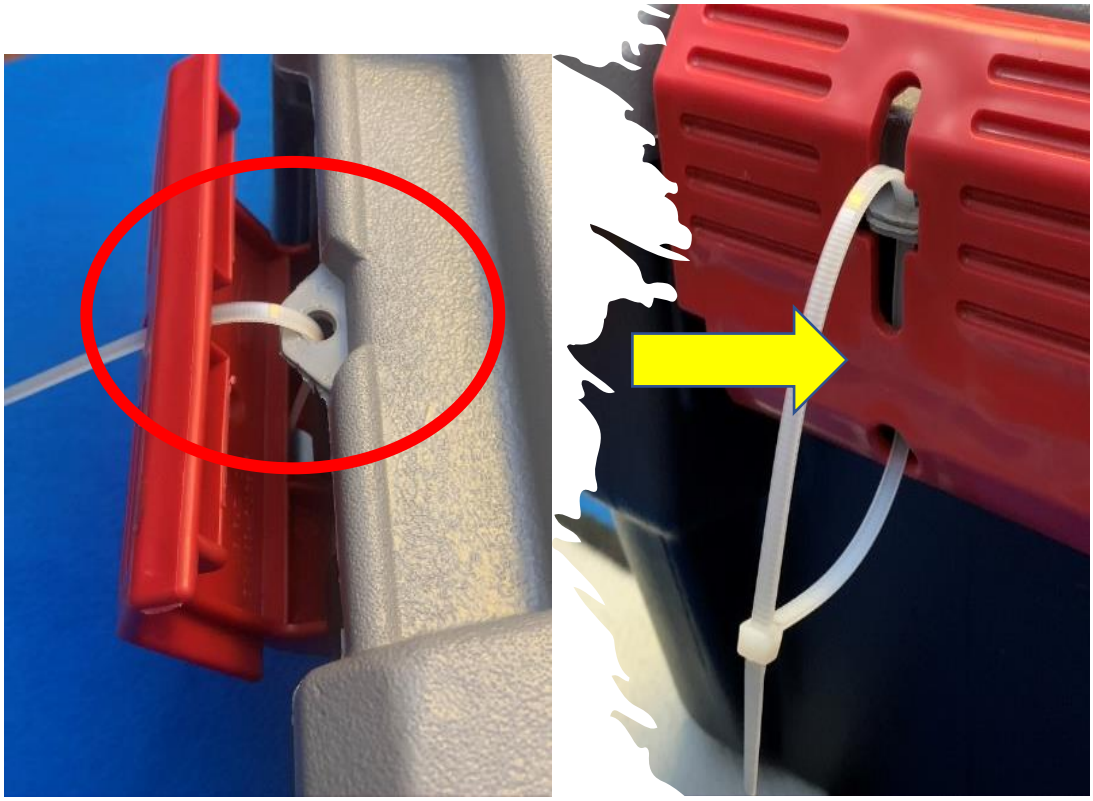
Securely sealing the black Rubbermaid shipping container (packers) is not obvious. The Rubbermaid "Action Packer" container that Mysticetus gear is used to ship gear to vessels and back to Mysticetus is not intuitive in how to properly seal. Incorrect sealing can result in direct insurance claims against PSO providers.

To **secure** the **packer** in preparation for shipping requires these **three simple steps**:

1) Properly zip tie the handles.
2) Apply a couple strips of strong shipping tape to effectively tie the handles together.
3) Cut the surplus length of zip tie to prevent snagging during shipping.

Properly loop the tie wrap through the packer lid tab and through the hole at the bottom of packer handle. Do this with the handle partially open to ease threading of tie wrap.

Step 1:



Once the tie wrap is properly threaded close the handle securely. Then, with the handle securely closed, cinch up the tie wrap as tightly as you can.

Figure 26 Properly secured shipping container handle

Step 2: Tape handle to handle as a secondary means to secure. The tie wraps often break.

Steps 2 and 3

Step 3

Cut the excess zip tie tail that extends beyond the tie wrap lock with scissors or cutting snips. Cutting the excess reduces chances of tie wrap breaking or snagging during transport.

CHECK LISTS

DAILY START UP CHECK LIST

Step Description		Completed?
1	Setup and turn on Garmin eTrex. Verify it has a solid GPS fix, if not move eTrex around for optimal view of satellites.	
2	Turn on Mysticetus Data Collection Laptop with USB GPS attached and any other peripheral as necessary.	
3	Log into Windows account "**PSO User**" (PIN: 32336580)	
4	Click on Mysticetus Data collection icon.	
5	Wait for GPS indicator (Green Ball)	
6	Click Sync PC Clock with GPS	
7	Add First Effort Record	
8	Set Camera time (and any watches) to match GPS time	

PSO END OF SHIFT CHECK

Step Description		Completed?
1	Review the Mysticetus entries during your shift for accuracy	
2	Correct missing/erroneous data entry issues	
3	Confirm a data value is entered for every data field	
4	As appropriate, write a clear note for each row of data	

5	Ensure, if you use input option of OTHER; UNKOWN or leave a value blank, to enter a note to describe why and the circumstances (in general, use NA instead of a blank field)	

END OF DAY CHECK LIST

DATA COLLECTION SHUTDOWN / LEAD PSO QA QC

Step Description		**Completed?**
0	When you shut down Mysticetus a Final "Visual Effort" row on the Visual Effort Tab with Effort Type 1 = "OFF" will be added. **Don't delete that data row.**	
1	Shut down Mysticetus by clicking the "X" at top right corner to close Mysticetus.	
2	Select "Final – Done for the Day"	
3	Start Mysticetus Editor mode - if on data collection laptop **do not reboot computer** as Mysticetus will continue tracking GPS position for the next day's track lines.	
4	Load the file labeled as **"Final"** for that day from Data->Open Mysticetus file under the "Saves" directory shown.	
5	Look for and fix any obvious errors and errors indicated by the watchdogs.	
6	Look at GPS track on map – does it make sense?	
7	Look at Sightings on map – do they make sense? Create a map key (right click on map -> Map Key). Does it make sense?	
8	Import the day's photos – Try to limit it to 10-ish photos per day. 3 for interesting sightings.	
9	Run GIS Analysis Tools (Effort, Sightings, Sightings inside 181m, etc.). Add notes indicating you did this.	
10	Look at Analysis CSVs – make any corrections necessary based on this.	
11	Save edited file using "Data->Save->Save Edit To" option only. Add your initials to the file name.	

12	Upload Handheld GPS GPX Track data while in editor mode using “Project->Obtain Handheld GPS Data” option. You can see confirmation at bottom of the Mysticetus same as other descriptors.	
13	Once upload is finished then clear track data from handheld GPS. Settings->Reset->delete track lines.	
14	Exit Mysticetus Editor, Restart computer and Handheld GPS per startup checklist if the computer is used for data collection too.	