MYSTICETUS
PSO & LEAD PSO
USER GUIDE

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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 not take more than another 10 minutes to accomplish.

This document does not currently discuss auto-generation of daily reports via OnCloud.mysticetus.com. Contact Mysticetus for guidance and training on that time-saving tool.

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).

BACKGROUND

FEEDBACK

Feedback goes opposite the data flow, back towards the field

We are all human. Sometimes life gets crazy out there and 16 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 shift, PSOs review the data they have entered for consistency, accuracy and to (literally) fill in the blanks.

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, they also run formal analysis tools, upload GPX files from handheld GPS's, 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. on the boat) 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 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, and try again. Fixing data at the time of collection represents the most efficient place to do so. This is where memories are freshest.

In this process if there are issues identified that are inhibiting efficient data collection they can be “bubbled up” allowing everyone to work together to correct them.

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 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.

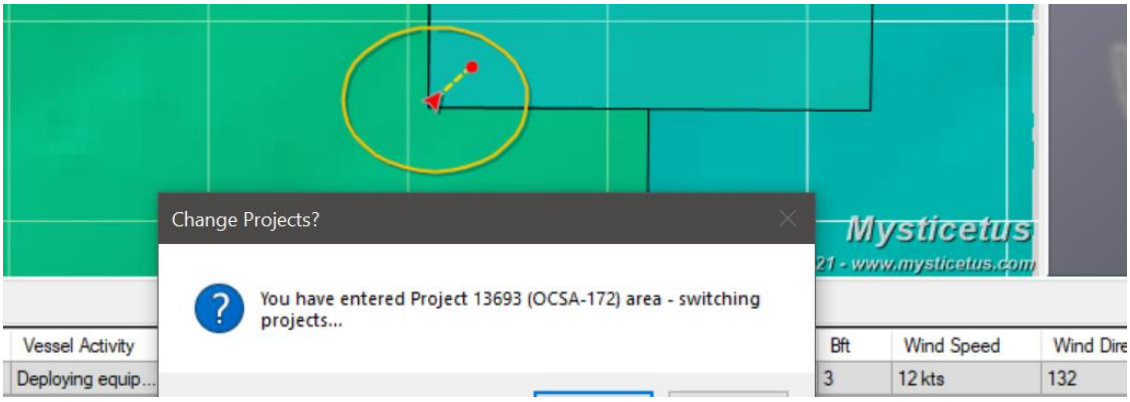
Final represents the final save of the data collection day, based upon UTC

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. Similar to what someone would see with a .pdf or .docx file.

MYSTICETUS AUTOMATIC GEO-FENCING AND GPS-DRIVEN PROJECT SWITCHING



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

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 are able to 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 trackline, 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 actually much deeper than simply Switching Projects. Mysticetus can now trigger ANY action when a vehicle crosses a GeoFence, including sending email or text messages, logging specific audit data, sending alerts to nearby vessels, etc.

DAILY TASKS

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**
13. Perform QA/Editing of the previous day's data in the Mysticetus Editor
14. Upload GPX file from handheld GPS, clear tracks on GPS
15. Exit Mysticetus (Final Save) and restart computer
16. If your vessel does not have internet (common near shore) start Mysticetus in editor mode onshore where it is connected to the internet, data will upload.

GARMIN ETREX

Accurate tracking is critical for the overall accuracy of data collection. This device and the information it collects are used if the USB GPS device fails during its data collection.

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.
    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 the Garmin into a Mac. Macintoshes fill up the Garmin with various system files, rendering it useless – the Garmin will stop saving records. Only plug the Garmin into power, or the Mysticetus Windows PC 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)

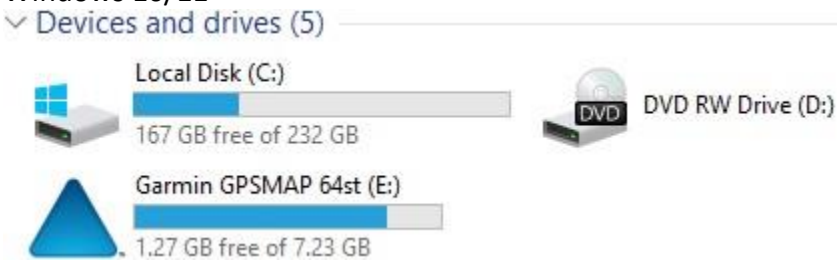
The information and steps below will walk you through backing up your data and resetting.

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 in the center of the thumbstick. It is important that the thumbstick 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**
5. Select **Yes**

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

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).
2. Verify the USB GPS, the hockey puck is plugged into the laptop.
3. Verify the SD card is in place in the laptop
    a. Confirm in the laptop's File Explorer that the SD card is named "MYSTICETUS" or data will not be written to it.
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 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.

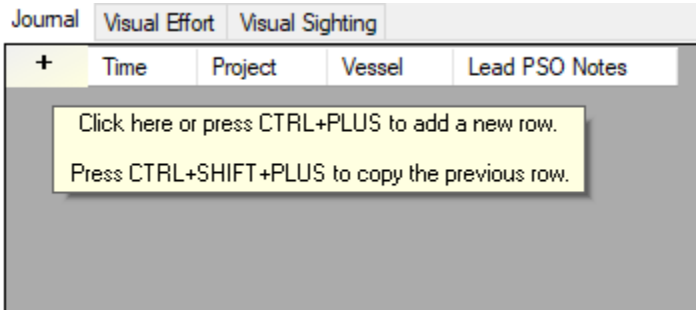
FIRST ENVIRONMENTAL / EFFORT RECORD

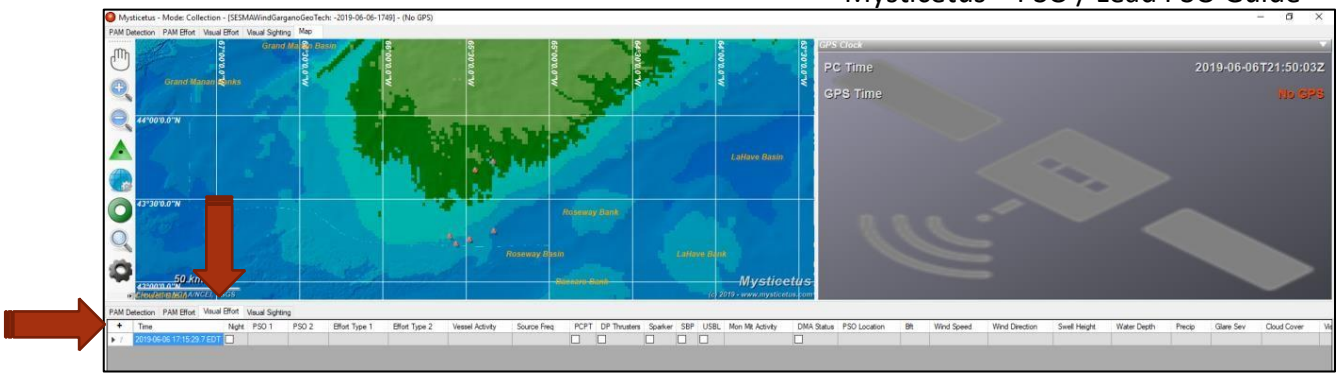
Once the Mysticetus data collection laptop is running, and the GPS is operational – the first step for the day is to enter the first “Effort Row”. Mysticetus will prompt you to do this. Populate this first record immediately and prior to any sightings.

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 requiremented changes by Microsoft Windows.

- 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:





JACK UP RIG OPERATIONS

JACKUP RIGS INTRO

Jackup 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 number of reasons, including precise position of the vessel and elevating the boat above inclement weather.

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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 Jackup rig move up and down, this changes the Observation Deck height. Mysticetus keeps track of this Platform Altitude Offset value and applies it to all distance calculations.

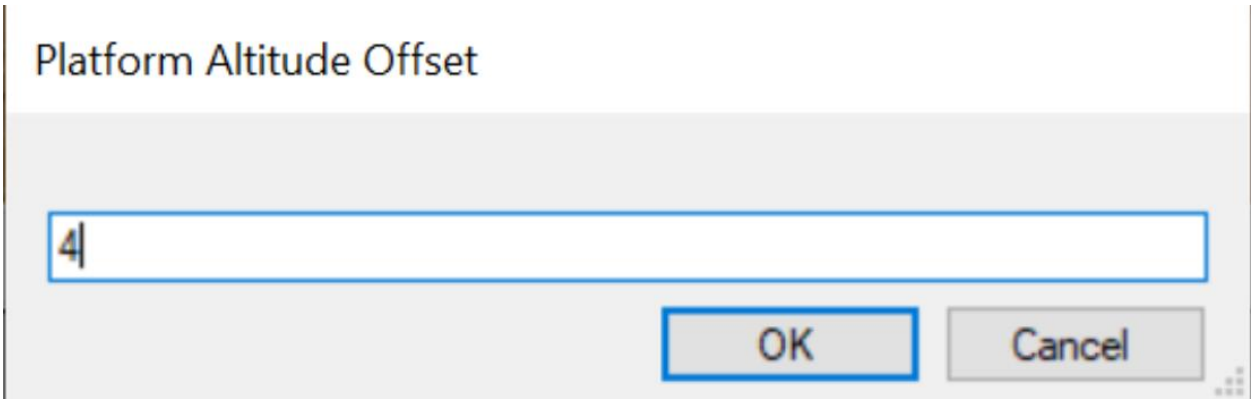
BACKGROUND - OBSERVATION PLATFORMS AND PSO EYE HEIGHTS

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 jackup 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 Jackup 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.

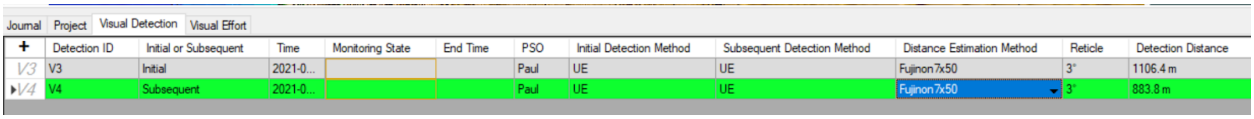


[Example...note that changing the altitude changes the distance for the same reticle value across two sightings]

ALTITUDE ENTRY MATTERS!

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

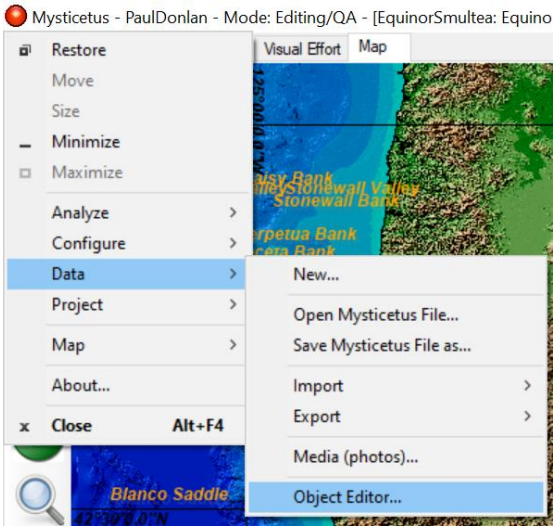
1) The first entry is with a rig altitude offset of 4 meters
2) The second entry is with a rig altitude offset of 0 meters
3) Note here without the correct value the error in this example is ~25% (!!)

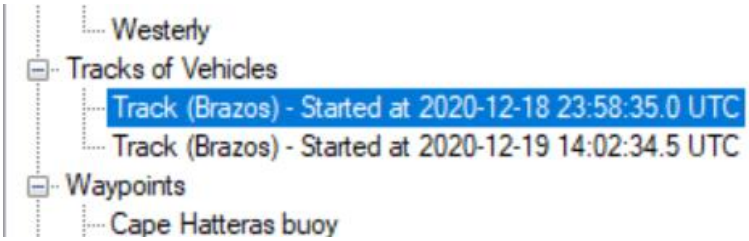


ALTITUDE OFFSET EDITING IN OBJECT EDITOR

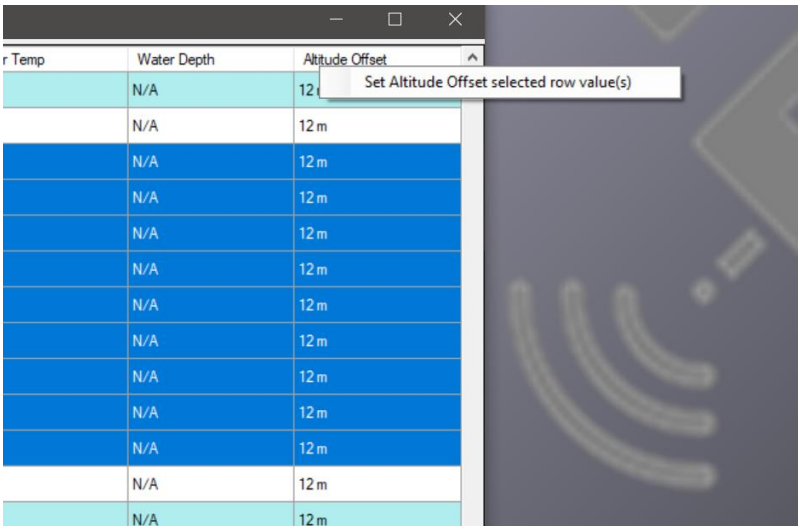
The value can be edited later in the Object Editor if, say, the PSO team got a bit behind and didn't change the value precisely on time. Any such fixes should be done no later than the final, end of day QA/QC on your data.

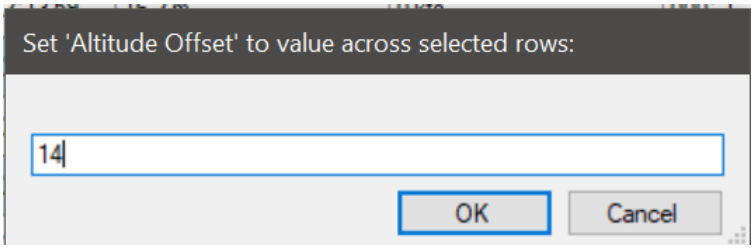
Click the ball -> Data -> Object editor,



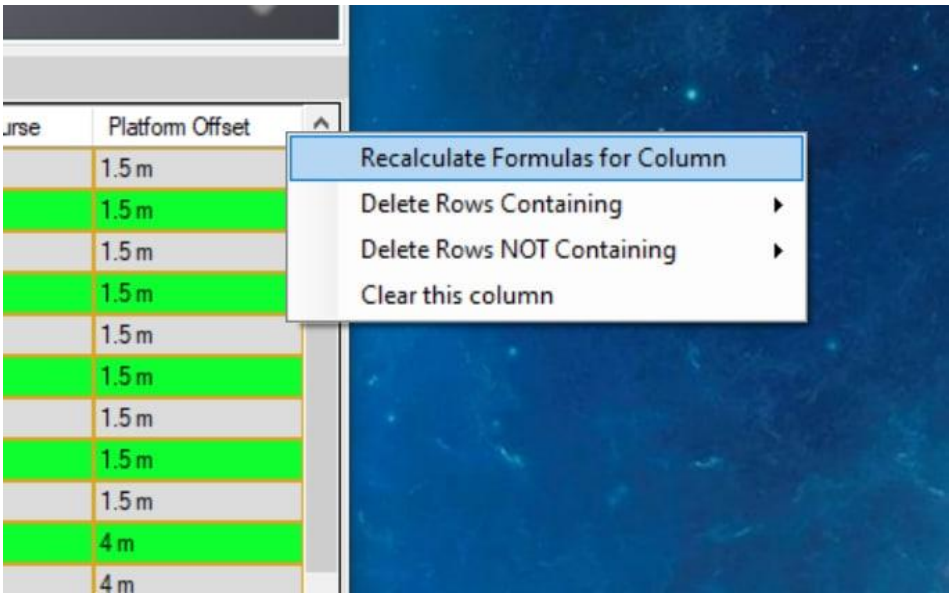


Then select the vehicle's track. You can choose the rows to change, right click on the Altitude Offset column header and choose Set Altitude Offset for Selected Rows. Mysticetus will automatically apply that value for that given timeframe, and update any Sighting distances during that time frame, appropriately.



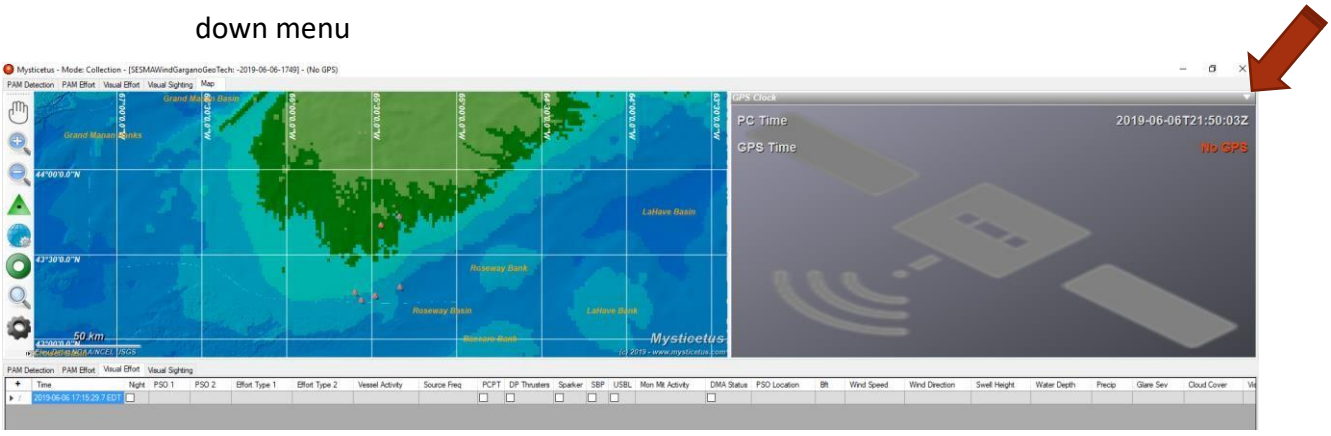


When you are finished editing your platform heights you need to recalculate the values. Mysticetus requires this anytime you are editing fields from what was originally recorded.

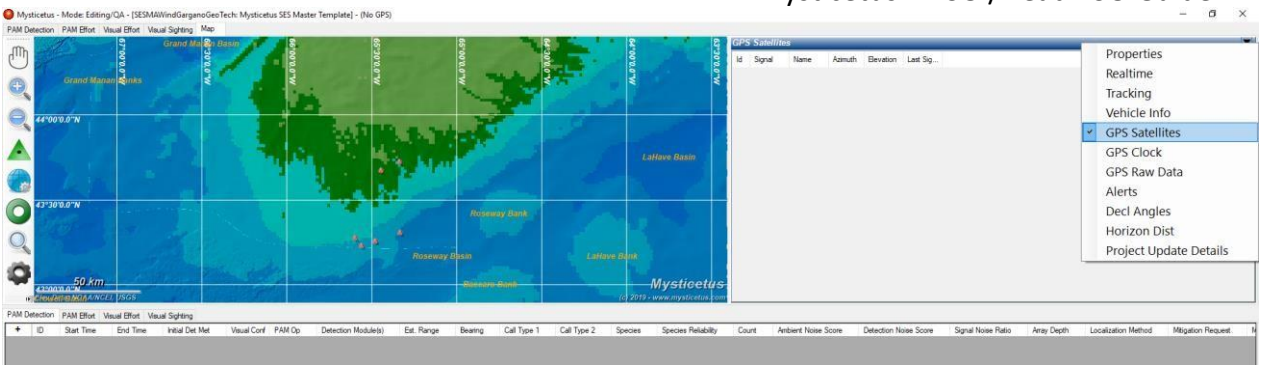


TROUBLESHOOTING THE GPS

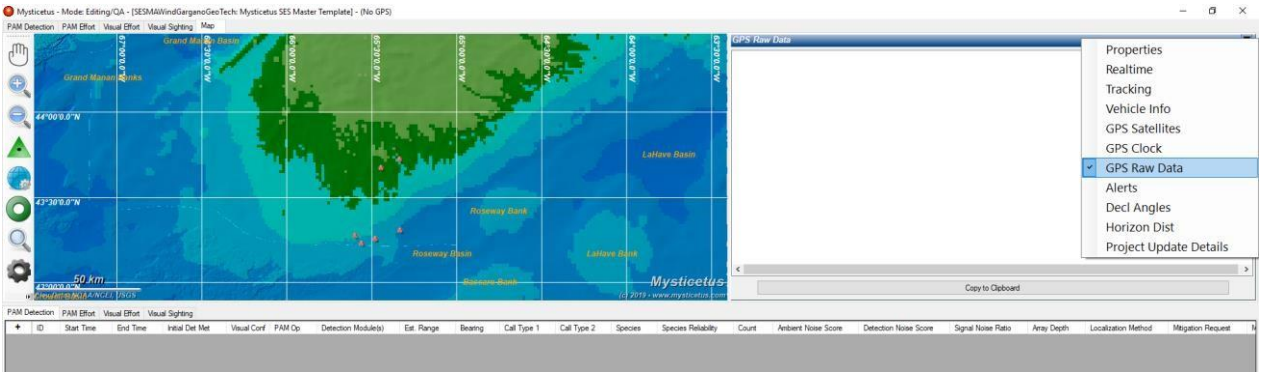
1. A solid red light on the “hockey puck” GPS unit means it is still acquiring a signal. The light flashes red when it has obtained the signal.
2. Check for satellites in the Mysticetus Data Panel
    a. Click the little white arrow at the top right corner for the Data Panel drop down menu



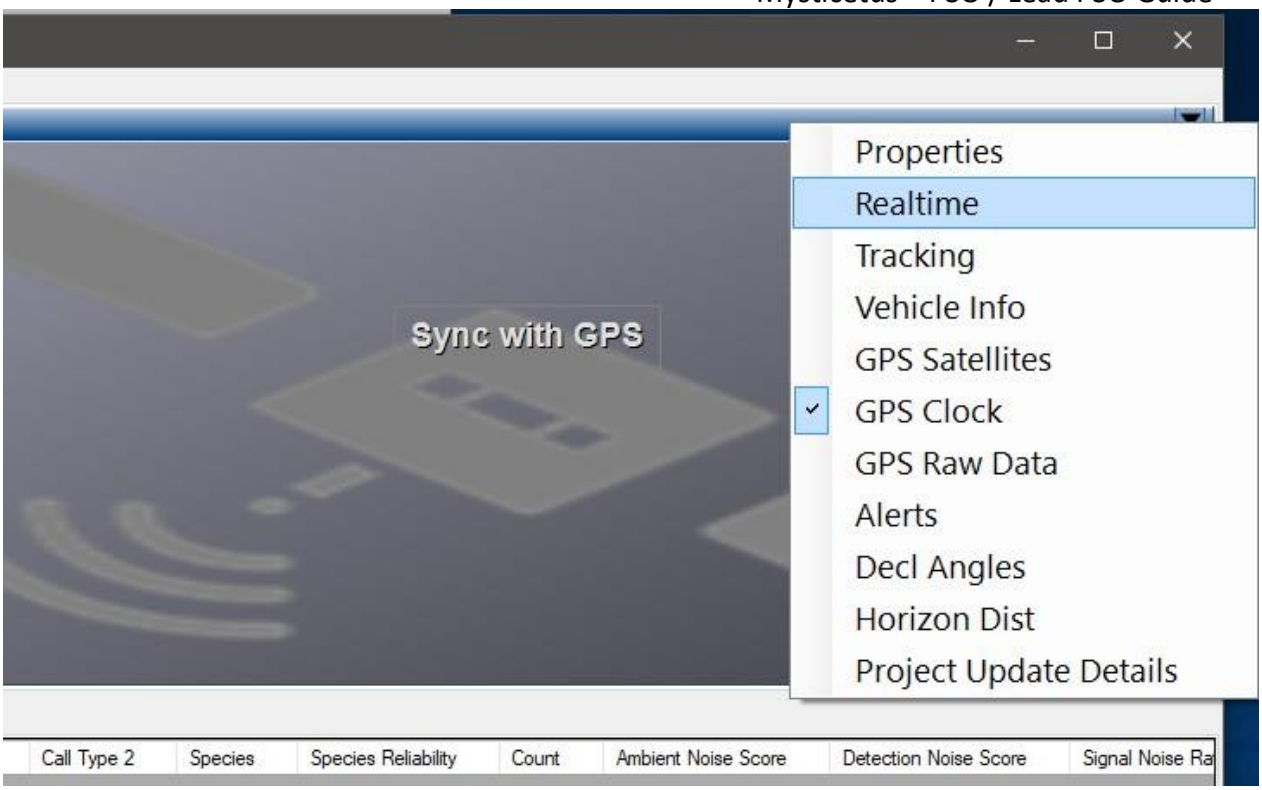
    b. Click on “GPS Satellites"



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. Re-plug in the GPS
5. When running, select Realtime in the Data Panel:



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.

COMMUNICATIONS PANEL STATUS

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.

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 principle 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.

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.

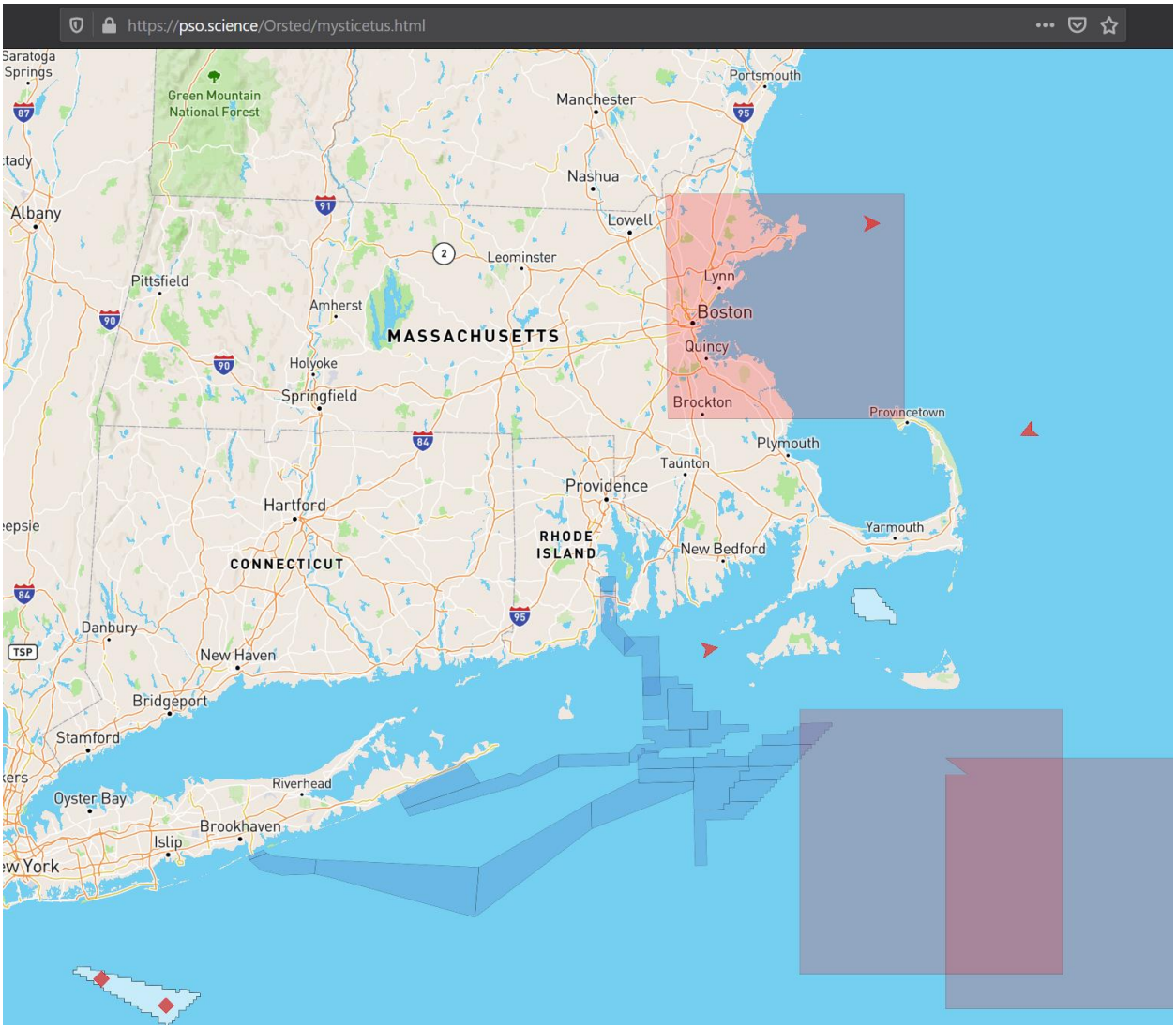
PSOs must perform a challenging balancing act between keeping eyes on the water and entering data as soon as practical, especially for "critical" sightings.

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).



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

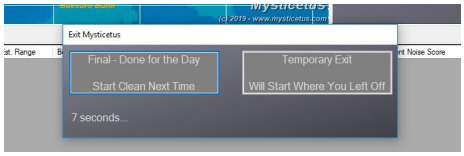
Generally, each day is a 24-hour period starting and ending at midnight UTC. Shortly before midnight follow the end of 24-hour period procedures listed below. Other projects run only during daylight hours (or similar). The processes still apply.

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

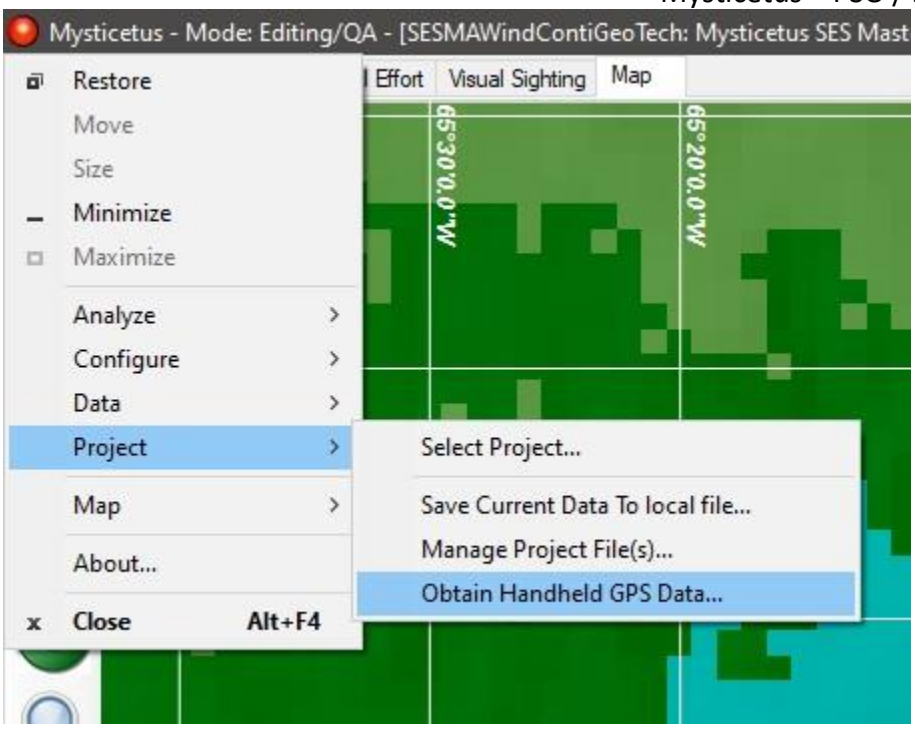
1. Enter the final record on the "Visual Effort" tab (press Alt+V until the appropriate tab is selected, then press Shift+Alt+Plus to create a new row and copy down fields).
    a. Complete all data entry for the row
    b. Select the "Effort Type 1" = "OFF" to indicate the end of day.
    c. Enter in 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.

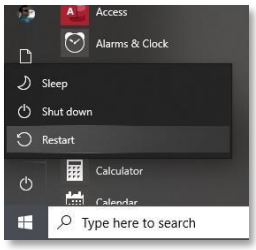
OBTAIN HANDHELD GPX DATA AND PERFORM DAILY QA/QC

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 laptop
    b Note 2: Garmin will not record track when connected to laptop



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**

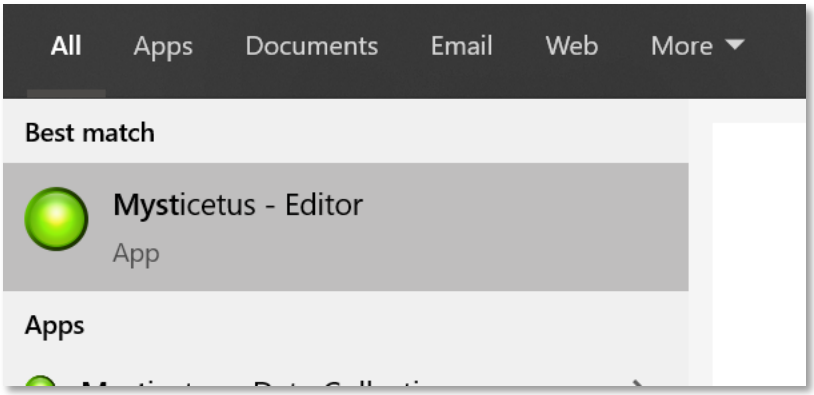
   a. **NOTE 1:** Daily track must be deleted, or Garmin memory will fill up and then stop recording new tracks (bad!)
8. Perform End of Day Lead PSO QA (see below for details)
9. Restart Mysticetus in Data Collection mode.
10. Restart via the **Start of day (24-hours)** procedures above



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:



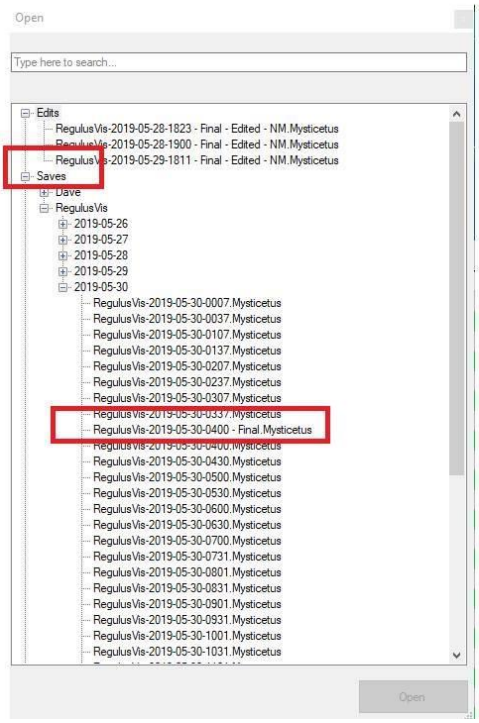
Note: Do not use Mysticetus – Editor (Admin)! That is for your project manager.

END OF DAY QA/QC

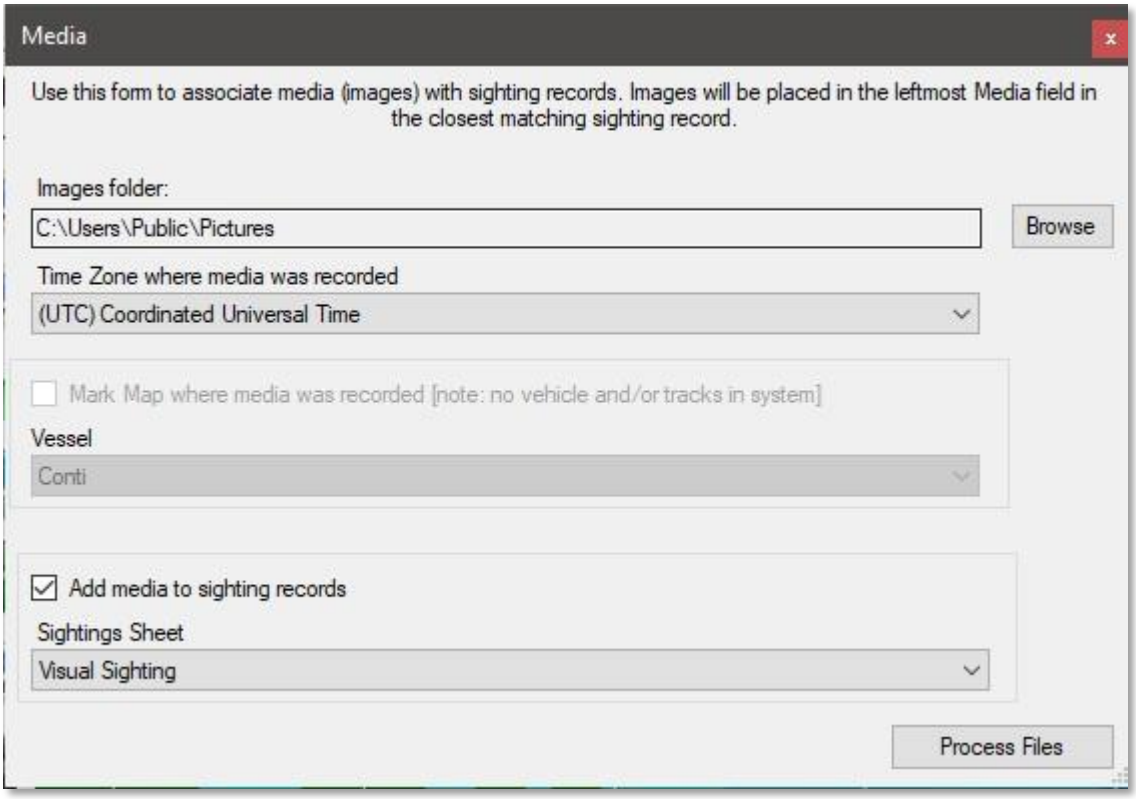
Review the day's data, looking for blank cells, that every mitigation request has a subsequent response, unusual species, odd GPS tracks, unlikely weather combinations, etc. Clarify any questions with the PSO who entered the data.

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**

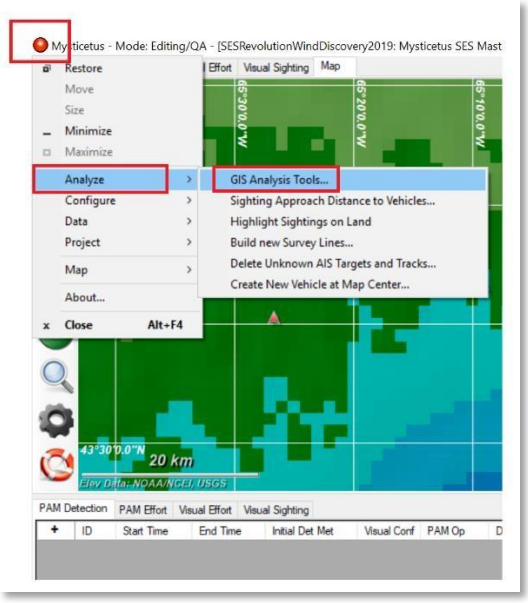
3. Navigate to "Saves" and select the Mysticetus file marked "Final" for the day to be reviewed, the click "Open". (note that this file may have been saved in the next day's folder, if the shutdown happened after midnight UTC – go look there if necessary)



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

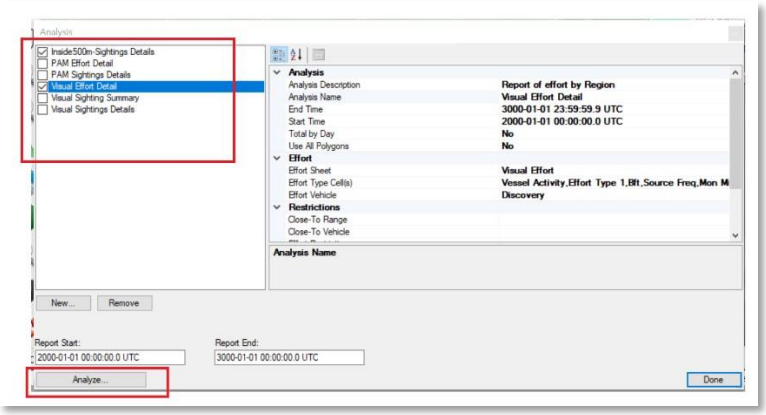


a. Run the Mysticetus GIS Analysis tools reports for an initial QAQC. Select: **Analyze -> GIS Analysis Tools** …



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.)



c. Click “Analyze”

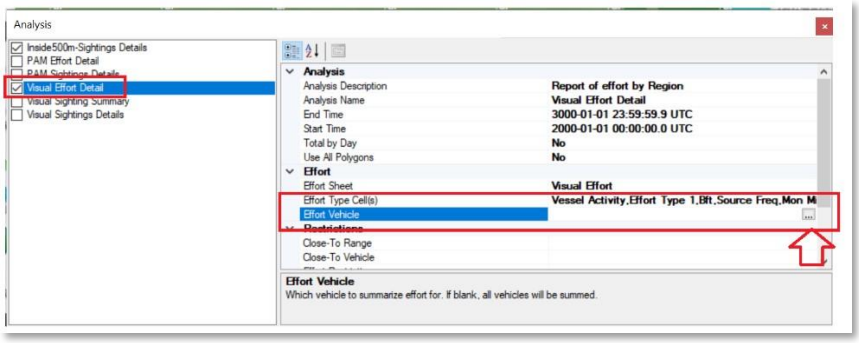
5. The “Note” box this is an area for you to communicate to the On-shore team any items of interest or concern. Examples could be lost GPS service, Mysticetus was accidently shut down during the day, or any missing data entry data values from the drop downs. This is dependent on the survey and client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

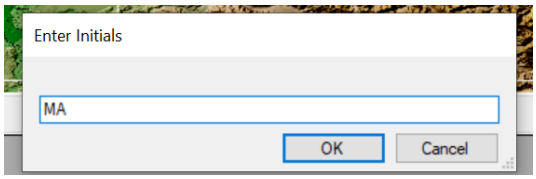
6. Finally, save the QA/QC'ed file. Go to the Mysticetus main menu and:

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

Do not save to the two that are x'd off, they are for special use by dedicated research projects.

b. For the edited save:

i. Enter your initials in the offered window:



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 on-shore team you have reviewed and approved the quality of the data.

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

v. 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		

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…

2 Missing & Incomplete data

3 BFT ranges or time in certain values that do not make sense

4 Animal sightings that do not make sense for the region.

5 Missing GPS track coverage

6 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.

7 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?

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 Beafort 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

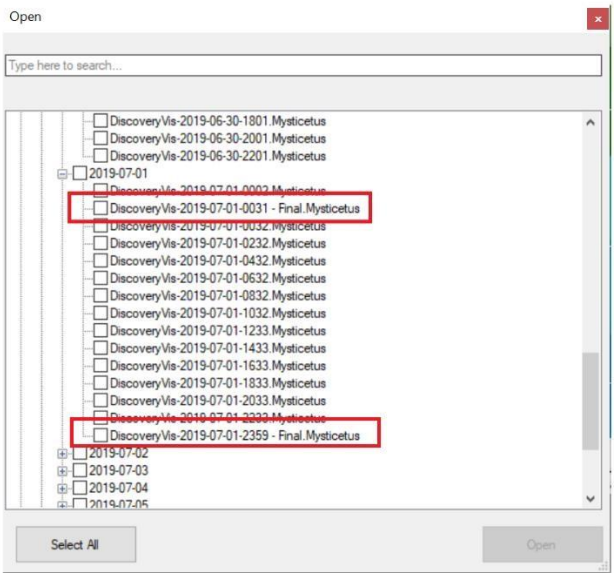
CERTAIN UNUSUAL SITUATIONS

TEMPORARY SAVE

Choose temporary save if you are not done for the day. Mysticetus will pick up where you left off when you restart it. This is an unusual thing to do, and generally only applicable if something is going wrong with the computer and you need to restart, or if the crew needs everyone and everything off the bridge for safety reasons (and you can't just leave the computer up there running).

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.



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 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) Laptop 1 placed on top of foam lining the bottom of the packer. **NOTE:** The laptop and electronics should never sit on bare plastic of the container or lid!
2) Place a ½ inch piece of grey foam separator over laptop.
3) Place laptop 2 on top of the grey foam separator
4) Place another ½ inch piece of grey foam over that laptop
5) Place laptop 3 (Or the 1 inch piece of filler foam) on top of the grey foam over laptop 2.
6) Place another ½-inch piece of grey foam on top of either laptop 3 or the filler foam
7) Place all supporting electronics on top of the foam in step 6
8) Place a final piece of grey foam over the electronics
9) Put the shipping manifest on top of the final piece of foam after verifying all contents
10) Secure the packer for shipping per the below guidance

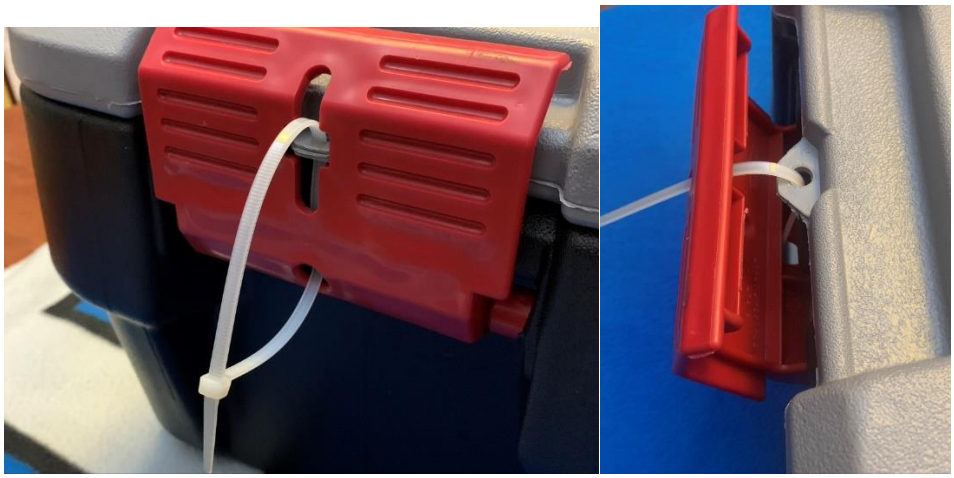
HOW TO PROPERLY SECURE THE SHIPPING CONTAINER

Securely sealing the black Rubbermaid shipping container (packers) is not always 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) Proper zip tie application to the handle
2) Apply a couple strips of strong shipping tape to effectively tie the handles together
3) Cut, if possible, the surplus length of zip tie to prevent snagging during shipping

1) 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.



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. Using pliers can help get the tie wrap fully cinched up. The handle will not crack open if done correctly. If you can pull open the red handle it is not correctly secured.

2) With the handle fully secured by zip ties, run strong tape between the handles on opposite sides of the packer as shown below. The tape method is fashioned to provide a secondary means of securing the container in case zip tie breakage (which happens). Tape does not reliably adhere to the grey plastic of the lid and black plastic of the container. Tape does stick well to the red handles. Running tape from handle to handle is important! Again, Tape just doesn't stick to the grey or black plastic due to some odd properties of the plastic material – use the handles.

3) Finally, cut the excess zip tie length the extends beyond the lock on the tie wrap 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	
3	Log into Windows (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?
1	Enter a Final "Visual Effort" row on the Visual Effort Tab with Effort Type 1 = "OFF" **use hotkey: ALT+Shift+O**	
2	Shut down Mysticetus by clicking the "X" at top right corner to close Mysticetus.	
3	Select "Final – Done for the Day"	
4	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 tracklines	
5	Load the file labeled as **"Final"** for that day from Data->Open Mysticetus file under the "Saves" directory shown.	
6	Look for and fix any obvious errors	
7	Look at GPS track on map – does it make sense?	
8	Look at Sightings on map – do they make sense? Create a map key (right click on map -> Map Key). Does it make sense?	
9	Import the day's photos – Try to limit to 10-ish photos per day. 3 for interesting sightings.	
10	Run GIS Analysis Tools (Effort, Sightings, Sightings inside 181m, etc.). Add notes indicating you did this.	
11	Look at Analysis CSVs – make any corrections necessary based on this.	
12	Save edited file using "Data->Save->Save Edit To" option only. Add your initials to the file name	
13	Upload Handheld GPS GPX Track data while in editor mode using "Project->Obtain Handheld GPS Data" option	
14	Once upload is finished then clear track data from handheld GPS	
15	Exit Mysticetus Editor, Restart computer per startup checklist if the computer in use is for data collection too	