MYSTICETUS
PSO & LEAD PSO
USER GUIDE

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AUDIENCE

This document serves as a tutorial for Protected Species Observers (PSOs) and Lead PSOs on using Mysticetus. The information presented here will be reinforced during Mysticetus training sessions, which will also provide opportunities to ask questions.

While primarily aimed at PSOs and Lead PSOs, significant portions of this document are also relevant for independent and academic researchers, who are encouraged to review it as well.

EXECUTIVE SUMMARY

Introduction

The Mysticetus PSO & Lead PSO User Guide offers complete instructions for using Mysticetus software during offshore mitigation efforts. It places emphasis on accurate and timely data entry which is crucial for regulatory compliance, client satisfaction, and, most importantly, preventing vessel strikes. Adhering to these procedures is essential for minimizing environmental impact and ensuring the safety of marine life during offshore operations.

This guide outlines the roles, responsibilities, and standard operating procedures for onboard PSOs and Lead PSOs. Each procedure is first presented as a concise summary, followed by a detailed explanation and supporting discussion.

Roles and Responsibilities

- **PSOs:** Responsible for real-time data collection, including marine mammal sightings, environmental conditions, and vessel activities. PSOs must review and correct their data at the end of each shift.
- **Lead PSOs:** Oversee daily data collection, perform initial QA/QC, upload data from handheld GPS devices, and provide feedback to PSOs.

Data Collection

- **GPS Tracking:** Mysticetus uses a dual GPS system: a "hockey puck" USB GPS connected to the laptop and a handheld Garmin eTrex as backup. Ensure both are functioning correctly.
- **Data Collection:** Data is collected in 24-hour periods (UTC) with particular steps at the start and end of day.
- **First Environmental/Effort Record:** Begin each day by entering an initial "Effort Row" in Mysticetus before any sightings.
- **During PSO Shifts:** Prioritize observing the water. Enter critical sightings (e.g., North Atlantic right whales, injured animals) immediately – small delays can cause errors in 100’s of meters. Record other data as soon as practical. Use notes if necessary.

- **Jack-up Rig Operations:** For operating on a jack-up rig, update the platform altitude offset in Mysticetus whenever the rig height changes (Ctrl+P).

End-of-Shift Procedures (PSOs)

- Review all entered data for accuracy and completeness.
- Correct errors and data gaps.
- Enter relevant notes as needed.

End-of-Day Procedures (Lead PSOs)

- **Mysticetus Data Collection Laptop:** Enter a final "Off Effort" row. Close Mysticetus application and select "Final - Done for the Day."
- **QA/QC:** Open the "Final" data file in Mysticetus Editor. Import photos, run GIS Analysis Tools, review all data tabs, and correct any errors. Save the edited file with your initials (e.g., filename-Edited-MA.Mysticetus).
- **Handheld GPS Data:** Upload the GPX file from the Garmin eTrex to Mysticetus and clear the track from the device.
- **Daily Report:** Generate and review the daily report. Approve it to be sent to the designated recipients set by your project manager.
- **Restart:** Restart the computer and handheld GPS per data collection procedurs above.

Troubleshooting

- **Hockey Puck GPS:** A solid red light indicates the device is acquiring a signal. A flashing red light indicates a signal has been acquired.
- **Garmin eTrex:** Refer to the troubleshooting section for instructions on resetting the device.

Checklists

- Refer to the daily start-up, end-of-shift, and end-of-day checklists for quick reference.

Contact Information

- Contact your project manager or Mysticetus support for assistance.

Returning Gear (End of Project)

- Pack laptops and electronic equipment securely in the provided Rubbermaid containers, following the instructions in this guide.

ROLLS AND RESPONSIBILITIES

This section outlines the distinct responsibilities of Protected Species Observers (PSOs) and Lead PSOs during offshore mitigation efforts using Mysticetus software. Clear understanding and execution of these roles are crucial for efficient data collection, regulatory compliance, and overall project success.

Protected Species Observer (PSO)

- **Real-time Data Collection:** PSOs are primarily responsible for observing and recording real-time data, including:
    - Marine Mammal Sightings: Documenting species, location, behavior, and any other relevant details of observed marine mammals.
    - Environmental Conditions: Recording weather conditions (visibility, sea state, wind speed/direction), water temperature, and other environmental factors.
    - Vessel Activities: Logging vessel movements, speed, course, and any mitigation measures implemented.
- **Data Entry and Validation:** PSOs enter the collected data into the Mysticetus OnBoard platform, ensuring accuracy and completeness. They are responsible for initial data validation and correcting any errors.
- **End-of-Shift Review:** At the end of each shift, PSOs review all entered data for completeness and accuracy, making necessary corrections and adding relevant notes.
- **Communication:** PSOs communicate any critical sightings or operational issues to the Lead PSO and vessel crew immediately. They also maintain open communication with the Lead PSO regarding data quality or any challenges encountered.

Lead Protected Species Observer (Lead PSO)

- **Oversight and Coordination:** Lead PSOs oversee the daily data collection activities of all PSOs on board, ensuring adherence to established protocols and data quality standards. They coordinate PSO shifts and provide guidance as needed.
- **Quality Assurance/Quality Control (QA/QC):** Lead PSOs perform the first formal QA/QC review of the collected data at the end of each day. This includes:
    - Data Validation: Checking for missing data, inconsistencies, and obvious errors.
    - GIS Analysis: Utilizing Mysticetus OnShore's GIS analysis tools to identify potential data issues and anomalies.
    - Handheld GPS Data Management: Uploading data from handheld GPS devices to Mysticetus OnShore and clearing the device's track.
    - Feedback to PSOs: Providing constructive feedback to PSOs regarding data quality and areas for improvement.
- **Data Upload and Management:** Lead PSOs are responsible for uploading supporting data such as photos, GPS track data, and adding final journal notes which will be added to the Mysticetus OnCloud platform copy of all collected data for secure storage and later analysis.
- **Communication:** Lead PSOs communicate daily data summaries and any significant findings to the Project Manager. They also maintain communication with the PSO team and vessel crew regarding operational updates and mitigation efforts.
- **Reporting:** Lead PSOs may be responsible for generating and reviewing daily reports, ensuring accuracy and completeness of provided data before submission to the designated recipients.
- **Troubleshooting:** Lead PSOs address any technical issues related to Mysticetus software or GPS devices, escalating complex problems to Mysticetus support if necessary.

DATA COLLECTION

GPS TRACKING

Accurate GPS tracking is critical for data collection. Without GPS track data all collected data is essentially worthless!

There are two PSO GPS devices provided. 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 hockey puck must be connected to the laptop and positioned so it can see the sky prior to starting Mysticetus.

Figure 1 "hockey puck"

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. The handheld GPS must be positioned such that it can see the sky while it is running. Verify a solid fix. Its location is independent of laptop location.

Note that the supply of batteries is incumbent upon the PSO provider.

Figure 2 Garmin handheld GPS for backup

More information on the setup and troubleshooting of the Garmin handheld can be found in the appendix.

MYSTICETUS DATA COLLECTION PROCEDURES

Mysticetus collects data continuously for 24/7 operations and during daylight hours for daylight-only operations. All times are recorded in Coordinated Universal Time (UTC).

Data Collection Periods (typical):

- **24/7 Operations:** Continuous data collection for 24-hour periods.
- **Daylight-Only Operations:** Data collection during daylight hours only.

Start of Data Collection Day:

- **Start Mysticetus:** Start in Mysticetus in data collection mode, verify GPS signal is green (active).
- **Enter first effort row:** Begin effort state tracking.

Data Saving:

Mysticetus automatically saves data throughout the day:

- **Cloud:** Approximately every two hours.
- **Local Storage (e.g., SD cards):** Every three minutes.

End of Period Procedures:

Protected Species Observers (PSOs) must perform a "Final Save" at the end of each data collection period.

- **Standard End Time:** Midnight UTC.
- **Daylight-Only/Shortened Day:** Earlier "Final Save" if the observation day ends before midnight UTC due to anchoring, docking, or leaving the dock.

Final Save and Audit Trail:

The PSO on duty creates a final save file at the end of the data collection period. This file, along with the automatic incremental saves, creates a comprehensive audit trail. This audit trail verifies daily activities and in-field quality assurance (QA) tasks performed by PSOs and Lead PSOs. It also serves as the basis for end-of-day QA/QC tasks.

FIRST ENVIRONMENTAL / EFFORT RECORD

Once the Mysticetus data collection laptop is running, and the hockey puck GPS is connected to the laptop and operational then Mysticetus has been launched in data collection mode – 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 sighting entries.

We have implemented a couple of short cut keys to support creating new rows.

- 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:

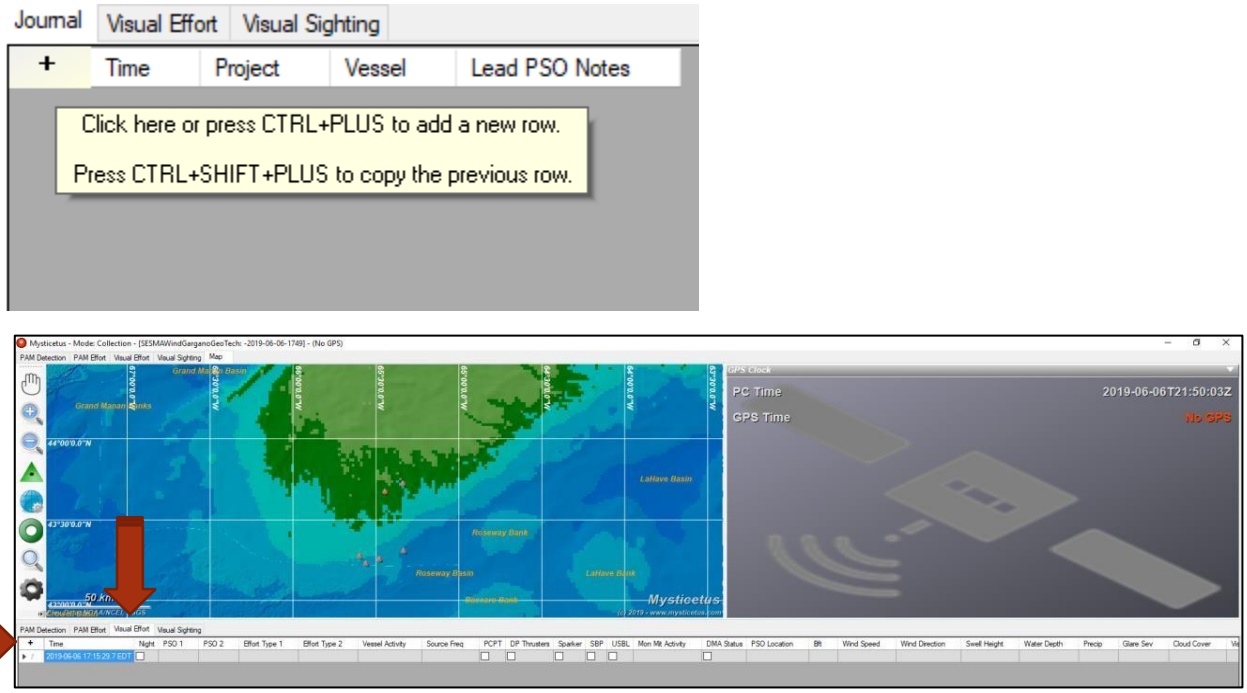


Figure 3 The first effort record of the new day

DURING 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 sighting data immediately.

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 immediately to alert all 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 onshore process with the government; providing early heads-up alerts to onshore administrators is critical.

Mysticetus also displays animal sightings in a web-based Command Center. This web page is viewed regularly by many external people outside of your operations. 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).

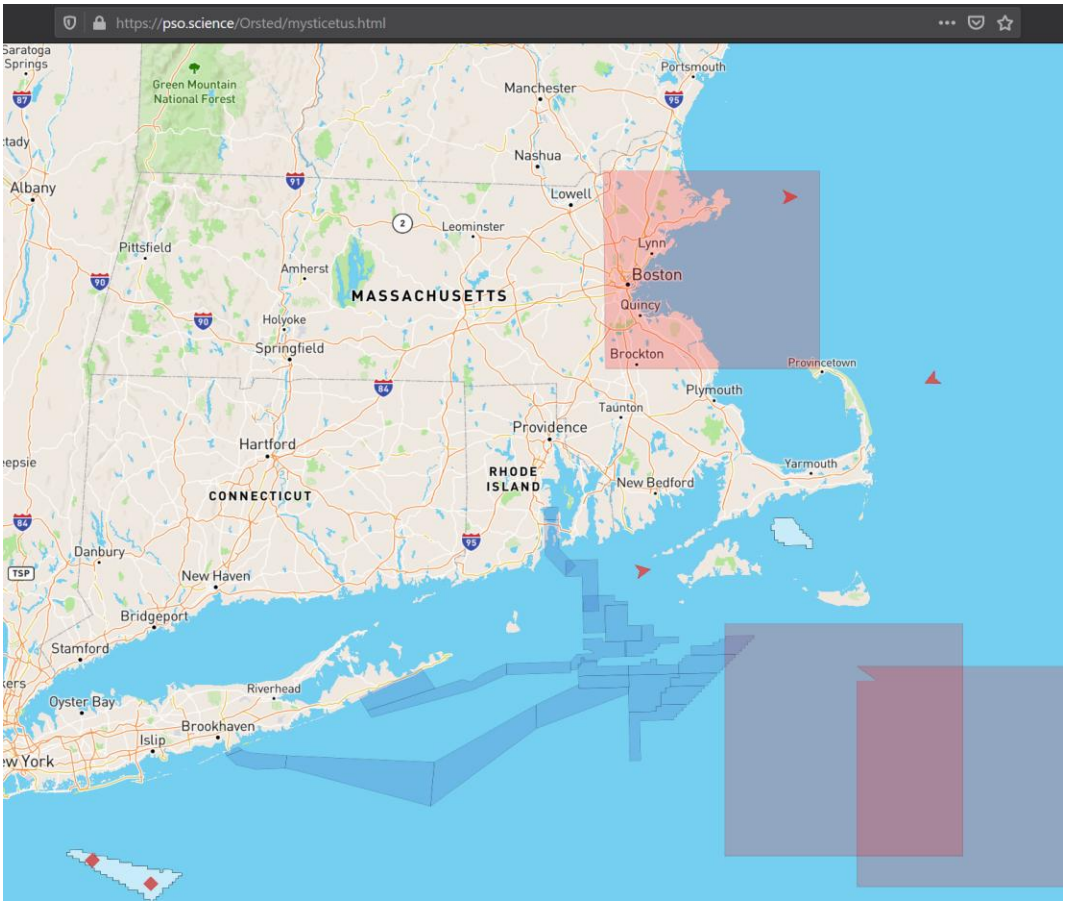


Figure 4 Mysticetus Command Center tracks all vessel activities.

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 into Mysticetus as soon as practical. Note that shared alerts only fire on other boats when you enter the sighting data – timely entry is critical in prevention of vessel 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.

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.

JACK UP RIG OPERATIONS

Figure 5 Typical jack up rig

JACK UP RIG OPERATIONS

Jack up rigs raise and lower their working platforms to different heights. Because of this, PSOs must update the Platform Altitude Offset in Mysticetus (Ctrl+P) every time the rig's height changes. This value is crucial for accurate distance calculations. The PSO enters the rig height

provided by the ship's crew. Mysticetus automatically combines this with pre-entered PSO eye height and observation deck height to calculate distances.

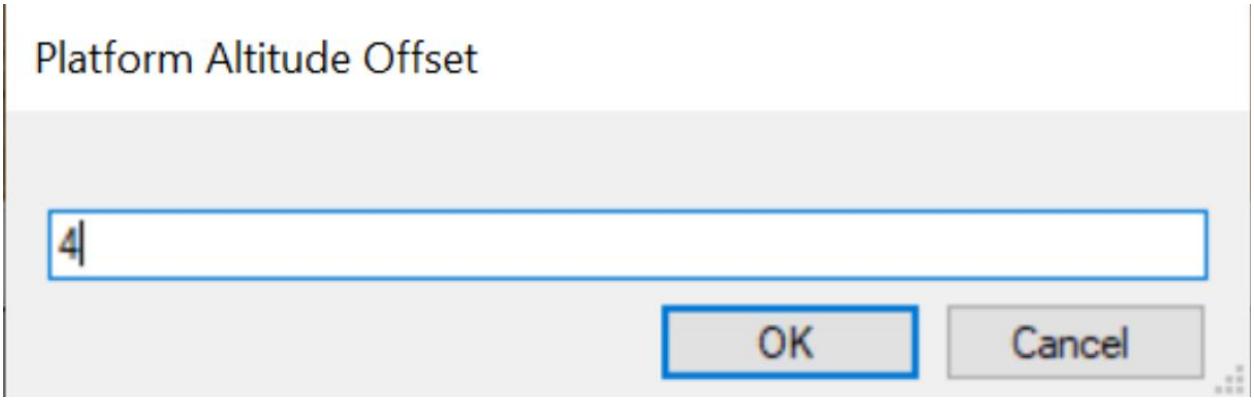


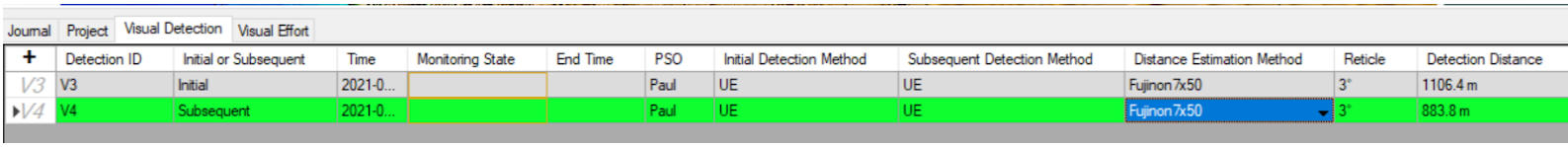
Figure 6 Setting platform offset

ALTITUDE ENTRY MATTERS!

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

- The first entry is with a rig altitude offset of 4 meters.
- The second entry is with a rig altitude offset of 0 meters.

Note here without the correct value the error in this example is ~25% (!!)



+	Detection ID	Initial or Subsequent	Time	Monitoring State	End Time	PSO	Initial Detection Method	Subsequent Detection Method	Distance Estimation Method	Reticle	Detection Distance
V3	V3	Initial	2021-0...			Paul	UE	UE	Fujinon 7x50	3°	1106.4 m
▸V4	V4	Subsequent	2021-0...			Paul	UE	UE	Fujinon 7x50	3°	883.8 m

Figure 7 Jack up rig example of changes to rig heights

For information on how to fix Jack Rig altitude values see the Troubleshooting section in the appendix.

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 reporting, and erroneous sighting information (such as unrealistic animal location relative to vessel track).

1. **Complete All Fields:** No data field should be left blank. Select "NA" or "None" if a field is not applicable. If none of the drop-down options are suitable, notify your Lead PSO for further instruction. They will arrange training or communicate the need for a template adjustment to the Project Manager.
2. **Verify Beaufort Scale (BFT) Values:** Double-check entered BFT values against recorded wind speed and swell height to ensure consistency and accuracy.
3. **Correct Data Entry Errors:** Review all entries for accuracy. Correct any errors resulting from incorrect selections or missing values.
4. **Add Comments (As Needed):** Use the "Notes" field to communicate essential information or context to the reporting team, Project Manager, and data reviewers. This includes explanations for unusual data, clarifications, or any other relevant details.

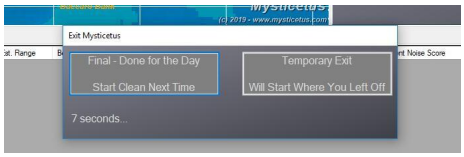
END OF DAY PROCEDURES

Each day is a 24-hour period starting and ending at midnight UTC. At midnight (or as close as possible) follow the end of 24-hour period procedures listed below. Other projects run only during daylight hours (or similar). The processes still apply at the end of the data collection day.

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.” 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.

4. Restart Mysticetus in data collection mode for the new day.
    a. We advise using the supplied, second laptop for end-of-day procedures.
    b. If a second laptop is not available, use the existing laptop for end-of-day procedures. Remember to leave the hockey puck GPS plugged in as it will continue to track ships position and amend this to the next day’s track data.

DATA QUALITY (QA/QC)

Quality Data Pipeline

Ensuring high-quality data is paramount at Mysticetus. Our data pipeline involves multiple levels of review and quality assurance (QA/QC) to maintain accuracy and consistency. This process is streamlined to minimize the time burden on observers while maximizing data integrity. Unless there is an unusually high volume of sightings, the entire QA/QC process should take approximately 20-30 minutes per day.

Here is a breakdown of the key stages and who's responsible:

1. End-of-Shift (PSO):

- **Purpose:** Quick initial check for data completeness.
- **Actions:** Review all newly entered data rows, ensuring no fields are left blank. Use "NA" or "None" if a data point is not applicable.

2. End-of-Day (Lead PSO):

- **Purpose:** First formal QA/QC review against the Final Save file.
- **Actions:** Perform a more thorough review of the entire day's data, including a check for blanks, logical inconsistencies, and any obvious errors. Run the automated GIS Analysis

Tools within Mysticetus to identify potential issues. Upload the GPX file from the handheld GPS and clear the track from the device. Provide feedback to PSOs on any errors or areas for improvement. Saves the adjusted final save file as the “edit” file.

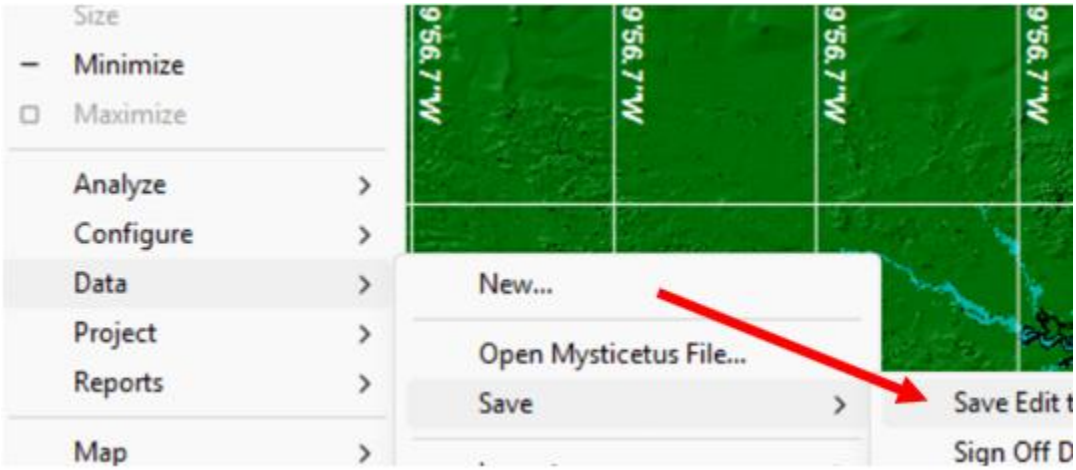


Figure 11 Save the Edit file once data in final save file is complete and correct.

3. Daily Review (Project Manager - PM):

- **Purpose:** Independent verification and final sign off.
- **Actions:** The PM reviews the data submitted by the Lead PSO, checking for consistency, accuracy, and adherence to project requirements. They address any outstanding questions or concerns with the Lead PSO.

This multi-tiered approach ensures data quality throughout the collection and reporting process, contributing to regulatory compliance, client satisfaction, and the overall success of our projects.

HANDHELD GPS DATA

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.

Note 1: Garmin will not charge when connected to the laptop.

Note 2: Garmin will not record track data when connected to the laptop.

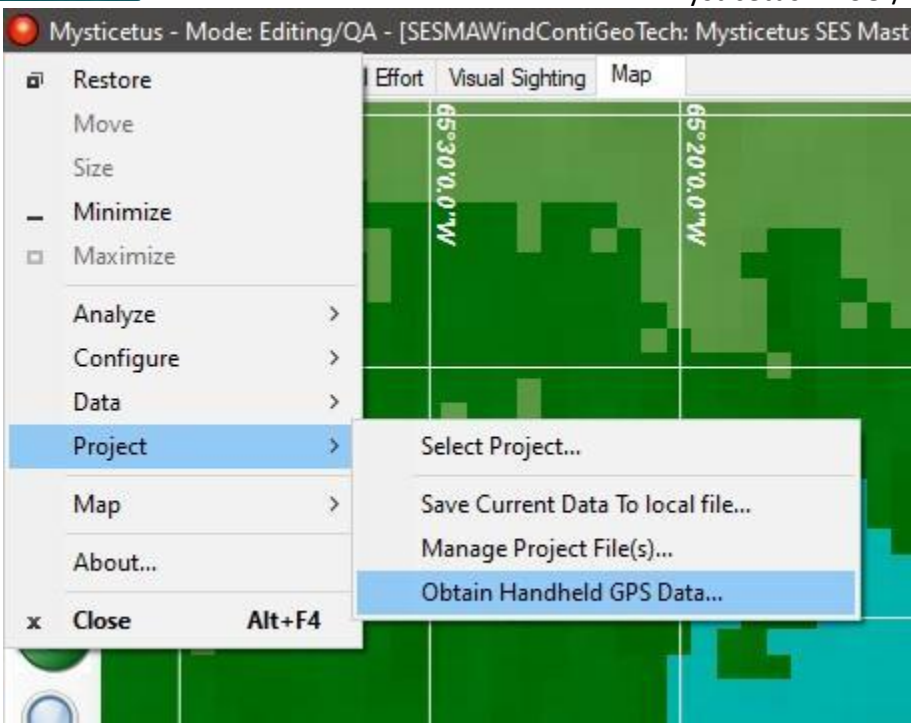


Figure 12 Uploading GPS data to Mysticetus.

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**

NOTE: Daily track must be deleted, or Garmin memory will fill up and then stop recording new tracks (bad!)

DAILY REPORT

Daily reports are generated by the lead PSO within Mysticetus itself as of 2024 season.

The process is simple – perform all steps below in Mysticetus editor mode.

1) Run the end of day daily GIS analysis outlined above verifying the resulting analysis makes sense.
    a. Fix up your data if issues as revealed in the analysis. Eg length of the day is significantly longer than 24 hours or distance traveled is excessive.
    b. Re-Run the GIS analysis again to verify changes.
2) Then save your edits to the indicated file below.

NOTE: even if you don't edit the data, save it this way now.

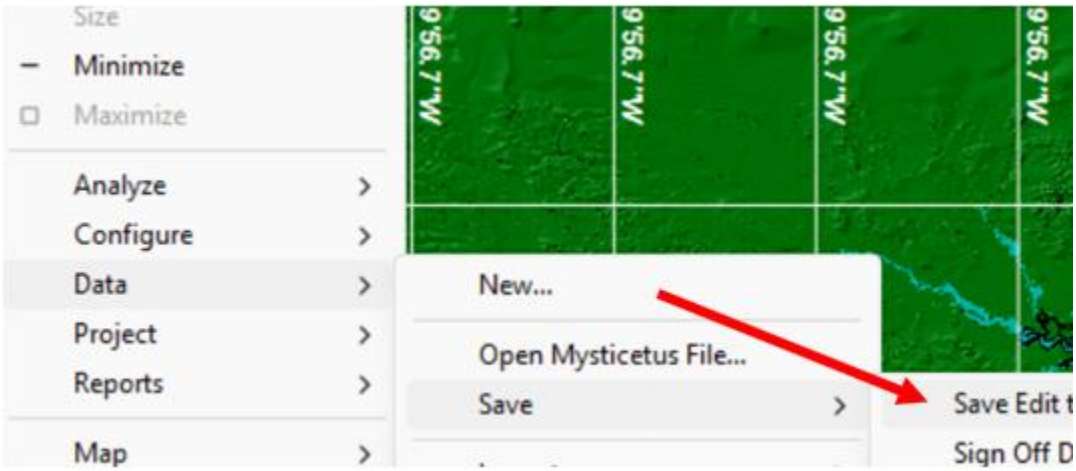


Figure 13 Saving your edited file with every change to the data.

3) Then run the daily report.

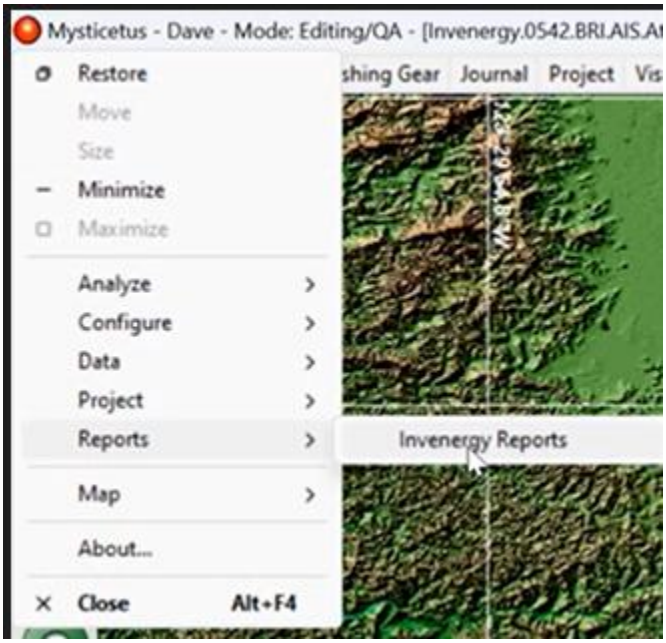


Figure 14 Launching the Daily Report

Then select the correct report type of the many viable options. and review the output using the currently loaded, reviewed file in step 2).

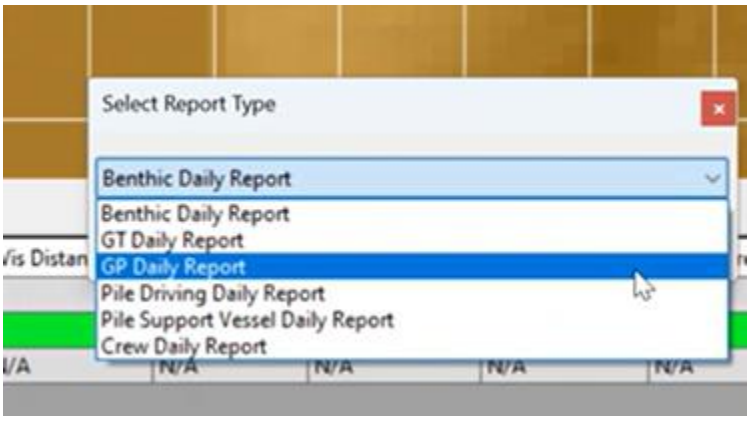


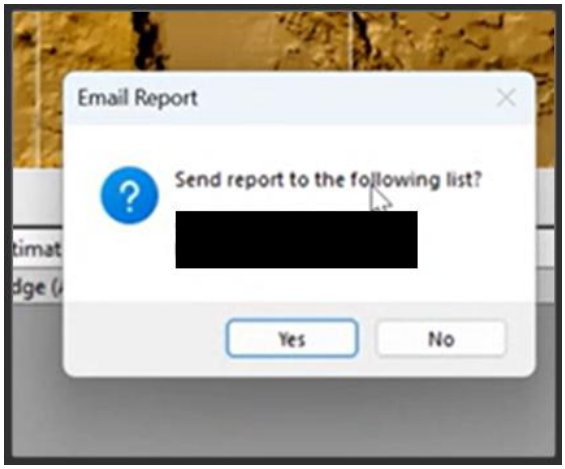
Figure 15 Selecting Geophysical in this example (GP).

This will generate the report, and the default document editor will open on your laptop. On Mysticetus computers we install an open-source document editor called Libre Office.

Perform the following steps once the daily report is presented to you in the document editor.

a. Review the report for correct entries and errors.
b. If there are errors, close the document. Return to the data collected and fix those errors. Resave the updated 'Edited' file.

c. Rerun your daily report and verify contents.
d. Once you are satisfied with the report contents, close the document, and let Mysticetus send it out.
e. Save to Edit the final edited data.



4) Mysticetus will email the report out for you automatically.

DETAIL OPERATIONS STEPS

MYSTICETUS LAPTOP SETUP AND OPERATION

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 hockey puck is plugged into the laptop.
3. Verify the memory device, either an 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 called PSOUser, (do not use 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.

START OF DAY, DURING, AND END OF DAY PROCEDURES

These instructions assume the project is already underway with the Mysticetus laptop set up in a 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.

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 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. Exit Mysticetus Data Collection and confirm it is the Final Save.
    a. End of day for PSOs is defined as midnight UTC.
    b. Final effort row is automatically applied.
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 with a Final Save.
    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. Review your data per the GIS and data review guidance.
17. Generate your daily report via Mysticetus review and send.
18. Restart computer. Restart of the computer clears up any issues that may have crept into the operating system. It's a precaution that has proven merit.
19. Restart Mysticetus in data collection mode and begin your new data collection day.

COMMUNICATIONS PANEL STATUS - THE WATCHDOGS

As of 2020 we've added a communications panel to show the status of all connected external environments for your operational use of Mysticetus. Not all the environments listed 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 for 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 20 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 hockey puck. 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 services below 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. A typical failure is due to loss of internet services if persists for longer than 15 – 30 minutes should be reported to the ship's crew for investigation.
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.

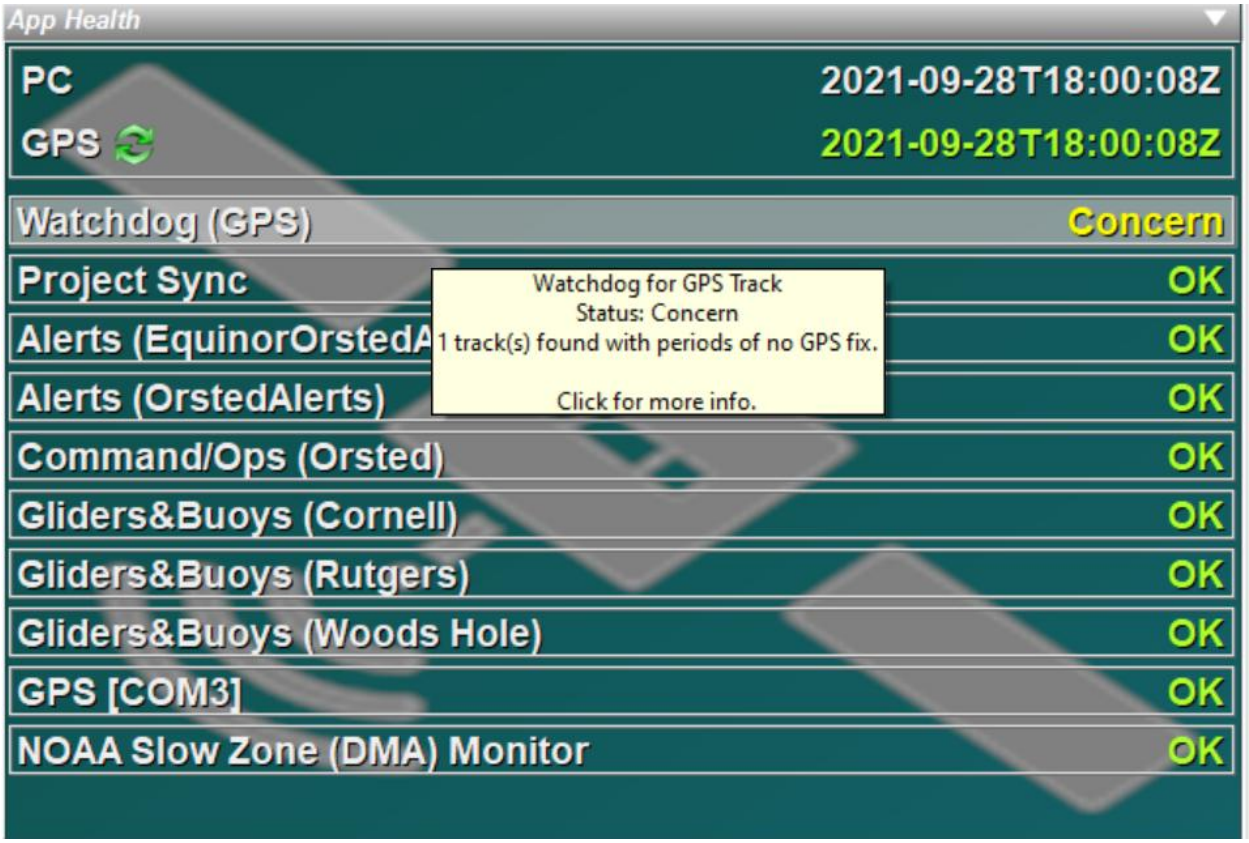
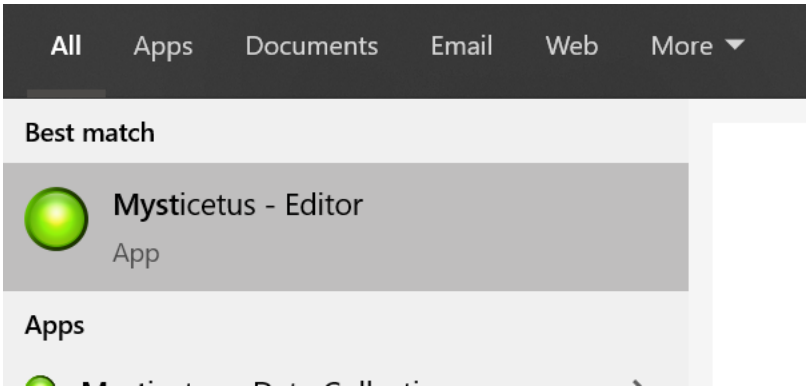


Figure 21 GPS watchdog showing some possible gaps in coverage.

END OF DAY LEAD PSO DATA QA/QC GUIDANCE

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.

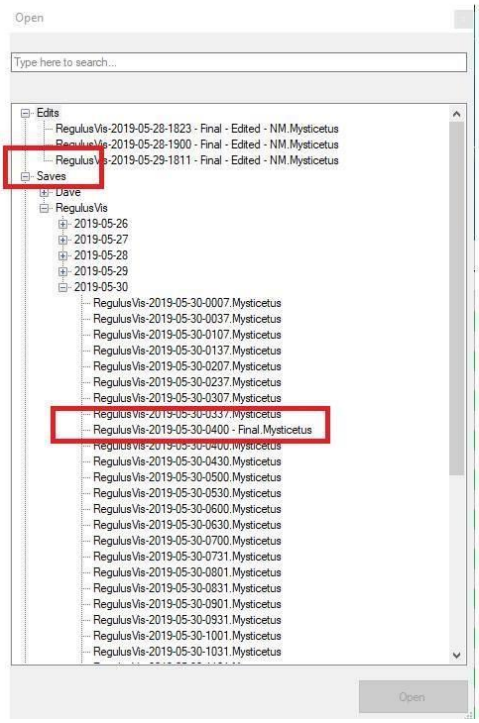
END OF DAY QA/QC STEPS

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 22 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.**

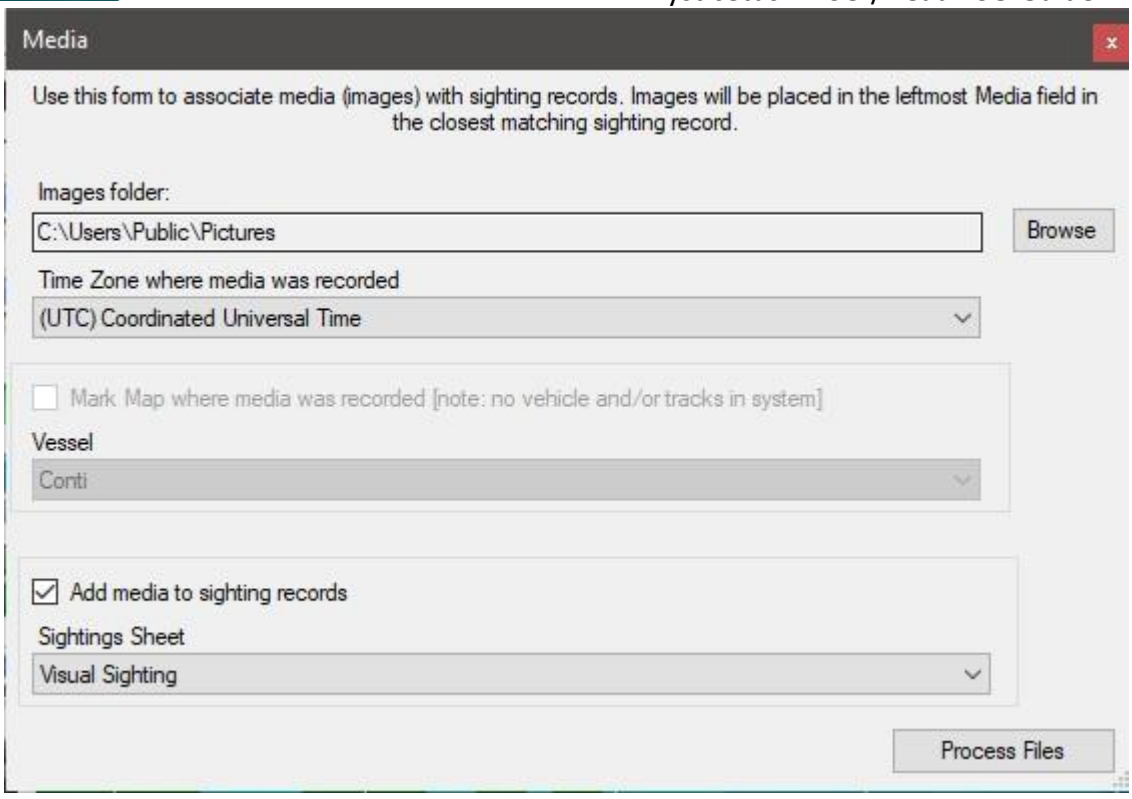
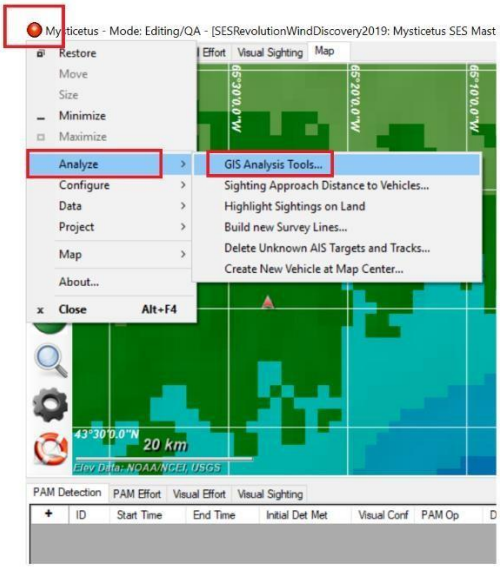


Figure 23 Uploading Photo Media to Mysticetus

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.)

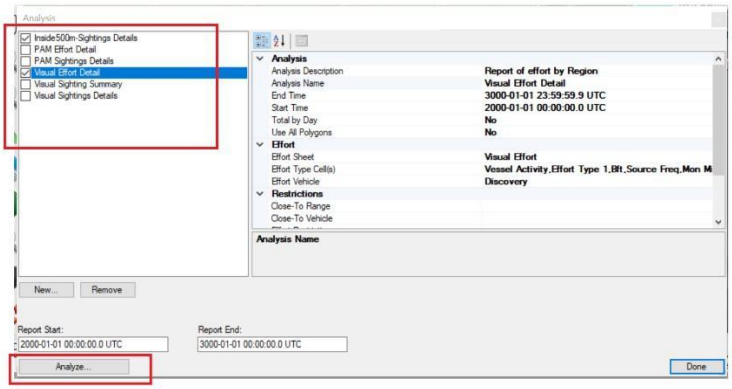


Figure 24 Performing the GIS analysis.

c. Click “Analyze”

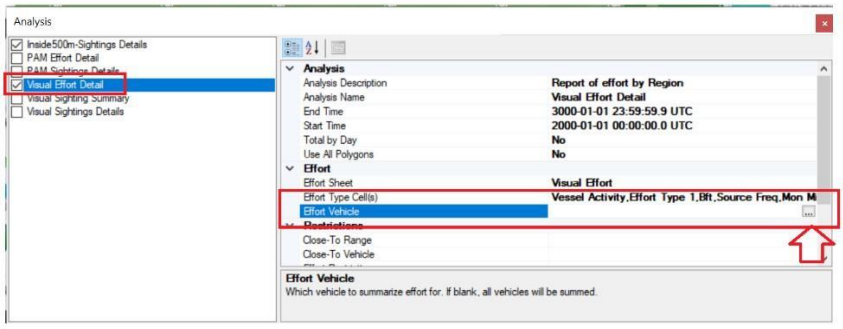
5. The “Note” box this is an area for you to communicate to the On-shore team any items of interest or concern. Examples could be lost GPS service, Mysticetus was accidently shut down during the day, or any missing data entry data values from the drop downs. This is dependent on the survey and client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

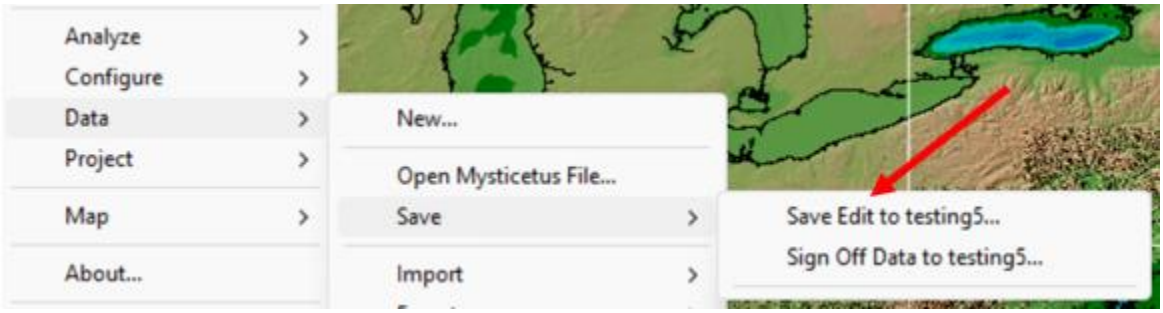
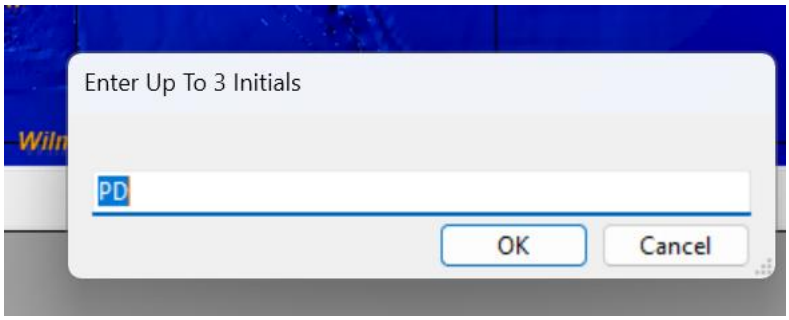


Figure 25 Saving your edited file correctly

   b. For the edited save:

      i. Enter your initials in the offered window:



      <u>Enter your initials here.</u>

      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.

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 26 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 DATASHEETS

1. Review all data sheets in Mysticetus (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? Do not leave any fields blank. looking for blank cells, make sure all are filled. Mysticetus will highlight fields with missing data.
        i. If not, put an explanation in the notes (example: equipment down, didn't write down, etc.)
    c. Look for inconsistent times.
        i. If time looks 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.

UNUSUAL SAVE SITUATIONS

TEMPORARY EXIT

A temporary exit is used if data collection is 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. **Always restart on the same computer the temporary save was performed on.**

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

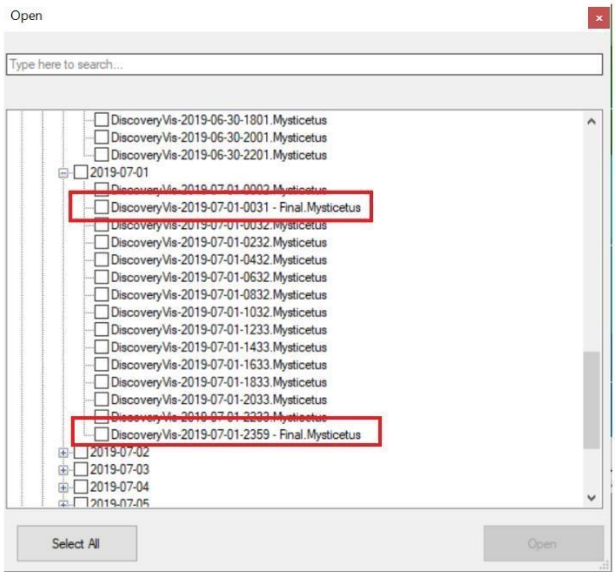
files will need to be combined by the lead PSO. A final save wipes the "slate" clean and Mysticetus starts from fresh.

Two indicators 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

When this occurs Select Both (or all) final save data files during the QAQC process.

Continue with QAQC process as outlined herein.



CHECK LISTS

DAILY START UP CHECK LIST

Step Description		Completed?
1	Set up and turn on Garmin eTrex. Verify a solid GPS fix.	
2	Turn on Mysticetus Data Collection Laptop with the hockey puck attached. Verify USB or SD memory card is plugged in.	
3	Log into Windows account "**PSO User**" (PIN: 32336580).	
4	Click on Mysticetus Data collection icon.	
5	Wait for GPS indicator (Green Ball) to indicate connection.	
6	Click Sync PC Clock with GPS.	
7	Add First Effort Record.	
8	Set Camera time 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 sighting data.	
5	Ensure, if you use input option of OTHER; UNKOWN or leave a blank value, to enter a note to describe why and the circumstances (in general, use NA instead of a blank field).	

END OF DAY CHECK LIST

Step Description		Completed?
!	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	Run 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. If editing on alternate laptop then reboot data collection laptop and restart Mysticetus in data collection mode.	
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? Examine 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.).	
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 indicated to be finished then clear track data from handheld GPS.	
14	Run the daily report within Mysticetus, verify its contents; fix errors within Mysticetus, run daily report verify, then send report, save "edit to" again	
15	Exit Mysticetus Editor, Restart computer and Handheld GPS per startup checklist if the computer is used for data collection too.	

APPENDIX

GARMIN ETREX

GGPS track data is essential for ensuring data collection continuity. This device serves as a backup to the hockey puck, providing critical location information should the primary device experience significant signal loss. The Garmin unit ensures data redundancy and safeguards against operational disruptions caused by primary device failure.

GARMIN ETREX SETUP

1. Set up 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 with 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 Mac OS system indexing files. These files render the Garmin useless aka “bricks” the device. The net effect is the

Garmin will stop recording track lines. Only plug the Garmin into the Mysticetus supplied Windows PC when it's time (end of day task) to upload the GPX file.

TROUBLESHOOTING

THE HOCKEY PUCK GPS

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. To troubleshoot the hockey puck start Mysticetus and click on the button stating "I Understand the Serious Risk to My Data…" Button as seen here.

To check for satellite status in the Mysticetus Data Panel.

a. Click the little white arrow at the top right corner for the Data Panel drop.

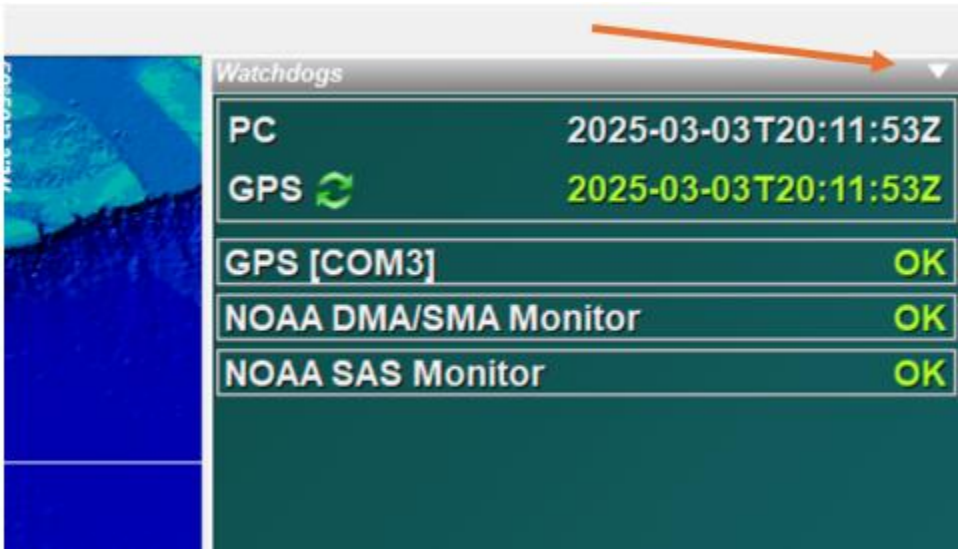


Figure 1 Data panel drop down selection

Select GPS Raw Data.

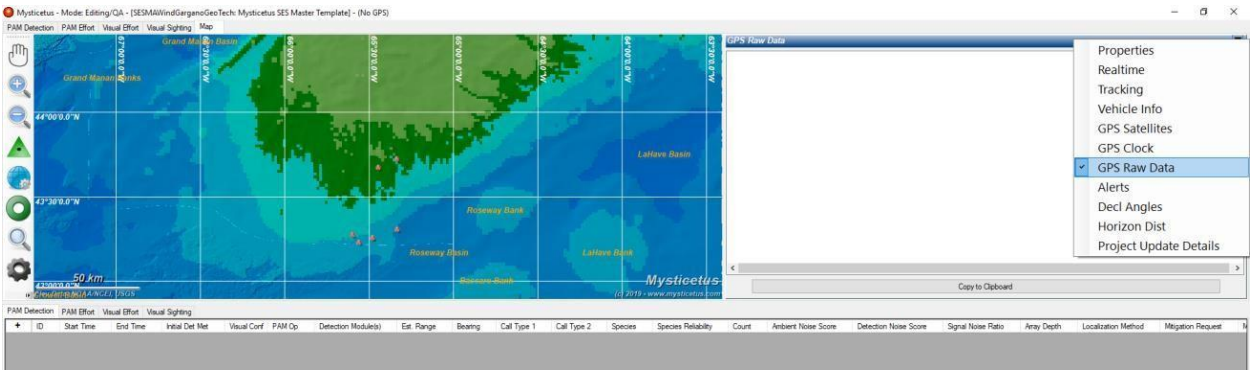


Figure 2 Check GPS Raw Data Stream

Check the “GPS Raw Data”. The Raw Data stream should now show the NMEA 0183 (a digital communication protocol) data streaming. You should see an active stream of data scrolling by in this view. If it is a trickle of data, then the GPS hockey puck is still sync’ing with the GPS cluster or the GPS hockey puck needs to be moved. When in doubt test outside.

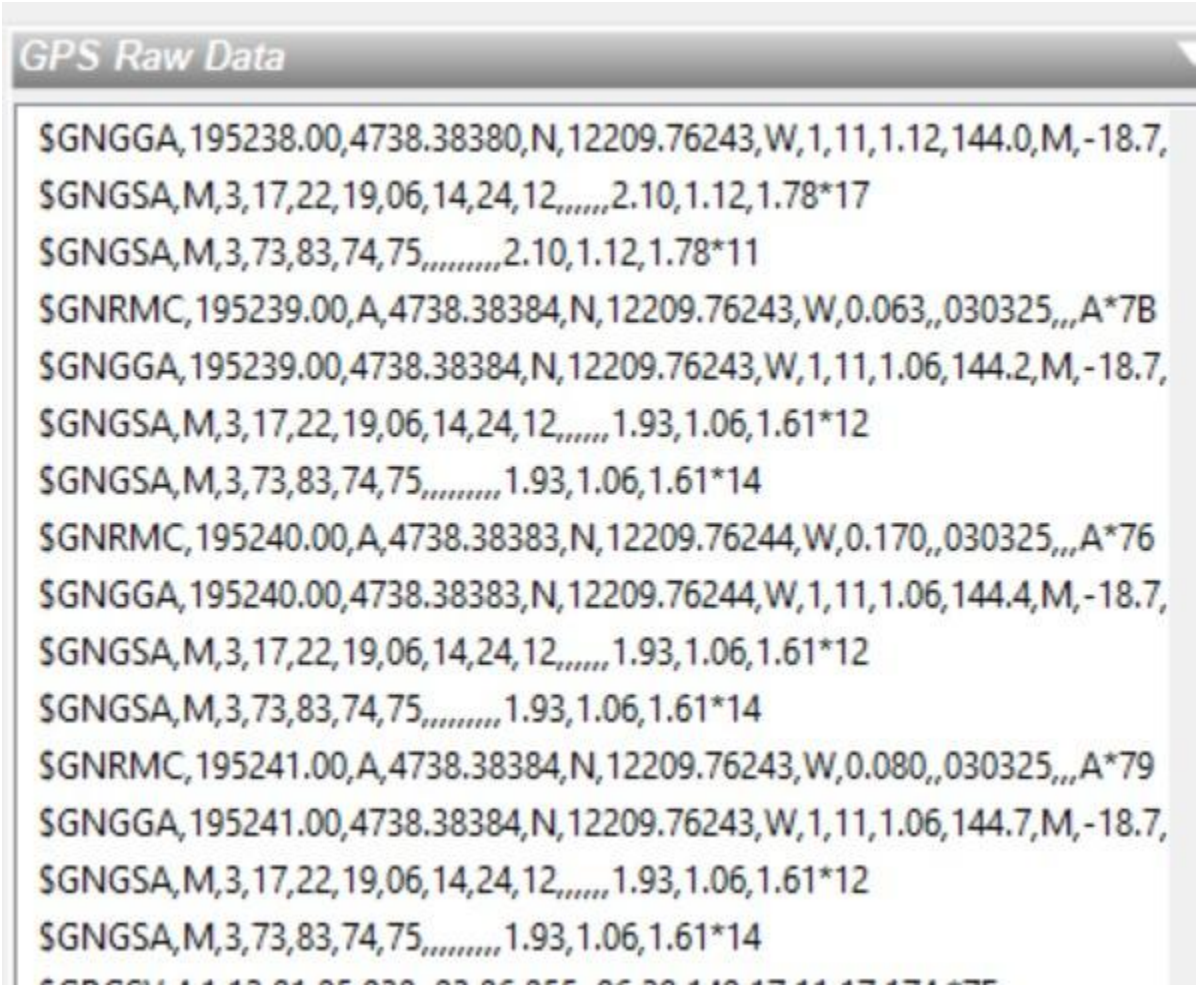


Figure 3 Example of healthy raw GPS Satellite data stream

The GPS Satellites window will display a summary of satellites it can see. You typically need at least three to four “Good” signals to get a fix. Acquisition and initial synchronization can take up to twenty minutes.

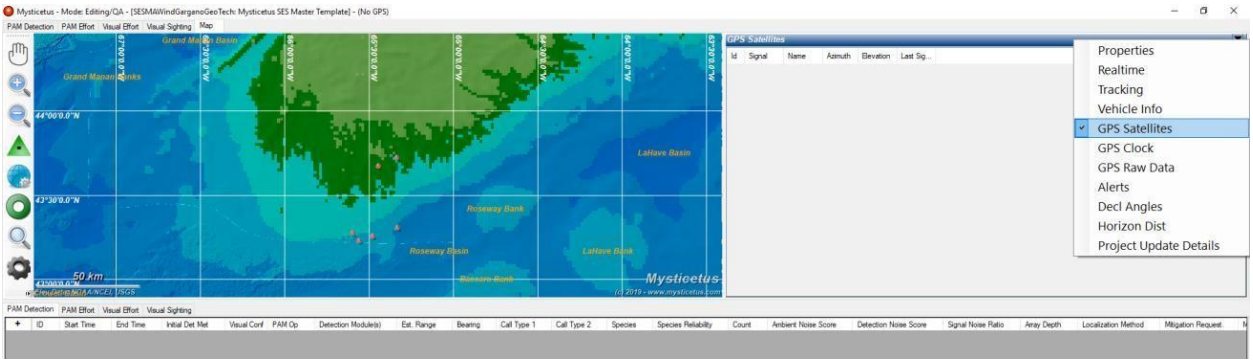


Figure 4 Select GPS Satellites to see acquired satellites by GPS

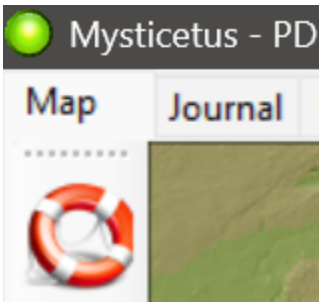
GPS Satellites

Id	Signal	Name	Azim...	Elevation	Last Si...
22	38 dB (...	Navsta...	E	44	1 seco...
12	35 dB (...	Navsta...	WNW	28	1 seco...
14	33 dB (...	Navsta...	E	23	1 seco...
17	32 dB (...	Navsta...	ENE	44	1 seco...
19	29 dB (...	Navsta...	ENE	77	1 seco...
24	28 dB (...	Navsta...	W	55	02:56
75	26 dB (...	New Sa...	NW	26	1 seco...
74	25 dB (...	New Sa...	N	76	1 seco...
6	23 dB (...	Navsta...	SSE	40	1 seco...
84	14 dB (...	New Sa...	SSE	61	01:11
15	13 dB (...	GPS 2R...	SW	5	06:01
66	12 dB (...	New Sa...	N	9	1 seco...
1	10 dB (...	Navsta...	NNE	6	03:06
3	9 dB (P...	Navsta...	NE	6	01:11
65	8 dB (P...	New Sa...	NW	12	26 seco...

Figure Example of healthy number of acquired GPS Satellites.

Note in the last screen shot some satellites are having fast update frequency of 1 - 3 seconds, and others are slow at, for example, 2:56, two minutes fifty-six seconds since last update. You'll need 4 satellites updating within the 1 to 3 second update window for a good fix.

WARNING: NEVER START COLLECTING DATA WITHOUT A GOOD GPS FIX WHICH MEANS A GREEN BALL IN UPPER LEFT-HAND CORNER OF MYSTICETUS!



THE HANDHELD ETREX GPS

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 such as:

- 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

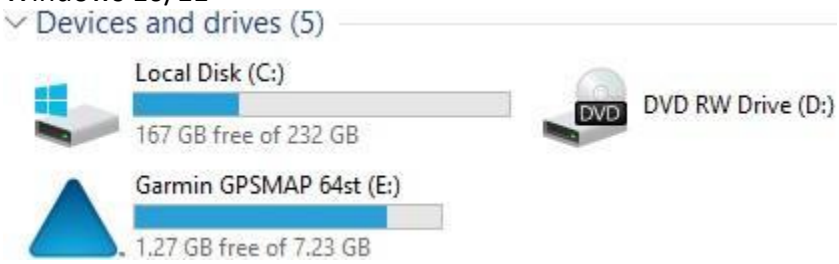


Figure 5 A healthy amount of available data

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 31 Full Reset of the ETrex

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

MAP VIEW FIXING RED 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 track line indicates the vessel is off effort. If the ship is underway and the track line 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!

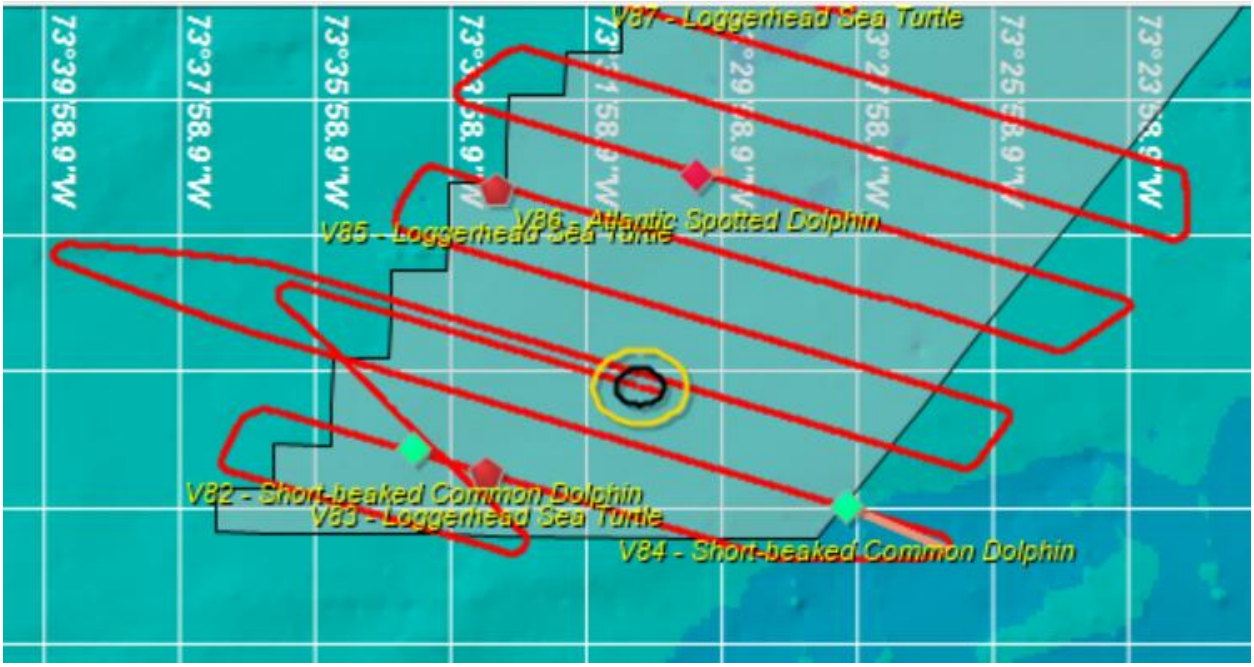


Figure 18 Red track lines indicate an unknown or off-effort state.

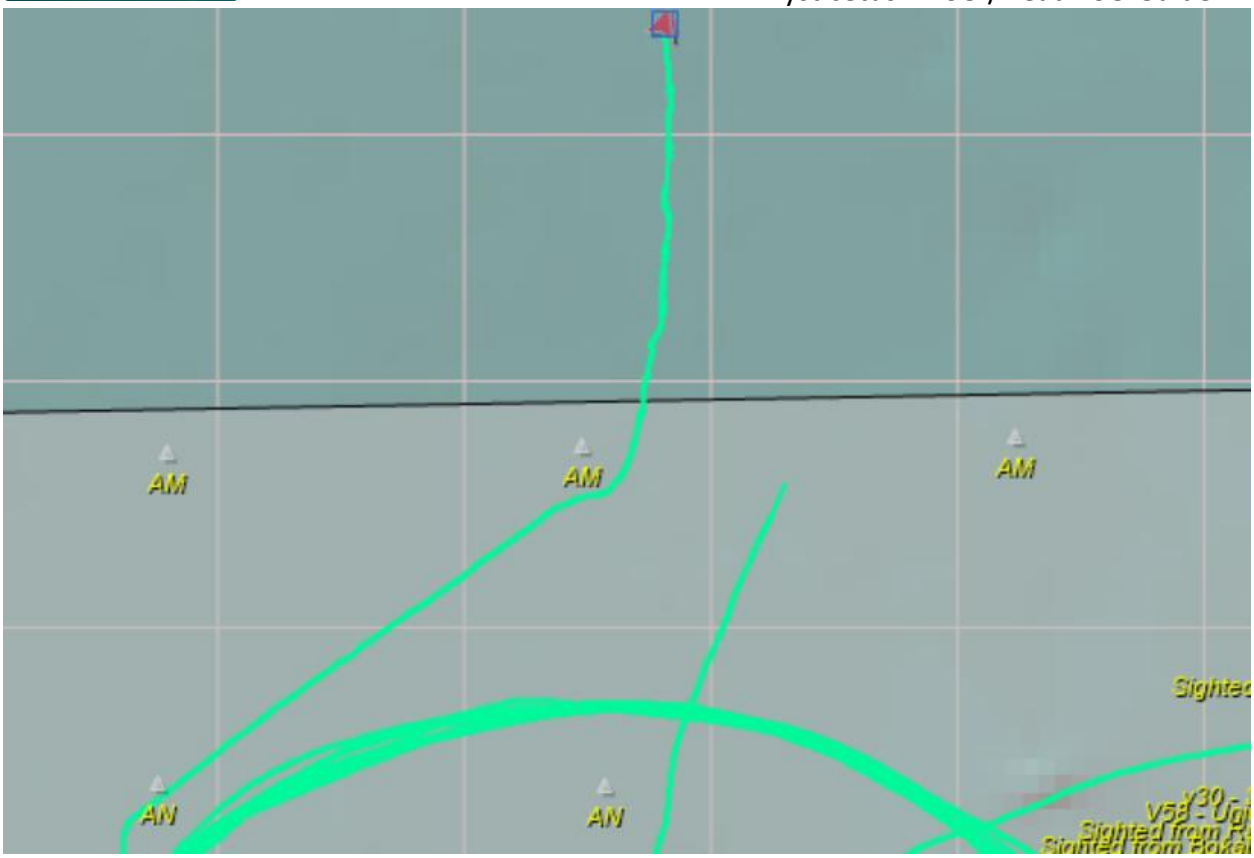


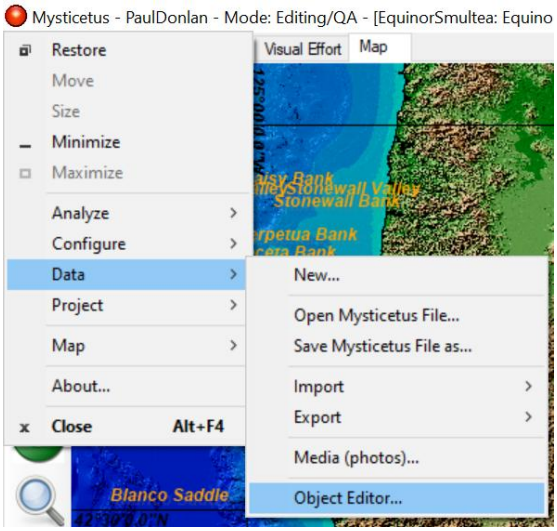
Figure 19 Correct color of track lines

CORRECTING MISSING/INCORRECT JACK RIG ALTITUDE OFFSETS

FIXING JACK RIG ALTITUDE OFFSETS IN OBJECT EDITOR

Historical altitude offsets are stored in the Track Line associated with the jack up rig vessel. During QA/QC if it becomes necessary to change previously entered Altitude Offsets (how high the rig was above the water), this is accomplished by editing the vessel track line in the Object Editor.

1. Click the ball -> Data -> Object editor,



2. Select the appropriate track for the vehicle

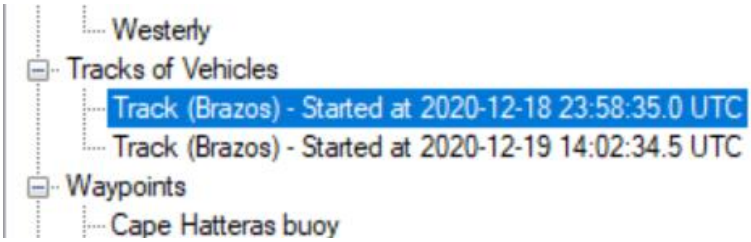
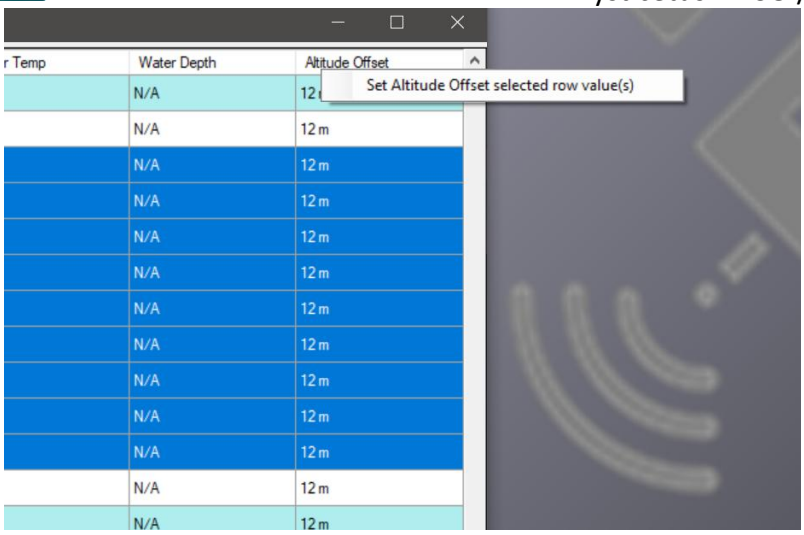
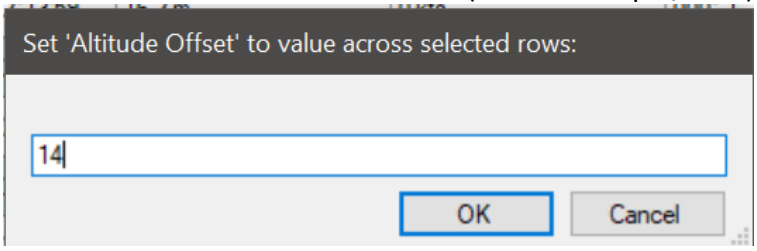


Figure 8 Finding data records for editing.

3. Change the Altitude Offset field(s) at the times in question.
    a. Select the row(s) of trackmarks you want to change.
    b. Right click the Altitude Offset column header, and choose "*Set Altitude Offset selected row values(s)*".



c. Enter the new value for these rows (in this example, 14m)



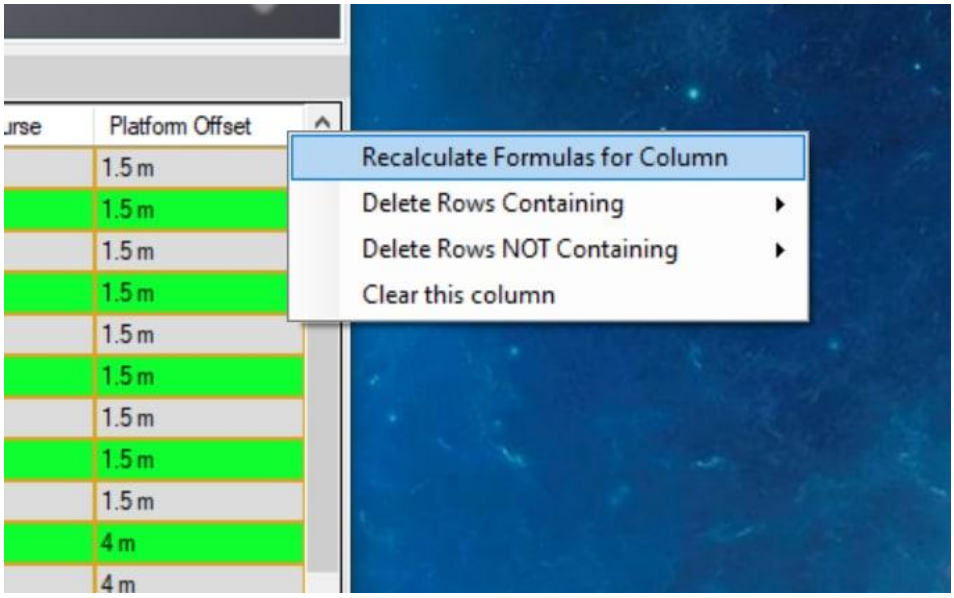
Note that the values for the selected rows are updated (from 12 to 14 in this

example)

d. **Exit the Object Editor.** (press Done)

Select the effort sheet where the Platform Offset is recorded (typically named “Effort/Env”, “Visual Effort”, or similar). Right click the column header for Platform Offset and choose “Recalculate Formulas for Column”. This updates platform offset values based on your recent changes to the trackline (based on

time stamp). This step also automatically repositions animal sightings correctly.



FILE NAMES DISCUSSION

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(2)-[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, Minnow, and station id, Vis. Station id 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”. The (2) indicates it is the second or most recent save. 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.

RETURNING GEAR TO MYSTICETUS

MYSTICETUS LAPTOP SHIPPING CONTAINERS

Mysticetus utilizes 8-gallon Rubbermaid "Action Packer" containers for the secure transport of laptops and electronic equipment. These containers are designed to accommodate up to three laptops and associated peripherals. Proper packing and sealing are crucial for preventing damage during transit.

WHAT IS IN THE PACKER

Each container includes:

- **Contracted Electronic Components:** All electronic items provided for your project.
- **Mysticetus QA Sheets:** These sheets contain important information, including account passwords for the provided laptops.
- **Shipping Manifest:** Use this document to verify that all equipment is returned to Mysticetus at the project's conclusion. Initial each item on the list to confirm its inclusion in the packer.

Protective Foam:

The container is equipped with foam inserts of varying densities to safeguard the contents:

- **Low-Density Foam:** Lines the walls and floor of the container and the underside of the lid.
- **High-Density Foam:** ½-inch thick grey foam pieces are placed between electronic components for added protection.
- **Spacer Foam (if applicable):** If only two laptops are shipped, a 1-inch thick spacer foam is included to fill the space usually occupied by a third laptop.

Important Note: The foam inserts are essential for safe shipping and are costly to replace. Please ensure all foam is returned with the equipment.

PACKING INSTRUCTIONS

Follow these steps for proper packing:

1. Place laptops in the container, separated by high-density foam pieces.
2. Position miscellaneous gear on top of the second-to-last foam piece.
3. Cover the miscellaneous gear with the final piece of grey foam.
4. Place the shipping manifest on top of the final foam piece.
5. Secure the container for shipping as detailed below.

HOW TO PROPERLY SECURE THE SHIPPING CONTAINER

The Rubbermaid "Action Packer" requires specific steps for secure closure:

1. **Zip-Tie the Handles:** Loop a zip tie through the packer lid tab and the hole at the bottom of the handle. Partially open the handle to facilitate threading. Once the zip tie is through, close the handle securely and tighten the zip tie as much as possible.
2. **Reinforce with Shipping Tape:** Apply several strips of strong shipping tape across the handles to further secure them together. This provides additional support in case the zip ties break.
3. **Trim Excess Zip Tie:** Cut off the excess zip tie tail extending beyond the lock to prevent snagging during transit.

Following these instructions will ensure the safe return of your equipment to Mysticetus. Improper sealing may lead to damage and potential insurance claims.

Step 1:

Figure 28 Routing the tie wrap

Figure 29 Correct routing 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.

Figure 30 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 Tape and trim the tie wrap

Step 3

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