


7. ELECTRONIC DATA COLLECTION



The software you will use for data collection is called Pendragon Forms (Forms 5.X ). It has been installed and backed up on every RDA. A great deal of effort goes into creating a monitoring database that is a balance between user friendliness and functionality. Complicated constraints or scripts requiring lots of data cross-referencing slow the system down, place it at greater risk of freezing up, and more importantly has the potential to tie your hands in the field and prevent you from collecting data electronically. Data domain constraints and scripts are detailed in the provided data dictionary. In short, you can enter non-valid data. This means that extra care and precision is needed on your part to ensure the highest quality data makes it in from the field.

The **goals** of Pendragon Forms and Database training are to provide you with the necessary knowledge and practice so that you accurately enter data, and conversely, if you determine that you have incorrectly entered data, to show you how to correct the mistake. The outline below details the individual objectives and standards, as well as the final metric for which you will be held accountable after completing this training.

Refer to **Appendix I** for collection database dictionaries and **Appendix II** for annotated datasheets.

Objective 1: Proficient understanding of database structure.

Each crew member will know 1) the basic terminology (form, sub-form, record, parent, child) and design of the database and how forms are related – i.e. parent and child, 2) what an orphan is, how they are created, and how to avoid and/or fix them, 3) the purpose and initiation of each form and sub-form

Objective 2: Proficient understanding of database records.

Each crew member will know how to 1) review and edit an already existing record and 2) delete a record (with another emphasis on the orphan problem)

Objective 3: Proficient understanding of how to enter written or tapped data into database fields.

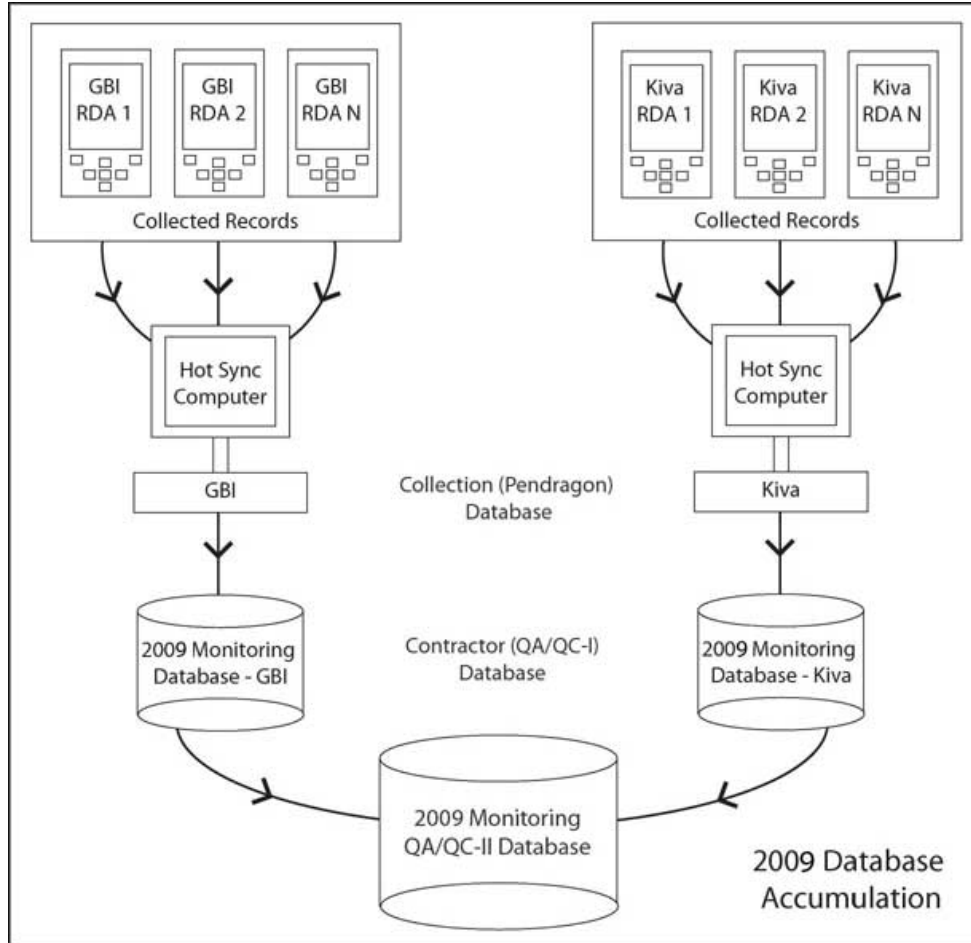
Each crew member will know 1) the importance of accurately entering data, 2) how to use the on screen keyboards to enter data, and 3) how to use the Graffiti 2 characters to enter data

Objective 4: Proficient understanding of how to use the Bluetooth GPS unit in combination with the RDA.

Each crew member will know how to 1) pair the RDA and the GPS units, 2) check that the units are properly paired and are connected, 3) remove a Bluetooth partnership from an RDA, 4) take a GPS grab, and 5) check the GPS grab for validity

Metrics: By week three trainees will be expected to maintain their equipment, successfully perform GPS grabs, and accurately record data in their RDA. This will be evaluated based upon the successful delivery at the close of each day complete and valid LSTS transect data. Failure to do so will result in the recommendation to USFWS that they not participate in monitoring.

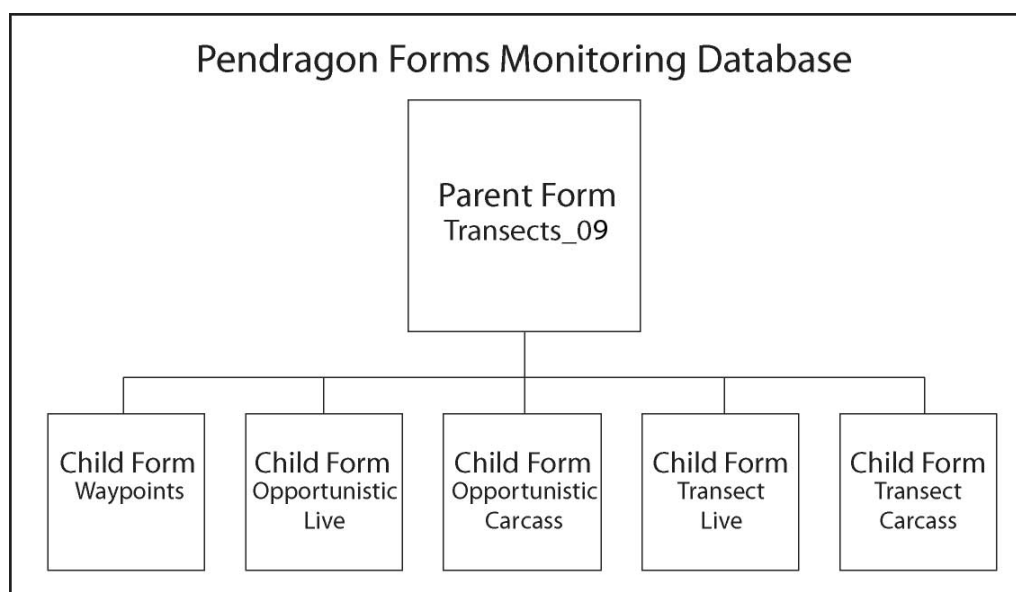
Objective 1: Understanding of Database Structure



1. Basic Terminology and Design of the Pendragon Database – Databases are complex electronic entities that have whole fields of study devoted to them. The below is a very brief and general review of database information and terminology that is relevant to your monitoring duties.

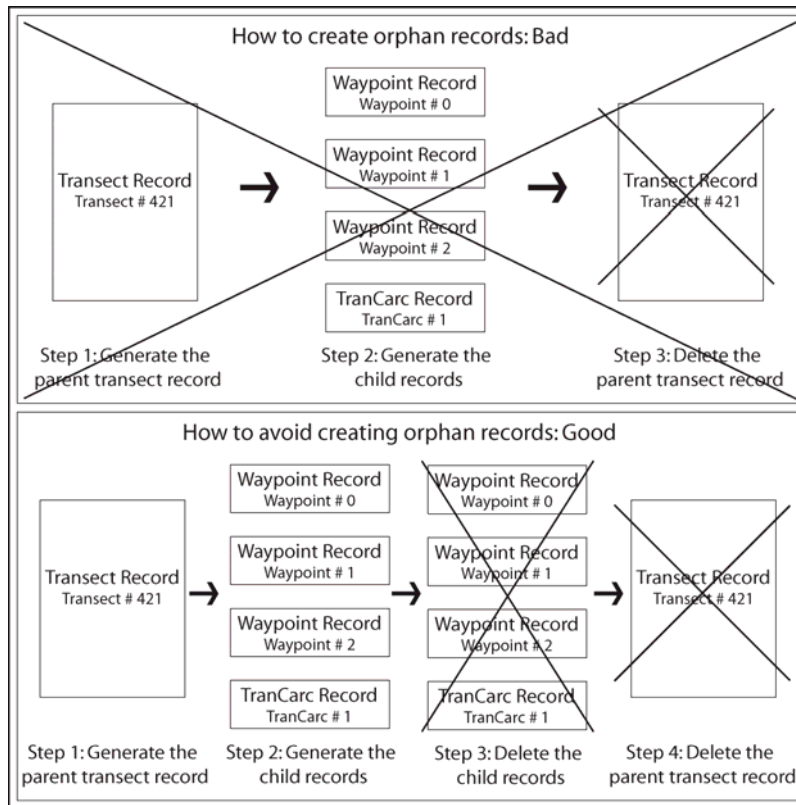
- Database – The Pendragon database you will be adding to while monitoring is comprised of related electronic data that will be organized to allow easy access and querying once finalized. The final database is accumulated in three stages, as explained in the diagram above and the steps below:
 - i. While you and your crew mate are out in the field collecting data on your RDA
 - ii. When the RDAs for each contractor are hot sync'd to the computer at the end of the day and your data are merged with the other crews' data and any data previously collected by your group
 - iii. When data from the different contractors are merged at the end of the monitoring season into one complete database. Several iterations of Quality Assurance/Quality Control (QAQC) go along with each stage to facilitate an accurate database.

- Form – Within the Pendragon database on the RDA, a form is an electronic sheet of monitoring questions to be answered by you. Questions within each form relate to one subject and each form is detailed in Standard 3 of this objective. Forms are the building blocks for the database – each time you complete a form, it will become a record in a table within the final database.
- Sub-form (Parent and Child) – A sub-form is a form that can only be accessed through and is dependent on another form. Another term for this is a Parent and Child relationship. For example, the Transects form is the access point for every other form. Transects is considered a Parent form and is the only Parent form for our database. The Child forms are the Waypoints, OppLiveObs, OppCarcObs, TranLiveObs, and TranCarcObs forms. A Child form cannot exist until a Parent form is created. This is considered a one to many relationship; a single transect can have many observations or waypoints, but an individual waypoint or observation can belong to one and only one transect. See the diagram below for the Parent and Child structure of our database.




- Record – A record is a single event within a database table. Each individual transect, waypoint, live or carcass transect tortoise, and live or carcass opportunistic tortoise is a record. Records are related to records in other tables via a primary key, also known as a unique identifier. A transect’s primary key is carried over and recorded in each child form as a means to identify which transect a waypoint or observation belongs to. This primary key plays a big part in the creation of orphan records (standard 2 of this objective, below).
- 2. Orphan Records** – Diagnosing and correcting orphan records when they occur is often a daunting task for the QAQC I manager, but there are many ways you, the data collector, can make their life and your life easier by understanding what orphan records are, how they are created, and how to avoid and/or fix them.

- Orphan Record – An orphan record is typically a child record whose parent record has been deleted, hence the “orphan”. Our database’s integrity depends on the relationship between the parent form (transects) and the child form(s). That relationship is upheld via the transect form’s primary key. When you begin a new transect form, the primary key is automatically generated and propagated to each child record created for that transect, creating the relationship. Without the transect primary key in the child form, there is no link between parent and child. The transect primary key is a hidden field in both the parent and child forms because it is not something you will need to know or edit, it is only important that you understand its role.
- Causes of Orphan Records – As mentioned above, an orphan record is created when a child record’s parent record is deleted. For example, you begin a new transect form and initialize the waypoints form. You collect three waypoints before realizing you are walking the incorrect transect and need to start over one transect to the west. You delete the transect from Pendragon forms and when you go to delete the waypoints, they are gone, too. Problem solved? Not quite. The waypoints are still there, but there is no way to access them because their parent has been deleted. There is also no way to regenerate the parent form and recreate the relationship because the hidden primary key is automatically generated and un-editable. Basically, once the parent form has been deleted, there is no going back, orphans will exist (if any waypoints or observations were collected before the transect form was deleted), and your QAQC I manager will have to fix them. The graphic below shows how orphan records are created and how they can be avoided.



- Avoiding Orphan Records – Orphan records are easy to create, but luckily they are also easy to avoid. If you find that you need to delete a transect record for whatever reason, start by deleting all child records first. Only after all the children have been deleted can the parent be deleted without creating orphans. How to delete a record is detailed in Objective 2 (database records), Standard 3 of this module. Keep in mind, too, that if you are nearing the end of your transect and somehow accidentally delete the transect form, all the child records you've collected are still there, just inaccessible. Start a new transect form, giving it the same transect number, resume where you left off, and leave detailed notes about the problem to help your QAQC manager resolve the issue. When your RDA is hot sync'd, those records will show up in the database as orphan records and your QAQC manager can re-link them with the new transect form.

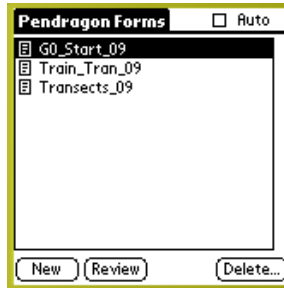
3. Initiation and Purpose of Pendragon Forms – There is one Parent form and five Child forms that you will use while monitoring. The following outlines some basic information on each form and provides a practical guide on how and when to access them on your RDA. You can refer to the data dictionary for a detailed explanation of the purpose of each field in a form. Within the parent Transect form, the child forms are ordered according to how often you will access and fill them out, with waypoints being first because they are the most frequently collected points.

- Forms 5.1 – To initiate any of the forms, including the Transects form, you must start the Pendragon Forms 5.1 software. With your RDA turned on and in the main application launcher menu, tap Forms 5.1  and the Parent table options will appear.



- Transects Parent Form -
 - i. Purpose - this is the parent form for the transect database and the child forms cannot be accessed until this form is initiated. Its purpose is to record general information about the transect, including the names of the observers, observations, and condition of the transect (i.e. mountainous, flat, unwalkable, inaccessible, etc). For walked transects, the transect record is created when the crew members are dropped off and is closed when the crew members return to their drop off point. Every transect considered or attempted will have a record, not just the transects actually walked.

- ii. Initiation - when you arrive at your drop off location, you will initiate this form by tapping and selecting Transects and then tapping New. Only a few of the fields are required before going on to the child forms or ending the transect form, which means you must double check that you have correctly completed everything.

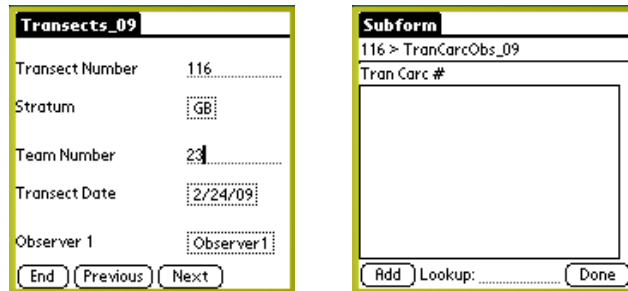


- Waypoints Child Form -

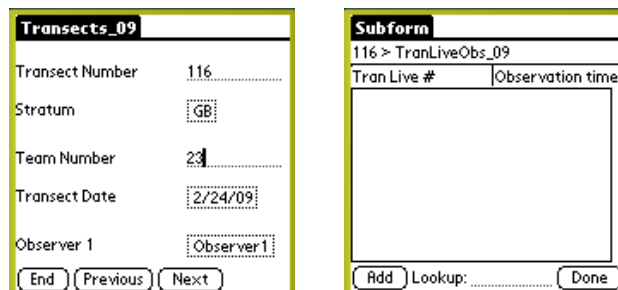
- i. Purpose - while walking a transect, you will create a new waypoint record and take a GPS grab approximately every 500 meters, making this your most frequently completed child form. Waypoints help us know where you actually walked instead of relying on the ideal transect outline and your descriptions. They also help you follow the methodology. Every walked transect must have at the very least 4 waypoints – waypoint 0 for the drop off location, 1 for the start point, 99 for the end point, and 100 for the return to drop off point. Please note that the recorded time for waypoint 0 is the time that you started walking towards your transect and that waypoint 100 time is the time you return to the drop off point, NOT the time that you are picked up. These times are used for estimating travel time to and from transect start points.
- ii. Initiation - to access the Waypoints table and collect a point, scroll down the Transects form until the Waypoints button is visible. Tap on this button, which will take you into the Waypoints record screen, and from there tap Add. Fill in the requested information and tap Next when necessary, or Previous if you need to go back and review data. When all information is completely recorded, tap Next or End until you are returned to the Waypoint record screen. Tap Done to return to the Transect form.
- iii.



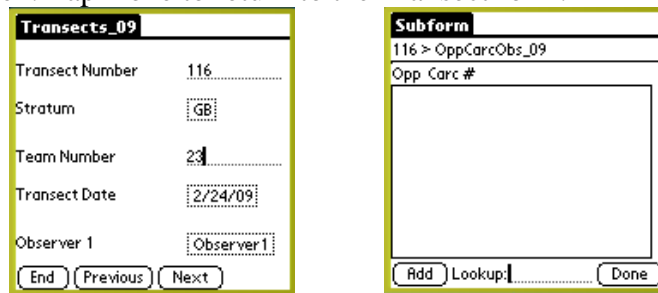
- TranCarcObs Child Form –
 - Purpose – unfortunately, you will find more carcasses than live tortoises, so this child form is next in line. You must fill out a new carcass observation form for every carcass you find while completing a transect. General information about the carcass, such as size, sex, and condition, is requested along with a GPS grab and information on azimuth and bearing.
 - Initiation - to access the TranCarcObs table and record a carcass observation, scroll down the Transects form until the TranCarcObs button is visible. Tap on this button, which will take you into the Carcass record screen, and from there tap Add. Fill in the requested information and tap Next when necessary, or Previous if you need to go back and review data. When all information is completely recorded, tap Next or End until you are returned to the Carcass record screen. Tap Done to return to the Transect form.



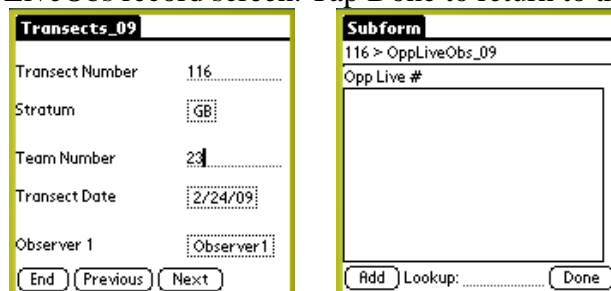
- TranLiveObs Child Form –
 - Purpose - we hope that you get to use this child form often, but in reality, it is common to find no tortoises. For those that you do find while walking a transect, this is the form you will complete. Similar to the carcass form, this form requests information on the individual tortoise’s size, sex, location, azimuth and bearing along with a GPS grab and additional tortoise centric data.
 - Initiation - to access the TranLiveObs table and record a live observation, scroll down the Transects form until the TranLiveObs button is visible. Tap on this button, which will take you into the Live record screen, and from there tap Add. Fill in the requested information and tap Next when necessary, or Previous if you need to go back and review data. When all information is completely recorded, tap Next or End until you are returned to the Live record screen. Tap Done to return to the Transect form.



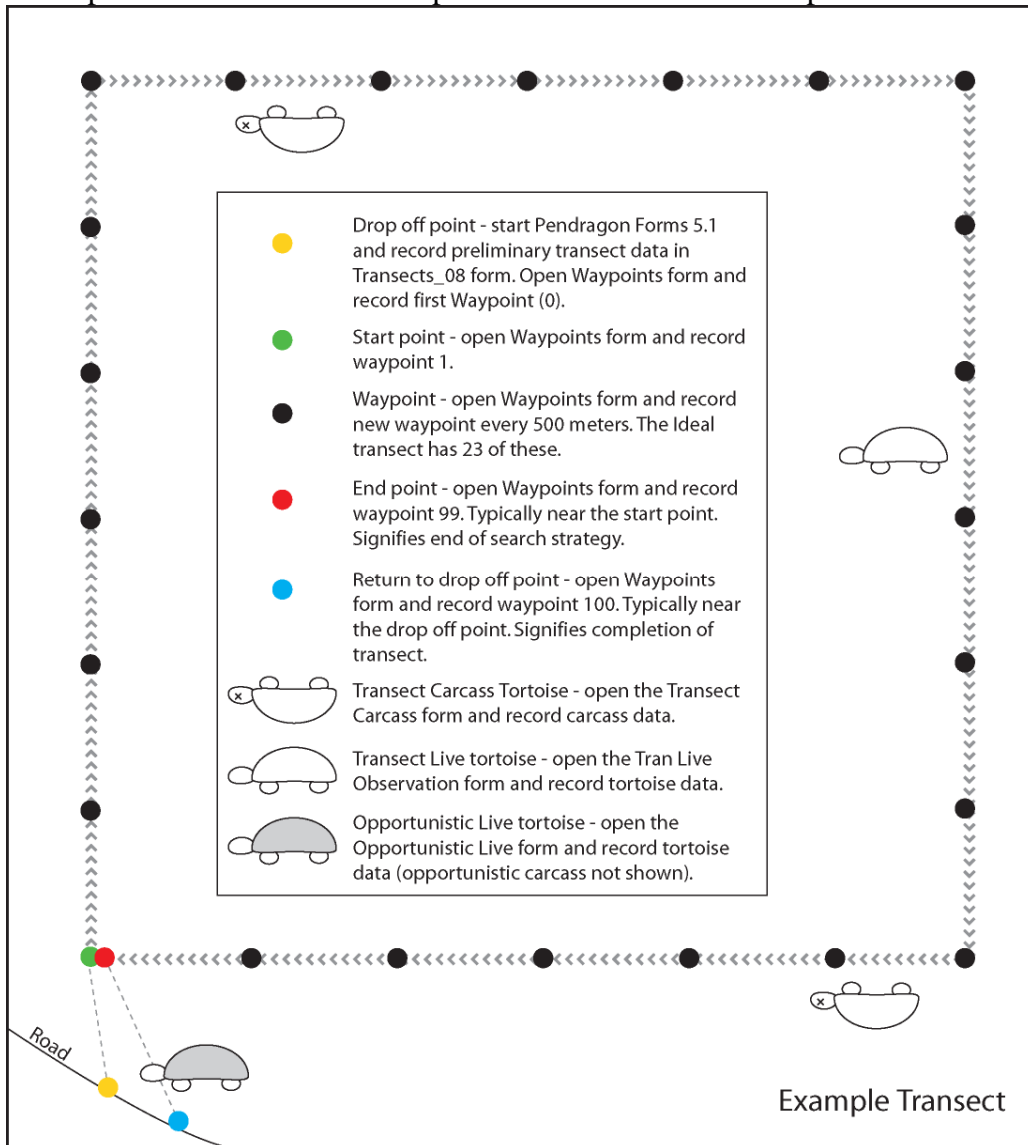
- OppCarcObs Child Form –
 - i. Purpose – opportunistic carcasses are tortoise carcasses that are typically found while walking from the drop off point to the transect start point or from the end point to the return to drop off point, or any other time a carcass is found while not walking the actual transect. Information similar to the transect carcass child form is requested, except for azimuth and bearing because it was not found while using the monitoring search methodology.
 - ii. Initiation - to access the OppCarcObs table, scroll down the Transects form until the OppCarcObs button is visible. Tap on this button, which will take you into the Opp Carc record screen, and from there tap Add. Fill in the requested information and tap Next when necessary, or Previous if you need to go back and review data. When all information is completely recorded, tap Next or End until you are returned to the Opp Carc record screen. Tap Done to return to the Transect form.



- OppLiveObs Child Form -
 - i. Purpose – this is the least frequently needed child form. Opportunistic tortoises are those found while walking between the drop off point and the transect start or end points, or any other time a live tortoise is found while not walking the transect centerline. Information similar to the transect live child form is requested, with the exception of azimuth and bearing, because these observations are not made using the distance search method.
 - ii. Initiation – to access the OppLiveObs table, scroll down the Transects form until the OppLiveObs button is visible. Tapping this button will take you into the Opp Live record screen, and from there tap Add. Fill in the requested information and tap Next or Previous to go back and review.
 - iii. When all information is entered, tap Next or End as needed to return to the OppLiveObs record screen. Tap Done to return to the Transect form.



The picture below shows a sample transect and when to complete each form.



Objective 2: Understanding Database Records

A requirement of every desert tortoise monitoring crew is to deliver an RDA that contains accurate data, a goal which can be more likely achieved by reviewing records twice - immediately after collecting them, and then again after the transect is complete. This objective focuses on how to approach the important task of data review, edit, and deletion.

1. **Review and Edit an Existing Record** – You are able to review and edit a record immediately after collecting it, which is useful and reduces the chance of incorrect data caused by having to go back hours later and correct something that is no longer fresh in your memory. As a double check, you will also compare your electronic data to your paper data after the entire transect is complete. The below steps outline how to review and edit a record and are essentially the same for every form, but in this case the waypoints form is used to demonstrate.
 - a. Reviewing records while collecting data
 - i. While in the process completing a record, you can always tap Previous to review what you have already collected and make changes as necessary. **NOTE** – it is strongly recommended that as you and your team mate are collecting data, you repeat the information being told to you as you either write it down or record it in the RDA. For example, your team mate weighs a tortoise and deems it to be 2500 grams, but you hear 4500 and record that in the RDA while they record 2500 on the paper. At the end of the transect, after 5 hours of walking, neither of you can recall which is correct and are forced to leave the records mismatched, but the problem could have been easily resolved by verbally repeating the entries.
 - ii. After completing and exiting a record, you will be returned to the sub-form of whatever you were collecting. If you would like to review a record, simply tap on it. Or, if you have returned to the Parent transect form, tap the child form that you would like to view and tap the record in question.

Transects_09

Transect Number 116

Stratum GB

Team Number 23

Transect Date 2/24/09

Observer 1 Observer 1


End Previous Next

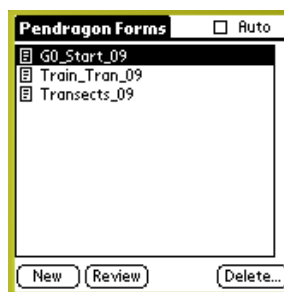
Subform

116 > Waypoints_09

Waypoint number	Waypoint Time
3	1:46 pm
2	1:46 pm
1	1:45 pm
0	1:45 pm

Add Lookup: Done

- iii. Scroll through the screens by tapping Next and if you see an error or need to change something, tap on the field and correct it, just like you would when entering data.
 - iv. After reviewing and correcting the record, either tap Next until you are returned to the sub-form screen or tap End. Tap Done to return to the Parent Transect form.
- b. Reviewing records after a transect is complete
- i. To ensure that your data are as correct as possible, you will compare your electronic data entries to your paper data entries after completing a transect and before turning in your RDA. It is up to you and your team mate to figure out the most efficient method for performing this check. In the past, it was common for one team member to read off what was on the paper form while the other compared it to the data on the RDA.
 - ii. When a discrepancy arises between the paper and the RDA, you must attempt to resolve the issue by either correcting the data on the RDA or correcting the paper data sheet, but if you cannot recall which is correct, do not guess and randomly change one answer to match the other. Instead, let the discrepancy remain and leave a note for your QAQC manager so they are aware of the issue. This is why double checking entries while in the field is crucial.
 - iii. To review a transect after completing and closing all forms, start Forms 5.1  on your RDA by tapping on its icon in the application launcher menu.
 - iv. Make sure the Transects form is selected and instead of tapping New, as you would when starting a new transect, tap Review.



- v. Any transects that have been completed and have not been transferred to the Hot Sync computer will be listed. Simply tap on the transect you want to review and the Parent Transect form will open with the previously collected data.

Transect N	Stratum	Transect Date
116	GB	2/24/09

▼ All Fields | [Search] [X]
 [Sort...] [Done]

Transect Number: 116
 Stratum: GB
 Team Number: 23
 Transect Date: 2/24/09
 Observer 1: Observer1

[End] [Previous] [Next]

vi. From here, follow the steps detailed above to view and edit your entries as necessary.

2. **Delete an Existing Record** - Sometimes, you just want to delete a record and start over. This is easy to do, but use caution because if you delete a transect record before deleting the waypoints or other child records that have been collected, you will create orphan records (see Objective 1, Standard 2 of this module for information on orphans). Delete any child records before deleting the parent record and your data will be orphan free. It is also possible for you to delete a form, which is what you fill out to create the record, instead of the record itself. Make sure you are viewing an actual record before deleting it and are not at the form level (i.e. if the words “Delete Form Designs” show up, do not proceed). The method for deleting a record is the same for every form, but the screens below demonstrate deleting a waypoint. **NOTE** – You may have noticed the Delete button in the lower right hand corner of the Pendragon Forms main screen. This button is not recommended because it deletes an entire transect without giving you the option to delete the child records first, creating orphans. Use this button only if you have not collected any child records or have already deleted all child records.

a. Access a record that you would like to delete by following the review steps above (Standard 1 of this objective) and tap to open it.

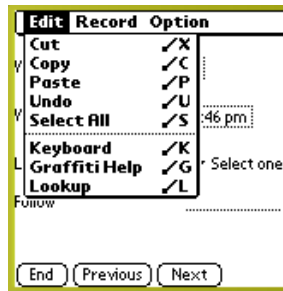
Subform
 116 > Waypoints_09

Waypoint number	Waypoint Time
3	1:46 pm
2	1:46 pm
1	1:45 pm
0	1:45 pm

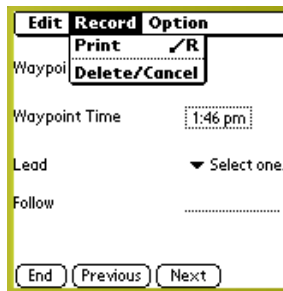
[Add] Lookup: [Done]

b. Tap in the upper left hand corner of the RDA screen, where the title of the form is (Waypoints).

- c. This opens the Menu Bar. You can also access the Menu Bar by tapping the Options icon next to the Graffiti 2 pad while viewing the record you'd like to delete.



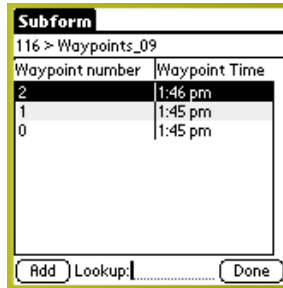
- d. By default, the drop down Edit menu is available, but you want the Record drop down menu, which will become active if you tap on Record.



- e. Under the Record menu, tap Delete/Cancel.
- f. If you are sure you want to delete the record, tap Yes, otherwise tap No.



- g. After tapping Yes, you are returned to the sub-form and the record is gone.

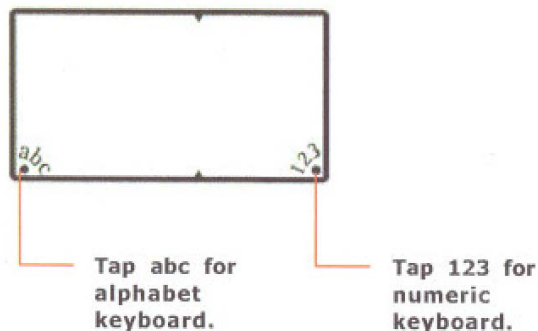



- h. Repeat the process on the next record to be deleted or tap Done.

If you are deleting an entire transect, delete every waypoint and observation first (child records), then delete the transect record (parent record), otherwise you will create orphans. For more information on orphans, refer to Standard 2, Objective 1 of this module.

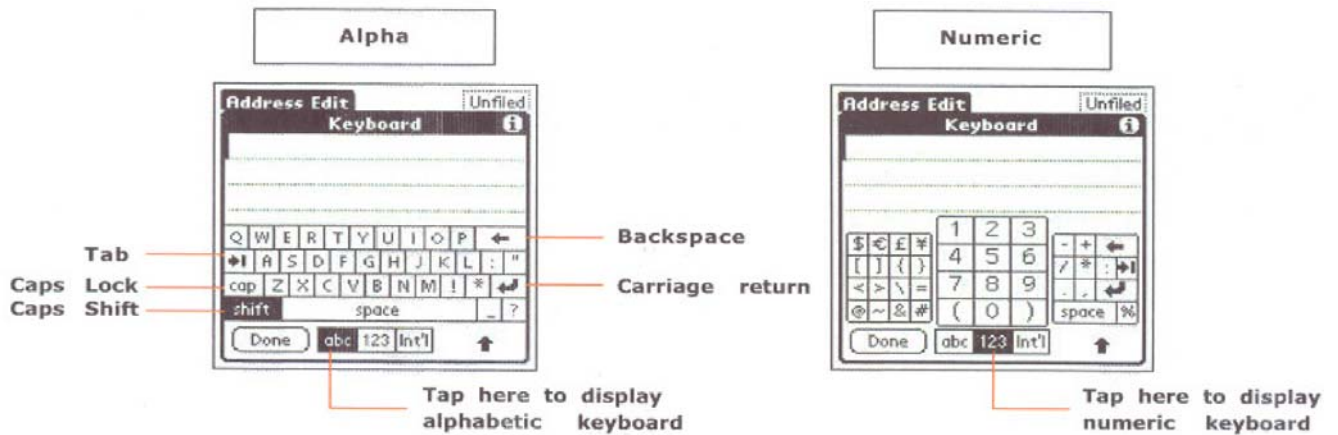
Objective 3: Understanding How to Enter Data on RDA

- 1. Importance of Data Entry** – as already stressed, accurate data is extremely important to tortoise monitoring and the accuracy begins with and relies heavily upon you, the monitor. The first and often most important step in achieving accurate data is inputting it correctly. There are two different methods for entering data while conducting monitoring: the onscreen keyboard or Graffiti 2. When it comes to entering data, pick whichever method is most comfortable for you, as long as the data you enter is accurate. Once you get the hang of it, the Graffiti method is faster, but it requires you to double check **every** number and letter you enter because, as you will find, the number five very easily turns into the number nine, amongst many other accidental errors. Timely, but very accurate, data entry is key.
- 2. On Screen Keyboard** - with the cursor in a field where data can be entered, do one of the following to activate a keyboard:
 - i. Tap either the ABC or the 123 on the front of your RDA to display the alphabetic or numeric keyboards.



- ii. Or, tap the Options icon  followed by the Edit menu, then tap Keyboard to display the alphabetic keyboard, from which you can access the numeric keyboard by tapping the 123 box at the bottom of the keyboard.

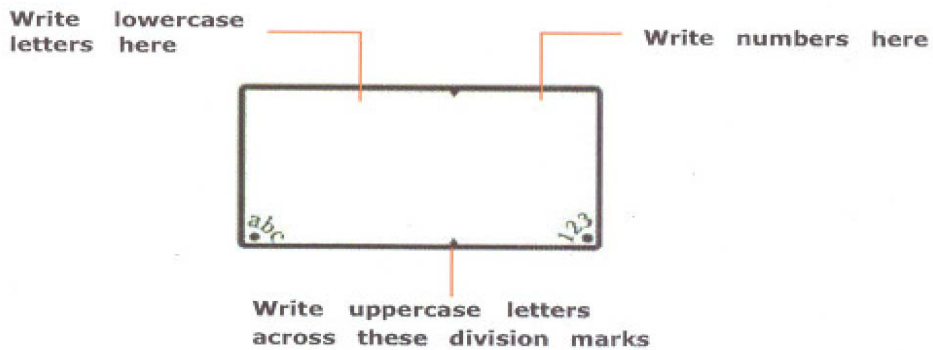
After you have tapped the desired characters or numbers, tap Done to enter your data into the field.



3. Graffiti 2 Characters –



- The Graffiti 2 strokes create the same letters, numbers, punctuation, and symbols found on a standard keyboard, and with some practice can prove to be a faster and easier method for entering data than using the keyboards.
- Instead of picking letters and numbers from the onscreen keyboards, you will be writing them on the Text and Number Input Area of the RDA.



- The only way to learn the Graffiti 2 strokes is through practice. There is a demo application on every RDA you should go through at least once to get a feel for how it works. It is available through the Graffiti icon (shown here).





For best results, it is important to draw the characters exactly as they appear in the demo screen. Some characters are more difficult to enter than others.

Objective 4: Using Bluetooth GPS and RDA Together



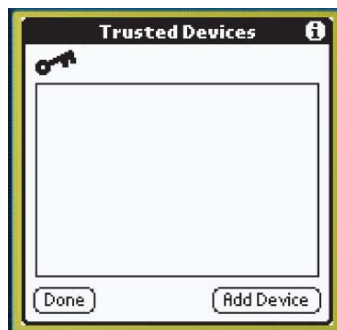
- 1. Pairing the RDA and GPS units** - Bluetooth devices connect and exchange information via a secure, globally unlicensed short-range radio frequency, which allows devices to communicate without a direct view of each other; they can even communicate through walls (though it weakens the signal), as long as they are within range (for our devices, about 30 feet). Before spatial data can be transferred from the GPS unit to the RDA, communication between the two units must be established. The Bluetooth GPS only needs to be added to your RDA once and you will rarely, if ever, need to repeat this or the other steps outlined in this objective, except for standards 4 and 5, which deal with taking and validating a GPS point. Adding the GPS is simple, but takes a few steps. Here's how to pair the units to allow for communication:

- On the RDA, from the main application launcher (tap Home  if necessary), tap Prefs 
- Tap the pick list in the upper right hand corner of the screen (denoted by the black triangle) to activate the drop down menu, from which you will tap Bluetooth (if necessary).
- The RDA preferences for Bluetooth should already be set to the following:
 - i. Bluetooth: Enabled
 - ii. Device Name: Palm OS handheld (the “held” is truncated) OR RDApp (your RDAs number)
 - iii. Allow Device to be Discovered: Yes.
- If your RDA's Bluetooth preferences screen does not match the above, tap on the offending pick list (black arrow) or entry field and correct it.

- When your preferences are correctly set, tap Trusted Devices.



- Trusted devices are Bluetooth devices that have been set up to communicate with the RDA. This list will most likely be empty until you add your GPS unit.
- Turn on your Bluetooth GPS unit (blue LED should blink).
- Tap Add Device on RDA. The RDA will usually take a few seconds to search for Bluetooth devices within range, but could minutes if there are several in range.




- Your GPS unit (Pharos BT GPS II) should appear on the screen, along with any other nearby devices (KINGFISHER-2 in the screenshot below). **NOTE:** If everyone tries to do this at the same time and in the same location, you will have 20 different Pharos BT GPS II units show up. Spread out and try to find an area away from other units and preferably with an obstacle weakening the other units' signals. It is impossible to determine which is the Bluetooth GPS in your hands, so you **MUST** be far enough away from others or all other Bluetooth GPS devices must be turned off.
- Make sure your device is selected (if it's not highlighted in black, tap on it to select it) and tap OK.



- The GPS unit requires that you enter a passkey to gain access to it. **The passkey is 12345678** and is the same for every GPS unit. This is a good place to practice those graffiti numbers, simply start writing them in the number portion of the graffiti pad or tap the 123 dot to gain access to the keyboard. Tap OK after entering the passkey. **NOTE:** If too much time elapses while you are entering numbers, the connection will be lost and you will have to reestablish the connection and enter the passkey again.
- Your GPS unit should now appear in the list of your RDA's trusted devices.



- Tap Done to go to the Bluetooth Preferences screen and tap Home  to return to the application launcher.
2. **Check that the units are properly paired** - Because they all have the same passkey and the same name, it's easy to add the wrong GPS unit to your RDA if other units nearby are turned on. Luckily, it's also easy to determine and fix an incorrect pairing. Here's how to make sure you are connected to the proper device:



- After adding a GPS unit to your RDA's trusted devices (detailed in Standard 1 of this objective), from your RDA's Bluetooth Preferences screen, tap Trusted devices.
- Tap on the GPS in question in the list (Pharos iGPS-BT) to select it and tap Details... This screen shows you details about the added GPS unit (see image below), including the Remote Device Address, which should match the alphanumeric code stickered on the front of your Bluetooth GPS device. If it does not match, you have paired your RDA with someone else's GPS unit. Follow the directions to remove the incorrect device (detailed in Standard 3 of this objective) and go through the pairing process again with the correct device (if necessary, find a secluded area where no other GPS units are detected). This screen also shows you the last time the GPS and RDA were connected.



- Tap Done to return to the Trusted Device screen.

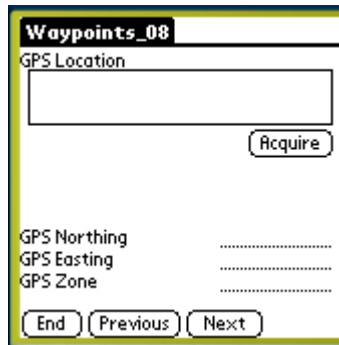
- If a pairing between an RDA and a GPS has been successful, a key symbol will appear next to the Bluetooth unit if you try to add more devices. After pairing the two, turn your GPS on and from the Trusted Devices screen, tap Add Device. Any Bluetooth device in range will appear, but yours will be distinguished with the key.
- **NOTE:** The key will appear even if it's the incorrect device. The only way to make sure it's the right device is to compare the alphanumeric code stickered on the GPS's front to the Remote Device Address on the RDA.



- Select your device and tap OK. Because the device is already trusted, you do not need to re-enter the passkey and will be returned to the Trusted Devices Screen. Or tap Cancel.
 - Tap Done to go to the Bluetooth Preferences screen and tap Home to return to the application launcher.
3. **Remove a Bluetooth partnership from an RDA** - You will perform this standard if you've paired your RDA with the incorrect GPS unit or need to switch to a different GPS and will no longer use a current pairing.
- On the RDA, from the main application launcher (tap Home  if necessary), tap Prefs 
 - Tap the pick list in the upper right hand corner of the screen (denoted by the black triangle) to activate the drop down menu, from which you will tap Bluetooth (if necessary).
 - Tap Trusted Devices.
 - Select the device you wish to remove from the trusted list by tapping on its name (if necessary).
 - Tap Details.
 - Note that this is the same screen where you can also determine if the alphanumeric code stickered on the GPS unit matches the Remote Device Address on your RDA. Tap Delete Device.
 - Tap OK when asked if you're sure you want to delete the device, or cancel if you've changed your mind.



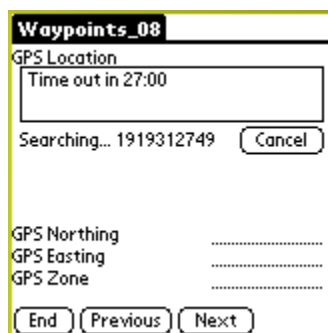
- You'll be returned to the Trusted Devices screen, which is now missing the deleted device. Tap Done if complete or tap Add Device if you'd like to add a new GPS unit.
4. **Take a GPS Grab** - Every child form requires that you collect spatial coordinates, i.e. an easting and a northing, which are transferred from the Bluetooth GPS unit to your RDA. This is often referred to as "taking a grab" and here's how to do it:
- When you need to record a point, whether a waypoint or a tortoise, turn the Bluetooth unit on (slide button on right hand side up) before collecting any other data so it has time to warm up. If you are recording a point after the Bluetooth has been off for over an hour, make sure it is on for at least a minute to warm up before attempting to take the grab.
 - Collect the requested data as described in your training manuals.
 - When you get to the GPS Location screen, tap Acquire. The RDA will now search for Bluetooth devices.



- A list of Bluetooth devices within range is displayed on the screen. If more than one device is present, your Bluetooth is distinguishable by its name (Pharos BT GPS II) and the key symbol next to it, which denotes a trusted device (refer to Standards 1, 2, and 3 of this objective for information on trusted devices). Make sure your device is selected, and then tap OK.



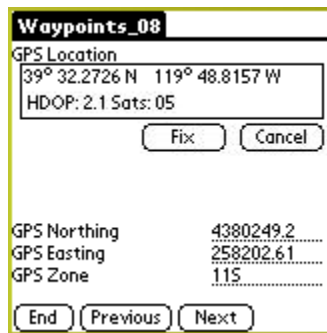
- The RDA will now attempt to connect to and receive a location from the Bluetooth GPS. Hold the Bluetooth unit so it is directly over the point you want to record (tortoise, carcass, or waypoint) and has as clear a view of the sky as possible. The GPS location recorded in your RDA will be the location of the Bluetooth GPS, NOT the location of the RDA in your hand. In other words, if your crew member has the Bluetooth GPS and is 20ft ahead of you and you are attempting to record the location of a tortoise at your feet, the location recorded will be where your crew member is, NOT the tortoise.
 - i. If the coordinates do not transfer to and display on the RDA within roughly 2 minutes, the connection will time out, meaning you need to either manually enter the Easting and Northing based on your navigational GPS unit or give it another go. Try getting the coordinates off the Bluetooth at least two times before resorting to the navigational GPS. There are many reasons for a grab to not work – too few satellites, poor satellite geometry, cloud cover, trees (which will not be a problem for us, unfortunately), etc. If your Bluetooth consistently does not transfer coordinates, though, notify your team leader or QAQC manager to see about a solution.



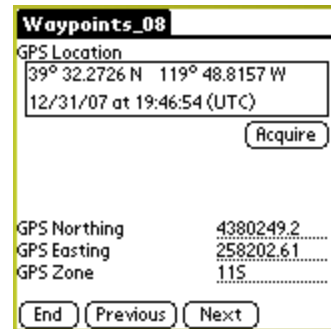
- ii. If the grab works and the coordinates transfer, you will see a screen, which refreshes itself frequently, displaying the coordinates of where the Bluetooth unit thinks it is, along with the HDOP and number of satellites. This screen is important and requires some scrutiny on your part because the HDOP and the number of satellites are indicators of how reliable the grab may be, both of which are not available after you tap Fix.
 - HDOP is confusing and all you need to know is that the higher the HDOP value, the worse the satellite geometry is and the less reliable the grab is likely to be. An HDOP of 2.1 (below screen) is good, while an HDOP of over 6 indicates a questionable grab that should be checked against the navigational GPS. Note that studies have shown the relationship between HDOP and signal quality is

not guaranteed, but with no other information it is a good educated estimate.

- The number of satellites is a little more straightforward; the more satellites there are, the better the grab is likely to be. A grab that is recorded with fewer than 5 satellites is not entirely reliable and should be compared with the reading on the navigational GPS.
- iii. If both HDOP and number of satellites are reasonable, or the easting and northing are within 20 meters of the easting and northing on the navigational GPS, tap Fix.



- iv. After tapping Fix, if you decide for any reason that you would like to retake the point, simply tap Acquire again and repeat the process. Otherwise, tap Next and continue collecting data. Only if the GPS grab fails do you need to manually enter the Easting and Northing when prompted by the RDA.



5. **Check the GPS grab** - During the monitoring season of 2007, occasionally the Bluetooth GPS units transferred an erroneous coordinate reading to the RDA. Based on the hypothesis that many of these faulty readings were due to the user fixing coordinates before the Bluetooth unit had sufficient time to establish contact with available satellites and zone in on its exact location. To address this possibility, the following guidelines were implemented in 2008 and almost eliminated these errors:

- If the Bluetooth GPS unit has been off for more than one hour, turn it on and let it warm up for a full minute before fixing your location.
- Every time you collect a point, turn the Bluetooth unit on for at least 15 seconds before fixing the location. The majority of your points will be waypoints with a 10 to 20 minute walk between them, which would waste precious battery life if the Bluetooth was left on, but is long enough for the unit to lose its location. A good way to ensure the Bluetooth has had enough time to warm up is to turn it on whenever you open a new form to record data, instead of waiting until you are at the GPS screen to turn it on.
- Error can also be introduced in the spatial data transferred to the RDA when too few satellites are available or when the geometry of available satellites is poor. To minimize this error, it is important to check that the easting and northing transferred to the RDA by the Bluetooth are similar to the easting and northing on your navigational GPS. If your Bluetooth's easting or northing is more than 20 meters off from your navigational GPS, try re-taking the point and if that does not work, hand enter the coordinates based on your navigational GPS reading. Compare the Bluetooth coordinates to the navigational GPS coordinates whenever:
 - Your Bluetooth has been off for more than an hour
 - Your HDOP is greater than six
 - There are fewer than five available satellites
 - There was a glitch or oddity in the grab process (the grab took an unusually long time)
- Note: Because your Navigational GPS is on continuously throughout the day, and because it is likely of higher manufacture quality than the Bluetooth GPS, we are making the assumption that when there is a conflict between the two units the Navigational GPS is correct. We are also making the assumption that you are carrying (e.g. maintaining good sky visibility) and caring for your Navigational GPS correctly.