

APPENDICES

APPENDIX I: COLLECTION DATABASE DICTIONARIES

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The following tables list subforms (database relational tables), field names, descriptions, logical domains (constraints), and data type for each of three databases used to collect electronic data for this project:

TRAINING LINE DATABASE

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | Contractor (logical) domain |
|-----------------------------|---------------------|---------------------|--|--|--|
| TRAIN_TRAN | | | | | |
| Train Tran | RecordID | Autogenerated | Field used by Pendragon | 0 | 0 |
| Train Tran | UnitID | Autogenerated | Field used by Pendragon | [0,10] | [0,10] |
| Train Tran | UserName | Autogenerated | Field used by Pendragon - Name of the RDA | {username} | {username} |
| Train Tran | TimeStamp | Autogenerated | Field used by Pendragon - time stamp when the record was created | Jan 01, 1904-Dec 31, 2031 | Between start and end dates of training |
| Train Tran | train_prime_key | Autogenerated | Primary Key - Combination of PDA user name and a time stamp for when the record was created | {username}- {date_time_key} | {username}- {date_time_key} |
| Train Tran | trial_number | Crew entry required | Number assigned to represent the pair of days in this styrotort trial. | [1,3] | [1,3] |
| Train Tran | team_num | Crew entry required | Number assigned to team | [01,99] | TBD |
| Train Tran | training_line_color | Crew entry required | The training course is built on 12 lines, each marked every 100m with painted pvc posts, and spaced 25 m apart, perpendicular to the center line. | {Red, Yellow, Magenta, White, Orange, Green} | {Red, Yellow, Magenta, White, Orange, Green} |
| Train Tran | start_post | Crew entry required | Starting posts are 10-ft pvc posts placed at the beginning of each kilometer. | {A,B,C,D,E,F,G,H,I,J, K,L} | {A,B,C,D,E,F,G, H,I,J,K,L} |
| Train Tran | tran_bearing | Crew entry required | Transect Bearing is the direction you are heading while moving forward on the transect. Because crews navigate a premeasured course, there are only 2 options, depending on direction. | {35, 215} | {35, 215} |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | Contractor (logical) domain |
|-----------------------------|------------------|---------------------|---|--|--|
| Train Tran | transect_seg_num | Autogenerated | Number of transect (1-km) segments, calculated from the starting post letter and transect bearing. If start_post is A and transect_bearing is 215 or start_post is B and transect_bearing is 35, then transect_seg_num is 1. If ...B and 215 or C and 35 then...2. If D and 215 or E and 35, then3. If E and 215 or F and 35, then 4. If G and 215 or H and 35, then 5. If H and 215 or I and 35, then 6. If J and 215 or K and 35, then 7. If K and 215 or L and 35, then 8. | [1,8] | [1,8] |
| Train Tran | transect | Autogenerated | Reports transect identifier using training_line_color and tran_seg_num | {Red_1, Red_2, Red_5, Red_6, Yellow_1, Yellow_2, Yellow_5, Yellow_6, Magenta_1, Magenta_2, Magenta_5, Magenta_6, White_3, White_4, White_7, White_8, Orange_3, Orange_4, Orange_7, Orange_8, Green_3, Green_4, Green_7, Green_8} | {Red_1, Red_2, Red_5, Red_6, Yellow_1, Yellow_2, Yellow_5, Yellow_6, Magenta_1, Magenta_2, Magenta_5, Magenta_6, White_3, White_4, White_7, White_8, Orange_3, Orange_4, Orange_7, Orange_8, Green_3, Green_4, Green_7, Green_8} |
| Train Tran | training_date | Crew entry required | Date transect is sampled | Jan 01, 1904-Dec 31, 2031 | Between start and end dates of training |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | Contractor (logical) domain |
|-----------------------------|---------------------|------------------------|--|---------------------------------------|---------------------------------------|
| Train Tran | training_start_time | Crew entry required | 24-hour time at beginning of segment | 12:00 AM-11:59 PM | 5:00 AM-6:00 PM |
| Train Tran | group | Crew entry required | Organization of team. Current values are KIVA or GBI (chosen from list) | {GBI, Kiva, IWS} | {GBI, Kiva, IWS} |
| Train Tran | lead | Crew entry required | Name of one observer | { -- all observer names -- } | { -- all observer names -- } |
| Train Tran | follow | Crew entry required | Name of other observer | { -- all observer names -- } | { -- all observer names -- } |
| Train Tran | training_end_time | Crew entry conditional | 24-hour time at end of segment | 12:00 AM-11:59 PM | 5:00 AM-6:00 PM |
| Train Tran | total_time | Autogenerated | Calculated field. Total time on the transect, in hours. Calculated as training_end_time minus training_start_time. | [0,10] | [0,10] |
| Train Tran | comments | Crew entry conditional | Additional notes or questions. | 2000 characters of unconstrained text | 2000 characters of unconstrained text |
| Train Tran | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1 } | { 0, 1 } |
| TRAIN_OBS | | | | | |
| Train Obs | RecordId | Autogenerated | Field used by Pendragon | 0 | RecordId |
| Train Obs | UnitID | Autogenerated | Field used by Pendragon | [0,10] | UnitID |
| Train Obs | UserName | Autogenerated | Field used by Pendragon - Name of the RDA | {username} | UserName |
| Train Tran | TimeStamp | Autogenerated | Field used by Pendragon - time stamp when the record was created | Jan 01, 1904-Dec 31, 2031 | TimeStamp |
| Train Obs | train_prime_key | Autogenerated | same as on transect record form | {username}- {date_time_key} | train_prime_key |
| Train Obs | train_obs_key | Autogenerated | additional primary key, combination of PDA user name and time stamp for when the record was created | {username}- {date_time_key} | train_obs_key |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | Contractor (logical) domain |
|-----------------------------|---------------------|-------------------------------|--|------------------------------|-----------------------------|
| Train_Obs | trial_number | Calculated during QAQC import | imported from transect form | [1,3] | trial_number |
| Train_Obs | team_number | Calculated during QAQC import | imported from transect form | [01,99] | team_number |
| Train_Obs | training_line_color | Calculated during QAQC import | The training course is built on 12 lines, each marked every 100m with painted pvc posts, and spaced 25 m apart, perpendicular to the center line. | same as Train_Tran_09 form | training_line_color |
| Train_Obs | transect | Calculated during QAQC import | imported from transect form | same as Train_Tran_09 form | transect |
| Train_Obs | training_date | Calculated during QAQC import | imported from transect form | Jan 01, 1904-Dec 31, 2031 | training_date |
| Train_Obs | transect_bearing | Calculated during QAQC import | imported from transect form | {35, 215} | transect_bearing |
| Train_Obs | observation_time | Crew entry required | 24-hour time of observation | 12:00 AM-11:59 PM | observation_time |
| Train_Obs | observer_name | Crew entry required | Name of observer who located the tortoise model | { -- all observer names -- } | observer_name |
| Train_Obs | observer_position | Crew entry required | Lead or Follow. Transect search position of the observer who located the model. | {Lead, Follow} | observer_position |
| Train_Obs | tortoise_size | Crew entry required | Adult or Immature. Indicates size of tortoise model (adult = 290 mm; immature = 180 mm) | {Adult, Immature} | tortoise_size |
| Train_Obs | local_bearing | Crew entry required | Actual bearing of the transect reach being walked when observation was made. This is identified by the 25-m line on the ground between the lead and following observers. | [0,360] | local_bearing |
| Train_Obs | azimuth | Crew entry required | Bearing (to nearest degree) from transect line to tortoise model | [0,360] | azimuth |
| Train_Obs | radial_distance_m | Crew entry required | Distance (to nearest 0.1 m) from transect line to tortoise model. | [0,100] | radial_distance_m |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | Contractor (logical) domain |
|--------------------------------|----------------------|--|--|---------------------------------------|--------------------------------|
| Train_Obs | bearing_radians | Autogenerated | Calculated field. Hidden | free numeric | bearing_radians |
| Train_Obs | azimuth_radians | Autogenerated | Calculated field. Hidden. | free numeric | azimuth_radians |
| Train_Obs | perp_distance_m | Autogenerated/Crew check required | Calculated field | free numeric | perp_distance_m |
| Train_Obs | original_observation | Crew entry required | location at which the model was first observed, either "from line" or "while at another model" | {from line, while at another model} | original_observation |
| Train_Obs | tortoise_id | Crew entry required | Unique number painted on each tortoise model | [0,288] | tortoise_id |
| Train_Obs | comments | Crew entry conditional | Additional notes or questions. | 2000 characters of unconstrained text | comments |
| Train_Obs | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1 } | exported |
| TRAIN_TEAMS | | QAQC database only – not on RDA | | | |
| Train_Teams | group | Crew entry required | Organization of team. Current values are KIVA or GBI (chosen from list) | | TBD |
| Train_Teams | trial_number | Crew entry required | Number assigned to represent the pair of days in this styrotort trial. | | [1,3] |
| Train_Teams | team_number | Crew entry required | number assigned to team | | TBD |
| Train_Teams | observer1 | Crew entry required | name of observer 1 on specified team | | {first name} {last name} |

TRANSECT COLLECTION DATABASE

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|------------|----------|-------------|---------------------------------|--------------------------|
|--------------------------------|------------|----------|-------------|---------------------------------|--------------------------|

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|-----------------|-----------------------------------|---|--|--|
| TRANSECTS | | | | | |
| Transects | RecordID | Autogenerated | Unique ID number assigned during QA/QC. This ID number is used to link violations with their corresponding record." | 0 | 0 |
| Transects | UnitID | Autogenerated | Field used by Pendragon | Free numeric | [0,10] |
| Transects | UserName | Autogenerated | Identifies the RDA | {username} | {username} |
| Transects | TimeStamp | Autogenerated | Date when the record was generated | Jan 01, 1904-Dec 31, 2031 | Between start and end dates of season |
| Transects | tran_prime_key | Autogenerated | Primary Key for the Transects table - Combination of "UserName" and "TimeStamp". Unique identifier for transect used to link transects with their selected start points, waypoints, and observations. | {username}- {date_time_key} | {username}{date_time_key} |
| Transects | tran_num | Crew entry required | 4-digit number assigned to transect by MDEP | [1, 6700] | Valid transect number (always less than 6701) |
| Transects | stratum | Crew entry required | Two- to four character code for monitoring strata | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} |
| Transects | team_num | Crew entry required | Unique number assigned to each team of observers | [1,99] | [1,20] (for Kiva), [21,40] (for IWS), [41, 70] (for GBI) |
| Transects | date_ | Autogenerated/Crew check required | Date that transect was walked | Jan 01, 1904-Dec 31, 2031 | First TRAINING date through final sample date: 1 Mar 2010 through 2 Jun 2010 |
| Transects | group_ | Crew entry required | agency collecting the data | {GBI, IWS, Kiva} | {GBI, IWS, Kiva} |
| Transects | do_time | Calculated during QAQC import | time the crew was dropped in field | 12:00 AM-11:59 PM | 4:00 AM-10:00 AM |
| Transects | tran_start_time | Calculated during QAQC import | time the transect was begun | 12:00 AM-11:59 PM | 5:00 AM-10:00 AM |
| Transects | tran_end_time | Calculated during QAQC import | time the transect was ended | 12:00 AM-11:59 PM | 8:00 AM-6:30 PM |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|-------------------|----------------------------------|--|--|--|
| Transects | ret_do_time | Calculated during QAQC import | time the crew was back in field vehicle | 12:00 AM-11:59 PM | 8:00 AM-6:30 PM |
| Transects | observer1 | Crew entry required | Name of observer 1 on specified team. This will not change all season. | { -- all observer names -- } | {first name} {last name} |
| Transects | observer2 | Crew entry required | Name of observer 2 on specified team. This will not change all season. | { -- all observer names -- } | {first name} {last name} |
| Transects | tran_reflected | Crew entry conditional | If the transect was reflected at an angle | {Yes, No} | {Yes, No} |
| Transects | dist_a | Crew entry conditional | Distance walked | Free Numeric | |
| | tran_bearing | Crew entry conditional | Intended transect bearing other value (only if a non-right-angle turn was preplanned) | [0-360] | [0-360] |
| Transects | intersect_bearing | Crew entry conditional | Intersection bearing | [0-360] | [0-360] |
| Transects | dist_l | Crew entry conditional | Transect side length | {1500, 3000} | {1500, 3000} |
| Transects | intersect_angle | Autogenerated | Intersection angle | [0-360] | [0-360] |
| Transects | bearing_radians | Calculated during QAQC import | Transect bearing in radians | Free Numeric | Free Numeric |
| Transects | dist_c | Autogenerated | | Free Numeric | [0-3000] |
| Transects | bearing_A | Autogenerated | New bearing to walk at A | | |
| Transects | dist_la | Autogenerated | | Free Numeric | [0-3000] |
| Transects | dist_lb | Autogenerated | | Free Numeric | [0-3000] |
| Transects | dist_b | Autogenerated | | Free Numeric | [0-3000] |
| Transects | tran_standard | Crew entry conditional | Was the completed transect "standard" with 12km length and 6 waypoints on each of 4 sides? | {Yes, No} | {Yes, No} |
| Transects | terr_obstacles | Crew entry conditional | Terrain obstacles - only identified if they resulted in a non-standard transect | {Mountainous, Cliff, Deep Washes, Prohibited Access} | {Mountainous, Cliff, Deep Washes, Prohibited Access} |
| Transects | subs_obstacles | Crew entry conditional | Substrate obstacles - only identified if these resulted in a non-standard transect | {Rock, Gravel, Tallus, Sand} | {Rock, Gravel, Tallus, Sand} |
| Transects | other_obstacles | Crew entry conditional | Obstacles not well-described by the limited entries for above 2 fields, | 2000 characters of unconstrained text | 2000 characters of unconstrained text |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|----------------|-----------------------------------|--|--|--|
| | | | including explanation of "prohibited access" | | |
| Transects | comments | Crew entry conditional | comments about the transect | 2000 characters of unconstrained text | 2000 characters of unconstrained text |
| Transects | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1 } | { 0, 1 } |
| WAYPOINTS | | | | | |
| Waypoints | RecordID | Autogenerated | Field used by Pendragon | 0 | 0 |
| Waypoints | UnitID | Autogenerated | Field used by Pendragon | Free numeric | [0,10] |
| Waypoints | UserName | Autogenerated | Field used by Pendragon - Name of the RDA | {username} | {username} |
| Waypoints | TimeStamp | Autogenerated | Field used by Pendragon - time stamp when the record was created | Jan 01, 1904-Dec 31, 2031 | Jan 01, 1904-Dec 31, 2031 |
| Waypoints | tran_prime_key | Autogenerated | same as on transect record form | {username}- {date_time_key} | {username}{date_time_key} |
| Waypoints | tran_num | Calculated during QAQC import | 5-digit number assigned to transect by MDEP | [1, 6700] | Valid transect number (always less than 6701) |
| Waypoints | stratum | Calculated during QAQC import | Two- to four-character code for monitoring strata | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} |
| Waypoints | group_ | Calculated during QAQC import | agency collecting the data | {GBI, IWS, Kiva} | {GBI, IWS, Kiva} |
| Waypoints | team_num | Calculated during QAQC import | number assigned to team | [1,99] | [1,20] (for Kiva), [21,40] (for IWS), [41, 70] (for GBI) |
| Waypoints | wp_key | Autogenerated | Additional Primary Key - Combination of PDA user name and a time stamp for when the record was created | {username}- {date_time_key} | {username}{date_time_key} |
| Waypoints | wp_num | Crew entry required | waypoint number of transect | {{0-40}, 99, 100} | {{0-40}, 99, 100} |
| Waypoints | time_ | Autogenerated/Crew check required | current time | 12:00 AM-11:59 PM | 5:00 AM-6:30 PM |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|-----------------|----------------------------------|--|---------------------------------|---|
| Waypoints | observer1 | Copied from Transects_10 | Observer1 entered in Transects_10 form | { -- all observer names -- } | {first name} {last name} |
| Waypoints | observer2 | Copied from Transects_10 | Observer2 entered in Transects_10 form | { -- all observer names -- } | {first name} {last name} |
| Waypoints | lead | Crew entry conditional | the person who will lead the way from this waypoint to the next one | {Observer1, Observer2} | {Observer1, Observer2} |
| Waypoints | follow | Autogenerated | the person who will follow from this waypoint to the next one | {Observer1, Observer2} | {Observer1, Observer2} |
| Waypoints | gps_bluetooth | Autogenerated | string downloaded from GPS unit for coordinates and time | Free Text | 57 characters long |
| Waypoints | gps_easting | Autogenerated | Easting coordinate of waypoint in UTM WGS84 Zone 11, calculated from gps grab taken in latitude/longitude. | Free Text | 6 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| Waypoints | gps_northing | Autogenerated | Northing coordinate of waypoint in UTM WGS84 Zone 11, calculated from gps grab taken in latitude/longitude. | Free Text | 7 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| Waypoints | gps_zone | Autogenerated | UTM Zone of waypoint, calculated from gps grab | Free Text | {11, 12} |
| Waypoints | gps_latitude | Calculated during QAQC import | Latitude of location, calculated from gps grab | Free Text | [32.95.37.32] |
| Waypoints | gps_longitude | Calculated during QAQC import | Longitude of location, calculated from gps grab | Free Text | [113.29,117.91] |
| Waypoints | gps_grab_valid | Crew entry required | whether GPS grab was successful | {Yes, No} | {Yes, No} |
| Waypoints | manual_easting | Crew entry conditional | Easting coordinate of waypoint, entered by hand. Field only visible if grab fails | [100000 - 999999] | 6 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| Waypoints | manual_northing | Crew entry conditional | Northing of waypoint, entered by hand. Field only visible if gps grab fails. | [1000000 - 9999999] | 7 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|------------------|----------------------------------|--|---|---|
| Waypoints | manual_zone | Crew entry conditional | UTM Zone for waypoint, entered by hand. Field only visible if gps grab fails | {11,12} | {11,12} |
| Waypoints | comments | Crew entry conditional | comments about waypoint | 2000 characters of unconstrained text | 2000 characters of unconstrained text |
| Waypoints | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1 } | { 0, 1 } |
| OPPLIVEOBS | | | | | |
| OppLiveObs | RecordID | Autogenerated | Field used by Pendragon | 0 | 0 |
| OppLiveObs | UnitID | Autogenerated | Field used by Pendragon | Free Numeric | [0,10] |
| OppLiveObs | UserName | Autogenerated | Field used by Pendragon - Name of the RDA | {username} | {username} |
| OppLiveObs | TimeStamp | Autogenerated | Field used by Pendragon - time stamp when the record was created | Jan 01, 1904-Dec 31, 2031 | Jan 01, 1904-Dec 31, 2031 |
| OppLiveObs | tran_prime_key | Autogenerated | same as on transect record form | {username}- {date_time_key} | {username}{date_time_ke y} |
| OppLiveObs | tran_num | Calculated during QAQC import | 5-digit number assigned to transect by MDEP | [1, 6700] | Valid transect number (always less than 6701) |
| OppLiveObs | stratum | Calculated during QAQC import | Two- to four character code for monitoring strata | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} |
| OppLiveObs | group_ | Calculated during QAQC import | agency collecting the data | {GBI, IWS, Kiva} | {GBI, IWS, Kiva} |
| OppLiveObs | team_num | Calculated during QAQC import | number assigned to team | [1,99] | [1,20] (for Kiva), [21,40] (for IWS), [41, 70] (for GBI) |
| OppLiveObs | opp_live_obs_key | Autogenerated | additional primary key, combination of PDA user name and time stamp for when the record was created | {username}- {date_time_key} | {username}{date_time_ke y} |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|---------------------------|------------------------|---|--|--|
| OppLiveObs | opp_live_number | Crew entry required | Opportunist Live Observation Count (Starting at 1, manually entered by the observers) | [1,15] | [1,15] |
| OppLiveObs | tort_location | Crew entry required | Where the tortoise is when detected | {Burrow, Pallet, Open, Vegetation, Rock} | {Burrow, Pallet, Open, Vegetation, Rock} |
| OppLiveObs | burrow_visibility | Crew entry conditional | If "burrow" to "tortoise_location", rate the visibility/detectability of the burrow. | {High, Medium, Low} | {High, Medium, Low} |
| OppLiveObs | tort_in_burrow_visibility | Crew entry conditional | If Yes to in_burrow, rate the visibility/detectability of the tortoise given that the burrow is detected. | {High, Medium, Low} | {High, Medium, Low} |
| OppLiveObs | tort_visibility | Crew entry conditional | If other than "burrow" to "tortoise_location", rate the visibility/detectability of the tortoise. | {High, Medium, Low} | {High, Medium, Low} |
| OppLiveObs | temp_c | Crew entry required | | [0, 50] | [0, 50] |
| OppLiveObs | temp_greater_35C | Crew entry required | | {Yes, No} | {Yes, No} |
| OppLiveObs | mcl_greater_180 | Crew entry required | whether carapace of tortoise is greater than 180mm | {Yes, No, Unknown} | {Yes, No, Unknown} |
| OppLiveObs | mcl_mm | Crew entry conditional | measurement of carapace | [0,400] | [0,400] |
| OppLiveObs | mass_g | Crew entry conditional | mass of tortoise | [0,7000] | [0,7000] |
| OppLiveObs | sex | Crew entry conditional | sex of tortoise | {male, female, unknown} | {male, female, unknown} |
| OppLiveObs | tort_voided | Crew entry required | tortoises voids its bladder or defecates | {Yes, No} | {Yes, No} |
| OppLiveObs | existing_tag | Crew entry required | existing tag status on tortoise | {Yes, No, Unreadable, Unknown} | {Yes, No, Unreadable, Unknown} |
| OppLiveObs | existing_tag_number | Crew entry conditional | tag number if existing tag exists | 10 characters of unconstrained text | 10 characters of unconstrained text |
| OppLiveObs | existing_tag_color | Crew entry conditional | Color of existing tortoise tag | {Blue, White, Green, Other} | {Blue, White, Green, Other} |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|--------------------------|----------------------------------|---|--|---|
| OppLiveObs | existing_tag_color_other | Crew entry conditional | Color name if other is selected from color field | Free Text | Free Text |
| OppLiveObs | new_tag_attached | Crew entry conditional | New Tag attached | {Yes, No} | {Yes, No} |
| OppLiveObs | new_tag_number | Crew entry conditional | Tag number if new tag attached | 10 characters of unconstrained text | 10 characters of unconstrained text |
| OppLiveObs | gps_bluetooth | Autogenerated | string downloaded from GPS unit for coordinates and time | Free Text | 57 characters long |
| OppLiveObs | gps_easting | Autogenerated | Easting coordinate of waypoint, calculated from gps grab. | Free Text | 6 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| OppLiveObs | gps_northing | Autogenerated | Northing of waypoint, calculated from gps grab. | Free Text | 7 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| OppLiveObs | gps_zone | Autogenerated | UTM Zone of waypoint, calculated from gps grab | Free Text | {11, 12} |
| OppLiveObs | gps_latitude | Calculated during QAQC import | Latitude of location, calculated from gps grab | Free Text | [32.95,37.32] |
| OppLiveObs | gps_longitude | Calculated during QAQC import | Longitude of location, calculated from gps grab | Free Text | [113.29,117.91] |
| OppLiveObs | gps_grab_valid | Crew entry required | whether GPS grab was successful | {Yes, No} | {Yes, No} |
| OppLiveObs | manual_easting | Crew entry conditional | Easting coordinate of waypoint, entered by hand. Field only visible if grab fails | [100000 - 999999] | 6 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| OppLiveObs | manual_northing | Crew entry conditional | Northing of waypoint, entered by hand. Field only visible if gps grab fails. | [1000000 - 9999999] | 7 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|----------------|----------------------------------|--|---|---|
| OppLiveObs | manual_zone | Crew entry conditional | UTM Zone for waypoint, entered by hand. Field only visible if gps grab fails | {11,12} | {11,12} |
| OppLiveObs | comments | Crew entry conditional | comments about observation | 2000 characters of unconstrained text | 2000 characters of unconstrained text |
| OppLiveObs | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1 } | { 0, 1 } |
| OPPCARCOBS | | | | | |
| OppCarcObs | RecordID | Autogenerated | Field used by Pendragon | 0 | 0 |
| OppCarcObs | UnitID | Autogenerated | Field used by Pendragon | Free Numeric | {0,10} |
| OppCarcObs | UserName | Autogenerated | Field used by Pendragon - Name of the RDA | {username} | {username} |
| OppCarcObs | TimeStamp | Autogenerated | Field used by Pendragon - time stamp when the record was created | Jan 01, 1904-Dec 31, 2031 | Jan 01, 1904-Dec 31, 2031 |
| OppCarcObs | tran_prime_key | Autogenerated | same as on transect record form | {username}- {date_time_key} | {username}{date_time_ke y} |
| OppCarcObs | tran_num | Calculated during QAQC import | 5-digit number assigned to transect by MDEP | [1, 6700] | Valid transect number (always less than 6701) |
| OppCarcObs | stratum | Calculated during QAQC import | Two- to four character code for monitoring strata | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} |
| OppCarcObs | group_ | Calculated during QAQC import | agency collecting the data | {GBI, IWS, Kiva} | {GBI, IWS, Kiva} |
| OppCarcObs | team_num | Calculated during QAQC import | number assigned to team | [1,99] | [1,20] (for Kiva), [21,40] (for IWS), [41, 70] (for GBI) |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|--------------------------|------------------------|---|-------------------------------------|--|
| OppCarcObs | opp_carc_obs_key | Autogenerated | additional primary key. combination of PDA user name and time stamp for when the record was created | {username}- {date_time_key} | {username}{date_time_key} |
| OppCarcObs | opp_carc_number | Crew entry required | Opportunist Carcass Observation Count (Starting at 1, manually entered by the observers) | {1,20} | {1,20} |
| OppCarcObs | carc_condition | Crew entry required | State of the carcass when encountered | {Intact, Disarticulated} | {Intact, Disarticulated} |
| OppCarcObs | mcl_greater_180 | Crew entry required | whether carapace of tortoise is greater than 180mm | {Yes, No, Unknown} | {Yes, No, Unknown} |
| OppCarcObs | mcl_mm | Crew entry conditional | measurement of carapace | {0,400} | {0,400} |
| OppCarcObs | sex | Crew entry conditional | sex of tortoise | {Male, Female, Unknown} | {Male, Female, Unknown} |
| OppCarcObs | existing_tag | Crew entry required | existing tag status on carcass | {Yes, No, Unreadable} | {Yes, No, Unreadable} |
| OppCarcObs | existing_tag_number | Crew entry conditional | Number from existing tag | 10 characters of unconstrained text | 10 characters of unconstrained text |
| OppCarcObs | existing_tag_color | Crew entry conditional | Color of existing tortoise tag | {Blue, White, Green, Other} | {Blue, White, Green, Other} |
| OppCarcObs | existing_tag_color_other | Crew entry conditional | Color name if other is selected from color field | Free Text | Free Text |
| OppCarcObs | gps_bluetooth | Autogenerated | string downloaded from GPS unit for coordinates and time | Free Text | 57 characters long |
| OppCarcObs | gps_easting | Autogenerated | Easting coordinate of waypoint, calculated from gps grab. | Free Text | 6 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| OppCarcObs | gps_northing | Autogenerated | Northing of waypoint, calculated from gps grab. | Free Text | 7 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|-----------------|-------------------------------|--|---------------------------------------|--|
| OppCarcObs | gps_zone | Autogenerated | UTM Zone of waypoint, calculated from gps grab | Free Text | {11, 12} |
| OppCarcObs | gps_latitude | Calculated during QAQC import | Latitude of location, calculated from gps grab | Free Text | [32.95.37.32] |
| OppCarcObs | gps_longitude | Calculated during QAQC import | Longitude of location, calculated from gps grab | Free Text | [113.29.117.91] |
| OppCarcObs | gps_grab_valid | Crew entry required | whether GPS grab was successful | {Yes, No} | {Yes, No} |
| OppCarcObs | manual_easting | Crew entry conditional | Easting coordinate of waypoint, entered by hand. Field only visible if grab fails | [100000 - 999999] | 6 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| OppCarcObs | manual_northing | Crew entry conditional | Northing of waypoint, entered by hand. Field only visible if gps grab fails. | [1000000 - 9999999] | 7 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| OppCarcObs | manual_zone | Crew entry conditional | UTM Zone for waypoint, entered by hand. Field only visible if gps grab fails | {11,12} | {11,12} |
| OppCarcObs | comments | Crew entry conditional | comments about observation | 2000 characters of unconstrained text | 2000 characters of unconstrained text |
| OppCarcObs | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1 } | { 0, 1 } |
| TRANLIVEOBS | | | | | |
| TranLiveObs | RecordID | Autogenerated | Field used by Pendragon | 0 | 0 |
| TranLiveObs | UnitID | Autogenerated | Field used by Pendragon | Free Numeric | [0,10] |
| TranLiveObs | UserName | Autogenerated | Field used by Pendragon - Name of the RDA | {username} | {username} |
| TranLiveObs | TimeStamp | Autogenerated | Field used by Pendragon - time stamp when the record was created | Jan 01, 1904-Dec 31, 2031 | Jan 01, 1904-Dec 31, 2031 |
| TranLiveObs | tran_prime_key | Autogenerated | same as on transect record form | {username}- {date_time_key} | {username}{date_time_key} |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|--------------------|-------------------------------|--|--|--|
| TranLiveObs | tran_num | Calculated during QAQC import | 5-digit number assigned to transect by MDEP | [1, 6700] | Valid transect number (always less than 6701) |
| TranLiveObs | stratum | Calculated during QAQC import | Two- to four character code for monitoring strata | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} |
| TranLiveObs | group_ | Calculated during QAQC import | agency collecting the data | {GBI, IWS, Kiva} | {GBI, IWS, Kiva} |
| TranLiveObs | team_num | Calculated during QAQC import | number assigned to team | [1,99] | [1,20] (for Kiva), [21,40] (for IWS), [41, 70] (for GBI) |
| TranLiveObs | tran_live_obs_key | Autogenerated | additional primary key, combination of PDA user name and time stamp for when the record was created | {username}- {date_time_key} | {username}{date_time_key} |
| TranLiveObs | tran_live_number | Crew entry required | Unique number reflecting the order in which this observation was seen on the transect. Counts start at 1. An autogenerated field would only record the number of cumulative records entered electronically. Instead, this field is entered manually so that discrepancies between paper- and electronic-records can be identified. | [1,15] | [1,15] |
| TranLiveObs | observer | Crew entry conditional | which of the two observers saw the tortoise | {Observer1, Observer2} | {Observer1, Observer2} |
| TranLiveObs | observer_position | Crew entry required | was the observer the leader or the follower when the tortoise was observed | {Lead, Follow} | {Lead, Follow} |
| TranLiveObs | last_waypoint | Crew entry required | Waypoint number of the last waypoint recorded before observation. | {[0-40], 99, 100} | {[0-40], 99, 100} |
| TranLiveObs | time_ | Crew entry required | current time | 12:00 AM-11:59 PM | 5:00 AM-6:00 PM |
| TranLiveObs | tran_bearing | Crew entry required | the bearing they intended to walk, 0, 90, 180, or 269 | {0, 90, 180, 270, Other} | {0, 90, 180, 270, Other} |
| TranLiveObs | tran_bearing_other | Crew entry conditional | Intended transect bearing other value (only if a non-right-angle turn was preplanned) | [0-360] | [0-360] |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|---------------------------|-----------------------------------|---|--|--|
| TranLiveObs | local_bearing | Crew entry required | The bearing actually being walked at the time of the observation. Measured along the line between observers at the time observation was made. | [0-360] | [0-360] |
| TranLiveObs | azimuth | Crew entry required | The angle of the tortoise observation from the actual transect line (as described by the local bearing). | [0-360] | [0-360] |
| TranLiveObs | radial_distance_m | Crew entry required | Straight-line distance from the point of observation to the tortoise. Measured to one decimal place. | [0-100] | [0-60] |
| TranLiveObs | bearing_radians | Autogenerated | Local Bearing in radians. Hidden. Used to calculate Perp_Distance_m | Free Numeric | [0-6.3] |
| TranLiveObs | azimuth_radians | Autogenerated | Azimuth in radians. Hidden. Used to calculate Perp_Distance_m | Free Numeric | [0-6.3] |
| TranLiveObs | perp_distance_m | Autogenerated/Crew check required | The calculated perpendicular distance of the tortoise from the transect line | Free Numeric | [0-50] |
| TranLiveObs | tort_location | Crew entry required | Where the tortoise is when detected | {Burrow, Pallet, Open, Vegetation, Rock} | {Burrow, Pallet, Open, Vegetation, Rock} |
| TranLiveObs | burrow_visibility | Crew entry conditional | If "burrow" to "tortoise_location", rate the visibility/detectability of the burrow. | {High, Medium, Low} | {High, Medium, Low} |
| TranLiveObs | tort_in_burrow_visibility | Crew entry conditional | If Yes to in_burrow, rate the visibility/detectability of the tortoise given that the burrow is detected. | {High, Medium, Low} | {High, Medium, Low} |
| TranLiveObs | tort_visibility | Crew entry conditional | If other than "burrow" to "tortoise_location", rate the visibility/detectability of the tortoise. | {High, Medium, Low} | {High, Medium, Low} |
| TranLiveObs | temp_c | Crew entry required | | [0, 50] | [0, 50] |
| TranLiveObs | temp_greater_35C | Crew entry required | | {Yes, No} | {Yes, No} |
| TranLiveObs | mcl_greater_180 | Crew entry required | Whether the midline of the carapace is greater than 180mm. This field identifies tortoises that will be included in density estimation | {Yes, No, Unknown} | {Yes, No, Unknown} |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|--------------------------|----------------------------------|--|--|---|
| TranLiveObs | mcl_mm | Crew entry conditional | Midline measurement of carapace in mm | [0,400] | [0,400] |
| TranLiveObs | mass_g | Crew entry conditional | Mass of tortoise | [0.7000] | [0.7000] |
| TranLiveObs | sex | Crew entry conditional | Sex of tortoise | {Male, Female, Unknown} | {Male, Female, Unknown} |
| TranLiveObs | tort_voided | Crew entry required | Tortoise releases its bladder or deficates | {Yes, No} | {Yes, No} |
| TranLiveObs | existing_tag | Crew entry required | existing tag status on tortoise | {Yes, No, Unreadable, Unknown} | {Yes, No, Unreadable, Unknown} |
| TranLiveObs | existing_tag_number | Crew entry conditional | tag number if existing tag exists | 10 characters of unconstrained text | 10 characters of unconstrained text |
| TranLiveObs | existing_tag_color | Crew entry conditional | Color of existing tortoise tag | {Blue, White, Green, Other} | {Blue, White, Green, Other} |
| TranLiveObs | existing_tag_color_other | Crew entry conditional | Color name if other is selected from color field | Free Text | Free Text |
| TranLiveObs | new_tag_attached | Crew entry conditional | Was a new tag attached? | {Yes, No} | {Yes, No} |
| TranLiveObs | new_tag_number | Crew entry conditional | Tag number if new tag attached | 10 characters of unconstrained text | 10 characters of unconstrained text |
| TranLiveObs | gps_bluetooth | Autogenerated | string downloaded from GPS unit for coordinates and time | Free Text | 57 characters long |
| TranLiveObs | gps_easting | Autogenerated | Easting coordinate of waypoint, calculated from gps grab. | Free Text | 6 digits long (must fall inside monitoring strata boundaries. whether UTM Zone 11 or 12) |
| TranLiveObs | gps_northing | Autogenerated | Northing of waypoint. calculated from gps grab. | Free Text | 7 digits long (must fall inside monitoring strata boundaries. whether UTM Zone 11 or 12) |
| TranLiveObs | gps_zone | Autogenerated | UTM Zone of waypoint. calculated from gps grab | Free Text | {11, 12} |
| TranLiveObs | gps_latitude | Calculated during QAQC import | Latitude of location, calculated from gps grab | Free Text | [32.95.37.32] |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|-----------------|----------------------------------|--|---|---|
| TranLiveObs | gps_longitude | Calculated during QAQC import | Longitude of location. calculated from gps grab | Free Text | [113.29,117.91] |
| TranLiveObs | gps_grab_valid | Crew entry required | whether GPS grab was successful | {Yes, No} | {Yes, No} |
| TranLiveObs | manual_easting | Crew entry conditional | Easting coordinate of waypoint. entered by hand. Field only visible if grab fails | [100000 - 999999] | 6 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| TranLiveObs | manual_northing | Crew entry conditional | Northing of waypoint, entered by hand. Field only visible if gps grab fails. | [1000000 - 9999999] | 7 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| TranLiveObs | manual_zone | Crew entry conditional | UTM Zone for waypoint, entered by hand. Field only visible if gps grab fails | {11,12} | {11,12} |
| TranLiveObs | comments | Crew entry conditional | comments about observation | 2000 characters of unconstrained text | 2000 characters of unconstrained text |
| TranLiveObs | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1 } | { 0, 1 } |
| TRANCARCOBS | | | | | |
| TranCarcObs | RecordID | Autogenerated | Field used by Pendragon | 0 | 0 |
| TranCarcObs | UnitID | Autogenerated | Field used by Pendragon | Free Numeric | [0,10] |
| TranCarcObs | UserName | Autogenerated | Field used by Pendragon - Name of the RDA | {username} | {username} |
| TranCarcObs | TimeStamp | Autogenerated | Field used by Pendragon - time stamp when the record was created | Jan 01, 1904-Dec 31, 2031 | Jan 01, 1904-Dec 31, 2031 |
| TranCarcObs | tran_prime_key | Autogenerated | same as on transect record form | {username}- {date_time_key} | {username}{date_time_ke y} |
| TranCarcObs | tran_num | Calculated during QAQC import | 5-digit number assigned to transect by MDEP | [1, 6700] | Valid transect number (always less than 6701) |
| TranCarcObs | stratum | Calculated during QAQC import | Two- to four character code for monitoring strata | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} | {AG, BD, CK, CM, CS, FE, FK, GB, IV, JT, LSTS, MM, OR, PI, PT, SC} |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|--------------------|-------------------------------|---|---------------------------------|--|
| TranCarcObs | group_ | Calculated during QAQC import | agency collecting the data | {GBI, IWS, Kiva} | {GBI, IWS, Kiva} |
| TranCarcObs | team_num | Calculated during QAQC import | number assigned to team | [1,99] | [1,20] (for Kiva), [21,40] (for IWS), [41, 70] (for GBI) |
| TranCarcObs | tran_carc_obs_key | Autogenerated | additional primary key, combination of PDA user name and time stamp for when the record was created | {username}- {date_time_key} | {username}{date_time_key} |
| | tran_carc_number | Crew entry required | Transect Carcass Observation Count (Starting at 1, manually entered by the observers) | [1,40] | [1,40] |
| TranCarcObs | observer | Crew entry-conditional | which of the two observers saw the tortoise | {Observer1, Observer2} | {Observer1, Observer2} |
| TranCarcObs | observer_position | Crew entry required | was the observer the leader or the follower when the tortoise was observed | {Lead, Follow} | {Lead, Follow} |
| TranCarcObs | last_waypoint | Crew entry required | last waypoint recorded in transect | {[0-40], 99, 100} | {[0-40], 99, 100} |
| TranCarcObs | time_ | Crew entry required | current time | 12:00 AM-11:59 PM | 5:00 AM-6:00 PM |
| TranCarcObs | tran_bearing | Crew entry required | the bearing they intended to walk, 0, 90, 180, or 269 | {0, 90, 180, 270, Other} | {0, 90, 180, 270, Other} |
| TranCarcObs | tran_bearing_other | Crew entry conditional | transect bearing other value | [0-360] | [0-360] |
| TranCarcObs | local_bearing | Crew entry required | the bearing actually being walked at the time of the observation | [0-360] | [0-360] |
| TranCarcObs | azimuth | Crew entry required | Azimuth to the tortoise | [0-360] | [0-360] |
| TranCarcObs | radial_distance_m | Crew entry required | distance to tortoise | [0-60] | [0-60] |
| TranCarcObs | bearing_radians | Autogenerated | Local Bearing in radians. Hidden, Used to calculate Perp_Distance_m | Free Numeric | [0-6.3] |
| TranCarcObs | azimuth_radians | Autogenerated | Azimuth in radians. Hidden, Used to calculate Perp_Distance_m | Free Numeric | 0-6.3 |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|--------------------------|--------------------------------------|--|--|---|
| TranCarcObs | perp_distance_m | Autogenerated/Crew check required | Perpendicular distance calculated to the tortoise | Free Numeric | [0-50] |
| TranCarcObs | carc_condition | Crew entry required | State of the carcass when encountered | {Intact, Disarticulated} | {Intact, Disarticulated} |
| TranCarcObs | mcl_greater_180 | Crew entry required | measurement of carapace | {Yes, No, Unknown} | {Yes, No, Unknown} |
| TranCarcObs | mcl_mm | Crew entry conditional | measurement of carapace | [0,400] | [0,400] |
| TranCarcObs | sex | Crew entry conditional | sex of tortoise | {Male, Female, unknown} | {Male, Female, unknown} |
| TranCarcObs | existing_tag | Crew entry required | existing tag status on carcass | {Yes, No, Unreadable} | {Yes, No, Unreadable} |
| TranCarcObs | existing_tag_number | Crew entry conditional | Number from existing tag | 10 characters of unconstrained text | 10 characters of unconstrained text |
| TranCarcObs | existing_tag_color | Crew entry conditional | Color of existing tortoise tag | {Blue, White, Green, Other} | {Blue, White, Green, Other} |
| TranCarcObs | existing_tag_color_other | Crew entry conditional | Color name if other is selected from color field | Free Text | Free Text |
| TranCarcObs | gps_bluetooth | Autogenerated | string downloaded from GPS unit for coordinates and time | Free Text | 57 characters long |
| TranCarcObs | gps_easting | Autogenerated | Easting coordinate of waypoint, calculated from gps grab. | Free Text | 6 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| TranCarcObs | gps_northing | Autogenerated | Northing of waypoint, calculated from gps grab. | Free Text | 7 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| TranCarcObs | gps_zone | Autogenerated | UTM Zone of waypoint, calculated from gps grab | Free Text | {11, 12} |
| TranCarcObs | gps_latitude | Calculated during QAQC import | Latitude of location, calculated from gps grab | Free Text | [32.95,37.32] |
| TranCarcObs | gps_longitude | Calculated during QAQC import | Longitude of location, calculated from gps grab | Free Text | [113.29,117.91] |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|-----------------|------------------------|--|---------------------------------------|--|
| TranCarcObs | gps_grab_valid | Crew entry required | whether GPS grab was successful | {Yes, No} | {Yes, No} |
| TranCarcObs | manual_easting | Crew entry conditional | Easting coordinate of waypoint, entered by hand. Field only visible if grab fails | [100000 - 999999] | 6 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| TranCarcObs | manual_northing | Crew entry conditional | Northing of waypoint, entered by hand. Field only visible if gps grab fails. | [1000000 - 9999999] | 7 digits long (must fall inside monitoring strata boundaries, whether UTM Zone 11 or 12) |
| TranCarcObs | manual_zone | Crew entry conditional | UTM Zone for waypoint, entered by hand. Field only visible if gps grab fails | {11,12} | {11,12} |
| TranCarcObs | comments | Crew entry conditional | comments about waypoint | 2000 characters of unconstrained text | 2000 characters of unconstrained text |
| TranCarcObs | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1 } | { 0, 1 } |

G₀ COLLECTION DATABASE

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|--------------|---------------|---|---------------------------------|-----------------------|
| G0 START | | | | | |
| G0_Start | RecordID | Autogenerated | Field used by Pendragon | 0 | RecordID |
| G0_Start | UnitID | Autogenerated | Field used by Pendragon | Free Numeric | UnitID |
| G0_Start | UserName | Autogenerated | Field used by Pendragon - Name of the RDA | {username} | UserName |
| G0_Start | TimeStamp | Autogenerated | Field used by Pendragon - time stamp when the record was created | Jan 01, 1904-Dec 31, 2031 | TimeStamp |
| G0_Start | G0_prime_key | Autogenerated | Primary Key - Combination of PDA user name and a time stamp for when the record was created | {username}-{date_time_key} | G0_prime_key |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|--------------|--|--|--|-----------------------|
| G0_Start | date_ | Autogenerated/ Crew check required | Date on which tortoises were located | Jan 01, 1904-Dec 31, 2031 | date_ |
| G0_Start | G0_site | Crew entry required | Name of GSub0 (telemetry) site | {Chemehuevi, Chuckwalla, Coyote Springs, Halfway, Ivanpah, Joshua Tree, Piute Mid. Ord Rodman, Superior Cronese} | G0_site |
| G0_Start | group_ | Crew entry required | agency collecting the data | {GBI, IWS, Kiva} | group_ |
| G0_Start | start_time | Calculated during QAQC import | Time the observer(s) first observed transmitterd tortoises on this date | 12:00 AM-11:59 PM | start_time |
| G0_Start | end_time | Calculated during QAQC import | Time the observer(s) last observed transmitterd tortoises on this date | 12:00 AM-11:59 PM | end_time |
| G0_Start | observer | Crew entry required | Name of observer | { -- all observer names -- } | observer |
| G0_Start | comments | Crew entry conditional | Notes from the observer about the g0 site and/or conditions | 2000 characters of unconstrained text | comments |
| G0_Start | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1 } | exported |
| G0 OBS | | | | | |
| G0_Obs | RecordID | Autogenerated | Field used by Pendragon | 0 | RecordID |
| G0_Obs | UnitID | Autogenerated | Field used by Pendragon | Free Numeric | UnitID |
| G0_Obs | UserName | Autogenerated | Field used by Pendragon - Name of the RDA | {username} | UserName |
| G0_Obs | TimeStamp | Autogenerated | Field used by Pendragon - time stamp when the record was created | Jan 01, 1904-Dec 31, 2031 | TimeStamp |
| G0_Obs | G0_prime_key | Autogenerated | same as on Gsub0 Start form | {username}-{date_time_key} | G0_prime_key |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|---------------------------|-------------------------------|--|--|---------------------------|
| G0_Obs | date_ | Calculated during QAQC import | Date on which tortoises were located | Jan 01, 1904-Dec 31, 2031 | date_ |
| G0_Obs | G0_site | Calculated during QAQC import | same as on Gsub0 Start form | {Chemehuevi, Chuckwalla, Coyote Springs, Halfway, Ivanpah, Joshua Tree, Piute Mid, Ord Rodman, Superior Cronese} | G0_site |
| G0_Obs | group_ | Calculated during QAQC import | agency collecting the data | {GBI, IWS, Kiva} | group_ |
| G0_Obs | G0_obs_key | Autogenerated | Primary Key - Combination of PDA user name and a time stamp for when the record was created | {username}-{date_time_key} | G0_obs_key |
| G0_Obs | tort_num | Crew entry required | Number on the observed tortoise | 8 characters of unconstrained text | tort_num |
| G0_Obs | time_ | Crew entry required | time of observation | 12:00 AM-11:59 PM | time_ |
| G0_Obs | burned | | If this is a burned location - Coyote Springs and Halfway Wash sites only | {Not Applicable, Yes, No} | burned |
| G0_Obs | visible | Crew entry required | Whether or not the tortoise is visible | {Yes,No} | visible |
| G0_Obs | tort_location | Crew entry required | Where the tortoise is when detected | {Burrow, Pallet, Open, Vegetation, Rock} | tort_location |
| G0_Obs | burrow_visibility | Crew entry conditional | If "burrow" to "tortoise_location", rate the visibility/detectability of the burrow. | {High, Medium, Low} | burrow_visibility |
| G0_Obs | tort_in_burrow_visibility | Crew entry conditional | If "burrow" to "tortoise_location", rate the visibility/detectability of the tortoise given that the burrow is detected. | {High, Medium, Low, NotVisible} | tort_in_burrow_visibility |
| G0_Obs | tort_visibility | Crew entry conditional | If other than "burrow" to "tortoise_location", rate the visibility/detectability of the tortoise. | {High, Medium, Low, NotVisible} | tort_visibility |
| G0_Obs | behavior | Crew entry required | tortoise's behavior | {Unknown, at Rest-active, Moving, Basking, Eating} | behavior |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|-----------------|-------------------------------|--|---------------------------------------|-----------------------|
| | | | | Mating, Agonistic, Digging} | |
| G0_Obs | gps_bluetooth | Autogenerated | string downloaded from GPS unit for coordinates and time | Free Text | gps_bluetooth |
| G0_Obs | gps_easting | Autogenerated | Easting coordinate of waypoint, calculated from gps grab. | Free Text | gps_easting |
| G0_Obs | gps_northing | Autogenerated | Northing of waypoint, calculated from gps grab. | Free Text | gps_northing |
| G0_Obs | gps_zone | Autogenerated | UTM Zone of waypoint, calculated from gps grab | Free Text | gps_zone |
| G0_Obs | gps_latitude | Calculated during QAQC import | Latitude of location, calculated from gps grab | Free Text | gps_latitude |
| G0_Obs | gps_longitude | Calculated during QAQC import | Longitude of location, calculated from gps grab | Free Text | gps_longitude |
| G0_Obs | gps_grab_valid | Crew entry required | whether GPS grab was successful | {Yes, No} | gps_grab_valid |
| G0_Obs | manual_easting | Crew entry conditional | Easting coordinate of waypoint, entered by hand. Field only visible if grab fails | [100000 - 999999] | manual_easting |
| G0_Obs | manual_northing | Crew entry conditional | Northing of waypoint, entered by hand. Field only visible if gps grab fails. | [1000000 - 9999999] | manual_northing |
| G0_Obs | manual_zone | Crew entry conditional | UTM Zone for waypoint, entered by hand. Field only visible if gps grab fails | {11,12} | manual_zone |
| G0_Obs | comments | Crew entry conditional | Comments about this observation | 2000 characters of unconstrained text | comments |
| G0_Obs | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1 } | exported |
| G0_OPPLIVEOBS | | | | | |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|---------------------|-------------------------------|---|--|-----------------------|
| G0_OppLiveObs | RecordID | Autogenerated | Field used by Pendragon | 0 | RecordID |
| G0_OppLiveObs | UnitID | Autogenerated | Field used by Pendragon | Free Numeric | UnitID |
| G0_OppLiveObs | UserName | Autogenerated | Field used by Pendragon - Name of the RDA | {username} | UserName |
| G0_OppLiveObs | TimeStamp | Autogenerated | Field used by Pendragon - time stamp when the record was created | Jan 01, 1904-Dec 31, 2031 | TimeStamp |
| G0_OppLiveObs | G0_prime_key | Autogenerated | same as on GSub0_Start record form | {username}-{date_time_key} | G0_prime_key |
| G0_OppLiveObs | date_ | Calculated during QAQC import | Date on which tortoises were located | Jan 01, 1904-Dec 31, 2031 | date_ |
| G0_OppLiveObs | G0_site | Calculated during QAQC import | same as on Gsub0 Start form | {Chemehuevi, Chuckwalla, Coyote Springs, Halfway, Ivanpah, Joshua Tree, Piute Mid, Ord Rodman, Superior Cronese} | G0_site |
| G0_OppLiveObs | group_ | Calculated during QAQC import | agency collecting the data | {GBI, IWS, Kiva} | group_ |
| G0_OppLiveObs | G0_opp_live_obs_key | Autogenerated | additional primary key, combination of PDA user name and time stamp for when the record was created | {username}-{date_time_key} | G0_opp_live_obs_key |
| G0_OppLiveObs | G0_opp_live_number | Crew entry required | Opportunist Live Observation Count (Starting at 1, manually entered by the observers) | [1,15] | G0_opp_live_number |
| G0_OppLiveObs | tort_location | Crew entry conditional | position of tortoise | {Burrow, Pallet, Open, Vegetation, Rock} | tort_location |
| G0_OppLiveObs | temp_c | Crew entry conditional | | {0, 50} | temp_c |
| G0_OppLiveObs | temp_greater_35C | Crew entry conditional | | {Yes, No} | temp_greater_35C |
| G0_OppLiveObs | mcl_greater_180 | Crew entry conditional | whether carapace of tortoise is greater than 180mm | {Yes, No, Unknown} | mcl_greater_180 |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|--------------------------|-------------------------------------|--|--|--------------------------|
| G0_OppLiveObs | mcl_mm | Crew entry conditional | measurement of carapace | [0,400] | mcl_mm |
| G0_OppLiveObs | mass_g | Crew entry conditional | mass of tortoise | [0,7000] | mass_g |
| G0_OppLiveObs | sex | Crew entry conditional | sex of tortoise | {Male, Female, Unknown} | sex |
| G0_OppLiveObs | tort_voided | Crew entry conditional | tortoises releases its bladder or deficates | {Yes, No} | tort_voided |
| G0_OppLiveObs | existing_tag | Crew entry required | existing tag status on tortoise | {Yes, No, Unreadable, Unknown} | existing_tag |
| G0_OppLiveObs | existing_tag_number | Crew entry conditional | tag number if existing tag exists | 10 characters of unconstrained text | existing_tag_number |
| G0_OppLiveObs | existing_tag_color | Crew entry conditional | Color of existing tortoise tag | {Blue, White, Green, Other} | existing_tag_color |
| G0_OppLiveObs | existing_tag_color_other | Crew entry conditional | Color name if other is selected from color field for existing tag | Free Text | existing_tag_color_other |
| G0_OppLiveObs | new_tag_attached | Crew entry conditional | Was a new tag attached? | {Yes, No} | new_tag_attached |
| G0_OppLiveObs | new_tag_number | Crew entry conditional | Tag number if new tag attached | 10 characters of unconstrained text | new_tag_number |
| G0_OppLiveObs | gps_bluetooth | Autogenerated | string downloaded from GPS unit for coordinates and time | Free Text | gps_bluetooth |
| G0_OppLiveObs | gps_easting | Autogenerated | Easting coordinate of waypoint, calculated from gps grab. | Free Text | gps_easting |
| G0_OppLiveObs | gps_northing | Autogenerated | Northing of waypoint, calculated from gps grab. | Free Text | gps_northing |
| G0_OppLiveObs | gps_zone | Autogenerated | UTM Zone of waypoint, calculated from gps grab | Free Text | gps_zone |
| G0_OppLiveObs | gps_latitude | Calculated during QAQC import | Latitude of location, calculated from gps grab | Free Text | gps_latitude |

| Subform (RDA)/ Table (QAQC) | Field name | Creation | Description | Collection (physical) domain | QAQC (logical) domain |
|--------------------------------|-----------------|-------------------------------|--|---------------------------------------|-----------------------|
| G0_OppLiveObs | gps_longitude | Calculated during QAQC import | Longitude of location, calculated from gps grab | Free Text | gps_longitude |
| G0_OppLiveObs | gps_grab_valid | Crew entry required | whether GPS grab was successful | {Yes, No} | gps_grab_valid |
| G0_OppLiveObs | manual_easting | Crew entry conditional | Easting coordinate of waypoint, entered by hand. Field only visible if grab fails | [100000 - 999999] | manual_easting |
| G0_OppLiveObs | manual_northing | Crew entry conditional | Northing of waypoint, entered by hand. Field only visible if gps grab fails. | [1000000 - 9999999] | manual_northing |
| G0_OppLiveObs | manual_zone | Crew entry conditional | UTM Zone for waypoint, entered by hand. Field only visible if gps grab fails | {11,12} | manual_zone |
| G0_OppLiveObs | comments | Crew entry conditional | comments about observation | 2000 characters of unconstrained text | comments |
| G0_OppLiveObs | exported | Autogenerated | Identifies fields that have been exported to the QA/QC database from the Pendragon database. This is the only field edited in the Pendragon database | { 0, 1} | exported |

Fields describing tortoise visibility and detectability

In addition to the usual field at G₀ sites stating whether the tortoise is visible or not, both G₀ and transect crews will be asked to fill in the following fields to help describe *how* visible the tortoise is. This is an attempt to better link the observations of transmittered tortoise behavior with the detectability of tortoises on transects. Below, each of the new fields is bolded, a brief clarification is given, and then the approach is described that crews will use to evaluate visibility (high, medium, low). In some cases, the description is followed by an operational definition in capital letters. This is the definition to use when entering data.

Field: tortoise_visible

This field is only relevant only at G₀ sites, where not-visible tortoises can be detected due to their transmitter. This field is not applicable on transects.

Values and their definition:

Yes

No

Not visible means that no part of the tortoise is visible, even when using a mirror or flashlight to search the burrow. For tortoises not in a burrow, "No" means that you could not see the tortoise even when you moved around the surrounding vegetation.

Field: tortoise_location

Values and their definition:

Burrows include both dirt constructed holes and caliche caves. A tortoise in a burrow is at the mouth of the burrow, deep inside, or anywhere in between.

Pallets are unconstructed shelters less than 2 tortoise body lengths.

Vegetation - tortoise is under the drip line, or in the shade of vegetation.

Rock - tortoise is under or in the shade of a rock.

Pallet - tortoise is in a similar configuration to the mouth of a burrow, but the burrow is undeveloped such that it is shorter than two tortoise lengths.

Open - tortoise is in the open and not under vegetation or rock.

Field: burrow_visibility

Consider the burrow as the center of a circle. Visibility will be estimated by the degrees of approach through which the burrow opening would be openly visible. Note that we don't need a "not visible" category here; if the burrow is not visible, we only know that the transmitter signal is coming from an undetectable tortoise, but not whether it is in a burrow.

*Values and their definition:***High.**

When it is the tortoise burrow itself (opening, mound, or apron) that catches your eye, that's a highly visible burrow. High visibility includes a burrow out in the open and facing you, or very obvious under sparse vegetation. OPERATIONALLY, THE BURROW (OPENING, MOUND, OR APRON) WOULD BE VISIBLE FROM MORE THAN 270 DEGREES OF APPROACH

Medium

When you see something that looks like a tortoise burrow, and with minimal investigation you discover that it is a tortoise burrow, that's a medium visible burrow. Medium visibility includes a burrow visible under vegetation, but where vegetation obscures tell-tale shapes of the mouth, mound, or apron. THE BURROW IS BLOCKED FROM VIEW THROUGH 90 TO 270 DEGREES OF VIEW.

Low

When you see something that looks like there could be a tortoise burrow there, but extensive investigation is required to confirm, that's a low visibility burrow. Low visibility includes burrows obscured completely or nearly completely by vegetation; burrows that you discover on a hunch. THE BURROW IS BLOCKED FROM VIEW THROUGH 270 TO 360 DEGREES OF VIEW.

Field: tort_in_burrow_visibility*Values and their definition:***High**

High visibility tortoises include those at the mouth of the burrow, and easily seen without bending over and no need for use of a mirror or flashlight.

Medium

Medium visibility tortoises include those that require bending over or getting down on your knees and the use of a mirror or flashlight.

Low

Low visibility tortoises include those so deep within a burrow that you are required to lay flat on the ground, searching the depths of the burrow with a mirror or flashlight. Your confirmation of the tortoise may include only an arm or leg, or small portion of the shell.

Field: Tortoise_visibility

This field is only used for tortoises not associated with a burrow or caliche cave. Consider the tortoise as the center of a circle. Visibility will be estimated by the degrees of approach through which the tortoise would be openly visible.

Values and their definition:

High

When it's the tortoise that catches your eye, that's a highly visible tortoise. Typically, high visibility includes tortoises out in the open, but they could be under vegetation or rocks but not obscured by them, or they could be in a pallet. THE TORTOISE WOULD BE VISIBLE FROM MORE THAN 270 DEGREES OF APPROACH

Medium

When you see something that might be a tortoise, and after minimal investigation you discover that it is a tortoise, that's a medium visible tortoise. Medium visibility includes tortoises slightly obscured by vegetation, including in the open but behind vegetation because of your angle of approach, in a pallet, or under rocks (not burrows or caves). THE TORTOISE IS BLOCKED THROUGH 90 TO 270 DEGREES OF VIEW.

Low

When you see something that looks like there should be a tortoise there, but you don't see the tortoise until extensive investigation, that's a low visibility tortoise. Low visibility includes tortoises completely obscured by vegetation or rocks, including obscured in a pallet. THE TORTOISE IS BLOCKED FROM VIEW THROUGH 270 TO 360 DEGREES OF VIEW.

APPENDIX II: ANNOTATED PAPER DATA SHEETS

| Desert Tortoise Distance Sampling Training Transect Form | | | | | |
|---|--|-----------------------|------------------------|---------------------|----------------------|
| Trial Number | | Transect Bearing | 35 | 215 | Group: Kiva GBI IWS |
| Team Number | | Transect Segment Num: | | | |
| Training line color | Red Yellow Magenta White Orange Green | Training Date | 2010 | | |
| Starting Post | A B C D E F G H I J K L | Train Start Time: | | | |
| | | Training End Time: | | | |
| | | Comments: | | | |
| Observation Time: | | Original observation | from line | Azimuth: | Tortoise Size: Adult |
| Observer Name: | | | while at another model | Radial Dist: | Immature |
| Observer Position: | Lead Follow | Local Bearing: | | Perpendicular Dist: | Tortoise ID: |
| | | | | | |
| Comments: | | | | | |
| Comments (include Tortoise ID): | | | | | |
| <small>If more than 10 observations occur on a segment, use a new data sheet and include page 2 of 2 at the bottom. Copy heading information and record the time on all sheets.</small> | | | | | Page of |
| Data Recorded By: | | | | Data Proofed By: | |

Trial number

It usually takes 2 days to complete a trial (walk 16 transects).
The first 2 days walked on training lines is "Trial 1". Likewise, the second pair of days is "Trial 2".

Date

To avoid data entry errors, dates are reported as DD MMM YYYY, with months indicated by 3-letter abbreviations.
For instance, "20 Mar 2010"

Start Post

Each starting post identifies a new "transect" and a new form must be started on paper and in the RDA

Transect Segment Num

This is calculated in the RDA. If the number is incorrect, recheck your LineColor, StartingPost, and TransectBearing

Observation time

Write the time in the same format (12- or 24-hour) that it appears on the RDA.

Original observation

If this particular model was first seen using the distance search technique from the centerline, circle "from line".
If the model was seen while working at the previous model, circle "while at another model".

Radial Distance

Enter only to one decimal place (tenths of a meter).

Perpendicular Distance

The former is entered; the latter is calculated automatically. Consider the resulting "perpendicular distance from the line". Does it match your eyeball estimate? If not, recheck your bearing, azimuth, and radial distance entries.
Partial calculations may appear in the box when only a portion of the necessary data has been entered.
Touch the box for Perpendicular Distance to recalculate before writing the value on your paper sheet.
The RDA will not round the Perpendicular distance calculation at all. On the paper sheet you must enter only to one decimal place.
Rules for rounding to one decimal place: if there is a 0, 1, 2, 3, or 4 in the second decimal place, do not change the first decimal place. If there is a 5, 6, 7, 8, or 9 in the second decimal place, round the first decimal place up.

Data proofed by

This field should record the name of the first reviewer who was not involved in collecting the data.
On monitoring transects, data are proofed by the member of a different team, the crew leader, or QAQC specialist.
On training lines, proofing is done by the QAQC specialist.

| Desert Tortoise Distance Sampling G ₀ Start and Obs Form | | | | | | |
|---|------------|----------------------------|--------------------|-----------|--------------|------------------|
| Date: | 2010 | | Group: | GBI | IWS | Kiva/Joshua Tree |
| Site: | | | Observer: | | | |
| Tortoise Num: | | Tortoise location: | Burrow Pallet Open | Behavior: | | GPS Location |
| Time: | | | Vegetation Rock | Unknown | AtRestActive | Easting: |
| Burned?: | Not Applic | Burrow Visibility: | High Med Low | Moving | Basking | Northing: |
| | Yes No | Tort in Burrow Visibility: | High Med Low Not | Eating | Mating | |
| Tort Visible?: | Yes No | Tortoise visibility: | High Med Low | Agonistic | Digging | |
| Comments: | | | | | | |

Time

The first observation of each day at a site determines the "start time" for telemetry observations that day. This time should not be later than the transect start time designated for that day, so telemetry observers must be careful to start early enough to locate their first tortoise by the designated start time.

Burned?

This entry is not applicable except in Coyote Springs and Halfway. At these sites, it is important to identify on each occasion whether the tortoise was encountered in a burned or unburned area.

Tort visible?

Is the tortoise visible at all? Other fields on the form are directed at describing how visible the tortoise is.

Tortoise location:

Burrows include both dirt constructed holes and caliche caves. A tortoise in a burrow is at the mouth of the burrow, deep inside, or anywhere in between.

Vegetation - tortoise is under the drip line, or in the shade of vegetation.

Rock - tortoise is under or in the shade of a rock.

Pallet - tortoise is in a similar configuration to the mouth of a burrow, but the shelter is unconstructed and is undeveloped such that it is shorter than two tortoise lengths.

Open - tortoise is in the open and not under vegetation or rock.

Burrow visibility:

Consider the burrow as the center of a circle. Visibility will be estimated by the degrees of approach through which the burrow would be openly visible.

Medium

The expectation is that most burrows detected on a transect will be "medium" visibility. The approach will be to expect "medium" and then for a given tortoise to decide if use of the other categories is warranted in case this is an unusual situation for a burrow. Medium-visibility burrows are blocked through more than 25% but less than 75% of the angles of approach.

Medium visibility includes a burrow visible under vegetation, but where vegetation obscures tell-tale shapes of the mouth, mound, or apron.

High

Distinguishing characteristics of a burrow (opening, mound, or apron) would be visible from more than 75% of the angles of approach. High visibility includes a burrow out in the open and facing you, or very obvious under sparse vegetation.

Low

The burrow is blocked from view through more than 75% of the angles of approach. This might be the case if you investigate because it looks like there should be a burrow there, but it isn't immediately visible. Low visibility includes burrows obscured completely or nearly completely by vegetation.

Tortoise-in-burrow-visibility

High

High visibility tortoises include those at the mouth of the burrow, and easily seen without bending over and no need for use of a mirror or flashlight.

Medium

Medium visibility tortoises include those that require bending over or getting down on your knees and the use of a mirror or flashlight.

Low

Low visibility tortoises include those so deep within a burrow that you are required to lay flat on the ground, searching the depths of the burrow with a mirror or flashlight. Your confirmation of the tortoise may include only an arm or leg, or small portion of the shell.

Tortoise visibility

This field is only used for tortoises not associated with a burrow or caliche cave. Consider the tortoise as the center of a circle. Visibility will be estimated by the degrees of approach through which the tortoise would be openly visible.

Medium

The expectation is that most tortoises detected on a transect will be "medium" visibility. The approach will be to expect "medium" and then for a given tortoise to decide if use of the other categories is warranted. Is it an unusual situation for a transect tortoise? Medium-visibility tortoises are blocked through more than 25% but less than 75% of the angles of approach. Medium visibility includes tortoises slightly obscured by vegetation, including in the open but behind vegetation because of your angle of approach, in a pallet, or under rocks (not burrows or caves).

High

The tortoise would be visible from more than 75% of the angles of approach. Typically, high visibility includes tortoises out in the open, but they could be under vegetation or rocks but not obscured by them, or they could be in a pallet.

Low

The tortoise is blocked from view through more than 75% of the angles of approach. This might be the case if you investigate because it looks like there should be a tortoise there, but it isn't immediately visible. Low visibility includes tortoises completely obscured by vegetation or rocks, including obscured in a pallet.

Behavior

Unknown

The tortoise is not visible, and the behavior cannot be discerned.

AtRestActive

The tortoise is visible, appears to be awake, but does not appear to be doing anything.

Moving

This typically involves the tortoise walking, with the plastron off the ground. However, if you hear what you believe to be the tortoise moving in the back of a burrow, record behavior as moving. Because observers frequently startle the animal, when possible observe behavior before approaching.

Basking

Shell on ground, legs sprawled out to maximum skin exposure posterior or broadside to sun orientation.

Eating

The tortoise appears to be biting vegetation or other possible food items.

Mating

The tortoise is engaged in mating activity with another tortoise (courtship behavior or copulation).

Agonistic

The tortoise is fighting with another tortoise.

Digging

The tortoise is modifying a burrow or pallet by digging, or possibly nesting. This can be with all four feet. Sometimes you can discern digging when the tortoise is not visible, (i.e. dirt flying out of the back of a burrow).

If the tortoise is not visible behavior can only be unknown, digging, or moving. Probably 99% of the time it will be unknown.

| Desert Tortoise Distance Sampling Focal Form (Opportunistic GO Tortoises) | | | | | | | | | | | | | |
|---|--------------------------------------|----|--|------------------|---|---|-----|-------------------|------------------|---|-----|------------|--------------|
| Date: | 2010 | | | Site: | | | | Observer: | | | | | |
| Opp Live # | | | | MCL ≥ 180? | Y | N | Unk | Existing Tag: | Y | N | U/R | Unk | GPS Location |
| Tortoise location: | Burrow Palet Open Vegetation Rock | | | MCL (mm): | | | | ET Number: | | | | Eastings: | |
| | | | | Mass (g): | | | | ET Color: | Blue White Green | | | Northings: | |
| Temperature: | °C | | | Sex: | M | F | Unk | Other Color: | | | | | |
| Temp > 35? | Yes | No | | Tortoise Voided? | Y | N | | New Tag Attached? | Y | N | | | |
| | | | | | | | | New Tag Number: | FW | | | | |
| Comments: | | | | | | | | | | | | | |

Opp Live #

This count starts at "1" for each observer on each new day.

Tortoise location

See GO observation annotations.

Burrow visibility

See GO observation annotations.

Tortoise in Burrow Visibility

See GO observation annotations.

Tortoise Visibility

See GO observation annotations.

MCL ≥ 180?

MCL (mm)

For all visible tortoises, the first field will have an entry. The second field will only have an entry if the tortoise was handled - this field should not be estimated.

Sex

If there is any uncertainty about the sex of the tortoise, record "unknown."

Desert Tortoise Distance Sampling **Transect Form (Waypoints 1)**

| | | | | | |
|------------------|----------------------------|-------------|--|-----------|---|
| Transect Number: | <input type="text"/> | Date: | <input type="text" value="2010"/> | Group: | <input type="text"/> |
| Stratum: | <input type="text"/> | Observer 1: | <input type="text"/> | | |
| Team Number: | <input type="text"/> | Observer 2: | <input type="text"/> | | |
| Waypoint 0 | Time: <input type="text"/> | Easting: | <input type="text"/> | UTM Zone: | <input type="text" value="11"/> <input type="text" value="12"/> |
| | | Northing: | <input type="text"/> | | |
| Comments: _____ | | | | | |
| Waypoint 1 | Time: <input type="text"/> | Lead: | <input type="text" value="Observer 1"/> <input type="text" value="Observer 2"/> | Easting: | <input type="text"/> |
| | | | | Northing: | <input type="text"/> |
| Comments: _____ | | | | | |

(many other waypoints here...)

| | | | | | |
|-------------------|----------------------------|-----------|--|-----------|---|
| Waypoint 24 | Time: <input type="text"/> | Lead: | <input type="text" value="Observer 1"/> <input type="text" value="Observer 2"/> | Easting: | <input type="text"/> |
| | | | | Northing: | <input type="text"/> |
| Comments: _____ | | | | | |
| Waypoint 99 | Time: <input type="text"/> | Easting: | <input type="text"/> | UTM Zone: | <input type="text" value="11"/> <input type="text" value="12"/> |
| | | Northing: | <input type="text"/> | | |
| Comments: _____ | | | | | |
| Waypoint 100 | Time: <input type="text"/> | Easting: | <input type="text"/> | UTM Zone: | <input type="text" value="11"/> <input type="text" value="12"/> |
| | | Northing: | <input type="text"/> | | |
| Comments: _____ | | | | | |
| Data Recorded By: | <input type="text"/> | | | | Page 3 of |
| Data Proofed By: | <input type="text"/> | | | | |

Desert Tortoise Distance Sampling Transect Form (Waypoints 4)

Trans Num: Stratum: Team Num: Date: 2010

Transect Summary

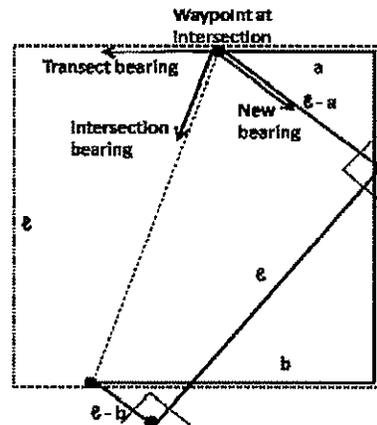
Transect reflected at unplanned angle? Y N

Entered fields:

Transect bearing °
 Partial side length (a) m
 Intersection bearing °
 Planned side length (l)
 3000m
 1500m

Calculated fields:

New bearing °
 1st dist to walk m
 3rd dist to walk m
 4th dist to walk m



Transect Standard? Y N

Terrain Obstacles: Mountainous Cliff Deep Washes Prohibited Access Major Road Boundary

Substrate Obstacles: Rock Gravel Tallus Sand

Other Obstacles?: _____

Other relevant information (military reservation, wilderness area, etc.): _____

Directions to transect (include UTM coordinates and/or names of nearest major roads, description of notable intersections, steep/challenging road conditions): _____

Tran num

The transect number a whole number assigned before arriving at the transect. There is one exception: if an obstacle must be navigated so that there is a break in the transect, each continuous segment must have a unique identifying number. After each segment is ended (with a "Waypoint 99" - see below), the next transect increments up by a tenth from the one before. If the original transect was "42" subsequent segments, in order, would be "42.1", "42.2", etc.

Stratum

This should be written long-hand on the Waypoints1 transect form. On the continuation pages, the appropriate abbreviation can be used.

Date

The RDA reads 3/31/2010. The paper entry should be written 31 Mar 2010.

Waypoint 0

The location where the crew left their vehicle. These data are taken when leaving for Waypoint 1, not when you arrive at the site (not the night before, for instance!)

Waypoint 1

The start point on the transect. If you arrive at this point early, time should not be recorded until you are about to leave for Waypoint 2.

Waypoints 2 through 24

Subsequent waypoints on the transect.

Waypoints 25 through 40

These will only be used on non-standard transects, if additional turns or interruptions are made in the transect.

Waypoint 99

The final location on the transect. On a standard transect, this would correspond to the return to the original start point, and in sequence would have been "Waypoint 25." For transects that are interrupted and resumed after navigating an obstacle, this is the only waypoint number that is repeated. At each interruption, the waypoint is "99."

Waypoint 100

Where the crew returns to their vehicle. May differ from Waypoint 0. For interrupted transects, Waypoint 0 and 100 data are only entered on the base segment. After completing Waypoint 99 for the final segment of an interrupted transect, close out that segment, return to your vehicle, then open the base transect to record Waypoint 100.

Easting**Northing**

On the paper sheet, these fields are recorded from the navigational (handheld) GPS unit.

In the RDA, if the BT GPS grab fails or is more than 20 meters from the navigational coordinates, use the manual easting and northing fields to record the navigational coordinates.

In this case, always record both the easting and the northing.

UTM Zone

Only entered by hand in the RDA if a manual GPS grab was required

Data recorded by**Data proofed by**

The recorder participated in collecting the data. The proofer must be someone other than one of the data collectors.

Candidates are other field personnel, crew leaders, or the QAQC specialist.

Transect reflected at an unplanned angle?

Do not enter "yes" if your transect was pre-planned to reflect around a boundaries. This field should only say "yes" if you are asking the calculator to generate an angle to reorient your crew, and to calculate distances for the new legs of the transect.

This is only useful if the boundary will exclude 2 corners, and it does not intersect along a cardinal axis. The RDA refers to lengths using the labels (a, b, l-b, etc) in this figure on the paper sheet.

The calculated side lengths are not to be used to the nearest meter. Please round to the nearest 50 or 100m.

Transect standard?

A transect is only "standard" if it was 12km long, with 4-3km sides at right angles to one another. Any other shapes or lengths, or the use of interruptions is non-standard, whether planned or unplanned. If non-standard, the terrain, substrate, or other obstacles should be identified as a follow-up.

Terrain obstacles

Only complete this field if you identified a non-standard transect. What obstacles to forward progress caused you to shorten or otherwise alter your transect path? Please note obstacles that you had to accommodate, not hills and mountains that you were able to traverse, for instance.

Substrate obstacles

Only complete this field if you identified a non-standard transect. Only substrates that affected ability to complete the transect should be noted here. Loose or rough substrate, particularly combined with sloping terrain, can impede progress, and cannot be reliably identified using remote sensing technology; it is difficult to identify transects that will be impacted by difficult substrate. This field is where "human sensing technology" can let us know about these otherwise-invisible obstacles.

Other obstacles

Only complete this field if you identified a non-standard transect. This field should be used to identify human-built obstacles. "Prohibited access" is a category under terrain obstacles, however.

Directions to transect

This information is only on the paper sheet, not on the RDA.

Drawing of transect

Draw this free-hand. This is not on the RDA! If it is helpful, sketch on the calculated side lengths from "Transect reflected at an unplanned angle?".

| Desert Tortoise Distance Sampling Transect Form (TranLiveObs) | | | | | | | | | |
|---|--|--------------------------------|--|--------------------|--|----------------------|--|------------------|--|
| Tran Num: | | Stratum: | | Team Num: | | Date: | | 2010 | |
| Tran Live #: | | Tortoise location: | | Burrow Pallet Open | | Sex of Tort: | | M F Unk | |
| Observer: | | Burrow Visibility: | | Vegetation Rock | | Tortoise Voided? | | Yes No | |
| Observer Position: | | Tortoise in Burrow Visibility: | | H M L | | Existing Tag: | | Y N U/R Unk | |
| Last Waypoint: | | Tortoise visibility: | | H M L | | Existing Tag Number: | | | |
| Observation Time: | | | | | | Existing Tag Color: | | Blue White Green | |
| Transect Bearing: | | Temperature: | | °C | | Other Tag Color: | | | |
| Local Bearing: | | Temp > 35?: | | Yes No | | New Tag Attached? | | Yes No | |
| Azimuth: | | MCL ≥ 180: | | Yes No Unk | | New Tag Number: | | | |
| Radial Distance: | | MCL (mm): | | | | GPS Location | | | |
| Perpendicular Dist: | | Mass (g): | | | | Easting: | | | |
| Comments: | | | | | | Northing: | | | |
| | | | | | | UTM Zone: | | 11 12 | |

Observer Position

It is extremely important to record whether the tortoise was first seen by the person in the "lead" or "follow" position.

Radial Distance

Enter only to one decimal place (tenths of a meter).

Perpendicular Distance

The former is entered; the latter is calculated automatically. Consider the resulting "perpendicular distance from the line". Does it match your eyeball estimate? If not, recheck your bearing, azimuth, and radial distance entries.

Partial calculations may appear in the box when only a portion of the necessary data has been entered.

Touch the box for Perpendicular Distance to recalculate before writing the value on your paper sheet.

The RDA will not round the Perpendicular distance calculation at all. On the paper sheet you must enter only to one decimal place.

Rules for rounding to one decimal place: if there is a 0, 1, 2, 3, or 4 in the second decimal place, do not change the first decimal place. If there is a 5, 6, 7, 8, or 9 in the second decimal place, round the first decimal place up.

Tortoise location:

Burrows include both dirt constructed holes and caliche caves. A tortoise in a burrow is at the mouth of the burrow, deep inside, or anywhere in between.

Vegetation - tortoise is under the drip line, or in the shade of vegetation.

Rock - tortoise is under or in the shade of a rock

Pallet - tortoise is in a similar configuration to the mouth of a burrow, but the shelter is unconstructed and is undeveloped such that it is shorter than two tortoise lengths.

Open - tortoise is in the open and not under vegetation or rock.

Burrow visibility:

Consider the burrow as the center of a circle. Visibility will be estimated by the degrees of approach through which the burrow would be openly visible.

Medium

The expectation is that most burrows detected on a transect will be "medium" visibility. The approach will be to expect "medium" and then for a given tortoise to decide if use of the other categories is warranted in case this is an unusual situation for a burrow. Medium-visibility burrows are blocked through more than 25% but less than 75% of the angles of approach. Medium visibility includes a burrow visible under vegetation, but where vegetation obscures tell-tale shapes of the mouth, mound, or apron.

High

Distinguishing characteristics of a burrow (opening, mound, or apron) would be visible from more than 75% of the angles of approach. High visibility includes a burrow out in the open and facing you, or very obvious under sparse vegetation.

Low

The burrow is blocked from view through more than 75% of the angles of approach. This might be the case if you investigate because it looks like there should be a burrow there, but it isn't immediately visible. Low visibility includes burrows obscured completely or nearly completely by vegetation.

Tortoise-in-burrow-visibility

High

High visibility tortoises include those at the mouth of the burrow, and easily seen without bending over and no need for use of a mirror or flashlight.

Medium

Medium visibility tortoises include those that require bending over or getting down on your knees and the use of a mirror or flashlight.

Low

Low visibility tortoises include those so deep within a burrow that you are required to lay flat on the ground, searching the depths of the burrow with a mirror or flashlight. Your confirmation of the tortoise may include only an arm or leg, or small portion of the shell.

Tortoise visibility

This field is only used for tortoises not associated with a burrow or caliche cave. Consider the tortoise as the center of a circle. Visibility will be estimated by the degrees of approach through which the tortoise would be openly visible.

Medium

The expectation is that most tortoises detected on a transect will be "medium" visibility. The approach will be to expect "medium" and then for a given tortoise to decide if use of the other categories is warranted. Is it an unusual situation for a transect tortoise? Medium-visibility tortoises are blocked through more than 25% but less than 75% of the angles of approach. Medium visibility

High

The tortoise would be visible from more than 75% of the angles of approach. Typically, high visibility includes tortoises out in the open, but they could be under vegetation or rocks but not obscured by them, or they could be in a pallet.

Low

The tortoise is blocked from view through more than 75% of the angles of approach. This might be the case if you investigate because it looks like there should be a tortoise there, but it isn't immediately visible. Low visibility includes tortoises completely obscured by vegetation or rocks, including obscured in a pallet.

MCL \geq 180?

MCL (mm)

For all visible tortoises, the first field will have an entry. Although "Unknown" is an option, indicate "Yes" or "No" if at all possible. If the tortoise is the size of a measurable burrow opening, for instance, use this to evaluate whether it is larger than 180mm. The second field will only have an entry if the tortoise was handled - this field should not be estimated.

Mass (g)

If the mass is too great to measure with existing equipment, use comment field to report ">5000g" for example.

Sex of tort

If there is any uncertainty about the sex of the tortoise, record "unknown."

Characteristics generally become easier to interpret as the tortoise ages;

it is more difficult to identify the sex of smaller tortoises. In particular, those under 180mm are often considered juveniles.

Existing Tag

For live tortoises, the possibilities are that the tortoise definitely has an existing tag (you have been able to handle the tortoise, see it in the open, or have a clear view of the tag on the tortoise in a burrow), or that you know the tortoise definitely does not have an existing tag (you have been able to handle the tortoise or see it in the open), or the tag exists but is unreadable ("U/R"; ultraviolet can for instance darken tags), or you can't see the entire tortoise, cannot handle it, and there is a possibility the same tortoise may be encountered later (in the open, for instance) and discovered to have a tag.

FW- tag numbers are recorded without hyphens. All other tag numbers are recorded as they appear.

Existing Tag Color

Other Tag Color

If any tag is present, it is likely to be blue, white, or green. Otherwise, use "Other tag color" and spell it out!

| Desert Tortoise Distance Sampling Transect Form (OppLiveObs) | | | | | | | | | | | | | | | |
|--|-------|---|--|---------------------------|-------|---|-------|----------------------|-------|---|--|---------------------------|--|--|--|
| Trans Num: <input style="width: 150px;" type="text"/> | | | Team Num: <input style="width: 100px;" type="text"/> | | | Date: <input style="width: 150px;" type="text"/> 2010 | | | | | | | | | |
| Opp Live # <input style="width: 150px;" type="text"/> | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Tortoise location:</td> <td style="width: 50%;">Burrow Pallet Open Vegetation Rock</td> </tr> <tr> <td>Burrow Visibility:</td> <td>H M L</td> </tr> <tr> <td>Tort in Burrow Visibility:</td> <td>H M L</td> </tr> <tr> <td>Tortoise visibility:</td> <td>H M L</td> </tr> </table> | | Tortoise location: | Burrow Pallet Open Vegetation Rock | Burrow Visibility: | H M L | Tort in Burrow Visibility: | H M L | Tortoise visibility: | H M L | Temperature: <input style="width: 50px;" type="text"/> °C | | Existing Tag: Y N U/R Unk | | GPS Location Easting: <input style="width: 50px;" type="text"/> Northing: <input style="width: 50px;" type="text"/> UTM Zone: <input style="width: 20px;" type="text"/> 11 <input style="width: 20px;" type="text"/> 12 | |
| | | Tortoise location: | Burrow Pallet Open Vegetation Rock | | | | | | | | | | | | |
| | | Burrow Visibility: | H M L | | | | | | | | | | | | |
| | | Tort in Burrow Visibility: | H M L | | | | | | | | | | | | |
| Tortoise visibility: | H M L | | | | | | | | | | | | | | |
| Temp > 35?: Yes No | | ET Number: <input style="width: 100px;" type="text"/> | | | | | | | | | | | | | |
| MCL ≥ 180?: Y N Unk | | Existing Tag Color: Blue White Green | | | | | | | | | | | | | |
| MCL (mm): <input style="width: 100px;" type="text"/> | | Other Tag Color: <input style="width: 100px;" type="text"/> | | | | | | | | | | | | | |
| | | Mass (g): <input style="width: 100px;" type="text"/> | | New Tag Attached?: Yes No | | | | | | | | | | | |
| | | Sex: M F Unk | | New Tag Number: FW | | | | | | | | | | | |
| | | Tortoise Voided?: Yes No | | | | | | | | | | | | | |
| Comments: <input style="width: 800px;" type="text"/> | | | | | | | | | | | | | | | |

Trans Num

Opportunistic tortoises must be associated with a transect. If you see one after you have closed out your transects (for instance when camping later that day), you may process the tortoise, but will have to do that additional work of adding the data to the appropriate paper and electronic forms.

Burrow visibility

See "Transect Tortoise" subform annotations.

Tortoise in Burrow Visibility

See "Transect Tortoise" subform annotations.

Tortoise Visibility

See "Transect Tortoise" subform annotations.

MCL ≥ 180?

MCL (mm)

For all visible tortoises, the first field will have an entry. *It is extremely important to make every effort to answer this "yes" or "no". "Unknown" should be avoided if at all possible!* The second field will only have an entry if the tortoise was handled - this field should not be estimated.

Sex

If there is any uncertainty about the sex of the tortoise, record "unknown."

Existing Tag

For live tortoises, the possibilities are that the tortoise definitely has an existing tag ("Y"; you have been able to handle the tortoise, see it in the open, or have a clear view of the tag on the tortoise in a burrow), or that you know the tortoise definitely does not have an existing tag ("N"; you have been able to handle the tortoise or see it in the open), or the tag exists but is unreadable ("U/R"; ultraviolet can for instance darken tags), or you can't see the entire tortoise, cannot handle it, and there is a possibility the same tortoise may be encountered later (in the open, for instance) and discovered to have a tag ("Unk").

Existing Tag Color

Other Tag Color

if any tag is present, it is likely to be blue, white, or green. Otherwise, use "Other tag color" and spell it out!

| Desert Tortoise Distance Sampling Transect Form (TranCarcObs) | | | | | |
|---|---|---------------------|------------------------|------------------|---|
| Tran Num: | <input type="text"/> | Stratum: | <input type="text"/> | Team Num: | <input type="text"/> |
| | | | | Date: | <input type="text"/> 2010 |
| Tran Carc #: | <input type="text"/> | Local Bearing: | <input type="text"/> ° | Existing Tag: | Yes No U/R |
| Observer: | <input type="text"/> 1 <input type="text"/> 2 | Azimuth: | <input type="text"/> ° | ET Number: | <input type="text"/> |
| Obs Position: | Lead Follow | Radial Distance: | <input type="text"/> m | ET Color: | B W G |
| Last Waypoint: | <input type="text"/> | Perpendicular Dist: | <input type="text"/> m | Other Tag Color: | <input type="text"/> |
| Observation Time: | <input type="text"/> | Carcass Condition: | Intact D/A | GPS Location | |
| Transect Bearing: | <input type="text"/> 0° 90° 180° 270° | MCL ≥ 180? | Yes No Unk | Easting: | <input type="text"/> |
| Other Tran Bearing: | <input type="text"/> ° | MCL (mm) | <input type="text"/> | Northing: | <input type="text"/> |
| | | Sex: | M F Unk | UTM Zone: | <input type="text"/> 11 <input type="text"/> 12 |
| Comments: <input type="text"/> | | | | | |

Opp Carc

Remains of a tortoise are recorded as a carcass if at least half of the shell (plastron and carapace) are present.

Carcass Condition

These definitions are project specific. You may have used other definitions, but for us, if the MCL can be measured, the tortoise is "intact," regardless of how much has fallen off or whether carapace and plastron are attached. Otherwise it is "disarticulated."

MCL ≥ 180?

MCL (mm)

For all visible tortoises, the first field will have an entry. The second field will only have an entry if the carcass was intact - this field should not be estimated.

Sex

If there is any uncertainty about the sex of the tortoise, record "unknown."

Existing Tag

For carcasses, the possibilities are that it definitely has an existing tag ("Y"), or that you know it definitely does not have an existing tag ("N"), or the tag exists but is unreadable ("U/R"; ultraviolet can for instance darken tags). In the case of live tortoises, there is a fourth possibility that is not a concern with carcasses. Whereas it is inappropriate to remove a tortoise from a burrow, carcasses can always be removed and examined completely. Live tortoises, therefore, may be "Unk" to have a tag, but if you can't find a tag with a carcass now, you won't find one at a later date.

Existing Tag Color

Other Tag Color

If any tag is present, it is likely to be blue, white, or green. Otherwise, use "Other tag color" and spell it out!

| Desert Tortoise Distance Sampling Transect Form (OppCarcObs) | | | | | | |
|--|----------------------|---|----------------------|---|--|---|
| Tran Num: | <input type="text"/> | Stratum: | <input type="text"/> | Team Num: | <input type="text"/> | Date: <input type="text" value="2010"/> |
| Opp Carc # | Carcass Condition: | <input type="text" value="Intact D/A"/> | Existing Tag: | <input type="text" value="Yes No U/R"/> | GPS Location: | |
| | MCL > 180? | <input type="text" value="Yes No Unk"/> | ET Number: | <input type="text"/> | Easting: <input type="text"/> | |
| | MCL (mm): | <input type="text"/> | Existing Tag Color: | <input type="text" value="Blue White Green"/> | Northing: <input type="text"/> | |
| | Sex: | <input type="text" value="M F Unk"/> | Other Tag Color: | <input type="text"/> | UTM Zone: <input type="text" value="11 12"/> | |
| Comments: <input type="text"/> | | | | | | |

Tran Num

Opportunistic tortoises must be associated with a transect. If you see one after you have closed out your transects (for instance when camping later that day), you may process the tortoise, but will have to do that additional work of adding the data to the appropriate paper and electronic forms.

Opp Carc #

Remains of a tortoise are recorded as a carcass if at least half of the shell (plastron and carapace) are present.

Carcass condition

These definitions are project specific. You may have used other definitions, but for us, if the MCL can be measured, the tortoise is "intact," regardless of how much has fallen off or whether carapace and plastron are attached. Otherwise it is "disarticulated."

MCL ≥ 180?

MCL (mm)

For all visible tortoises, the first field will have an entry. The second field will only have an entry if the carcass was intact - this field should not be estimated.

Sex

If there is any uncertainty about the sex of the tortoise, record "unknown."

Existing Tag

For carcasses, the possibilities are that it definitely has an existing tag ("Y"), or that you know it definitely does not have an existing tag ("N"), or the tag exists but is unreadable ("U/R"; ultraviolet can for instance darken tags). In the case of live tortoises, there is a fourth possibility that is not a concern with carcasses. Whereas it is inappropriate to remove a tortoise from a burrow, carcasses can always be removed and examined completely. Live tortoises, therefore, may be "Unk" to have a tag, but if you can't find a tag with a carcass now, you won't find one at a later date.

Existing Tag Color

Other Tag Color

If any tag is present, it is likely to be blue, white, or green. Otherwise, use "Other tag color" and spell it out!