

# **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
<b>TRAIN_TRAN</b>					
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}

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>Contractor (logical) domain</b>
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

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>Contractor (logical) domain</b>
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 }
<b>TRAIN_OBS</b>					
Train_Obs	RecordId	Autogenerated	Field used by Pendragon	0	0
Train_Obs	UnitID	Autogenerated	Field used by Pendragon	[0,10]	[0,10]
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	Between start and end dates of training
Train_Obs	train_prime_key	Autogenerated	same as on transect record form	{ username }- { date_time_key }	{ username }- { date_time_key }
Train_Obs	train_obs_key	Autogenerated	additional primary key, combination of PDA user name and time stamp when the record was created	{ username }- { date_time_key }	{ username }- { date_time_key }

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>Contractor (logical) domain</b>
Train_Obs	trial_number	Calculated during QAQC import	imported from transect form	[1,3]	[1,3]
Train_Obs	team_number	Calculated during QAQC import	imported from transect form	[01,99]	same as Train_Tran_09 form
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	same as Train_Tran_09 form
Train_Obs	transect	Calculated during QAQC import	imported from transect form	same as Train_Tran_09 form	same as Train_Tran_09 form
Train_Obs	training_date	Calculated during QAQC import	imported from transect form	Jan 01, 1904-Dec 31, 2031	same as Train_Tran_09 form
Train_Obs	transect_bearing	Calculated during QAQC import	imported from transect form	{35, 215}	{35, 215}
Train_Obs	observation_time	Crew entry required	24-hour time of observation	12:00 AM-11:59 PM	5:00 AM-6:00 PM
Train_Obs	observer_name	Crew entry required	Name of observer who located the tortoise model	{ -- all observer names -- }	{ -- all observer names -- }
Train_Obs	observer_position	Crew entry required	Lead or Follow. Transect search position of the observer who located the model.	{Lead, Follow}	{Lead, Follow}
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]	[0,360]
Train_Obs	azimuth	Crew entry required	Bearing (to nearest degree) from transect line to tortoise model	[0,360]	[0,360]
Train_Obs	radial_distance_m	Crew entry required	Distance (to nearest 0.1 m) from transect line to tortoise model.	[0,100]	[0,100]
Train_Obs	bearing_radians	Autogenerated	Calculated field. Hidden	free numeric	free numeric

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>Contractor (logical) domain</b>
Train_Obs	azimuth_radians	Autogenerated	Calculated field. Hidden.	free numeric	free numeric
Train_Obs	perp_distance_m	Autogenerated/Crew check required	Calculated field	free numeric	free numeric
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 }	{ from line, while at another model }
Train_Obs	tortoise_size	Crew entry required	Adult or Immature. Indicates size of tortoise model (adult = 290 mm; immature = 180 mm)	{ Adult, Immature }	{ Adult, Immature }
Train_Obs	tortoise_id	Crew entry required	Unique number painted on each tortoise model	[0,288]	[0,288]
Train_Obs	comments	Crew entry conditional	Additional notes or questions.	2000 characters of unconstrained text	2000 characters of unconstrained text
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 }	{ 0, 1 }
<b>TRAIN_TEAMS</b>		<b>QAQC database only – not on RDA</b>			
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 }
Train_Teams	observer2	Crew entry required	name of observer 2 on specified team		{ first name } { last name }

### TRANSECT COLLECTION DATABASE

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
<b>TRANSECTS</b>					
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, with decimal places populated for each segment of interrupted transects	[1, 6700]	Valid transect number (always less than 6701)
Transects	tran_root	Autogenerated	4-digit number assigned to transect by MDEP. This number is the same for all segments of a single walked transect	[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: 3/1/11 through 6/6/11
Transects	group_	Crew entry required	agency collecting the data	{GBI, IWS, Kiva}	{GBI, IWS, Kiva}

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
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
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, "LSTS" as placeholder for 1-person transects in that stratum -- }	{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}

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
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, including explanation of "prohibited access"	2000 characters of unconstrained text	2000 characters of unconstrained text
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 }
<b>WAYPOINTS</b>					
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}

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
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_ke y}
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
Waypoints	interrupted_tran	Crew entry required	Identifies if a transect was interrupted before resuming after an obstacle.	{No, Yes}	{No, Yes}
Waypoints	observer1	Copied from Transects_10	Observer1 entered in Transects_10 form	{ -- all observer names -- }	{first name} {last name}
Waypoints	observer2	Copied from Transects_11	Observer2 entered in Transects_11 form	{ -- all observer names, "LSTS" as placeholder for 1-person transects in that stratum -- }	{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]

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
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)
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	Photo_orig_bearing	Crew entry required	This enables the camera and inserts photo taken facing in original direction of travel into database	image stored in binary format	image stored in binary format
Waypoints	Photo_orig_bearing_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
Waypoints	Photo_new_bearing	Crew entry conditional	This enables the camera and inserts photo taken facing new direction of travel into database	image stored in binary format	image stored in binary format
Waypoints	Photo_new_bearing_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
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 }
<b>OPPLIVEOBS</b>					
OppLiveObs	RecordID	Autogenerated	Field used by Pendragon	0	0
OppLiveObs	UnitID	Autogenerated	Field used by Pendragon	Free Numeric	[0,10]

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
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_key}
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_key}
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}

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
OppLiveObs	temp_c	Crew entry required		[0, 50]	[0, 50]
OppLiveObs	temp_greater_35C	Crew entry required		{Yes, No}	{Yes, No}
OppLiveObs	tort_not_handled_list	Crew entry conditional	If mcl_mm, sex not entered, or if tag not present and not attached, crew should indicate the reason	{deep in burrow, scutes too small, in social interaction, research project area, temperature, voided, no permit, other}	{deep in burrow, scutes too small, in social interaction, research project area, temperature, voided, no permit, other}
OppLiveObs	tort_not_handled_other	Crew entry conditional	If mcl_mm, sex will not be entered, or if tag not present and not attached, if reason not in drop down list, they should enter free-hand	Free text	Free text
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	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}
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	existing_red_tag	Crew entry required – LSTS ONLY	existing tag status on tortoise	{Yes, No, Unreadable, Unknown}	{Yes, No, Unreadable, Unknown}

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
OppLiveObs	existing_red_tag_number	Crew entry conditional – LSTS ONLY	tag number if existing tag exists	10 characters of unconstrained text	10 characters of unconstrained text
OppLiveObs	marginals_notched	Crew entry conditional – LSTS ONLY	were existing notches present?	{ Yes, No }	{ Yes, No }
OppLiveObs	existing_LM_notches	Crew entry conditional – LSTS ONLY	List describing existing notching pattern on left marginals	20 characters of unconstrained text (commas or other separator must be allowed)	21 characters of unconstrained text (commas or other separator must be allowed)
OppLiveObs	existing_RM_notches	Crew entry conditional – LSTS ONLY	List describing existing notching pattern on right marginals	20 characters of unconstrained text (commas or other separator must be allowed)	21 characters of unconstrained text (commas or other separator must be allowed)
OppLiveObs	new_notches	Crew entry conditional – LSTS ONLY	Were new notches applied?	{ Yes,No }	{ Yes,No }
OppLiveObs	new_LM_notches	Crew entry conditional – LSTS ONLY	List describing notching pattern just added on left marginals	21 characters of unconstrained text (commas or other separator must be allowed)	22 characters of unconstrained text (commas or other separator must be allowed)
OppLiveObs	new_RM_notches	Crew entry conditional – LSTS ONLY	List describing notching pattern just added on right marginals	21 characters of unconstrained text (commas or other separator must be allowed)	22 characters of unconstrained text (commas or other separator must be allowed)
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)

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
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)
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	Photo_tort	Crew entry conditional	This enables the camera and inserts photo of the tortoise into database	image stored in binary format	image stored in binary format
OppLiveObs	Photo_tort_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
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 }
<b>OPPCARCOBS</b>					
OppCarcObs	RecordID	Autogenerated	Field used by Pendragon	0	0
OppCarcObs	UnitID	Autogenerated	Field used by Pendragon	Free Numeric	[0,10]

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
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_key}
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)
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}

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
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	existing_red_tag	Crew entry required	existing tag status on carcass	{Yes, No, Unreadable, Unknown}	{Yes, No, Unreadable, Unknown}
OppCarcObs	existing_red_tag_number	Crew entry conditional	tag number if existing tag exists	10 characters of unconstrained text	10 characters of unconstrained text
OppCarcObs	marginals_notched	Crew entry conditional	were existing notches present?	{Yes, No}	{Yes, No}
OppCarcObs	existing_LM_notches	Crew entry conditional	List describing existing notching pattern on left marginals	20 characters of unconstrained text (commas or other separator must be allowed)	21 characters of unconstrained text (commas or other separator must be allowed)
OppCarcObs	existing_RM_notches	Crew entry conditional	List describing existing notching pattern on right marginals	20 characters of unconstrained text (commas or other separator must be allowed)	21 characters of unconstrained text (commas or other separator must be allowed)
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)
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]

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
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	Photo_carc	Crew entry conditional	This enables the camera and inserts photo of the carcass into database	image stored in binary format	image stored in binary format
OppCarcObs	Photo_carc_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
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 }
<b>TRANLIVEOBS</b>					
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_ke y}

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_wp	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}

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
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 defecates	{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	existing_red_tag	Crew entry required – LSTS ONLY	existing tag status on tortoise	{Yes, No, Unreadable, Unknown}	{Yes, No, Unreadable, Unknown}
TranLiveObs	existing_red_tag_number	Crew entry conditional – LSTS ONLY	tag number if existing tag exists	10 characters of unconstrained text	10 characters of unconstrained text
TranLiveObs	marginals_notched	Crew entry conditional – LSTS ONLY	were existing notches present?	{Yes, No}	{Yes, No}
TranLiveObs	existing_LM_notches	Crew entry conditional – LSTS ONLY	List describing existing notching pattern on left marginals	20 characters of unconstrained text (commas or other separator must be allowed)	21 characters of unconstrained text (commas or other separator must be allowed)

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
TranLiveObs	existing_RM_notches	Crew entry conditional – LSTS ONLY	List describing existing notching pattern on right marginals	20 characters of unconstrained text (commas or other separator must be allowed)	21 characters of unconstrained text (commas or other separator must be allowed)
TranLiveObs	new_notches	Crew entry conditional – LSTS ONLY	Were new notches applied?	{Yes,No}	{Yes,No}
TranLiveObs	new_LM_notches	Crew entry conditional – LSTS ONLY	List describing notching pattern just added on left marginals	21 characters of unconstrained text (commas or other separator must be allowed)	22 characters of unconstrained text (commas or other separator must be allowed)
TranLiveObs	new_RM_notches	Crew entry conditional – LSTS ONLY	List describing notching pattern just added on right marginals	21 characters of unconstrained text (commas or other separator must be allowed)	22 characters of unconstrained text (commas or other separator must be allowed)
TranLiveObs	tort_not_handled_list	Crew entry conditional	If mcl_mm, sex not entered, or if tag not present and not attached, crew should indicate the reason	{deep in burrow, scutes too small, in social interaction, research project area, temperature, voided, no permit, other}	{deep in burrow, scutes too small, in social interaction, research project area, temperature, voided, no permit, other}
TranLiveObs	tort_not_handled_other	Crew entry conditional	If mcl_mm, sex will not be entered, or if tag not present and not attached, if reason not in drop down list, they should enter free-hand	Free text	Free 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}

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
TranLiveObs	gps_latitude	Calculated during QAQC import	Latitude of location, calculated from gps grab	Free Text	[32.95,37.32]
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	Photo_tort	Crew entry conditional	This enables the camera and inserts photo of the tortoise into database	image stored in binary format	image stored in binary format
TranLiveObs	Photo_tort_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
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 }
<b>TRANCARCOBS</b>					
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

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
TranCarcObs	tran_prime_key	Autogenerated	same as on transect record form	{username}- {date_time_key}	{username}{date_time_key}
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}
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_wp	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]

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
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
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	existing_red_tag	Crew entry required – LSTS ONLY	existing tag status on carcass	{Yes, No, Unreadable, Unknown}	{Yes, No, Unreadable, Unknown}
TranCarcObs	existing_red_tag_number	Crew entry conditional – LSTS ONLY	tag number if existing tag exists	10 characters of unconstrained text	10 characters of unconstrained text
TranCarcObs	marginals_notched	Crew entry conditional – LSTS ONLY	were existing notches present?	{Yes, No}	{Yes, No}

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
TranCarcObs	existing_LM_notches	Crew entry conditional – LSTS ONLY	List describing existing notching pattern on left marginals	20 characters of unconstrained text (commas or other separator must be allowed)	21 characters of unconstrained text (commas or other separator must be allowed)
TranCarcObs	existing_RM_notches	Crew entry conditional – LSTS ONLY	List describing existing notching pattern on right marginals	20 characters of unconstrained text (commas or other separator must be allowed)	21 characters of unconstrained text (commas or other separator must be allowed)
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]
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)

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
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	Photo_carc	Crew entry conditional	This enables the camera and inserts photo of the carcass into database	image stored in binary format	image stored in binary format
TranCarcObs	Photo_carc_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
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 }

### G<sub>0</sub> COLLECTION DATABASE

Subform (RDA)/ Table (QAQC)	Field name	Creation	Description	Collection (physical) domain	QAQC (logical) domain
<b>G0_START</b>					
G0_Start	RecordID	Autogenerated	Field used by Pendragon	0	0
G0_Start	UnitID	Autogenerated	Field used by Pendragon	Free Numeric	[0,10]
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	Jan 01, 1904-Dec 31, 2031
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}	{username}{date_time_key}
G0_Start	date_	Autogenerated/ Crew check required	Date on which tortoises were located	Jan 01, 1904-Dec 31, 2031	first training date through final sample date: 3/1/11 through 6/6/11
G0_Start	G0_site	Crew entry required	Name of GSub0 (telemetry) site	{Chemehuevi, Chuckwalla, Coyote Springs, Gold Butte, Halfway, Ivanpah, Joshua Tree, LSTS, Piute Mid, Ord Rodman, River Mtns, Superior Cronese}	{Chemehuevi, Chuckwalla, Coyote Springs, Gold Butte, Halfway, Ivanpah, Joshua Tree, LSTS, Piute Mid, Ord Rodman, River Mtns, Superior Cronese}

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
G0_Start	group_	Crew entry required	agency collecting the data	{GBI, IWS, Kiva}	{GBI, IWS, Kiva}
G0_Start	start_time	Calculated during QAQC import	Time the observer(s) first observed transmitted tortoises on this date	12:00 AM-11:59 PM	5:00 AM-10:00 AM
G0_Start	photo_site_1	Crew entry conditional	Initial pictures of the site	image stored in binary format	image stored in binary format
G0_Start	photo_site_1_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
G0_Start	photo_site_2	Crew entry conditional	Initial pictures of the site	image stored in binary format	image stored in binary format
G0_Start	photo_site_2_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
G0_Start	photo_site_3	Crew entry conditional	Initial pictures of the site	image stored in binary format	image stored in binary format
G0_Start	photo_site_3_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
G0_Start	photo_site_4	Crew entry conditional	Initial pictures of the site	image stored in binary format	image stored in binary format
G0_Start	photo_site_4_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
G0_Start	photo_carc	Crew entry conditional	Photo of the carcass found	image stored in binary format	image stored in binary format
G0_Start	photo_carc_file	Crew entry conditional	This field would record the file name of the photo that is taken manually	Free Text	Free Text
G0_Start	end_time	Calculated during QAQC import	Time the observer(s) last observed transmitted tortoises on this date	12:00 AM-11:59 PM	8:00 AM-6:30 PM
G0_Start	observer	Crew entry required	Name of observer	{ -- all observer names -- }	{first name} {last name}

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
G0_Start	comments	Crew entry conditional	Notes from the observer about the g0 site and/or conditions	2000 characters of unconstrained text	2000 characters of unconstrained text
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 }	{ 0, 1 }
<b>G0_OBS</b>					
G0_Obs	RecordID	Autogenerated	Field used by Pendragon	0	0
G0_Obs	UnitID	Autogenerated	Field used by Pendragon	Free Numeric	[0,10]
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	Jan 01, 1904-Dec 31, 2031
G0_Obs	G0_prime_key	Autogenerated	same as on Gsub0 Start form	{username}-{date_time_key}	{username}{date_time_key}
G0_Obs	date_	Calculated during QAQC import	Date on which tortoises were located	Jan 01, 1904-Dec 31, 2031	first training date through final sample date: 3/1/11 through 6/6/11
G0_Obs	G0_site	Calculated during QAQC import	same as on Gsub0 Start form	{Chemehuevi, Chuckwalla, Coyote Springs, Gold Butte, Halfway, Ivanpah, Joshua Tree, LSTS, Piute Mid, Ord Rodman, River Mtns, Superior Cronese}	{Chemehuevi, Chuckwalla, Coyote Springs, Gold Butte, Halfway, Ivanpah, Joshua Tree, LSTS, Piute Mid, Ord Rodman, River Mtns, Superior Cronese}
	observer	Calculated during QAQC import	Name of observer	{ -- all observer names -- }	{first name} {last name}
G0_Obs	group_	Calculated during QAQC import	Entity collecting the data	{GBI, IWS, Kiva}	{GBI, IWS, Kiva}
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}	{username}{date_time_key}

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
G0_Obs	tort_num	Crew entry required	Number on the observed tortoise	8 characters of unconstrained text	8 characters of unconstrained text
G0_Obs	time_	Crew entry required	time of observation	12:00 AM-11:59 PM	5:00 AM-6:30 PM
G0_Obs	burned		If this is a burned location - Coyote Springs and Halfway Wash sites only	{Not Applicable, Yes, No}	{Not Applicable, Yes, No}
G0_Obs	visible	Crew entry required	Whether or not the tortoise is visible	{Yes,No}	{Yes,No}
G0_Obs	tort_location	Crew entry required	Where the tortoise is when detected	{Burrow, Pallet, Open, Vegetation, Rock}	{Burrow, Pallet, Open, Vegetation, Rock}
G0_Obs	burrow_visibility	Crew entry conditional	If "tortoise_location" is "burrow", rate the visibility/detectability of the burrow.	{High, Medium, Low, NotVisible}	{High, Medium, Low, NotVisible}
G0_Obs	tort_in_burrow_visibility	Crew entry conditional	If "tortoise_location" is "burrow", rate the visibility/detectability of the tortoise given that the burrow is detected.	{High, Medium, Low, NotVisible}	{High, Medium, Low, NotVisible}
G0_Obs	tort_visibility	Crew entry conditional	If "tortoise_location" other than "burrow", rate the visibility/detectability of the tortoise.	{High, Medium, Low, NotVisible}	{High, Medium, Low, NotVisible}
G0_Obs	behavior	Crew entry required	tortoise's behavior	{Unknown, at Rest-active, Moving, Basking, Eating, Mating, Agonistic, Digging}	{Unknown, at Rest-active, Moving, Basking, Eating, Mating, Agonistic, Digging}
G0_Obs	gps_bluetooth	Autogenerated	string downloaded from GPS unit for coordinates and time	Free Text	57 characters long
G0_Obs	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)
G0_Obs	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)
G0_Obs	gps_zone	Autogenerated	UTM Zone of waypoint, calculated from gps grab	Free Text	{11, 12}
G0_Obs	gps_latitude	Calculated during QAQC import	Latitude of location, calculated from gps grab	Free Text	[32.95,37.32]

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
G0_Obs	gps_longitude	Calculated during QAQC import	Longitude of location, calculated from gps grab	Free Text	[113.29,117.91]
G0_Obs	gps_grab_valid	Crew entry required	whether GPS grab was successful	{Yes, No}	{Yes, No}
G0_Obs	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)
G0_Obs	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)
G0_Obs	manual_zone	Crew entry conditional	UTM Zone for waypoint, entered by hand. Field only visible if gps grab fails	{11,12}	{11,12}
G0_Obs	comments	Crew entry conditional	Comments about this observation	2000 characters of unconstrained text	2000 characters of unconstrained text
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 }	{ 0, 1 }
<b>G0_OPPLIVEOBS</b>					
G0_OppLiveObs	RecordID	Autogenerated	Field used by Pendragon	0	0
G0_OppLiveObs	UnitID	Autogenerated	Field used by Pendragon	Free Numeric	[0,10]
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	Jan 01, 1904-Dec 31, 2031
G0_OppLiveObs	G0_prime_key	Autogenerated	same as on GSub0_Start record form	{username}-{date_time_key}	{username}{date_time_key}
G0_OppLiveObs	date_	Calculated during QAQC import	Date on which tortoises were located	Jan 01, 1904-Dec 31, 2031	first training date through final sample date: 3/1/11 through 6/6/11

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
G0_OppLiveObs	G0_site	Calculated during QAQC import	same as on Gsub0 Start form	{Chemehuevi, Chuckwalla, Coyote Springs, Gold Butte, Halfway, Ivanpah, Joshua Tree, LSTS, Piute Mid, Ord Rodman, River Mtns, Superior Cronese}	{Chemehuevi, Chuckwalla, Coyote Springs, Gold Butte, Halfway, Ivanpah, Joshua Tree, LSTS, Piute Mid, Ord Rodman, River Mtns, Superior Cronese}
G0_OppLiveObs	group_	Calculated during QAQC import	agency collecting the data	{GBI, IWS, Kiva}	{GBI, IWS, Kiva}
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}	{username}{date_time_key}
G0_OppLiveObs	G0_opp_live_number	Crew entry required	Opportunistic Live Observation Count (Starting at 1, manually entered by the observers)	[1,15]	[1,15]
G0_OppLiveObs	tort_location	Crew entry conditional	position of tortoise	{Burrow, Pallet, Open, Vegetation, Rock}	{Burrow, Pallet, Open, Vegetation, Rock}
G0_OppLiveObs	temp_c	Crew entry conditional		[0, 50]	[0, 50]
G0_OppLiveObs	temp_greater_35C	Crew entry conditional		{Yes, No}	{Yes, No}
G0_OppLiveObs	tort_not_handled_list	Crew entry conditional	If mcl_mm, sex not entered, or if tag not present and not attached, crew should indicate the reason	{deep in burrow, scutes too small, in social interaction, research project area, temperature, voided, no permit, other}	{deep in burrow, scutes too small, in social interaction, research project area, temperature, voided, no permit, other}
G0_OppLiveObs	tort_not_handled_other	Crew entry conditional	If mcl_mm, sex will not be entered, or if tag not present and not attached, if reason not in drop down list, they should enter free-hand	Free text	Free text
G0_OppLiveObs	mcl_greater_180	Crew entry conditional	whether carapace of tortoise is greater than 180mm	{Yes, No, Unknown}	mcl_greater_180
G0_OppLiveObs	mcl_mm	Crew entry conditional	measurement of carapace	[0,400]	mcl_mm

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
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
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

<b>Subform (RDA)/ Table (QAQC)</b>	<b>Field name</b>	<b>Creation</b>	<b>Description</b>	<b>Collection (physical) domain</b>	<b>QAQC (logical) domain</b>
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

## **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	Training Date:	2010		
	White Orange Green	Train Start Time:			
Starting Post	A B C D E F	Training End Time:			
	G H I J K L	Comments:			
Observation Time:		Original observation	from line	Azimuth:	°
Observer Name:			while at another model	Radial Dist:	m
Observer Position:	Lead Follow	Local Bearing:	°	Perpendicular Dist:	m
				Tortoise Size:	Adult
					Immature
Comments:					
Comments (include Tortoise ID):					
If more than 10 detections occur on a segment, use a new data sheet and indicate page 2 of 2 at the bottom. Copy header information and record stop time on all sheets.					
Data Recorded By:				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 <sub>0</sub> Start and Obs Form					
Date:	2010		Group:	GEI IWS Kiva/Joshua Tree	
Site:			Observer:		
Tortoise Num:		Tortoise location:	Burrow Pallet Open Vegetation Rock	Behavior:	GPS Location
Time:		Burrow Visibility:	High Med Low	Unknown ARestActive	Easting:
Burned?:	Not Applic Yes No	Tort in Burrow Visibility:	High Med Low Not	Moving Basking	Northing:
Tort Visible?:	Yes No	Tortoise visibility	High Med Low	Eating Mating Agonistic Digging	GPS grab valid?: Yes
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 G0 Tortoises)										
Date:		2010		Site:		Observer:				
Opp Live #				MCL≥180?		Y N Unk		Existing Tag:		Y N U/R Unk
Tortoise location:		Burrow Pallet Open Vegetation Rock		MCL (mm):				ET Number:		
Temperature:		°C		Mass (g):				ET Color:		Blue White Green
Temp > 35?:		Yes No		Sex:		M F Unk		Other Color:		
				Tortoise Voided?		Y N		New Tag Attached?		Y N
								New Tag Number:		FW
								GPS Location		Easting: <input type="text"/>
								GPS Location		Northing: <input type="text"/>
								GPS grab valid?:		<input type="checkbox"/> Yes <input type="checkbox"/> No
Comments: _____										

**Opp Live #**

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

**Tortoise location**

See G0 observation annotations.

**Burrow visibility**

See G0 observation annotations.

**Tortoise in Burrow Visibility**

See G0 observation annotations.

**Tortoise Visibility**

See G0 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"/>	GPS grab valid?	<input type="text" value="Y"/> <input type="text" value="N"/>
Comments: _____						

---

Waypoint 1	Time:	<input type="text"/>	Lead:	<input type="text" value="Observer 1"/> <input type="text" value="Observer 2"/>	Easting:	<input type="text"/>	UTM Zone:	<input type="text" value="11"/> <input type="text" value="12"/>
					Northing:	<input type="text"/>	GPS grab valid?	<input type="text" value="Y"/> <input type="text" value="N"/>
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"/>	UTM Zone:	<input type="text" value="11"/> <input type="text" value="12"/>
					Northing:	<input type="text"/>	GPS grab valid?	<input type="text" value="Y"/> <input type="text" value="N"/>
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"/>	GPS grab valid?	<input type="text" value="Y"/> <input type="text" value="N"/>
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"/>	GPS grab valid?	<input type="text" value="Y"/> <input type="text" value="N"/>
Comments: _____						

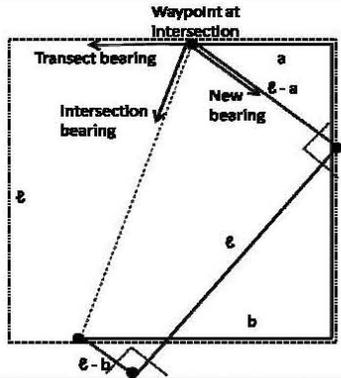
---

Data Recorded By:	<input type="text"/>	<input type="text" value="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?	<input type="checkbox"/> Y <input type="checkbox"/> N
Entered fields:	Calculated fields:
Transect bearing <input type="text"/> °	New bearing <input type="text"/> °
Partial side length (a) <input type="text"/> m	1st dist to walk <input type="text"/> m
Intersection bearing <input type="text"/> °	3rd dist to walk <input type="text"/> m
Planned side length (l) <input type="text"/> 3000m <input type="text"/> 1500m	4th dist to walk <input type="text"/> m
Transect Standard?	<input type="checkbox"/> Y <input type="checkbox"/> N
Terrain Obstacles:	<input type="checkbox"/> Mountainous <input type="checkbox"/> Cliff <input type="checkbox"/> Deep Washes <input type="checkbox"/> Prohibited Access <input type="checkbox"/> Major Road <input type="checkbox"/> Boundary
Substrate Obstacles:	<input type="checkbox"/> Rock <input type="checkbox"/> Gravel <input type="checkbox"/> Tallus <input type="checkbox"/> Sand
Other Obstacles?:	<input type="text"/>
Other relevant information (military reservation, wilderness area, etc.):	<input type="text"/>
Directions to transect (include UTM coordinates and/or names of nearest major roads, description of notable intersections, steep/challenging road conditions): <input type="text"/>	



**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.

an unplanned angle?

the data collectors.

ould only say "yes" if you are  
ie new legs of the transect.  
al axis. The RDA refers to

: 50 or 100m.

. Any other shapes or  
ard, the terrain, substrate, or

ress caused you to shorten  
hills and mountains that you

bility to complete the transect  
mpede progress, and cannot  
ie impacted by difficult  
e-invisible obstacles.

ntify human-built obstacles.

from "Transect reflected at

## Desert Tortoise Distance Sampling Transect Form (TranLiveObs)

Tran Num: <input style="width: 50px;" type="text"/>	Stratum: <input style="width: 50px;" type="text"/>	Team Num: <input style="width: 50px;" type="text"/>	Date: <input style="width: 50px;" type="text"/> 2010
Tran Live #: <input style="width: 50px;" type="text"/>	Tortoise location:	Burrow Pallet Open Vegetation Rock	Tortoise Voided? Yes No
Observer: <input style="width: 20px;" type="text"/> 1 <input style="width: 20px;" type="text"/> 2	Burrow Visibility:	H M L	Existing Tag: Y N U/R Unk
Observer Position: <input style="width: 50px;" type="text"/>	Tortoise in Burrow Visibility:	H M L	Existing Tag Number: <input style="width: 50px;" type="text"/>
Last Waypoint: <input style="width: 50px;" type="text"/>	Tortoise visibility:	H M L	Existing Tag Color: Blue White Green
Observation Time: <input style="width: 50px;" type="text"/>	Temperature: <input style="width: 50px;" type="text"/> °C		Other Tag Color: <input style="width: 50px;" type="text"/>
Transect Bearing: <input style="width: 50px;" type="text"/> °	Temp > 35?: Yes No		New Tag Attached? Yes No
Local Bearing: <input style="width: 50px;" type="text"/> °	MCL ≥ 180: Yes No Unk		New Tag Number: <input style="width: 50px;" type="text"/>
Azimuth: <input style="width: 50px;" type="text"/> °	MCL (mm): <input style="width: 50px;" type="text"/>		GPS Location
Radial Distance: <input style="width: 50px;" type="text"/> m	Mass (g): <input style="width: 50px;" type="text"/>		Easting: <input style="width: 50px;" type="text"/>
Perpendicular Dist: <input style="width: 50px;" type="text"/> m	Sex of Tort: M F Unk		Northing: <input style="width: 50px;" type="text"/>
Comments: <input style="width: 500px;" type="text"/>			UTM Zone: 11 12
			GPS grab valid?: Yes No

### 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: 10%;">Burrow</td> <td style="width: 10%;">Pallet</td> <td style="width: 10%;">Open</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td></td> <td style="text-align: center;">Vegetation</td> <td style="text-align: center;">Rock</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Burrow Visibility:</td> <td style="text-align: center;">H</td> <td style="text-align: center;">M</td> <td style="text-align: center;">L</td> <td></td> <td></td> </tr> <tr> <td>Tort in Burrow Visibility:</td> <td style="text-align: center;">H</td> <td style="text-align: center;">M</td> <td style="text-align: center;">L</td> <td></td> <td></td> </tr> <tr> <td>Tortoise visibility:</td> <td style="text-align: center;">H</td> <td style="text-align: center;">M</td> <td style="text-align: center;">L</td> <td></td> <td></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: <input style="width: 50px;" type="text"/> Y N U/R Unk		GPS Location			
		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?: <input style="width: 50px;" type="text"/> Yes No		ET Number: <input style="width: 100px;" type="text"/>		Easting: <input style="width: 100px;" type="text"/>		Northing: <input style="width: 100px;" type="text"/>																																	
MCL ≥ 180?: <input style="width: 50px;" type="text"/> Y N Unk		Existing Tag Color: <input style="width: 100px;" type="text"/> Blue White Green		Other Tag Color: <input style="width: 100px;" type="text"/>		UTM Zone: <input style="width: 50px;" type="text"/> 11 <input style="width: 50px;" type="text"/> 12																																	
MCL (mm): <input style="width: 100px;" type="text"/>		Mass (g): <input style="width: 100px;" type="text"/>		New Tag Attached? <input style="width: 50px;" type="text"/> Yes No		GPS grab valid?: <input style="width: 50px;" type="text"/> Ye																																	
Sex: <input style="width: 50px;" type="text"/> M F Unk		Tortoise Voided?: <input style="width: 50px;" type="text"/> Yes No		New Tag Number: <input style="width: 100px;" type="text"/> FW																																			
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"/> °
Observer:	<input type="text"/> 1 <input type="text"/> 2	Azimuth:	<input type="text"/> °
Obs Position:	<input type="text"/> Lead <input type="text"/> Follow	Radial Distance:	<input type="text"/> m
Last Waypoint:	<input type="text"/>	Perpendicular Dist:	<input type="text"/> m
Observation Time:	<input type="text"/>	Carcass Condition:	<input type="text"/> Intact <input type="text"/> D/A
Transect Bearing:	<input type="text"/> 0° <input type="text"/> 90° <input type="text"/> 180° <input type="text"/> 270°	MCL ≥ 180?	<input type="text"/> Yes <input type="text"/> No <input type="text"/> Unk
Other Tran Bearing:	<input type="text"/> °	MCL (mm):	<input type="text"/>
Comments:	<input type="text"/>		
	Sex:	<input type="text"/> M <input type="text"/> F <input type="text"/> Unk	GPS grab valid?
	Existing Tag:	<input type="text"/> Yes <input type="text"/> No <input type="text"/> U/R	
	ET Number:	<input type="text"/>	
	ET Color:	<input type="text"/> B <input type="text"/> W <input type="text"/> G	
	Other Tag Color:	<input type="text"/>	
	Easting:	<input type="text"/>	
	Northing:	<input type="text"/>	
	UTM Zone:	<input type="text"/> 11 <input type="text"/> 12	

**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"/>	2010	
Opp Carc #	Carcass Condition:	<input type="text"/> Intact D/A	Existing Tag:	<input type="text"/> Yes No U/R		Easting:	<input type="text"/>		
	MCL>180?	<input type="text"/> Yes No Unk	ET Number:	<input type="text"/>		Northing:	<input type="text"/>		
	MCL (mm):	<input type="text"/>	Existing Tag Color:	<input type="text"/> Blue White Green		UTM Zone:	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Sex:	<input type="text"/> M F Unk	Other Tag Color:	<input type="text"/>		GPS grab valid?	<input type="text"/>	<input type="text"/>	<input type="text"/>
Comments: <input 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.

**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!