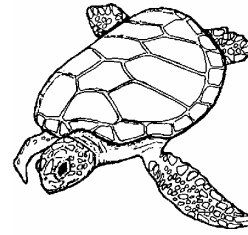


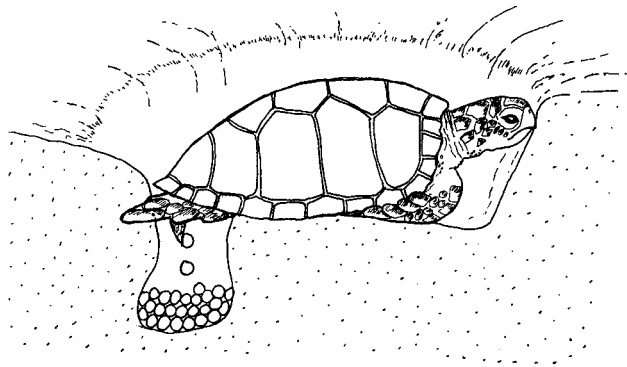
Instruction Manual



for

Sea Turtle Monitoring

in the
Arnavon Marine Conservation Area
(AMCA)



Based on recommendations made during a site visit in August
2001

Jeanne A. Mortimer
Consultant, The Nature Conservancy

TABLE OF CONTENTS

	Page Number
TABLE OF CONTENTS	i
BACKGROUND	ii
Introduction	ii
Data Sheets	ii
Monthly Activity Schedule	iii
ACKNOWLEDGMENTS	iii
TAGGING OF NESTING TURTLES AT NIGHT	1
"Nesting Turtle Tagging" data sheet	1
Instructions for Use	1
BLANK Data Sheet	2
SAMPLE Data Sheet	3
TAGGING OF FORAGING TURTLE	7
"Rodeo Turtle Tagging" data sheet	7
Instructions for Use	7
BLANK Data Sheet	12
SAMPLE Data Sheet	13
DAILY BEACH SURVEYS: KEREHIKAPO	14
"Kerehikapo Daily Turtle Track Counts" data sheet	14
Instructions for Use	14
BLANK Data Sheet	16
SAMPLE Data Sheet	17
"Kerehikapo -- Nest Predation Survey" data sheet	18
Instructions for Use	18
BLANK Data Sheet	20
SAMPLE Data Sheet	21
WEEKLY BEACH SURVEYS: OTHER ISLANDS	22
"Weekly Beach Surveys: Sikopo, Big Maleivona, & Small Maleivona" data sheet	22
Instructions for Use	22
BLANK Data Sheet	25
SAMPLE Data Sheet	26
RAW Data Sheet (SAMPLE)	27
DETERMINING EGG CLUTCH SURVIVAL	28
"Hatched Nests: Egg Clutch Survival" data sheet	28
Instructions for Use	28
BLANK Data Sheet	33
SAMPLE Data Sheet	34
MONTHLY ACTIVITY SCHEDULE	35
"Monthly Activity Schedule" sheet	35
Instructions for Use	35
BLANK Sheet	38
SAMPLE Sheet	39

BACKGROUND

Introduction:

The monitoring protocol described on the following pages was devised during a month-long site visit made by the Consultant to the Arnavon Islands Marine Conservation Area in July and August 2001 at the peak of the turtle nesting season.

The activities described in this revised monitoring protocol are similar to those that were already being conducted by the Conservation Officers (COs) prior to July 2001. Modifications to both the field methods and the design of the data sheets were made to maximize the value of the data being collected.

All details of the "new" revised monitoring protocol were discussed and agreed upon by the following individuals, on site in the AMCA:

- All the COs who attended the workshops conducted by the Consultant. These include the following (in alphabetical order by surname):
 - "Danny" Michael Danibea (*Kia*)
 - Nelson Kokonava (*Kia*)
 - Dickson Motui (*Kia*)
 - Arnold Pitakaka (*Posarae*)
 - Chris Ribua Taniana (*Wagina*)
 - Victor Tooa Tebaubau (*Wagina*)
 - Melvin Zama Davis (*Posarae*)
- Mr. John Pita
- Mr. Peter Ramohia

Data Sheets:

The following table provides a list of the categories of monitoring activities recommended, the title(s) of the data sheet(s) associated with each activity, and the page(s) within this manual where detailed instructions are provided.

Category of Activity	Data Sheet Title(s)	Page(s)
A Tagging of Nesting Turtles at Night	• <i>Nesting Turtle Tagging</i>	1 - 6
B Tagging of Foraging Turtles	• <i>Rodeo Turtle Tagging</i>	7 - 13
C Daily Beach Surveys: Kerehikapo	• <i>Kerehikapo Daily Turtle Track Counts</i> • <i>Kerehikapo - Nest Predation Survey</i>	14 - 17 18 - 21
D Weekly Beach Surveys: Other Islands	• <i>Weekly Beach Surveys: Sikopo, Big Maleivona, & Small Maleivona</i>	22 - 27
E Determining Egg Clutch Survival	• <i>Hatched Nests: Egg Clutch Survival</i>	28 - 34

This manual is divided into sections, each of which is devoted to a different data sheet. Each section includes the following:

- a) a Blank data sheet;
- b) a data sheet filled in with Sample Data; and
- c) Detailed instructions on how to collect and record information on each data sheet.

Monthly Activity Schedule:

For sea turtles to be adequately monitored within the AMCA, some activities need to be conducted daily, some weekly, and others at less frequent intervals. Coordinating such a complex schedule of activities can be difficult, especially with a complete change in CO personnel each month.

After consultation with the COs, Mr. Pita, and Mr. Ramohia, a method was devised to assist the COs in planning and organizing their rather complex schedule of turtle monitoring activities. This can be found in the last section of this manual, in the section entitled "***Monthly Activity Schedule***", on pages 35-39.

ACKNOWLEDGMENTS

The methodologies described herein could not have been developed without the collaboration, patience, and assistance of Mr. John Pita, Mr. Peter Ramohia, and the AMCA Conservation Officers (COs) on site in the AMCA. I am grateful to all of them for their enthusiasm, good company, and hard work. Among the COs, the assistance provided by Dickson Motui, Victor Tooa Tebaubau, and "Danny" Michael Danibea was particularly valuable.

I wish to thank the AMCA Management Committee for enabling me to visit their beautiful islands and participate in their conservation program. The Nature Conservancy (TNC) funded my visit. I am grateful to all the TNC staff who supported my work, but especially to: Rodney V. Salm (Director, TNC Asia Pacific Coastal Marine Program); George Myers, Willie A, George Taliki, and Martha McManus (TNC Honiara Office); Shari Walker (TNC Honolulu office); and Robyn Curham and Peter Thomas (TNC New Zealand office).

Activity: A. Tagging of Nesting Turtles at Night

Data Sheet: "Nesting Turtle Tagging"

When to conduct the activity:

Between 8:00 pm and midnight every day, if possible.

Where to conduct the activity:

For logistical reasons, most turtle tagging is conducted at Kerihikapo island. But, if possible, nesting turtles should also be tagged on the other islands.

Instructions on how to enter data on data sheet:

Data for two turtles can be recorded on each sheet.

Information to Label the Data Sheet:

Year-Month: Record the year and the month when data are collected. (*In the example, the turtle was tagged in August 2002.*)

Page: Number each page in order, starting with "1" at the beginning of each month. (*The sample data sheet is the 35th used since 1 August.*)

Entered: The circle "O" will be checked after the data have been entered into the computer.

Data to Gather for Each Turtle Tagged:

Tag No.: Record the tags for the right "R" and left "L" flippers in the appropriate boxes, depending on whether the turtle is a 'recapture' or a 'new' turtle.

- a) "Recapt.": arrives wearing one or more tags; or
- b) "New": arrives untagged.

For each tag, place an "X" in the correct box depending on whether the tag is "new" or "old". Because any tag applied to a "new" turtle would be a "New" tag, those boxes already have an "X" in them.

(In the example, the turtle is a "Recapture" that arrived wearing one "Old" tag ('X3826') on her Right flipper. A "New" tag ('X5599') was applied to her Left flipper.)

All turtles should wear two tags. If a "Recaptured" turtle arrives wearing only one tag, a second tag should be applied to the other flipper. A tag should only be removed if it is in bad condition, or has been improperly applied.

The number of every tag needs to be recorded:

- a) If an "Old" tag is removed from a "Recapt." it needs to be recorded in the correct Tag No. box. The "New" tag that is applied to replace it is also recorded.
- b) Any tags destroyed while being applied need to be recorded as "Broken Tags" (see below).

Broken Tags: Any tags that are broken, badly bent, destroyed, or lost need to be recorded as "Broken Tags". (*In the example, one tag (X5598) was destroyed.*)

Island or Beach: In the AMCA, simply record the name of the island where the turtle is tagged. *(In the example, the turtle was tagged at Kerehikapo island.)*

Sector: Record the beach sector where the turtle was tagged. *(In the example, this was Sector 10.)*

Date: Record the date when the turtle was tagged. *(In the example, this was '12 August 2002'.)*

Time: Record the time of day when the turtle was tagged. Be sure to circle either "am" or "pm". *(In the example, this was '10:15 pm'.)*

Activity: Check the appropriate circle "O":

- "Successfully Laid (SL)" if the turtle laid eggs;
- "Attempted Crawl (AC)" if the turtle dug a nest, but did not lay eggs; or
- "Crawl (C)" if the turtle did not dig before returning to the sea.

(In the example, the turtle dug two egg chambers, but did not lay eggs.)

Clutch Size: If you are able to count the eggs as they are being laid, record the number of eggs laid. Do not dig up the egg clutch in order to count the eggs.

Yolkless Eggs: "Yolkless eggs" are very small eggs that do not have a "yolk". They are commonly laid by Leatherback turtles, but rarely by hawksbills.

Nest Number: Assign each nest containing eggs a number. Number the egg clutches in the order they were laid, starting with "1" at the beginning of the year. *(In the example, the egg clutch was the 144th laid since January 1, 2002.)*

Damage: If the turtle has injuries or other deformities check the appropriate circle(s) "O" to indicate what part of the turtle is affected:

- "Carapace" if the carapace is damaged;
- "LFF" if the Left Front Flipper is damaged;
- "RFF" if the Right Front Flipper is damaged;
- "LHF" if the Left Hind Flipper is damaged; or
- "RHF" if the Right Hind Flipper is damaged.

If the turtle is damaged, sketch the damage onto the drawing of the turtle in the lower left hand corner.

(In the example, the turtle was missing its Right Hind Flipper and part of its Carapace.)

Commensals: Commensals are plants or animals that live on the body of the turtle. Check the appropriate circle(s) "O" to indicate if the turtle is affected by any of the following:

- "Chelonibia": barnacles growing on the surface of the shell or skin;
- "burrowing": barnacles burrowing into the shell or flesh of the turtle;
- "Algae, thick": thick layer of algae on the shell or flesh;
- "Mud, thick": thick layer of mud on the shell or flesh; or
- "Other": if other forms of commensals are noted, describe them on the line provided.

The location of the commensals can be sketched onto the drawing of the turtle in the lower left hand corner.

(In the example, the turtle had no commensals on its body, so no circles were marked.)

Notes: This space can be used to describe damage, commensals, or any other interesting observations regarding the turtle. (In the example, the nature of the damage is described in more detail.)

Nest Location: Check the appropriate circle(s) "O" to indicate the location of the nest on the beach. In most cases more than one circle needs to be checked:

- "above erosion bank": is above the sand cliff eroded by the sea;
- "below erosion bank": is below the sand cliff eroded by the sea;
- "on sloping bank": there is no erosion bank and the nest is located on the slope of the beach. (This situation is most common at the leatherback beaches.);
- "below HW": is below the high water line. In such cases the nest is likely to be destroyed by the sea, and should be relocated to another site.;
- "under tree";
- "under shrub": is under a shrub, and in the shade;
- "in grass";
- "in bare sand": is in bare sand lacking vegetation.

(In the example, the eggs were laid "above the erosion bank", "under a tree", but also in the shade "under a shrub", and "in bare sand.")

Relocated: Check the appropriate circle(s) "O" to indicate whether or not the nest was relocated to a new site. (In the example, the egg clutch was laid above the erosion cliff, so there was no need to move it.)

Number of Egg Chambers: Record how many egg chambers were dug by the turtle. In some cases, the turtle may dig several egg chambers but not lay eggs. (In the example, the turtle dug two ("2") egg chambers, and laid her eggs in the second one.)

Cause of Disturbance: Fill in this section only if:

- the turtle did not lay eggs; or
 - the turtle had to dig more than one egg chamber before laying eggs.
- Some possible causes of disturbance are: roots; rocks; sand too dry; or human interference. (In the example, the first egg chamber was abandoned because the sand was too dry and kept caving in.)

Species: Check the appropriate circle "O" to indicate the species of turtle:

- "hawksbill": hawksbill turtle (*Eretmochelys imbricata*);
 - "green": green turtle (*Chelonia mydas*);
 - "logger": loggerhead turtle (*Caretta caretta*);
 - "ridley": olive ridley turtle (*Lepidochelys olivacea*);
 - "flatback": flatback turtle (*Natator depressa*);
 - "leatherback": leatherback turtle (*Dermochelys coriacea*);
- (In the example, the turtle is a hawksbill.)

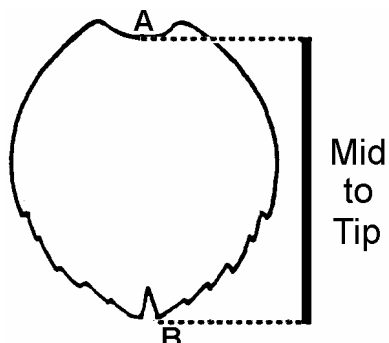
Carapace Length: Use a tape measure to determine the curved carapace length.

CCL: Mid to Tip: Curved carapace length "mid to tip". Record this measurement for all species of turtle encountered. The diagrams on the following page show how to take this measurement.

CCL: Midline: Curved carapace length "midline". Record this measurement only for Green Turtles. The diagrams on the next page show how.

How to Measure CCL: Mid to Tip

For Hawksbills and Green Turtles :

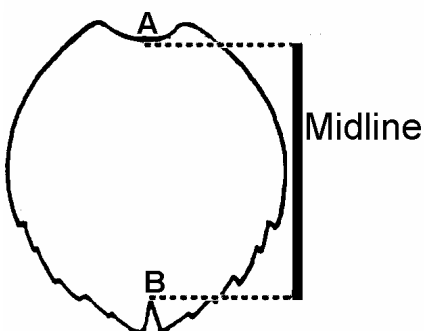


Measure:

from the midpoint where the shell and the skin meet just above the neck (A),
to the most posterior tip of the carapace (choose either the right or the left side, depending on which is longest (B)).

How to Measure CCL: Midline

For Green Turtles only (not Hawksbills)



Measure:

from the midpoint where the shell and the skin meet just above the neck (A),
to the most posterior point on the midline of the carapace (B).

(In the example, the "CCL: Mid to Tip" measurement was 80 cm. No "CCL: Midline" measurement was taken because the turtle was not a Green Turtle.)

Recorders: In the appropriate space indicate who "Measured" and who "Recorded" the data. *(In the example, "Arnold" Measured and "Chris" Recorded the data.)*

DNA Sample ID Number: For nesting turtles in the AMCA, DNA samples need only be collected from Green Turtles.

Label each sample using the following code:
species – activity – ID number.

"Species" would be 'GT' (green turtle).

"Activity" be 'N' (nesting).

"ID number" should be unique for that species and activity.

For example, the first five DNA samples collected from nesting Green Turtles would be the following:

GT – N – 01	GT – N – 03	GT – N – 05
GT – N – 02	GT – N – 04	

(In the example, however, no DNA sample was collected because the nesting turtle was a Hawksbill.)

Tag No.		New	Old
Recapt	R		
	L		
New	R	X	
	L	X	

NESTING TURTLE TAGGING

Year-Month	Page
Entered 0	

Broken Tags: _____

Island or Beach: _____

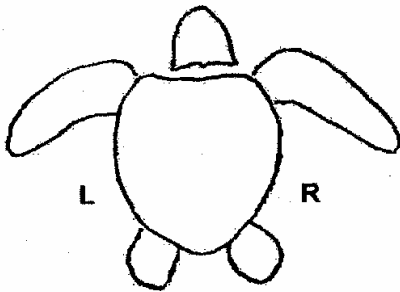
Sector: _____ Date: _____ Time: _____ am
pm

- Activity:**
- Successfully Laid (SL) 0
 - Attempted Crawl (AC)..... 0
 - Crawl (C) 0

Clutch Size: _____

Yolkless Eggs: _____

Nest Number: _____



- Damage:**
- Carapace 0
 - LFF 0
 - RFF 0
 - LHF 0
 - RHF 0

- Commensals, etc.:**
- Chelonibia 0
 - burrowing 0
 - Algae, thick 0
 - Mud, thick 0
 - Other _____

Notes:

- Nest Location:**
- above erosion bank 0
 - below erosion bank 0
 - on sloping bank 0
 - below HW 0
 - under tree 0
 - under shrub 0
 - in grass 0
 - in bare sand..... 0

- Relocated:**
- Yes 0
 - No 0

Number of Egg Chambers: _____

Cause of disturbance:

- Species:**
- hawksbill 0
 - green 0
 - logger 0
 - ridley 0
 - flatback 0
 - leatherback 0

Carapace Length (cm):

CCL: Mid to Tip _____

CCL: Midline _____

Recorders:

Measured _____

Recorded _____

DNA Sample:

ID Number _____

Entered 0

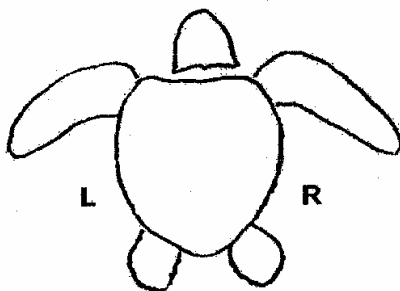
Tag No.		New	Old
Recapt	R		
	L		
New	R	X	
	L	X	

- Activity:**
- Successfully Laid (SL) 0
 - Attempted Crawl (AC)..... 0
 - Crawl (C) 0

Clutch Size: _____

Yolkless Eggs: _____

Nest Number: _____



Broken Tags: _____

Island or Beach: _____

Sector: _____ Date: _____ Time: _____ am
pm

- Damage:**
- Carapace 0
 - LFF 0
 - RFF 0
 - LHF 0
 - RHF 0

- Commensals, etc.:**
- Chelonibia 0
 - burrowing 0
 - Algae, thick 0
 - Mud, thick 0
 - Other _____

Notes:

- Nest Location:**
- above erosion bank 0
 - below erosion bank 0
 - on sloping bank 0
 - below HW 0
 - under tree 0
 - under shrub 0
 - in grass 0
 - in bare sand..... 0

- Relocated:**
- Yes 0
 - No 0

Number of Egg Chambers: _____

Cause of disturbance:

- Species:**
- hawksbill 0
 - green 0
 - logger 0
 - ridley 0
 - flatback 0
 - leatherback 0

Carapace Length (cm):

CCL: Mid to Tip _____

CCL: Midline _____

Recorders:

Measured _____

Recorded _____

DNA Sample:

ID Number _____

Tag No.		New	Old
Recapt	R	X3826	X
	L	X5599	X
New	R		X
	L		X

NESTING TURTLE TAGGING

Year-Month 2002-08 Page 35
 Entered 0

Broken Tags: X5598
 Island or Beach: KEREHIKAPU
 Sector: 10 Date: 12/08/02 Time: 10:15 am
 pm

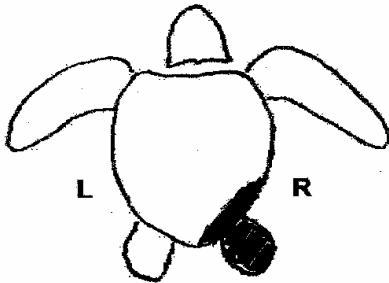
Activity:

- Successfully Laid (SL) 0
 Attempted Crawl (AC)..... X
 Crawl (C) 0

Clutch Size: —

Yolkless Eggs: —

Nest Number: 144



Damage:

- Carapace X
 LFF 0
 RFF 0
 LHF 0
 RHF X

Commensals, etc.:

- Chelonibia 0
 burrowing 0
 Algae, thick 0
 Mud, thick 0
 Other _____

Nest Location:

- above erosion bank X
 below erosion bank 0
 on sloping bank 0
 below HW 0
 under tree X
 under shrub X
 in grass 0
 in bare sand..... X

Relocated:

- Yes 0
 No X

Number of Egg

Chambers: 2

Cause of disturbance:

SAND TOO DRY

Species:

- hawksbill X
 green 0
 logger 0
 ridley 0
 flatback 0
 leatherback 0

Carapace Length (cm):

CCL: Mid to Tip 80
 CCL: Midline —

Recorders:

Measured ARNOLD
 Recorded CHRIS

DNA Sample:

ID Number _____

Notes:

MISSING FLIPPER
 AND PART OF
 CARAPACE

Tag No.		New	Old
Recapt	R		
	L		
New	R		X
	L		X

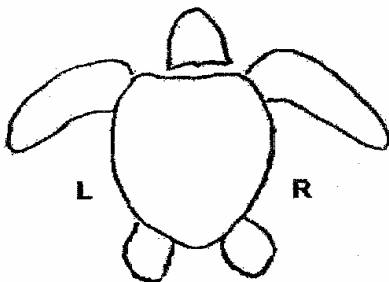
Activity:

- Successfully Laid (SL) 0
 Attempted Crawl (AC)..... 0
 Crawl (C) 0

Clutch Size: _____

Yolkless Eggs: _____

Nest Number: _____



Damage:

- Carapace 0
 LFF 0
 RFF 0
 LHF 0
 RHF 0

Commensals, etc.:

- Chelonibia 0
 burrowing 0
 Algae, thick 0
 Mud, thick 0
 Other _____

Nest Location:

- above erosion bank 0
 below erosion bank 0
 on sloping bank 0
 below HW 0
 under tree 0
 under shrub 0
 in grass 0
 in bare sand..... 0

Relocated:

- Yes 0
 No 0

Number of Egg

Chambers: _____

Cause of disturbance:

Species:

- hawksbill 0
 green 0
 logger 0
 ridley 0
 flatback 0
 leatherback 0

Carapace Length (cm):

CCL: Mid to Tip _____
 CCL: Midline _____

Recorders:

Measured _____
 Recorded _____

DNA Sample:

ID Number _____

Broken Tags: _____ Entered 0
 Island or Beach: _____
 Sector: _____ Date: _____ Time: _____ am
 pm

Damage:

- Carapace 0
 LFF 0
 RFF 0
 LHF 0
 RHF 0

Commensals, etc.:

- Chelonibia 0
 burrowing 0
 Algae, thick 0
 Mud, thick 0
 Other _____

Nest Location:

- above erosion bank 0
 below erosion bank 0
 on sloping bank 0
 below HW 0
 under tree 0
 under shrub 0
 in grass 0
 in bare sand..... 0

Relocated:

- Yes 0
 No 0

Number of Egg

Chambers: _____

Cause of disturbance:

Species:

- hawksbill 0
 green 0
 logger 0
 ridley 0
 flatback 0
 leatherback 0

Carapace Length (cm):

CCL: Mid to Tip _____
 CCL: Midline _____

Recorders:

Measured _____
 Recorded _____

DNA Sample:

ID Number _____

Activity: B. Tagging of Foraging Turtles

Data Sheet: "Rodeo Turtle Tagging"

When to conduct the activity:

Approximately once per month.

Where to conduct the activity:

Green Turtles can be captured by jumping on them from the boat, in the bay in front of the AMCA Research Station at Kerehikapo Island.

Instructions on how to enter data on data sheet:

Data for two turtles can be recorded on each sheet.

Information to Label the Data Sheet:

Year-Month: Record the year and the month when data are collected. (*In the example, the turtle was tagged in May 2002.*)

Page: Number each page in order, starting with "1" at the beginning of each month.

Entered: The circle "O" will be checked after the data have been entered into the computer.

Data to Gather for Each Turtle Tagged:

Tag No.: Record the tags for the right "R" and left "L" flippers in the appropriate boxes, depending on whether the turtle is a 'recapture' or a 'new' turtle.

- a) "Recapt.:" arrives wearing one or more tags; or
- b) "New:" arrives untagged.

For each tag, place an "X" in the correct box depending on whether the tag is "new" or "old". Because any tag applied to a "new" turtle would be a "New" tag, those boxes already have an "X" in them.

(In the example, the turtle is a "Recapture" that arrived wearing one "Old" tag ('X2500') on her Right flipper, and another "Old" tag ('X2501') on her Left flipper. Because her Right tag was in poor condition, it was removed and a "New" tag ('X5322') was applied to her Right flipper to replace 'X2500'. Note that both the "Old" and the "New" Right flipper tags are recorded, even though one was removed from the turtle.)

All turtles should wear two tags. If a "Recaptured" turtle arrives wearing only one tag, a second tag should be applied to the other flipper. A tag should only be removed if it is in bad condition, or has been improperly applied.

The number of every tag needs to be recorded:

- a) If an "Old" tag is removed from a "Recapt." it needs to be recorded in the correct Tag No. box. The "New" tag that is applied to replace it is also recorded. (*It can be recorded as in the example.*)
- b) Any tags destroyed while being applied need to be recorded as "Broken Tags" (see below).

Broken Tags: Any tags that are broken, badly bent, destroyed, or lost need to be recorded as "Broken Tags". *(In the example, no tags were destroyed when the turtle was tagged.)*

Location: Describe the location where the turtle was captured. *(In the example, the turtle was captured in the bay east of the Station.)*

Island: In the AMCA, simply record the name of the island closest to where the turtle is captured. *(In the example, the turtle was captured near Kerehikapo island.)*

Date: Record the date when the turtle was tagged. *(In the example, this was '18 May 2002'.)*

Time: Record the time of day when the turtle was tagged. Be sure to circle either "am" or "pm". *(In the example, this was '2:20 pm'.)*

Damage: If the turtle has injuries or other deformities check the appropriate circle(s) "O" to indicate what part of the turtle is affected:

- "Carapace" if the carapace is damaged;
- "LFF" if the Left Front Flipper is damaged;
- "RFF" if the Right Front Flipper is damaged;
- "LHF" if the Left Hind Flipper is damaged; or
- "RHF" if the Right Hind Flipper is damaged.

If the turtle is damaged, sketch the damage onto the drawing of the turtle in the lower left hand corner.

(In the example, the turtle was missing part of its Left Front Flipper.)

Commensals: Commensals are plants or animals that live on the body of the turtle. Check the appropriate circle(s) "O" to indicate if the turtle is affected by any of the following:

- "Chelonibia": barnacles growing on the surface of the shell or skin;
- "burrowing": barnacles burrowing into the shell or flesh of the turtle;
- "Algae, thick": thick layer of algae on the shell or flesh;
- "Mud, thick": thick layer of mud on the shell or flesh; or
- "Other": if other forms of commensals are noted, describe them on the line provided.

The location of the commensals can be sketched onto the drawing of the turtle in the lower left hand corner.

(In the example, the turtle had two big Chelonibia barnacles in the left forward part of its carapace.)

Weight (kg): Record the weight the turtle in kilograms. *(In the example, the turtle weighed 20.4 kg.)*

DNA Sample ID Number: For foraging turtles in the AMCA, DNA samples should be collected from **all species** of turtle captured.

Label each sample with a unique number, using the following code:
species – activity – ID number.

"Species" would be 'HB' (hawksbill), 'GT' (green turtle), or 'LB' (leatherback); "Activity" would be 'F' (foraging).

"ID number" should be unique for that species and activity.

For example, the first five DNA samples collected from foraging Green Turtles and Hawksbills would be:

GT - F - 01	HB - F - 01
GT - F - 02	HB - F - 02
GT - F - 03	HB - F - 03
GT - F - 04	HB - F - 04
GT - F - 05	HB - F - 05

(In the example, however, the DNA sample was "GT - F - 23" because it was the 23rd DNA sample collected from a Foraging Green Turtle.)

Species: Check the appropriate circle "O" to indicate the species of turtle:

- "hawksbill": hawksbill turtle (*Eretmochelys imbricata*);
- "green": green turtle (*Chelonia mydas*);
- "logger": loggerhead turtle (*Caretta caretta*);
- "ridley": olive ridley turtle (*Lepidochelys olivacea*);
- "flatback": flatback turtle (*Natator depressa*);
- "leatherback": leatherback turtle (*Dermochelys coriacea*).

(In the example, the turtle is a green turtle.)

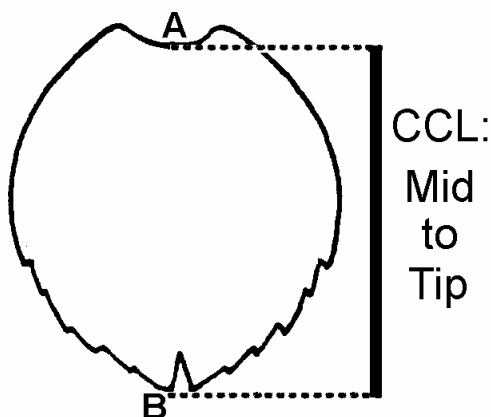
Recorders: In the appropriate space indicate who "Measured" and who "Recorded" the data. (In the example, "Nelson" Measured and "Moses" Recorded the data.)

MEASUREMENTS:

One of the reasons for studying foraging turtles is to determine their **rate of growth**. Because sea turtles usually grow very slowly, it is important to take all measurement very carefully. Each measurement should be taken twice (as a check on accuracy) before it is recorded.

CURVED CARAPACE (CC) Measurements (Using Tape Measure):

CC Length: Mid to Tip (All turtles)

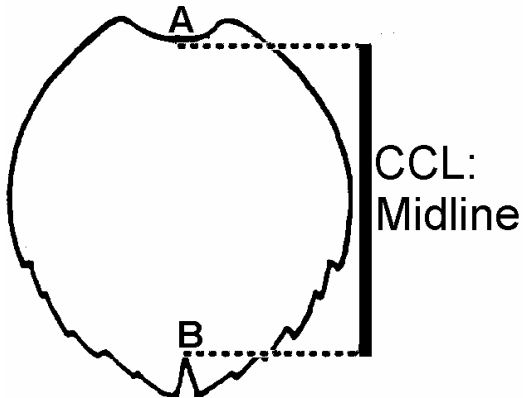


Measure:

from the midpoint where the shell and the skin meet just above the neck (A),

to the most posterior tip of the carapace (choose either the right or the left side, depending on which is longest (B)).

CC Length: Midline (**Green** turtles **only**)

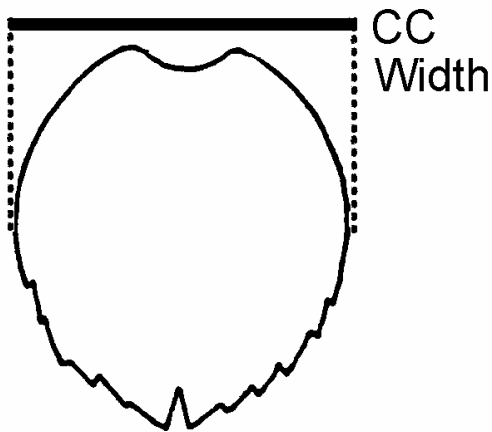


Measure:

from the midpoint where the shell and the skin meet just above the neck (A),

to the most posterior point on the midline of the carapace (B).

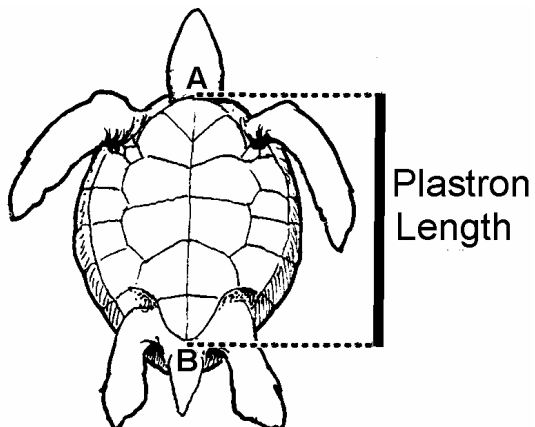
CC Width : (**All** turtles)



Measure:

along the widest part of the carapace. Usually this is near the most forward end of the 2nd vertebral scute.

Plastron Length : (**All** turtles)

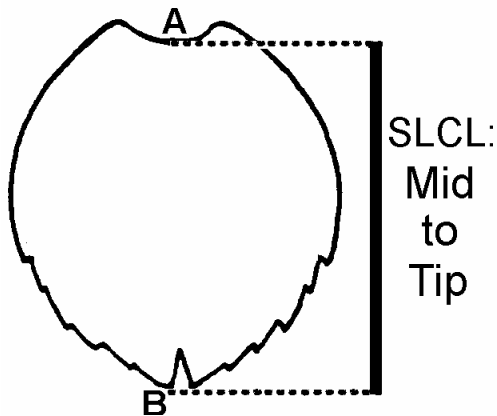


Measure:

along the midline of the plastron, using a tape measure.

STRAIGHT-LINE CARAPACE (SCC) Measurements (Using Calipers):

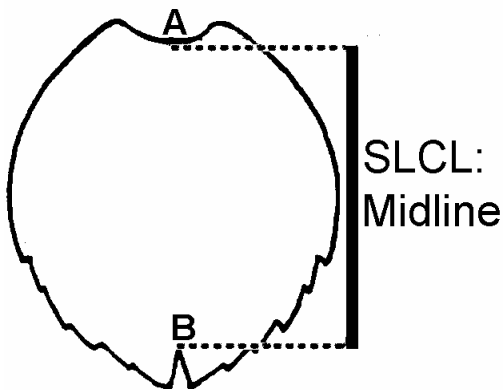
SLC Length: Mid to Tip (All turtles)



Measure:

from the midpoint where the shell and the skin meet just above the neck (A),
to the most posterior tip of the carapace (choose either the right or the left side, depending on which is longest (B)).

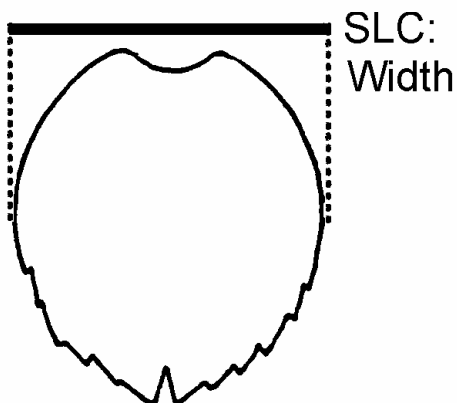
SLC Length: Midline (Green turtles only)



Measure:

from the midpoint where the shell and the skin meet just above the neck (A),
to the most posterior point on the midline of the carapace (B).

SLC Width: (All turtles)



Measure:

along the widest part of the carapace. Usually this is near the most forward end of the 2nd vertebral scute.

Notes: The space labeled "Notes" can be used to describe damage, commensals, or any other interesting observations regarding the turtle. (In the example, notes are recorded about tag removal, barnacles, and damage.)

Tag No.		New	Old
Recapt	R		
	L		
New	R	X	
	L	X	

RODEO TURTLE TAGGING

Year-Month	Page
Entered..... O	

Broken Tags: _____
 Location: _____
 Island: _____ Date: _____ Time: _____ am
 pm

- Damage:**
 Carapace O
 LFF O
 RFF O
 LHF O
 RHF O

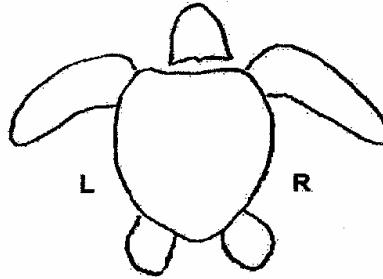
- Commensals, etc.:**
 Chelonibia O
 burrowing O
 Algae, thick O
 Mud, thick O
 Other _____

Weight (kg): _____

DNA Sample:
 ID Number _____

- Species:**
 hawksbill O
 green O
 logger O
 ridley O
 flatback O
 leatherback O

- Recorders:**
 Measured _____
 Recorded _____



- Measurements (cm)**
Curved Carapace (CC) (use Tape Measure):
 CC Length: Mid to Tip _____
 CC Length: Midline _____
 CC Width _____
 Plastron Length _____
Straight-Line Carapace (SLC) (use Calipers):
 SLC Length: Mid to Tip _____
 SLC Length: Midline _____
 SLC Width _____

Notes:

Tag No.		New	Old
Recapt	R		
	L		
New	R	X	
	L	X	

Broken Tags: _____ Entered..... O
 Location: _____
 Island: _____ Date: _____ Time: _____ am
 pm

- Damage:**
 Carapace O
 LFF O
 RFF O
 LHF O
 RHF O

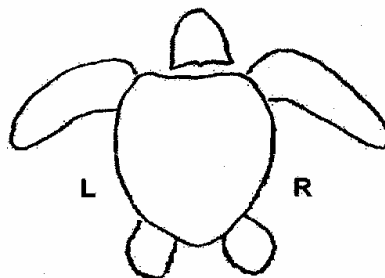
- Commensals, etc.:**
 Chelonibia O
 burrowing O
 Algae, thick O
 Mud, thick O
 Other _____

Weight (kg): _____

DNA Sample:
 ID Number _____

- Species:**
 hawksbill O
 green O
 logger O
 ridley O
 flatback O
 leatherback O

- Recorders:**
 Measured _____
 Recorded _____



- Measurements (cm)**
Curved Carapace (CC) (use Tape Measure):
 CC Length: Mid to Tip _____
 CC Length: Midline _____
 CC Width _____
 Plastron Length _____
Straight-Line Carapace (SLC) (use Calipers):
 SLC Length: Mid to Tip _____
 SLC Length: Midline _____
 SLC Width _____

Notes:

REMOVED

Tag No.		New	Old
Recapt	R	X	X
	L	X	X
New	R	X	
	L	X	

RODEO TURTLE TAGGING

Year-Month <u>2002-05</u>	Page <u>15</u>
Entered..... 0	

Broken Tags: _____
 Location: IN THE BAY EAST OF THE STATION
 Island: KEREHIKAPO Date: 18 MAY 2002 Time: 2:20 am
 pm

Damage:

- Carapace 0
- LFF X
- RFF 0
- LHF 0
- RHF 0

Commensals, etc.:

- Chelonibia X
- burrowing 0
- Algae, thick 0
- Mud, thick 0

Other _____

Weight (kg): 20.4

DNA Sample:

ID Number GT-F-23

Species:

- hawksbill 0
- green X
- logger 0
- ridley 0
- flatback 0
- leatherback 0

Recorders:

Measured NELSON
 Recorded MOSES

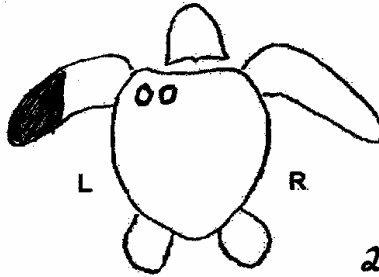
Measurements (cm)

Curved Carapace (CC) (use Tape Measure):

CC Length: Mid to Tip 55.4
 CC Length: Midline 54.4
 CC Width 53.0
 Plastron Length 43.9

Straight-Line Carapace (SLC) (use Calipers):

SLC Length: Mid to Tip 51.5
 SLC Length: Midline 50.7
 SLC Width 43.3



Notes: Tag X2500 removed and replaced by X5322.
 2 CHELONIBIA barnacles.
 Part of LLF missing.

Tag No.		New	Old
Recapt	R		
	L		
New	R	X	
	L	X	

Broken Tags: _____ Entered..... 0
 Location: _____
 Island: _____ Date: _____ Time: _____ am
 pm

Damage:

- Carapace 0
- LFF 0
- RFF 0
- LHF 0
- RHF 0

Commensals, etc.:

- Chelonibia 0
- burrowing 0
- Algae, thick 0
- Mud, thick 0

Other _____

Weight (kg): _____

DNA Sample:

ID Number _____

Species:

- hawksbill 0
- green 0
- logger 0
- ridley 0
- flatback 0
- leatherback 0

Recorders:

Measured _____
 Recorded _____

Measurements (cm)

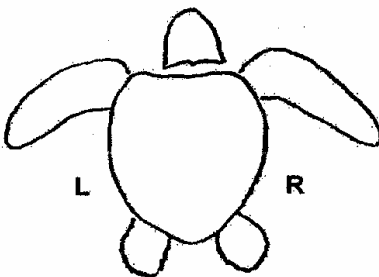
Curved Carapace (CC) (use Tape Measure):

CC Length: Mid to Tip _____
 CC Length: Midline _____
 CC Width _____

Plastron Length _____

Straight-Line Carapace (SLC) (use Calipers):

SLC Length: Mid to Tip _____
 SLC Length: Midline _____
 SLC Width _____



Notes:

Activity: C. Daily Beach Surveys: Kerehikapo

Data Sheet: "Kerehikapo Daily Turtle Track Counts"

When to conduct the activity:

Every morning before 12:00 noon.

Where to conduct the activity:

On the main turtle nesting beach at Kerehikapo Island. Start at Sector 1 and continue to Sector 24. Walk along the beach just **below** the **erosion bank**. Check each track that you find to fill in a "Description of Each Track".

Instructions on how to enter data on data sheet:

Data from more than one day can be recorded on each sheet.

Information to Label the Data Sheet:

Year-Month: Record the year and the month when data are collected. *(In the example, the beach surveys were conducted in July 2002.)*

Page: Number each page in order, starting with "1" at the beginning of each month.

Entered: The circle "O" will be checked after the data have been entered into the computer.

General Information to Describe the Survey:

For each survey fill out the following information on the first line.

Date: Record the date of the morning that the survey is conducted. *(In the example, surveys were conducted on '16 July', '18 July', and '19 July 2002'.)*

Time: Record the time of day when the survey is conducted. Be sure to indicate either "am" or "pm" (ideally, the survey will be conducted in the "am".) *(In the examples, this was '9:15 am', '10:30 am', and '8:30 am'.)*

Recorder(s): Record the name(s) of the person(s) conducting the survey. *(In the example, the survey was conducted by 'Chris' and 'Dicky'.)*

Sectors Surveyed: Record all of the beach sectors that were surveyed. In most cases this will be the entire beach. If part of the beach is not surveyed because it is too rocky for turtle nesting, you should make a note of this. *(In the examples, the entire beach, Sectors 1-24, was surveyed, but the beach on sectors 23 to 24 was too eroded for nesting to occur.)*

Number New Tracks Since Last Count: Record the total number of new tracks since the last survey. You would fill in this information after you have finished making the survey. *(In the examples, "2" tracks were recorded on 16 July 2002, "3" tracks were recorded on 18 July 2002, and "0" tracks were recorded on 19 July 2002.)*

Information to Describe Each Track Surveyed:

Fill out one line for each track encountered.

Sector: Record the beach sector where the track was encountered. *(For example, the 1st and 2nd tracks were found in Sectors '8' and '10'.)*

Species: Record which species of turtle made each track. You can shorten the name as follows:

- "H" : hawksbill turtle (*Eretmochelys imbricata*);
- "G" : green turtle (*Chelonia mydas*);
- "LOG" : loggerhead turtle (*Caretta caretta*);
- "OR" : olive ridley turtle (*Lepidochelys olivacea*);
- "FB" : flatback turtle (*Natator depressa*);
- "LB" : leatherback turtle (*Dermochelys coriacea*);

(In the examples, the only turtles found in the AMCA were hawksbills and green turtles.)

Track Type: Indicate one of the following as appropriate:

- "SL" : Successfully Laid if the turtle laid eggs;
- "AC" : Attempted Crawl if the turtle dug a nest, but did not lay eggs;
- or
- "C" : Crawl if the turtle did not dig before returning to the sea.

(In the examples, all three types of tracks were encountered.)

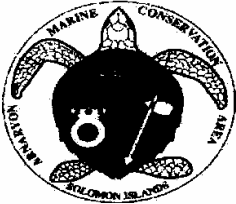
Nest Number: Assign each nest containing eggs a number. Number each egg clutch in the order they were laid, starting with "1" at the beginning of the year.

- For nests recorded while tagging turtles the night before: use those numbers already given.
- For new nests not seen before, give new numbers following on from the last numbers already given.

(In the example, on 18 July 2002, nest number "82" was found while tagging turtles during the night of 16 July. But nest "83" was laid later in the night, and was given a number in the morning during the survey.)

Date (Night) Track Made *(Estimate if necessary):*

- If surveys are conducted every morning, then all the "new" tracks will have been made during the previous night.
- If morning surveys are missed on some days, it will be necessary to estimate on which night each "new" track was made. *(For example, track surveys were conducted on 16 July, but not on 17 July. So, on 18 July it was necessary to estimate which night the new tracks had been made.)*



Kerehikapo Daily Turtle Track Counts

Date (Morning)	Time	Recorder(s)	Sectors Surveyed	Number New Tracks Since Last Count	Description of Each Track				
					Sector	Species	Track Type (SL, AC, C)	Nest Number	Date (Night) Track Made (Estimate if necessary)
16 JULY	09:15 AM	DICKY + CHRIS	1-24*	2	8	H	AC	—	15 Jul
↓	↓	↓	↓		10	H	SL	81	15 Jul
17 JULY	NO	BEACH	PATROL						
18 JULY	10:30 AM	DICKY + CHRIS	1-24*	3	2	H	SL	83	17 Jul
↓	↓	↓	↓		19	H	SL	82	16 Jul
↓	↓	↓	↓		22	G	C	—	17 Jul
19 JULY	08:30 AM	DICKY + CHRIS	1-24*	0	—	—	—	—	—

* NOTE: SECTORS 23-24 TOO ERODED FOR NESTING TURTLES.