Community-Based Sea Turtle Research and Conservation in Dominica: A Manual of Recommended Practices

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Note:

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COMMUNITY-BASED SEA TURTLE RESEARCH AND CONSERVATION IN DOMINICA:

A MANUAL OF RECOMMENDED PRACTICES

Seth P. Stapleton
Karen L. Eckert

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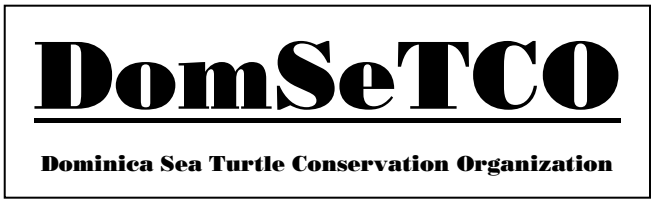

PREFACE AND INTENT

For more than 25 years the Wider Caribbean Sea Turtle Conservation Network (WIDECAST), with Country Coordinators in more than 40 Caribbean nations and territories, has linked scientists, conservationists, natural resource users and managers, policy-makers, industry groups, educators, and other stakeholders together in a collective effort to develop a unified management framework, and to promote a region-wide capacity to design and implement scientifically sound sea turtle conservation programmes.

As a Partner Organization of the UNEP Caribbean Environment Programme and its Regional Programme for Specially Protected Areas and Wildlife (SPAW), WIDECAST is designed to address research and management priorities at national and regional levels, both for sea turtles and for the habitats upon which they depend. We focus on bringing the best available science to bear on contemporary management and conservation issues, empowering stakeholders to make effective use of that science in the policy-making process, and providing an operational mechanism and a framework for cooperation at all levels, both within and among nations.

Network participants are committed to working collaboratively to develop their collective capacity to manage shared sea turtle populations. By bringing people together and by encouraging inclusive management planning, WIDECAST is helping to ensure that utilization practices, whether consumptive or non-consumptive, do not undermine sea turtle survival over the long term. Among these capacity building initiatives is a programme in Dominica, begun in 2003, to demonstrate how sustainable management of depleted sea turtle stocks can be accomplished through community-led processes of engagement, consensus and small business training related to eco-tourism development appropriate to the "Nature Island".

This *Manual of Recommended Practices* is designed to offer guidance to community-based organizations involved in sea turtle population monitoring (on nesting beaches), tagging and measuring of sea turtles, characterizing habitat and nest site selection, documenting hatch success, keeping standardized records, and engaging in public education and outreach. The recommendations are based on the experience and success of Dominica's Rosalie Sea Turtle Initiative (RoSTI), and they follow internationally recognized best practices.

We dedicate this *Manual*, the development of which was made possible through support provided by the U.S. Agency for International Development, to the people of Dominica who are striving to ensure the survival of their sea turtles. Such efforts will surely result in rising populations, and with that recovery will come new economic choices, stronger communities, healthier coastal ecosystems, and a better future for all.

Karen L. Eckert
Executive Director
WIDECAST

ACKNOWLEDGEMENTS

The present-day sea turtle conservation programme in the Commonwealth of Dominica draws its strength from the dedicated efforts of many people over the course of many years. In particular: Adolphus Christian, Stephan Durand, Arlington James, David Williams, Eric Hypolite, Ronald Charles and other Forestry, Wildlife and Parks Division staff; Andrew Magloire, Harold Guiste, Al Philbert and Norman Norris of the Fisheries Division; and Inspector Cuffy Williams and fellow officers of the Commonwealth of Dominica Police Force. This Manual benefits from their experiences, as well as from access to established international norms related to sea turtle field research and conservation programming.

The authors are grateful to Mr. Errol Harris (Dominican Sea Turtle Conservation Organization, DomSeTCO), Mr. Stephen Durand (Forestry, Wildlife and Parks Division), Mr. Harold Guiste (Fisheries Division), Dr. Scott Eckert (WIDECAST) and Dr. Julia Horrocks (University of the West Indies) for their expert review of this document.

We would also like to recognize Mr. Rowan Byrne (University of University of Wales, Aberystwyth) and Mr. Allan Franklin (University of the West Indies, Barbados) for their contributions to sea turtle conservation in Dominica as former Project Directors of the Rosalie Sea Turtle Initiative (RoSTI), and to the following beach patrollers and data collectors who have contributed countless thousands of hours documenting and protecting the sea turtles that arrive each year to lay their eggs on the island's shores: John Alexander, Damian Althnese, Alexander Beaupierre, Jerome Bruno, Jackson Cadette, John Cadette, Osmond Cadette, Nelly Felix, Gracien Fontaine, Andre George, Dexter George, Vernon George, MacDonald Greenaway, Bradley Guye, Julian Frances, Errol Harris, Marcella Harris, Clarisant Joseph, Bonifas Lawrence, Frances Lawrence, Wenslaus Lawrence, Zuane Prescott, Charles Richards, Dennis Roman, Martin Sorhaindo, Charles Watty, Edward Watty, Jolly Williams, Hannah Williams, and Joelle and Glen of the Northeast, in addition to Stephen Durand, Adolphus Christian, and other current and retired Forestry, Fisheries, Police and other Government officers. Similarly, we are grateful for the contributions of the 2003 RoSTI Youth Interns: Beverly Scotland, Mia Beaupierre, Ashlene Giraudel, Darren Esprit, and Regina Joseph

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The next generation. Photo by Didiher Chacón C.

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I. INTRODUCTION

The Caribbean Sea is home to six of the world's seven species of sea turtle. Three of these species are known to nest in Dominica; namely, Leatherback (*Dermochelys coriacea*), Hawksbill (*Eretmochelys imbricata*), and Green (*Chelonia mydas*) turtles (Figure 1; Appendix I). Hawksbill and Green turtles are resident; Leatherbacks migrate seasonally from highseas feeding grounds to lay their eggs on Dominica's windward beaches (Appendix II). Historical accounts include nesting by Loggerhead (*Caretta caretta*) turtles, but this species has not been seen nesting in the 'Nature Isle' in recent memory.

Sea turtles survive remarkable odds – an estimated 1 in 1,000 eggs survive to maturity – and adults often make spectacular long-distance migrations between feeding and nesting grounds during complex life cycles. Sea turtles are late-maturing (reproducing for the first time at ages ranging from 12 to more than 40 years, depending on the species) and they can live more than 50 years, making them one of the oldest creatures in the sea.

Why would anyone want to conserve sea turtles? The reasons might be *economic* (a sustainable fishery, a profitable 'Turtle Watching' programme); *ecological* (Leatherbacks eat poisonous jellyfish, thereby protecting humans and benefiting fisheries; Green turtles help keep seagrass meadows healthy, which in turn stabilize coastal sediments and provide nursery habitat; Hawksbills feed on sponges, helping to maintain species diversity in coral reefs, which in turn stabilize our coast and support fisheries); *aesthetic* (sea turtles comprise a unique and beautiful part of our heritage); and/or *moral* (they awe and inspire us).

Despite the varied reasons people cite for caring about sea turtles, Caribbean (and global) sea turtle populations declined dramatically over the course of the 20th century. Today the World Conservation Union (IUCN) lists all Caribbean sea turtle species as 'Endangered' or 'Critically Endangered', meaning that,

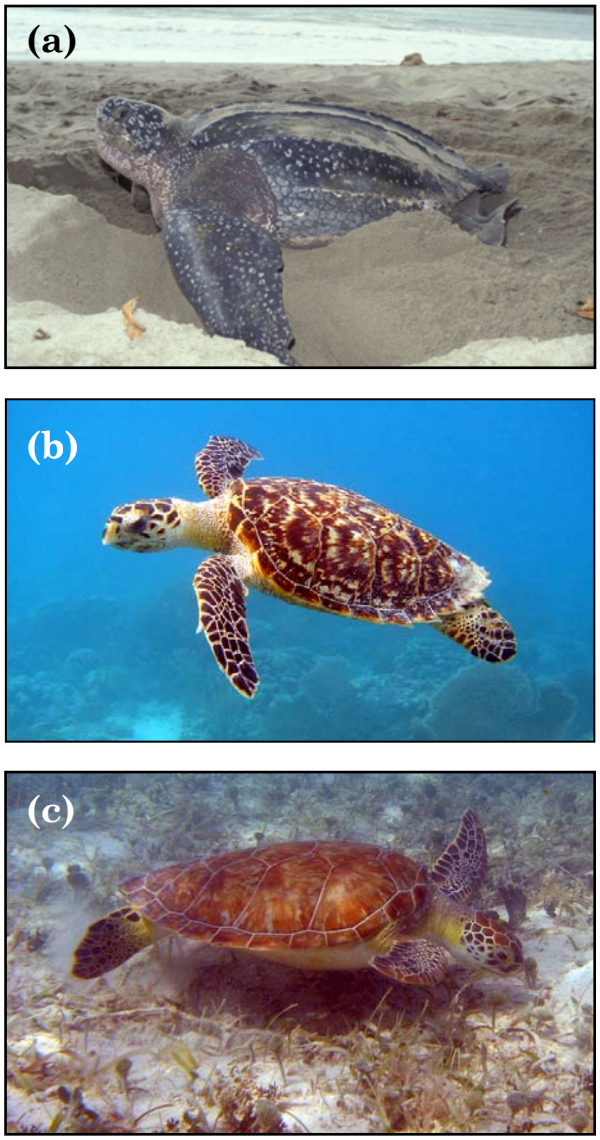


Figure 1. (a) Leatherback, (b) Hawksbill and (c) Green turtles are all known to nest in the Commonwealth of Dominica. Photos: (a) Scott Eckert, WIDECAST, (b-c) Caroline Rogers

worldwide, these species have suffered adult population declines of at least 50% or 80%, respectively, over their last three generations (IUCN 2007). Human threats, including incidental capture by fishing nets, habitat loss and degradation, over-exploitation (including the poaching of turtles and eggs), and pollution are responsible for these declines.

The Rosalie Sea Turtle Initiative (RoSTI), a project of the Wider Caribbean Sea Turtle Conservation Network (WIDECAST), began studying Dominica's sea turtles in 2003, initially focusing on Rosalie Bay and gradually expanding to monitor other nesting beaches along the East coast. Partnering with the Forestry, Wildlife and Parks Division, the Fisheries Division, the private sector, and local communities, RoSTI gathered valuable information about the nesting ecology of sea turtles, including when and where different species nest (Franklin et al. 2004, Byrne and Eckert 2006, Bryne 2006). Nesting occurs throughout the country from the high energy, Atlantic-facing beaches of the East and North coasts to the calmer Caribbean-facing West coast beaches (Figure 2; Appendix II).

Figure 2. (a) Rosalie and (b) Castle Bruce are two of the many beaches in Dominica where sea turtles come to lay their eggs each year. Photos: Seth Stapleton

Communities have played a central role in conserving local sea turtle populations and in documenting the abundance and distribution of seasonal egg-laying – and this role will become even more important in the coming years. By becoming active in sea turtle research, conservation and management efforts, beach patrollers, tour guides and other interested citizens can help to provide a better understanding of the biology of sea turtles. This understanding will, in turn, support recommendations and actions to ensure that the sea turtle resource remains healthy and useful for economic, ecological, and cultural uses.

Regular beach patrols, identification tagging, measuring sea turtles and characterizing nesting habitat, monitoring nest success, and engaging in public education and awareness form the core of Dominica's national sea turtle programme. Each of these activities should be carried out in accordance with international best practices: the objective of this Manual is to define and explain these "best practices".

II. Nesting Beach Patrols

Regular foot patrolling is a well-established research technique (e.g. Schroeder and Murphy 1999) that can provide valuable information about the number (and species) of nesting sea turtles, their favoured nesting sites, and trends in their distribution and abundance. In addition, the presence of beach patrollers often results in reduced poaching activity.

Before becoming involved in nesting beach patrols, it is helpful to have a basic understanding of the nesting process. Sea turtles are highly vulnerable while on land and they can be quite sensitive to lights, noise and movement. For this reason it is essential to limit lights and activity in order to give the turtle every opportunity to complete the nesting process.

After emerging from the surf, the turtle pulls herself onto the beach in search of a suitable nesting site. She selects a nest site, creates a 'body-pit' using her flippers to brush away dry surface sand, and digs the egg chamber (the nest into which the eggs are dropped) using her agile hand-like rear flippers. This process usually takes at least 20 minutes, but digging time may greatly increase if obstacles such as stones, roots or groundwater are present. After the chamber has reached the appropriate depth, the turtle typically lays anywhere from 70 to 160 round, leathery white eggs.

BEACH PACK CHECKLIST

- ☐ 20 clean tags, with tag applicator(s)
- ☐ Approved torch (flashlight) or headlamp
- ☐ Measuring tape(s) of the appropriate length(s)
- ☐ Clipboard, data sheets, pencils
- ☐ Nylon flagging tape, permanent marker
- ☐ Radio or cell phone, charged batteries
- ☐ Rain gear, insect repellent

During the egg-laying phase a sea turtle is relatively less responsive to activity around her – she can be approached by trained data collectors, or viewed more closely by visitors accompanied by a licensed guide. Despite the large number of eggs, egg-laying only takes about 8-15 minutes before the turtle backfills the chamber with sand and 'camouflages' the area (by tossing sand with her flippers) before returning to the sea.

Beach patrolling is challenging work. Walking in soft sand all night, in all kinds of weather, requires energy and dedication! Be prepared when you head out to the beach: carry a ***Beach Pack*** (see *Insert*) and take care to protect specialty items such as GPS units, PIT tags and scanners, cameras, etc. from sand, ocean spray and weather.

During peak nesting season, patrol the beaches as frequently as possible. Having patrollers on the beach nightly is optimal but may not always be practical. Be sure to consider the nesting season and preferred nesting beach types for each species of sea turtle (see *Insert*).

SEA TURTLE NESTING IN DOMINICA

	When?	*Where?*	*How many eggs?*	*How many nests?*
Leatherback	Peak nesting from April to June	High energy beaches along the East and North coasts	About 80 eggs per nest and many smaller, 'yolkless' eggs	Average 5-7 nests per season (reported from the scientific literature)
Hawksbill	Occasional nesting year-round; Activity may increase from June – October	Small, isolated beaches with mature vegetation, particularly on the West coast	About 150 eggs per nest ('yolkless eggs rarely seen)	Average 4-5 nests per season (reported from the scientific literature)
Green Turtle	Occasional nesting year-round; Activity may increase from June – September	Usually high energy beaches with wide stretches of open sand	About 120 eggs per nest ('yolkless' eggs rarely seen)	Average 3-4 nests per season (reported from the scientific literature)

Marine turtles typically nest during the night, and experience has shown that turtles generally complete the nesting process in 60 to 90 minutes. By conducting patrols at least hourly, patrollers will encounter most, if not all, turtles before they return again to the sea.

Note: "Hourly" patrol means that no part of the beach is left unpatrolled for more than one hour, not that you patrol only once per hour. If, for example, it takes you 15 minutes to walk down the beach, then you can rest for 30 minutes before you walk back – meaning that you are back where you started in no more than one hour's time.

Start patrols no later than one hour after sunset and continue until sunrise. Early morning foot patrols should be used to record nesting activity that might have been missed when all-night patrol is not possible.

Spotting sea turtle crawls amongst human footprints can be difficult at first. However, a bit of practice makes recognizing crawls easy! Hold a dim flashlight low and nearly parallel to the ground to illuminate the beach, but don't let the beam shine too far ahead of you. When you see a crawl (Figure 3), determine if the turtle is still on the beach and, if so, what she is doing. Turn off your flashlight so as not to disturb the turtle; let your eyes adjust and scan the area. Approach the turtle from behind to determine her activity.

If you do not see the turtle, slowly follow the crawl until you locate her position. If the turtle has not begun to lay eggs and the beach is not long, you may have time to finish the patrol and return to the turtle for data collection.

If she is already laying her eggs (or covering her nest), *check for flipper tags as a priority* so that her identity can be known.

IDENTIFY THAT CRAWL!

- Leatherback
  - Crawl Pattern: Symmetrical (front flippers move in unison)
  - Maximum Width: 150 – 250 cm
- Hawksbill
  - Crawl Pattern: Asymmetrical (front flippers alternate, one then the other)
  - Maximum Width: 70 – 85 cm
- Green
  - Crawl Pattern: Symmetrical (front flippers move in unison)
  - Maximum Width: 100 – 130 cm

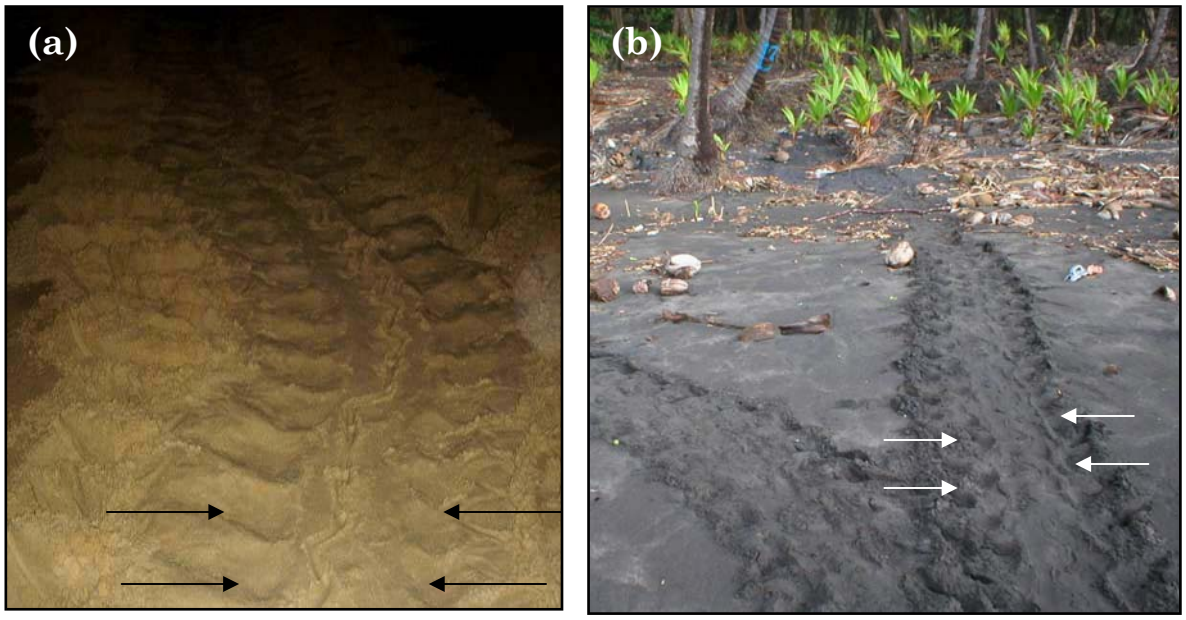


Figure 3. (a) Leatherback crawls are symmetrical; (b) Hawksbills, which tend to nest in or near beach vegetation, have an asymmetrical crawl pattern (i.e. one front flipper moves forward, then the other). Photos: (a) Seth Stapleton, (b) Rowan Byrne

A "false crawl" – meaning that the turtle returns to the sea without laying any eggs – is a common occurrence resulting from factors ranging from very dry (or very wet) sand to barking dogs or other disturbances. Whether the nesting is successful or unsuccessful, drag your foot across the track, making a large 'X', so the crawl will not be double-counted in your nightly tally.

If the turtle is no longer on the beach, you will need to rely on "crawl signs" to identify the species and the outcome of the crawl. First, make certain that the crawl leads back to the sea – if it does not, the turtle is still on the beach! Consider the outcome a NEST *only* if you observe eggs. In the absence of visual confirmation of eggs, an area with a large amount of disturbance that appears to be a nest site can be classified as a SUSPECTED NEST. Suspected nests can later be confirmed if, for example, hatchlings are seen.

A FALSE CRAWL is indicated when there is no body pit or the egg chamber was clearly abandoned before eggs were laid.

The species can often be determined if the crawl or nest is fresh. Crawl width and symmetry are species-specific (see *Insert*, "Identify that Crawl!"). Habitat characteristics can also be useful. A deep body pit in an open, sandy nesting site is most likely a Green turtle (Figure 4), whereas a modest disturbance close to vegetation is more likely a Hawksbill.

Figure 4. Green sea turtles typically create a deep nesting pit. Photo: Edith van der Wal (Aruba)

III. Tagging Sea Turtles

While beach patrols provide information about the number and species of sea turtles using particular beaches, marking individual turtles for long-term identification can provide more detailed information, such as how many years pass before a female returns to Dominica to nest again, how many nests an individual turtle lays in a year, etc. Tagging also provides data about sea turtle size and growth. Finally, knowing the identity of a turtle can shed light on long distance movement; for example, tags are often reported or returned when a turtle is located or killed in another country.

The 2007 nesting season in Dominica provides an excellent example of the information that can be gathered from marking turtles. In 2007, each Leatherback tagged while nesting in Dominica was seen, on average, three times and each laid an average of 2.6 confirmed nests (Stapleton and Eckert 2007). (*Note*: This number would have been higher had each and every nest been observed and recorded.)

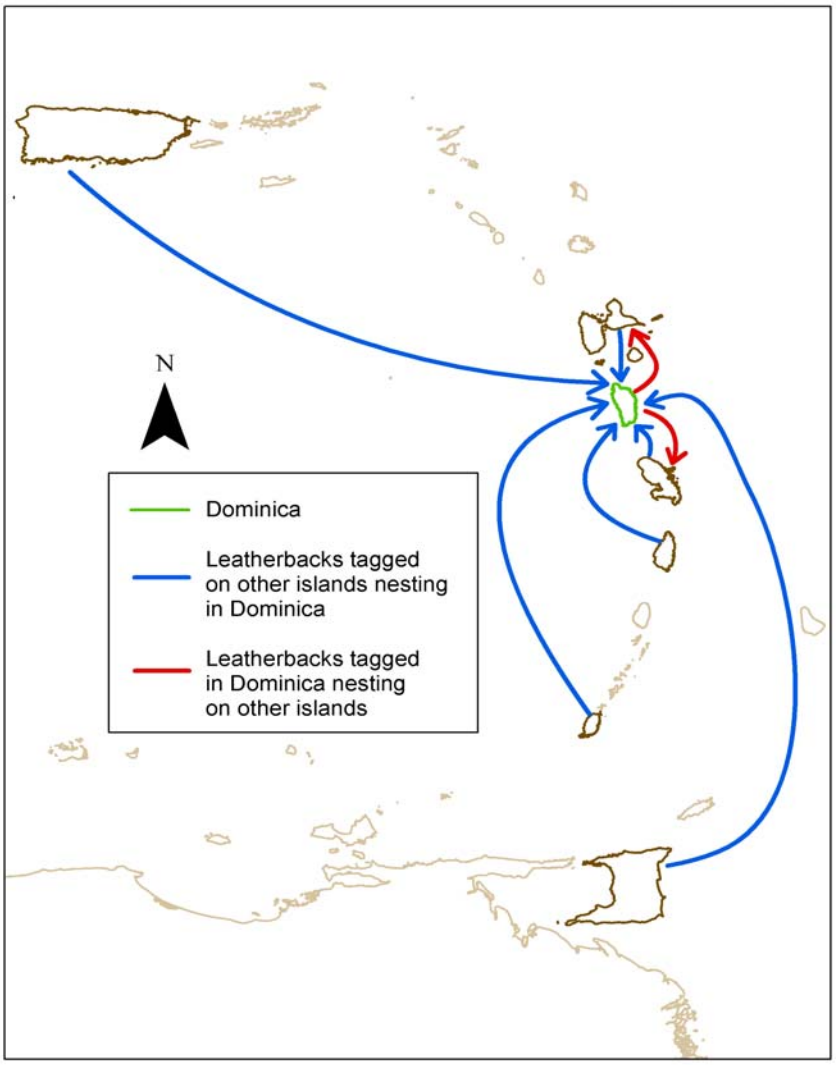


Figure 5. Nesting leatherbacks moved between Dominica and several other Caribbean islands during 2007. Source: adapted from Stapleton and Eckert (2007)

Five Leatherbacks tagged by other sea turtle monitoring programmes (Puerto Rico, St. Lucia, Grenada, and Trinidad) also nested in Dominica in 2007, and 8 Leatherbacks traveled between Dominica, Guadeloupe and Martinique (see Stapleton and Eckert 2007) (Figure 5).

Similarly, more than half of all Leatherbacks tagged while nesting in Dominica in 2007 were seen on more than one nesting beach in Dominica. For example, Leatherbacks seen nesting at La Plaine might later be found laying eggs at Rosalie or Londonderry (Stapleton and Eckert 2007).

A number of methods are available for marking turtles, ranging from painting and shell notching to metal or plastic flipper tags and computer microchips (Eckert and Beggs 2006). Each technique has its benefits and drawbacks, and methods are generally chosen based on project objectives and financial considerations (some tags are more expensive than others). The two most common tags are external flipper tags and internal PIT (Passive Integrated Transponder) tags.

Flipper tags are modified livestock ear tags applied with a specialized applicator. Applied correctly, the tag tab pierces the turtle's flesh and a clasp secures the tag to the flipper. A unique identification number and return address are inscribed on either side of each metal flipper tag. Metal flipper tags are widely used and relatively inexpensive. PIT tags, computer microchips about the size of a grain of rice and more expensive than flipper tags, are injected under the skin and provide a more permanent mark.

Getting Started

The tagging procedures described here have been adapted from Eckert and Beggs (2006) and their manual should be consulted for additional detail.

Metal flipper tags are coated in animal-based oils (often ostrich oil!) during production, and these oils can result in infection. Always clean tags thoroughly to remove the oily residue before you apply the tag to the turtle's flipper. Use a biodegradable cleaning solution, such as Simple Green®, to wash the tags and follow-up with hot, soapy water and a 24-hour soak in alcohol. Rinse and dry tags prior to storage and use. A thorough cleaning reduces the risk of infection and increases the probability that the tag will remain on the turtle for many years.

Each Beach Pack should be given a certain number tags (10-20), based how many turtles the patroller might see that night.

Record all tag numbers as soon as the tags are distributed. Each patroller is responsible for his or her tags. A small plastic bag, safety pin, or fishing line will help to keep flipper tags organized in the Beach Pack during beach patrols.

FLIPPER TAGGING CHECKLIST

- ☐ CLEAN all flipper tags thoroughly as soon as you receive them
- ☐ RECORD all tag numbers immediately
- ☐ On the beach, WAIT until the turtle is laying eggs before you approach to tag her
- ☐ Check ALL 4 FLIPPERS for existing tags
- ☐ Select the correct TAG, and tagging SITE
- ☐ RECORD tag number(s) on your data form
- ☐ APPLY tags with a firm, swift motion
- ☐ Be sure that the tag is attached properly, and RE-CHECK the tag number
- ☐ Make sure that each turtle has TWO flipper tags before she leaves the beach!

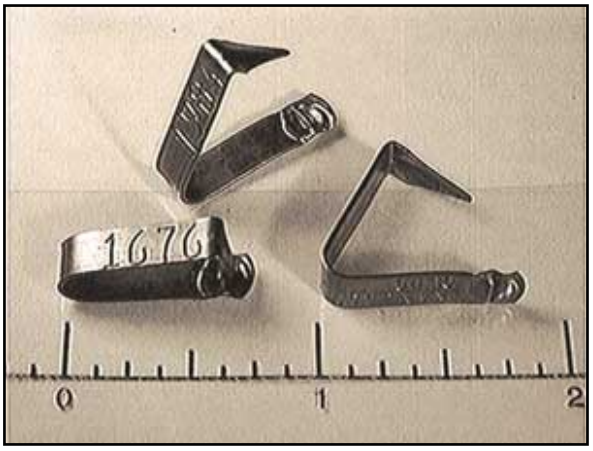
Flipper Tagging

Nesting sea turtles are protected in Dominica (Appendix V). Tagging sea turtles requires a permit from the Forestry, Wildlife and Parks Division, and formal training is required prior to tagging.

For Leatherbacks, the larger 'monel' tags are placed in the thinnest section of skin between a rear flipper and the tail (Figure 6). Run your fingers along the flesh until you identify the thinnest portion of skin. Do not place the tag too close to the tail!

Leave a small amount of space (a few millimeters) between the curved edge of the tag and the edge of the flipper.

Hard-shelled sea turtles (Greens, Hawksbills) should be tagged on the front flippers in the flipper 'pads' closest to the shell (Figure 6).



Use the larger 'monel' tags or the smaller 'inconel' tags (pictured at right) with Green turtles. Use only the smaller 'inconel' tags with Hawksbills.

First, ***examine thoroughly all four flippers*** – front and rear – for tags. Other projects may tag in different location or use different types of tags than you do. Make note of possible tag "scars" which might appear as holes or tears in the turtle's flesh or flipper pads. If a turtle is already carrying tags, she does not need additional tags.

Before applying any new tag(s), be sure to read the tag number(s) carefully and write them in the appropriate place on the data form.

After the tags have been applied, ***re-check*** that the correct tag numbers have been recorded. It is easy to misread a tag amidst the excitement of a nesting turtle and crowds of people!

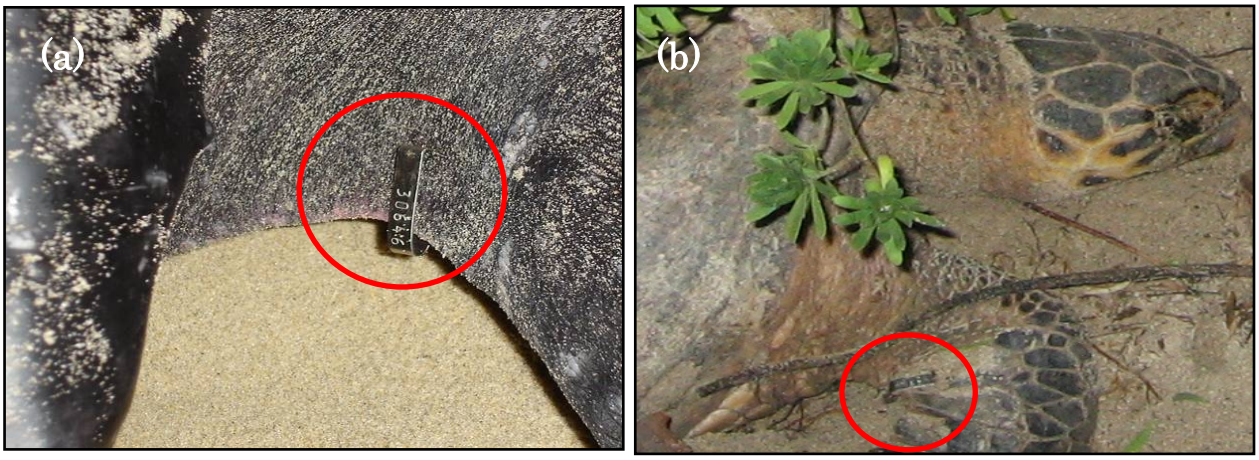


Figure 6. In Dominica, (a) flipper tags are applied to a Leatherback in the skin between the tail and the hind flipper (note the posterior point of the carapace on the left edge of the photo); (b) flipper tags are applied to a Hawksbill or Green turtle through the center of the first or second 'pad' (on the trailing edge of the front flipper) closest to the body. Photos: Seth Stapleton

Nesting turtles should have two flipper tags before they leave the nesting beach. 'Double-tagging' increases the chance that at least one tag will remain to identify the turtle in future years.

Do not approach a turtle for tagging until she enters the 'nesting trance', and then wait until the mid stages of egg-laying to begin tagging. Do **not** interfere with a sea turtle that is still in the process of selecting a nest site, body-pitting, or digging the nest. During pauses in her crawling (or digging) you may be able to read rear flipper tags discreetly using a dim light, approaching her from behind.

It is difficult (for you) and stressful (for the turtle) to tag her as she is returning to the sea. Restraining a sea turtle, especially a Leatherback, can be impossible. An organized and consistent patrol schedule is the best strategy for encountering turtles early in the nesting cycle, and successfully tagging them.

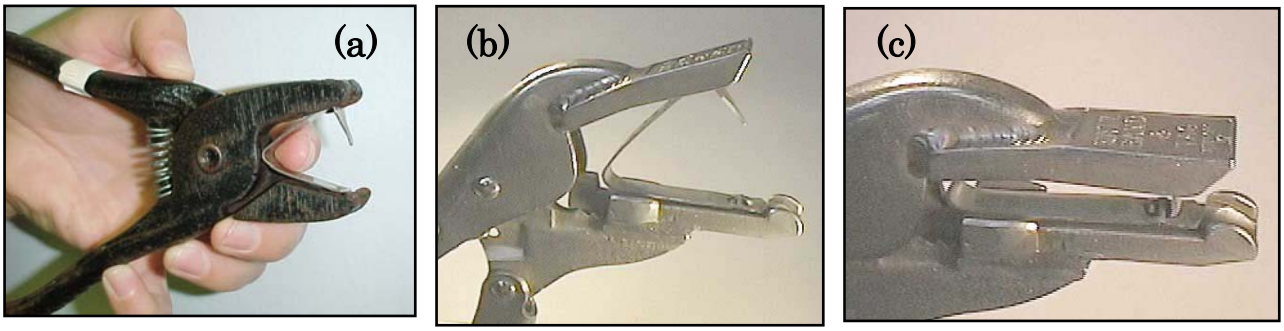


Figure 7. A Monel 1005-49 style metal flipper tag (a-b) correctly loaded and (c) cinched in the application pliers. ALWAYS align the base plate of the tag flat against the pliers. Note the tine bent over and completely through the stirrup. Source: http://www.nationalband.com/nbt.pdf

Figure 8. Use a firm, swift motion to apply flipper tags to nesting sea turtles. Photo: Seth Stapleton

Tagging applicators (or pliers) are used to attach flipper tags. Select the appropriate tag and applicators.

Load the tag by pressing the 'V' end of the tag into the applicator pliers until it fits snugly into place (Figure 7).

When the tag is correctly seated in the applicator pliers, both hands are needed to squeeze the applicator in a firm, smooth motion to ensure that the tag cinches properly (Figure 8).

After applying the tag, check the underside of the tag to verify that the tab is closed, the tag is securely attached, and the tag is not pinching the flipper.

Hint: to get a better feel for how much pressure to apply, it is useful to practice tagging on a sheet of heavy cardboard.

The turtle may move slightly during tagging; a swift, strong tagging motion helps to reduce any reaction to the tagging. If you sense that the turtle was disturbed by tagging, take a few steps back, turn off your lights, and wait a few moments before continuing.

If a tag must be removed for any reason, use two pairs of needle-nosed pliers to grasp and unclasp the tag, or use wire-cutters to cut the tag and pull it carefully through the turtle's flesh. Put any removed tags in your Beach Pack, do not discard them on the beach. Record on the data form the number of the tag you removed. Write down why the tag was removed and carefully record the number(s) of any new tag(s) applied.

Do not remove existing tags unless they are causing harm (such as infection) to the turtle. Instead, record the tag numbers and, if the tag was not issued to your project, flip the tag over and write down the return address. Contact the WIDECAST Marine Turtle Tagging Centre (Prof. Julia Horrocks, Coordinator: (246) 417-4320, julia.horrocks@cavehill.uwi.edu) at the University of the West Indies in Barbados to report tag numbers applied by scientists in other countries, or submit this information to DomSeTCO, the Forestry, Wildlife and Parks Division, or the Fisheries Division in Roseau.

PIT Tagging

Applying PIT (Passive Integrated Transponder) tags is considered to be more invasive than applying flipper tags and should be done only under the guidance of workers experienced with the technique. If you are considering this technique, contact the WIDECAST Marine Turtle Tagging Centre and seek advice from experienced PIT tagging colleagues in the Caribbean region.

PIT tagging is not a substitute for flipper tagging, but is best used together with flipper tagging. A PIT tag is injected under the skin, generally into muscle, using a needle applicator provided by the manufacturer (Figure 9). Most PIT tags and applicators are pre-sterilized and packaged for field use.

Figure 9. A PIT tag injected into the front right shoulder of an adult Leatherback. Photo: Seth Stapleton

For further detail on PIT tag purchase, field use, and record-keeping, please refer to Eckert and Beggs (2006) "*Marine Turtle Tagging: A Manual of Recommended Practices*".

IV. MEASURING SEA TURTLES

Measuring the carapace (shell) of a sea turtle provides information on the turtle's growth from year to year, as well as information about the average size of the sea turtles that nest in Dominica. Sea turtles are measured either in a straight line using tree calipers, or over-the-curve using a flexible measuring tape.

Curved Carapace Length notch-to-tip (CCLn-t) is the distance from the nuchal notch (the shell edge directly behind the head) along the mid-line to the shell's furthest tip. Curved Carapace Width (CCW) is the maximum shell width (Bolten 1999). See Figure 10.

Use a flexible measuring tape to obtain the CCL and CCW measures. For CCLn-t, place the end of the tape at the shell edge (nuchal notch), straighten the tape along the length of the shell, and record the measurement at the most distant portion of the shell (Figure 11a).

For CCW, align the '0' of the tape with one edge at the widest portion of the shell, just behind the front flippers (Figure 11b). Stretch the tape over the shell to the opposite edge so that the tape is perpendicular to the CCLn-t measure.

Leatherbacks are large (CCL often exceeds 1.5 meters!), and two people may be required to measure size accurately.

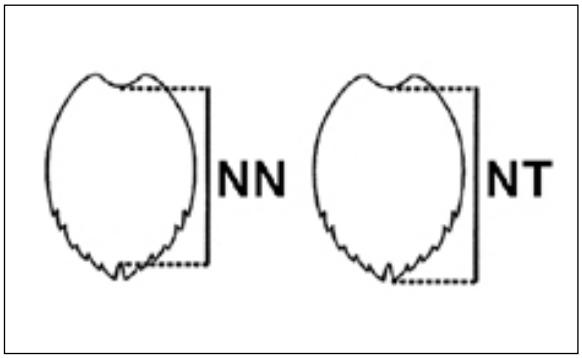


Figure 10. CCLn-n ("NN") extends from the nuchal notch in the shell to the notch above the tail. CCLn-t ("NT") extends from the nuchal notch to the furthest shell tip. **Use "NT" !**

Figure 11. Researchers measure (a) Hawksbill CCLn-t in Antigua and (b) Leatherback CCW in Dominica. Photos: (a) M. Watkins-Gilkes, (b) Seth Stapleton

When using a measuring tape, be sure the tape lies flat and in a straight line; remove kinks from the tape and excess sand from the shell. Always record the measurement in centimeters (cm), and make careful note of injuries, deformities, or other distinguishing features such as barnacles or algae (Figure 12). Injuries provide an index of turtle encounters with predators, fishing gear, and boats, and unusual characteristics can help identify a turtle that has lost its tags. If possible, include a sketch or photograph with the data form.

Figure 12. Injuries and distinguishing features, such as (a) barnacles on a Hawksbill's shell, (b) an amputated rear flipper and (c) lacerations caused by (d) fishing gear are important to note on the data form. Some injuries, such as when the shell is broken or shortened, can result in inaccurate measurements and should be noted clearly on the data form. Photos: Seth Stapleton

V. CHARACTERIZING HABITAT

To better understand how sea turtles use Dominica's beaches, and what type of habitat(s) they prefer, always record basic measures that characterize the nesting site. Over the years, this information will help managers understand how patterns of beach use, nest site selection, nest loss to erosion, etc. can change over time.

Divide the beach length into sectors of approximately equal size. Structure the sectors to best characterize your beach, providing a suitable (but not excessive!) amount of detail. For example, a 300 meter long beach may be divided into 10 segments of 30 meters in length or 6 segments of 50 meters in length. It would not make sense to divide a 300 meter beach into 150 2-meter segments (too much detail) or 2 150-meter segments (not enough detail)!

Natural landmarks such as streams or rock outcroppings can provide ideal beach divisions. In addition, 'permanent' features such as large tress or rocks, a road entrance, or a built structure near the beach can mark beach sectors as described above. When existing land-marks are unavailable, place signs, posts or rocks (at the vegetation line), as necessary, to mark beach sectors. To ensure that the boundaries are visible by flashlight (torch) at night, number your markers with reflective tape or white (or reflective) paint.

Make a map of your beach sectors and their labeled markers, including photocopies, and store these in a safe place. This is an important document and will be needed every year.

A Global Positioning System (GPS) uses satellite technology to calculate an exact position. Different GPS units record data differently, so be careful that you understand the details. Record the latitude and longitude on the data form.

In addition to location, document the following on the data form (see *Record-Keeping*, and Appendix IV):

- Distance to the high water line (HWL) – defined as the distance from the nest to the furthest reach of tidal waters, often marked by a row of debris and seaweeds. Using the large measuring tape, align the '0' with the nest, have a partner hold the tape in place, and walk toward the sea with the other end of the measuring tape in-hand until you reach the high water mark. Record your measurement to the nearest tenth of a meter.

- Distance to the vegetation edge (VE) – defined as the distance from the nest to the edge of the closest line of permanent vegetation. Again, align the '0' with the nest, have a partner hold the tape in place, and walk to the nearest vegetation edge with the other end of the tape in-hand. Record your measurement to the nearest tenth of a meter. If the nest is located in vegetation, measure VE in the same manner and record on the data form that the nest was located in the vegetation.

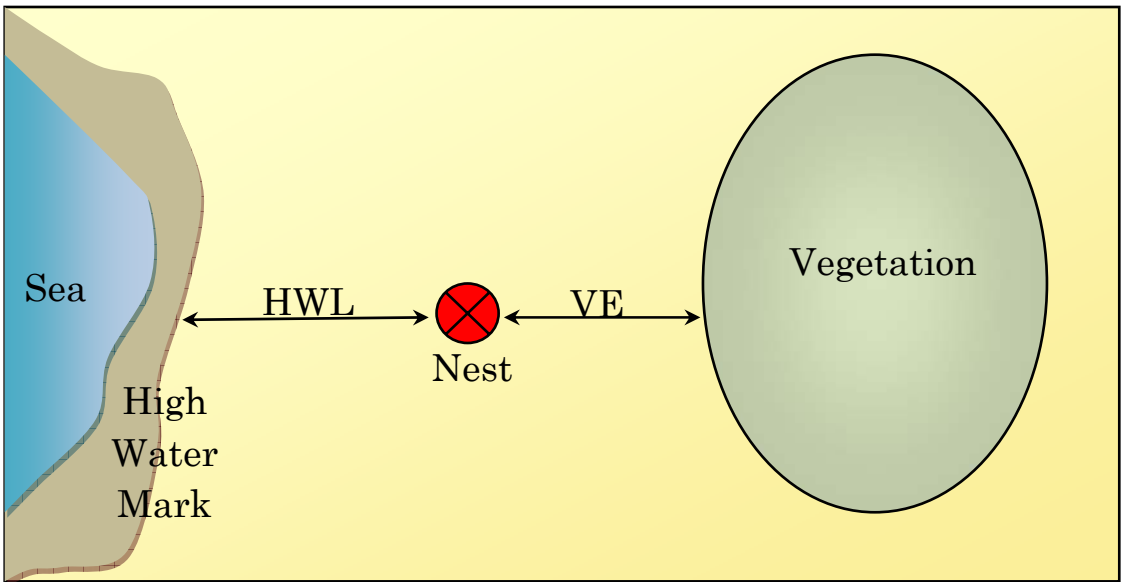


Figure 13. HWL is measured from the nest to the highest point that the water has reached, and VE is measured from the nest to the edge of the closest vegetation.

VI. Moving Sea Turtle Eggs

In Dominica, nesting sea turtles and eggs are protected by law (Appendix V). ***Handling sea turtle eggs without a permit from the Forestry, Wildlife and Parks Division is an illegal act.***

Leatherbacks, in particular, prefer "high energy" beaches and there is a natural amount of egg loss to erosion each year. Managers can counter this loss by moving eggs laid in high risk areas, to areas of lower risk. For example, eggs can be moved to an area higher on the same beach (closer to the vegetation) or to a nearby beach where erosion is less likely.

Of course eggs must always be moved properly and in accordance with international best practices: eggs should be moved within 12 hours of egg-laying, they should be moved gently and carefully (to minimize breakage or damage), and they should be moved to a beach that has suitable incubation characteristics (e.g. similar sand composition), preferably one where sea turtles from the same colony are known to nest.

Before we discuss the specifics of nest relocation, it is useful to have a little background on nest site fidelity – meaning a turtle's tendency to return repeatedly to a particular beach. Popular belief holds that an adult female will return to nest precisely on the beach from which she hatched. While sea turtles show a strong attraction to the general area of their birth (for example, the East coast of Dominica), Leatherbacks show a bit less site fidelity than do other sea turtle species (for a recent summary, see Bräutigam and Eckert 2006). Leatherbacks are more likely to consider a small island's entire coastline (which may include several sandy beaches) as a single nesting ground.

Data collected in Dominica demonstrate this behaviour: more than half the Leatherbacks reported on Dominica's nesting beaches in 2007 were recorded on multiple beaches over the course of the nesting season. Some even traveled between Dominica and other Caribbean islands, depositing clutches of eggs in more than one country (Stapleton and Eckert 2007). Over time this has been a successful strategy for this species – with the Leatherback's habit of nesting on coastlines with strong wave action, an entire season's young might be lost to erosion if all the eggs were laid in one place.

To reduce the risk of egg loss to erosion (or poaching), "nest relocation" – the act of removing the eggs from their natural nest and creating a new, exact copy of the nest somewhere else – is a widely used management option. The following nest relocation procedures are modified from Boulon (1999) and Mortimer (1999). For more detail, please review the original sources (find these online at www.widecast.org).

Cautionary note: It is always best to allow eggs to remain in their original setting if erosion, over-wash, or poaching do not present a significant risk. Relocate eggs only as a last resort, and remember that Government permits are required.

Eggs contain fragile embryos that will not survive rough handling. If the nest must be moved, use extreme care during the collection, transfer, and reburial of eggs. Collect the eggs as they are laid, placing them gently into a clean bag or bucket set next to you in the sand.

NEST RELOCATION CHECKLIST

☐ Relocate eggs ONLY IF absolutely necessary, and then as soon as possible!

☐ CAREFULLY collect eggs in a clean bag or container

☐ Locate a SAFE, nearby reburial site

☐ GENTLY transfer eggs to the reburial site

☐ Be the turtle! Dig a new nest BY HAND, and confirm that the new nest is the right depth

☐ CAREFULLY (by hand!) place the yolked eggs in the nest; smaller, yolkless eggs go on top

☐ BACKFILL the nest with damp sand, gently tamping the sand as you continue

☐ Place NEST MARKER in the nest, map the nest's location, and record it on the data form

Some people prefer to fit a plastic bag into the nest, such that the eggs are laid directly into it. In that case, care must be taken to dig the bag out, generally from the back of the nest. The natural "light-bulb" (flask) shape of the nest means that you cannot pull the bag straight up and out without breaking the eggs.

If a nest has already been covered, locate and excavate the eggs with care (see *Nest Emergence and Excavation*).

To reduce the risk of bacterial transmission during next excavation, wear latex gloves. If the eggs are in a bucket, prevent moisture loss by covering them with a damp (not wet) cloth. Measure and record the depth and width of the original nest chamber so that you will have a guide for the dimensions of the new nest chamber (Figure 14).

Figure 14. (a) A Leatherback lays her eggs and (b) a RoSTI staff member reburies a nest at Londonderry Beach, Dominica. Photos: Seth Stapleton

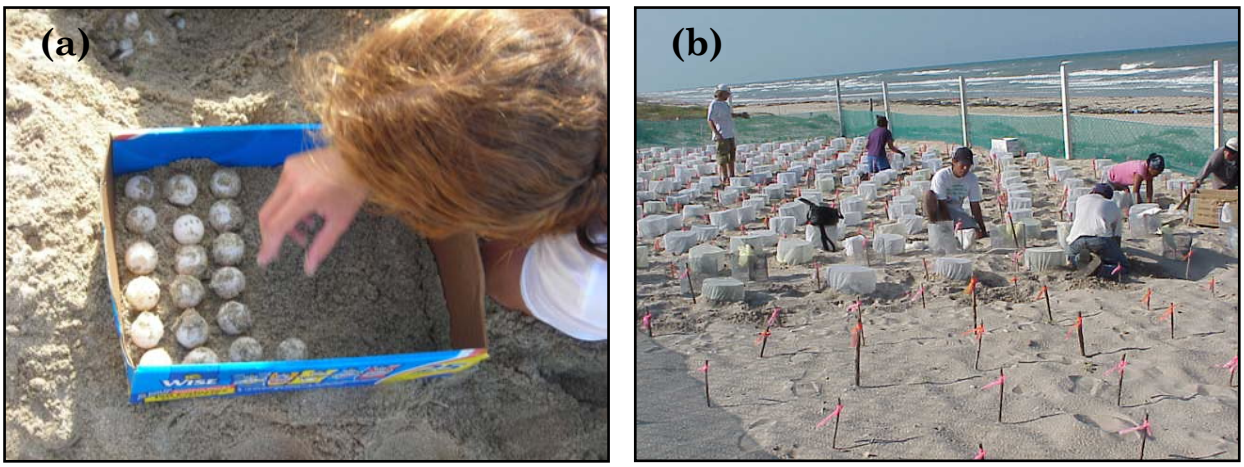


Figure 15. Images from elsewhere: (a) eggs collected for relocation in Nevis, West Indies and (b) nests carefully reburied at 1-meter intervals at Rancho Nuevo, Mexico. Photos: (a) Alicia Marin, (b) Jamie Pena.

Once the eggs have been collected, they must be reburied as quickly as possible, preferably within one hour. Identify a suitable reburial site nearby, ideally on the same beach. Minimize the distance traveled and, if possible, eliminate the need for vehicle transport. Do **not** travel excessive distances to relocate nests; for example, you would not transport a nest from Portsmouth to Rosalie. If a vehicle is required, take care that the eggs are held securely in place and do not chill the eggs through exposure to air-conditioning.

Nests should not be reburied too close together – a good rule is that nests be reburied no closer than 1 meter (3 feet) apart on all sides (Figure 15b). After selecting a suitable site, use your hands to dig a new nest chamber. Match the dimensions of the new nest to those of the original nest. As a guide, Leatherback nests are typically about 70 cm deep, Green turtles about 60 cm deep, and Hawksbills about 50 cm deep.

Carefully place eggs into the new egg chamber by hand (see *Insert*: "Nest Relocation Check List"). ***Do not dump or drop the eggs*** from the collection bucket or bag into the new nest.

Leatherbacks (and occasionally other species) lay two types of eggs: yolked eggs that may develop into hatchlings, and small, irregular yolkless eggs that will never develop into hatchlings. Count the eggs as you set them in the nest, making certain to separate the yolked and yolkless eggs. When you rebury the eggs, place the yolkless eggs last (on top). Cover the eggs, replacing into the nest several centimeters of the naturally damp sand that you removed when you dug the egg chamber. Continue backfilling until the nest surface is even with the surrounding beach surface. Finally, label a segment of plastic flagging tape with the turtle's tag numbers and nest date, and insert it just beneath the surface of the sand. This marker will provide important information later when the nest is dug after the hatchlings are gone. If you are concerned that poaching remains a threat, rebury eggs at night and scatter dry sand across the site to minimize evidence of digging.

Record on the *Sea Turtle Sighting Form* (Appendix IV) whether – and where – the nest was relocated. Watch the site closely 55 75 days later for evidence of hatching (Figure 16). If the nest is lost (such as to poachers, predators, or erosion), make a note on the original data form.

If there is no practical area for reburial, then you may need to consider identifying an area for a hatchery. A hatchery must be in an area protected from erosion, at least one vertical meter above the highest tide levels, and must be large enough to allow nest spacing of 1 m between nests.

Figure 16. Baby sea turtles leave small tracks that are miniature versions of their mothers' tracks. Photo: Carol Stapleton

Cautionary note: Enclosed hatcheries (cf. Figure 15b) require a major investment of man-power and money, they artificially concentrate nests (in some cases increasing the risk of erosion or poaching), and they generally reduce hatch success (although the trade-off is acceptable if the nest would likely be completely lost in its original location). Consistent monitoring and fencing is generally needed to protect nests from predators and poachers. Watch for hatchlings, release them immediately. To maintain a healthy incubation environment (e.g. reduce concentrations of metabolic gases and/or bacteria), discard the waste collected from excavated nests (e.g. hatched shells, rotten eggs) in the surf. Discarding this material nearby will attract predators to your hatchery. The hatchery site should be moved to a new location every 1-2 years. See Mortimer (1999) for details.

VII. NEST EMERGENCE AND EXCAVATION

While beach patrols and tagging help us understand the numbers and types of sea turtles nesting in Dominica, conservation programmes also need to estimate hatch success – defined as the number (proportion) of eggs that hatch and/or the number of hatchlings that make it safely to the sea. Identifying causes of nest failure can help you determine if management practices, such as nest relocation, are necessary. To estimate hatch success and assess possible causes of nest failure, nests are excavated – meaning that they are dug and their contents categorized (see Appendix IV: *Nest Excavation Data Form*). It can be a messy job, but it provides essential data about reproductive success.

Hatchlings typically emerge and crawl to the sea after 55 – 75 days. During this 'hatch window', watch nests closely. Visit, at least daily, nests that are due to hatch. Usually hatchlings crawl from the nest to the sea in a few minutes (Figure 17).

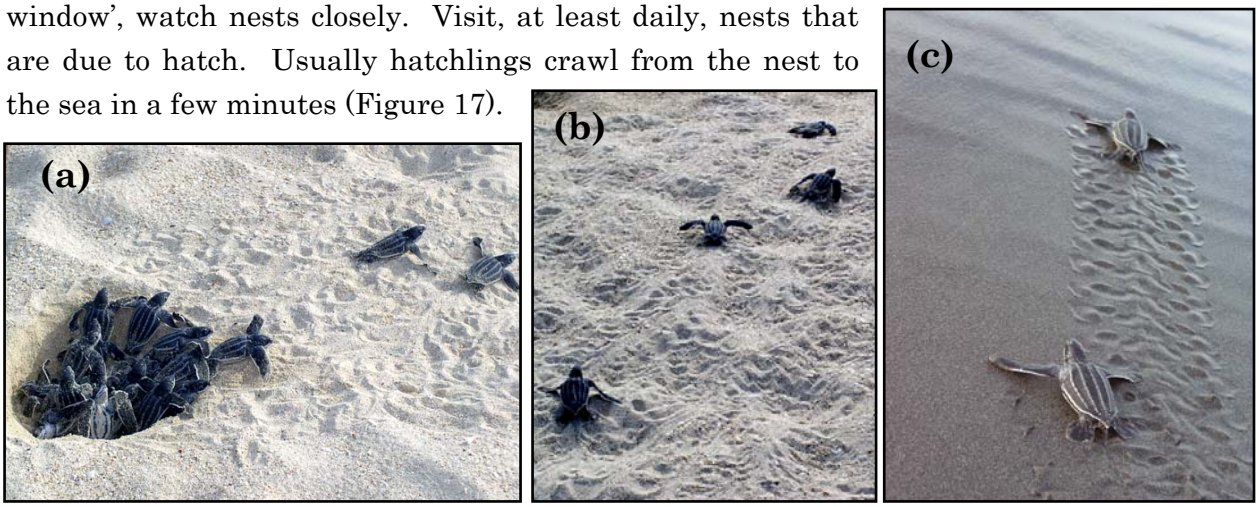


Figure 17. A Leatherback nest hatches in the early evening, leaving dozens of tiny tracks as evidence of the hatchlings' race to the sea. Photos: (a-b) Jenny Freestone (Antigua), (c) Didiher Chacón (Costa Rica)

To an untrained eye, hatchling tracks may appear similar to crab or other small animal tracks. A little practice will help you correctly identify sea turtle tracks – look for a large number of tracks with a central point of origin. A hatched nest will create a slight depression, as the sand collapses into the space vacated by the hatchlings (Figure 17a). Both the nest depression and the hatchlings' tracks are easily erased by tides, rain, and beach traffic.

SORTING NEST CONTENTS BY CATEGORY

- Hatched egg shells
- Hatchlings: Live, dead, or deformed
- Unhatched eggs:
  - Rotten – contents show signs of decay , e.g. rainbow colors and/or 'chunkiness'
  - Embryo – unhatched baby turtle or any sign of embryo development
    - Early – Tiny, pink embryos; may be the size of a pencil point
    - Late – Larger embryos (>1 cm)
  - Undeveloped – No sign of embryo development and no signs of rotting
  - Deformed – An improperly formed embryo; e.g. twins, missing flippers, double head
  - Pipped – Partially hatched turtle

Usually the majority of a nest's hatchlings emerge together. However, they may also emerge and crawl to the sea in small groups. If you witness a hatch, keep your distance and do not interfere with their race for the sea. Gently free any hatchling that becomes trapped by beach debris or tyre tracks, or becomes disoriented by shoreline lighting.

Nest excavations are easiest to complete within 1-2 days after hatchling emergence. Nest contents decompose quickly, becoming more difficult to excavate and catalog. If 75 days pass with no signs of emergence, consider excavating the nest to assess reason(s) for nest failure.

Wear latex or rubber gloves to reduce exposure to bacteria. Using your hands, gently scoop sand from the nest, carefully unearthing the eggs and separating the hatched egg shells from unhatched eggs and any live hatchlings (Figure 18a). Be as delicate as possible while removing the contents. Eggshells are fragile, and they are much easier to categorize when intact, and don't forget that there may be hatchlings remaining in the nest! Continue to scoop and sort nest contents until you reach the bottom of the egg chamber.

If you have trouble pinpointing the exact location of a nest, find a thin, stiff stick to use as a probe. At the possible nest site, ***gently*** press the stick into the sand, paying close attention to the resistance you feel. You will feel less resistance as you probe the nest site – the sand in the egg chamber is less dense than the surrounding sand.

Once the nest contents have been removed, identify and categorize the contents and record them on the *Nest Excavation Data Form* (Appendix IV). Place any live, active hatchlings on the sand to crawl to the sea. Very weak hatchlings can be placed in a dark container for release later in the evening. Count whole (unhatched) eggs, as well as hatched eggshells that appear to consist of more than half of an entire shell. Carefully open each unhatched egg by pinching the shell and tearing it open. Be careful – egg contents are under pressure and can squirt upon opening. Examine the contents of unhatched eggs for signs of embryo development and categorize appropriately (see *Insert*, previous page). Look carefully along the inside of the shell for small embryos and blood vessels that indicate early development; these signs are easily missed. Each turtle is counted only once on the data form; e.g. a dead mid-term embryo missing a front flipper is cataloged in the 'deformity' category or the 'late-term embryo' category (more correctly the former), but not both.

Live 'pipped' (partially hatched) turtles nearly completed hatched can be helped from the shell and held to allow the shell to straighten, or reburied in a bucket with damp, loose, shallow sand and given an opportunity to emerge on their own. Place pipped eggs and hatchlings in a container stored in a dark, cool, quiet location until they are ready for release. All hatchlings should be released during darkness. Remember to keep flashlights off; lights confuse sea turtles. Gently shake the container and move the hatchlings in your hands to awaken inactive, sleepy turtles. Be sure to allow the turtles to crawl for a few meters along the sand into the surf. Never place hatchlings directly into the sea.

If the excavated nest was located in a hatchery, collect the egg contents and toss them in the surf or bury them in an area regularly washed out to sea, or an area away from the beach so they do not attract predators. Wash your hands thoroughly afterwards!

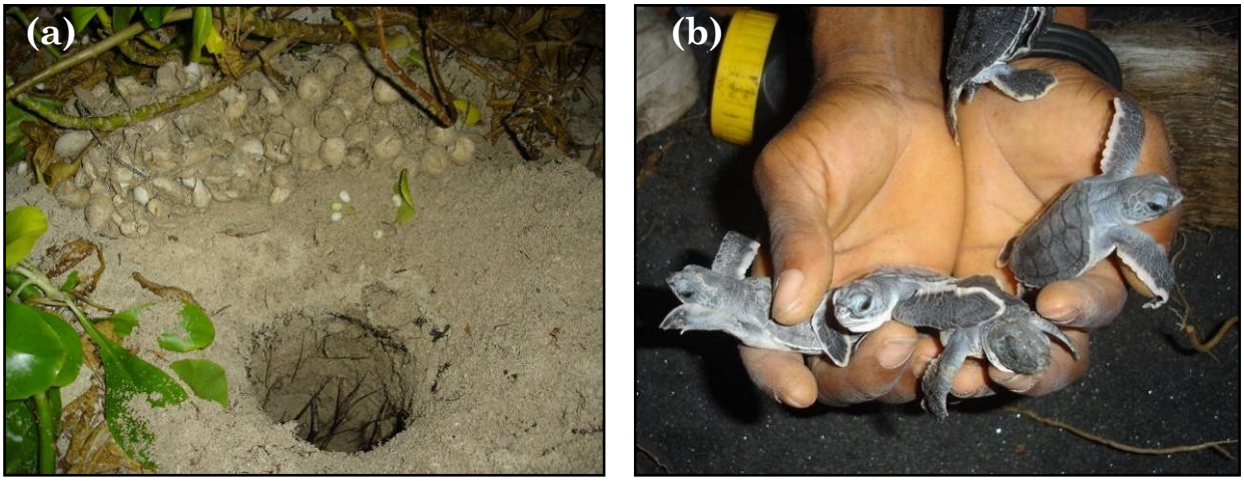


Figure 18. (a) Contents of a Hawksbill nest are separated into piles of hatched shells and unhatched eggs; (b) recently emerged Green turtle hatchlings are ready to crawl to the sea. Photos: Seth Stapleton

VIII. RECORD-KEEPING

Accurate record-keeping is an important part of conservation. An occasional data collection error is unavoidable; even an experienced biologist may forget to document the time or measure a turtle! However, it's important to try to limit errors – data is most useful when it is **complete and accurate**. High quality data helps Government and communities alike make the best management decisions. And after spending long, challenging hours on the beach, you want to make sure that your data forms are as useful as possible!

A data form must be completed for each nesting activity and each turtle encountered. For example, if you witness 3 false crawls and 2 successful nests during a beach patrol, five (5) data forms must be completed. Complete the data forms immediately (as shown in Figure 19); ***do not*** try to remember details and expect that you will be able to accurately record this information later.

Figure 19. Record all data immediately, while you are still with the turtle. Photo: Jumby Bay Hawksbill Project.

The *Sea Turtle Sighting Form* (Appendix IV) is designed to document nesting, but in-water observations can also be recorded on this form.

The first line of the data form is used to record the *date* and *time*. Record the date in DAY-MONTH-YEAR format, and remember that the date changes at midnight! 'AM' refers to times in the morning (after midnight and before noon); 'PM' refers to the afternoon and evening (after noon and before midnight). Record the TIME when you first encounter the animal. Write down the NAMES of each beach patroller present (*Observers*) and record the NUMBER of *Guests*. Note the beach NAME and LOCATION and, if applicable, the beach SECTOR where the crawl took place.

Record the SPECIES (or 'Unknown'), GENDER (egg-laying turtles are always female), and how you determined the species: did you see an adult turtle, a juvenile, a hatchling, or just a nesting crawl? If you saw a turtle, what was its CONDITION: alive or dead? Carefully record *crawl width*, circle the correct *crawl pattern*, and take the turtle's *measurements*. (Note whether a damaged carapace has affected the measurement.) Record the ACTIVITY you first noticed when you saw the turtle: searching for a nest site, body-pitting, digging the nest, laying eggs, covering the nest, returning to the sea, or stranded (dead).

The ***most important part*** of data collection is the turtle's identity. Carefully read and RECORD TAG NUMBERS; if you apply a new tag, remember to write the tag number(s) down before you apply the tag. Check the appropriate box to show whether the flipper tag was *Old* (already present) or *New* (just applied), located on the *Front* or *Rear* flipper and on the *Right* or *Left* side (her right or left, not yours). Note the location of any possible tag scars, and record the tag numbers of any tags that were *Destroyed* or *Lost* during tagging.

If the turtle crawled ashore, be sure to check the result: CONFIRMED NEST, SUSPECTED NEST, or FALSE CRAWL. A nest is only 'Confirmed' if you *see eggs!* For Leatherbacks, record both yolked and yolkless EGG COUNTS (note: for other species, all eggs are assumed to be yolked). Record whether eggs were collected and REBURED; if so, write the *time* (*collected, reburied*) and the *reburial site*. In the NOTES section, describe *injuries*, *barnacles*, *measurements to nearby landmarks* (to help you relocate the nest at hatching), evidence of *predators*, *poaching*, etc. The PAGE NUMBER is not filled out in the field; all data forms are numbered sequentially in a notebook by the database manager.

Use the *Nest Excavation Data Form* (Appendix IV) when you exhume the contents of a hatched nest. Record *Dates*, *Times*, *Observers*, *Beach Location, Species*, and *Guests* as described above. Write the adult turtle's tag numbers and note what *Evidence* (if any) was present to indicate that the nest hatched. Record how many live and dead hatchlings you see on the beach, as well as the *Date*, *Time*, and *Number of Turtles Released* under the *Hatchlings Released* heading. You'll also see that this data form contains blanks corresponding to all egg categories discussed in the *Excavating Nests* section.

Read and review your data form one last time to make sure you have been as thorough as possible. Designate a secure area where you can store all of your project's data forms. The data manager should collect your completed data forms on a regular basis; data should be computerized and annual reports submitted to the permitting agency. WIDECAST can provide database management software and training. For information about data entry and database use, refer to the *WIDECAST Regional Marine Turtle Database: User's Manual* (Eckert and Sammy 2005).

IX. Education and Outreach

Population monitoring and related research is essential to better management of the depleted sea turtle resource, but effective conservation and recovery programmes need to do more than patrol beaches and count sea turtle eggs. Teaching your community and the whole of Dominica about sea turtle conservation issues (and marine conservation issues in general) is another incredibly important task!

Dominica is a diverse country. Your education and outreach programmes need to appeal to many different people: rural East coast farmers and Roseau businessmen, elders and students, fishers and taxi drivers. Expect lots of different questions, some simple, some complex, some controversial. Regardless of the activity and the audience, always be prepared to answer questions! In the sections below, we'll discuss some effective ways to communicate you conservation message.

Turtle Watches

There's nothing quite like seeing an enormous turtle lumber out of the sea, scoop sand with agile hand-like flippers, and lay dozens of eggs in hopes of contributing to the next generation of sea turtles. 'Turtle Watching' is a memorable hands-on way to teach people about sea turtles … but it's also a very vulnerable time for the turtle. Egg-laden females can be disturbed and disoriented by artificial lights (including torches/flashlights and camera flashes), noise, and unexpected movement. Nesting is the only reason that Caribbean sea turtles return to land after hatching, and excessive disturbance can cause a female to abandon this important activity. To ensure a safe environment for the turtle, your visitors, and yourself, emphasize and enforce internationally accepted guidelines (e.g. Appendix III). Guided 'Turtle Watches' can also generate employment for your community; contact the Dominica Sea Turtle Conservation Organization (DomSeTCO) for more information.

TURTLE WATCHING: Do's and Don'ts

- Give the turtle PLENTY OF SPACE – at least 30 feet (10 m) – before she begins laying her eggs and after she has completed laying her eggs. Only approach a turtle when she is laying her eggs.
- LIGHTS may only be used while the turtle is laying her eggs. The light should be dim, and should never be directed to the face of the turtle.
- Flash PHOTOGRAPHY may disorient or temporarily blind a turtle. Only take photographs while the turtle is depositing her eggs, and then only from behind.
- Limit visitor NOISE and movement. Pay attention to your Guide.
- View the nesting turtle in SMALL GROUPS and limit viewing time to make sure that all have a chance to see the nesting process.
- Turtles may only be TOUCHED very gently while they are laying eggs, but only as permitted by project staff or your tour guide. Never RIDE turtles.
- Take your RUBBISH with you as you leave the beach. Adult turtles and hatchlings may become trapped or entangled in any rubbish found on the beach.
- Remind visitors that nesting sea turtles and eggs are PROTECTED in Dominica!

Figure 20. (a) 'Turtle Watches', (b) beach clean-ups, (c) hands-on sharing, and (d) classroom presentations are just some of the ways to spread the message of sea turtle conservation. Photos: S. Stapleton

School Programmes

Speaking to school groups, either in the classroom or on the beach (Figure 20), can be a very effective and enjoyable outreach technique. Kids are enthusiastic and excited to share their sea turtle experiences, and they will often bring the conservation messages home to their parents and others in the community.

Always take the age of your audience into consideration! Ideas need to be presented differently to 6-year olds than to 13-year olds. Incorporating simple games and art activities, especially with younger children, is a great way to get them involved in the lesson and thinking about the marine environment. An interactive slide show, puppet show, or photos

that you can pass around the class can reinforce your message. Contests and quizzes are fun for all ages and they can be useful in encouraging participation in group discussions.

WIDECAST has provided DomSeTCO with a variety of educational tools, including classroom lessons (Harold and Eckert 2005), summer camp programmes, children's books, a sea turtle slideshow, and various technical materials. These are suitable for all ages and can be useful in planning activities and creating templates for creative outreach. Ask a local library, Government office, or DomSeTCO if you can borrow a slide projector, as needed.

Media

The media reaches thousands of people island-wide, everyday. Radio, television, newspapers, magazines … they all help to publicize marine conservation issues and shape public opinion. With the growing popularity of sea turtles in Dominica, the media continues to be an important conservation partner. Prepare press releases. Invite the media to special events. Agree to be interviewed for a radio programmes. Keep sea turtles in the news!

General Comments

Many people don't have the opportunity to personally view a nesting or hatching turtle … yet we still want them to feel a sea turtle shell, see how the backbone and ribs fit together, and marvel at how small the eggs and hatchlings are! For this purpose, the Forestry, Wildlife and Parks Division keeps a small sea turtle natural history collection in Roseau. Inquire with Forestry to learn if you may borrow these materials for your education programmes. ***Cautionary note***: Do not collect sea turtle shells, eggs, or other parts for personal use or display. Remember, sea turtles and their eggs are protected by law.

We've touched on just a few of the many ways to communication a conservation message to the general public. Other ideas that have been successfully used in the past include 'Hatchling Day', summer camp, internship programmes, publicly-displayed murals, beach clean-ups, and appearances at events such as DiveFest and Scott's Head / Soufriere Marine Reserve Day. The possibilities are endless, so don't be afraid to try something new! Dominica is your island, and you know best how to teach your fellow citizens. Be creative and have fun – your enthusiasm will spread!

X. Solving Common Problems

Disoriented Turtles

Sea turtles can be confused and misdirected by artificial lights. For detailed recommendations; advice for architects, planners and hotels; contact information for lighting manufacturers; and model lighting ordinances, see Witherington and Martin (2000).

Hatchlings, and to a lesser extent nesting females, are strongly affected by artificial lights and may wander inland toward hotel and road lighting, sports fields, and security lights of one kind or another. Even beach fires can be deadly, especially to hatchlings (Figure 21). Solving this issue requires dialogue with those responsible for the lights.

An *absence of lighting* is the best guarantee that sea turtles will safely find the ocean, but where this is not an option several "next best" solutions have long been available. For example, Witherington (1990) proposed: (1) shielding and lowering light sources (low intensity lighting at low elevations can be both attractive and adequate for most purposes; the glow can be shielded from the beach by ornamental flowering hedges or other barriers), (2) alternative light sources (e.g., low pressure sodium (LPS) lighting is known to be less attractive to hatchlings than full-spectrum white light), (3) time restrictions (turn lights off during evening hours when hatching is most likely to occur; e.g., 7 PM to 11 PM), (4) motion sensitive lighting (sensor-activated lighting comes on only when a moving object, such as a person, approaches the light; this might be effective in low traffic areas), and/or (5) area restrictions (restrict beach lighting to areas of the beach where little or no nesting occurs; the effectiveness of this is diminished, however, since sources of light several kilometers away can disrupt hatchling orientation).

Lighting associated with people on the nesting beach can also pose a problem. Strict lighting guidelines should be enforced (see "*Turtle Watching: Do's and Don'ts*"): flashlights/ torches/ headlamps should be dim and aimed downward, camera flashing should be confined to the late egg-laying phase, and no light should be shined in the turtle's face.

Figure 21. Artificial lights, including (a) beachfront developments and (b) bonfires, disorient and confuse adult sea turtles and hatchlings, often misdirecting them away from the sea and to their deaths. Photos: (a) Ticiana Fettermann, (b) Alicia Marin

If a turtle is disoriented by fixed lighting (e.g. a house or street light), try using your body to block her from crawling in the wrong direction and redirect her to the sea. Don't worry, she isn't going to knock you down and crawl over you! She will try to avoid you, so carefully placing yourself is a very helpful means to redirect her movements. It can be painful to be struck by a sea turtle flipper, so standing a meter or two in front of her shoulder is wise. With stubborn turtles you may need to use a flashlight/torch to light a return path to the sea. ***Do not*** shine a light *from* the sea *back* to the turtle. Instead, stand behind the turtle and shine a light *to* the sea *from behind* the turtle at a low angle.

In the case of confused hatchlings, be sure that all flashlights are turned off and that other artificial light sources are blocked (again, use your body!). In the absence of artificial lights, hatchlings typically correct their path to the sea and do not require further assistance. If they are unable to redirect themselves, gently collect them, carry them (a short distance) to the nearest place on the beach that is unaffected by lights, and turn them towards the sea.

Hatchlings must be allowed to orient and crawl to the sea, ***do not place them directly in the waves***. Scientists believe that those first steps to the sea may help set the 'compasses' that will guide the hatchlings offshore and, ultimately, bring them home again as adults.

Poaching and Predators

Finding a slaughtered turtle carcass or a destroyed nest (Figure 22) is a frustrating and disheartening experience. Despite your efforts, poachers and animal predators may continue to present a serious threat to adult females and their nests.

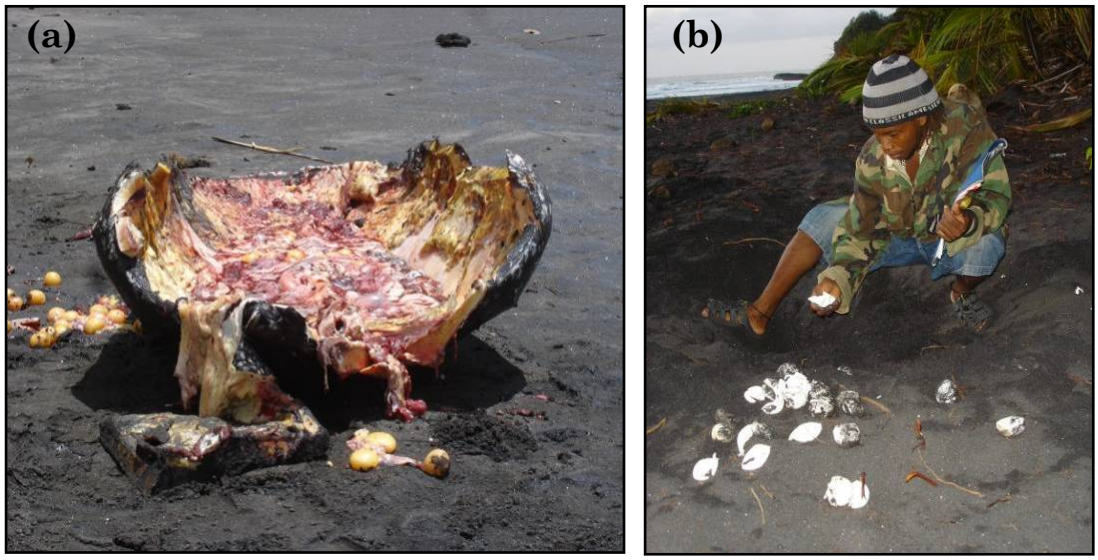


Figure 22. (a) A carapace and a few eggs are all that remain of a Leatherback killed illegally in Dominica in 2007. (b) A RoSTI staff member investigates the remains of a sea turtle nest partially destroyed by dogs. Photos: Seth Stapleton

Although the results of poaching and predation can be discouraging, do not lose hope! Be diligent with your beach patrol schedule. Your presence on the beach will help to safeguard the turtles from poachers and predators. Try not to leave turtles unattended. Disguise nesting activities by walking across crawls, dragging palm fronds over the area, scattering dry sand over the nest sites or, if necessary, relocating eggs (see *Moving Sea Turtle Eggs*).

Be careful: keep in mind that, while sea turtle conservation is very important and rewarding work, no turtle is worth putting yourself in harm's way. ***Report illegal activity***. Seek the assistance of the Police, the Forestry, Wildlife and Parks Division, and other authorities. Alerting the media to illegal activity can also help focus attention on the problems that poaching – whether of sea turtles or other endangered species – pose to the nation and the future generations of its citizens.

While animal predators are clearly part of the natural cycle of life, some predators, such as dogs, have been introduced to the environment and can be incredibly destructive to sea turtles and other endangered wild creatures. Dialogue with dog owners is the first step to reducing the presence of dogs on nesting beaches. Fenced hatcheries are one solution to the loss of eggs to unsupervised dogs; the 'caging' of individual nests can also be effective. This type of management decision must be made in consultation with experts and authorities.

Sick and Injured Sea Turtles

Sea turtles are susceptible to variety of injuries, ranging from amputations from encounters with boat propellers or sharks to entanglement in fishing gear and embedded fishing hooks. Refer to WIDECAST's *Marine Turtle Trauma Response Procedures: A Field Guide* (Phelan and Eckert 2006) to learn how to respond to sick and injured sea turtles that you encounter on the beach or in the water. This *Field Guide*, as well as other useful references, are available from the Dominica Sea Turtle Conservation Organization (DomSeTCO). ***Cautionary note***: Do not attempt to treat a sea turtle without expert assistance, and never bring a sick or injured sea turtle or hatchling home.

Equipment Maintenance

Sand, salt, wind and water are tough on field equipment, and some wear and tear is unavoidable. Routine maintenance and precautionary measures can help to extend equipment life. Regularly lubricate the hinges and springs of tagging pliers with WD-40 or similar spray lubricant to keep them working properly. Keep electronic equipment in sealed plastic bags on the beach. Regularly inspect and wipe away salt and sand from gear, as necessary.

Questions?

Questions about research and conservation protocols, sea turtle regulations and law enforcement, and problems encountered can be directed to local authorities (see *Contact List*).

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Figure 23. Local youth enjoy participating in a sand sculpture competition after a beach clean-up in La Plaine, Dominica. Photo: Seth Stapleton

XII. GLOSSARY

Body-pitting – During the nesting process, egg-bearing sea turtles clear away dry, surface sand using sweeping flipper motions

Carapace – The topside (back) of a sea turtle's shell

Confirmed Nest – A nesting activity in which egg-laying is visually confirmed

Curved Carapace Length (CCL) - A measurement following the midline of the carapace, extending from the nuchal (see **Nuchal**) notch to the furthest posterior tip of the shell

Curved Carapace Width (CCW) - A size measurement taken at the widest part of the carapace (typically just behind the front flippers) and perpendicular to the midline

Egg Chamber – The hole into which the turtle lays her eggs

Embryo – A still-developing turtle fully enclosed in the egg

False Crawl – A nesting attempt that does not result in egg-laying

Flipper Tag – A uniquely numbered metal or plastic tag attached to the front or rear flipper used to identify individual turtles

Global Positioning System (GPS) – A device using satellite technology to calculate an exact position

High Water Line (HWL) – The distance from the nest to the highest point reached by the sea

Keratin – Rough protein substances forming various biological tissues including hair, protein, and scutes (see **Scutes**)

Neophyte – a sea turtle that is nesting for the first time

Nest (see **Confirmed Nest**)

Nesting Trance – The period of the nesting process (egg-laying) when a sea turtle may be approached for data collection

Nuchal, or **Nuchal Notch** – The edge of the carapace directly behind the turtle's head

Pipped Egg – A partially hatched egg; an egg in which the turtle has partially emerged

PIT Tag – Passive Integrated Transponder; a uniquely coded microchip, injected just beneath the skin, used to mark individual animals

Plastron – The bottomside (belly) of a sea turtle's shell

Remigrant – A sea turtle that is not nesting for the first time, but has nested in Dominica in previous years (this is confirmed by the presence of flipper tags)

Scute – The thin, colorful plates covering the carapace of a hard-shelled sea turtle

Suspected Nest – A nesting activity that likely resulted in a nest, but eggs could not be visually confirmed (confirmation may come later, such as when eggs are seen to have washed away, or hatchlings emerge)

Vegetation Edge (VE) – The distance from the nest to the closest vegetation edge

XIII. CONTACT LIST

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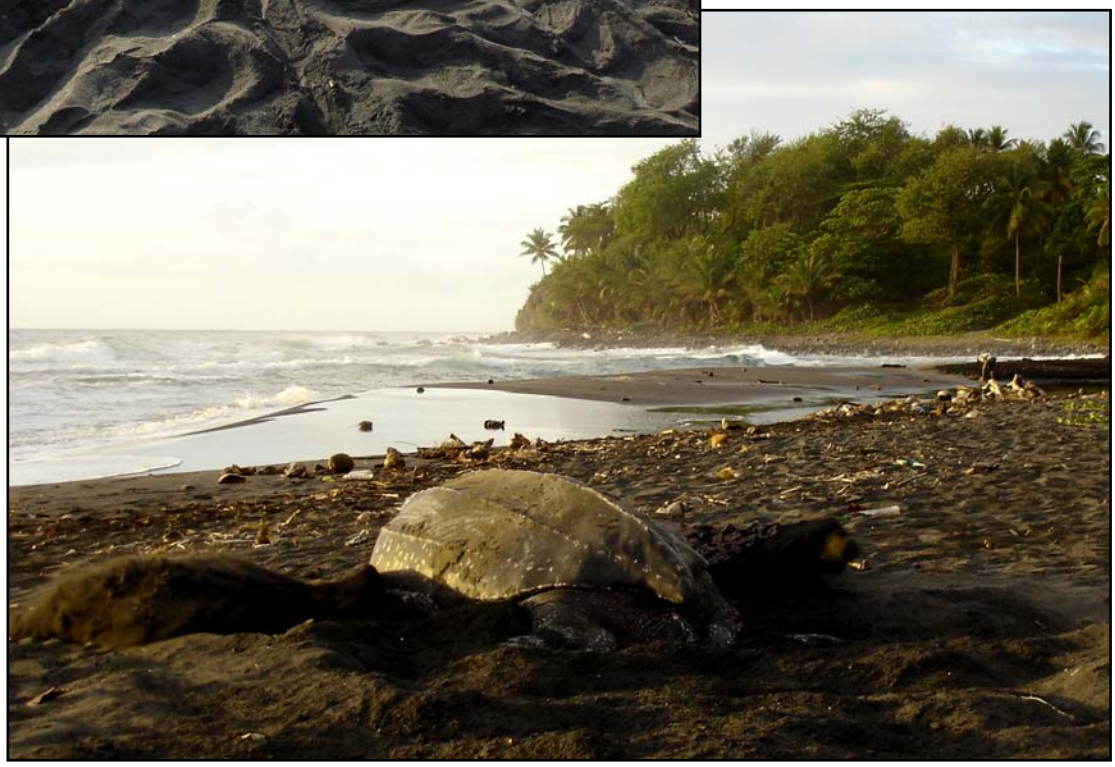
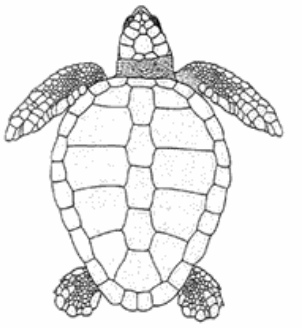
keckert@widecast.org
Visit **www.widecast.org**!

Figure 24. As the last sea turtle of the night returns safely to the ocean, a satisfied beach patroller enjoys a colourful sunrise. Photos: Seth Stapleton



APPENDIX I: IDENTIFYING DOMINICA'S SEA TURTLES

***Caretta caretta*: Loggerhead (Eng), Caguama (Sp), Caouanne (Fr)**



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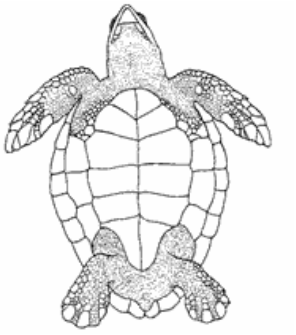

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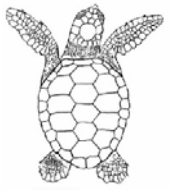


Hatchling

Head

Physical Characteristics

- Named for: Relatively large head (up to 10 inches [25 cm] in width)
- Length-adult: Carapace (upper shell) length of 3-4 feet (ca. 1-1.2 m)
- Length-hatchling: Carapace length of 1.7-1.8 in (ca. 44-48 mm)
- Weight-adult: to 400 lb (ca. 100-180 kg)
- Color-adult: Carapace is red-brown; plastron (belly) is light yellow to light brown
- Color-hatchling: Uniform in color, red-brown to grey-black

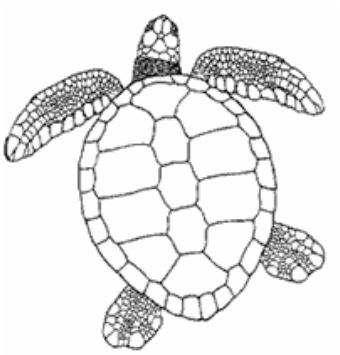
Caribbean Reproduction/Nesting

- Peak nesting: May-July
- Number of nests: On average, 3-4 per year at 13-15-day intervals
- Average clutch size: 100-120 eggs per nest
- Incubation time: ca. 50-75 days

Global Status

- Endangered (World Conservation Union: IUCN); international trade prohibited by CITES; protected under the Protocol concerning Specially Protected Areas and Wildlife (SPAW) to the UNEP Cartagena Convention; protected under the Inter-American Convention for the Protection and Conservation of Sea Turtles

***Chelonia mydas*: Green Turtle (Eng), Tortuga verde (Sp), Tortue verte (Fr)**



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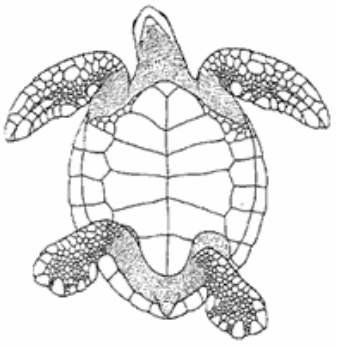

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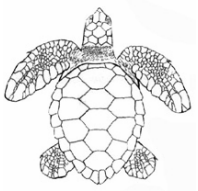
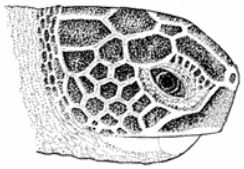


Hatchling



Head

Physical Characteristics

- Named for: Color of body fat (tinted from a diet of seagrass)
- Length-adult: Carapace (upper shell) length of 3-4 feet (ca. 1-1.2 m)
- Length-hatchling: Carapace length of 1.9 in (ca. 49 mm)
- Weight-adult: to 400 lb (ca. 120-180 kg)
- Color-adult: Carapace usually mottled gray, green, brown and black; plastron (belly) is pale yellow
- Color-hatchling: black carapace, white plastron

Caribbean Reproduction/Nesting

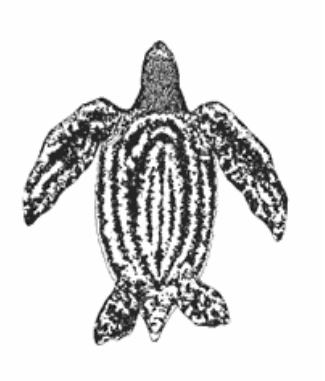
- Peak nesting: May-September
- Number of nests: On average, 3-5 per year at 12-14 day intervals
- Average clutch size: 110-140 eggs per nest
- Incubation time: 50-70 days

Global Status

- Endangered (World Conservation Union: IUCN); international trade prohibited by CITES; protected under the Protocol concerning Specially Protected Areas and Wildlife (SPAW) to the UNEP Cartagena Convention; protected under the Inter-American Convention for the Protection and Conservation of Sea Turtles

***Dermochelys coriacea*: Leatherback (Eng), Tortuga Laúd (Sp), Tortue luth (Fr)**

Adult (top)



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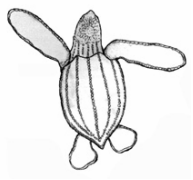

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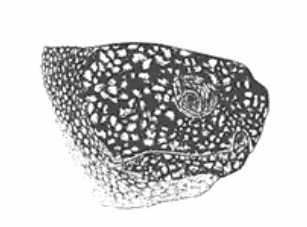


Head

Physical Characteristics

- Named for: Lack of a bony carapace (upper shell); leathery skin
- Length-adult (female): Carapace length of 4.5-6 feet (ca. 1.4-1.8 m), with 7 ridges
- Length-hatchling: Carapace length of 2.4-2.6 in (ca. 60-65 mm)
- Weight-adult (female): 550-1400 lb (ca. 250-650 kg) [males to 2000 lb (920 kg)]
- Color-adult: Carapace and plastron (belly) both gray/black with white or pale spots
- Color-hatchling: Carapace is black with white spots, plastron is mottled black and white

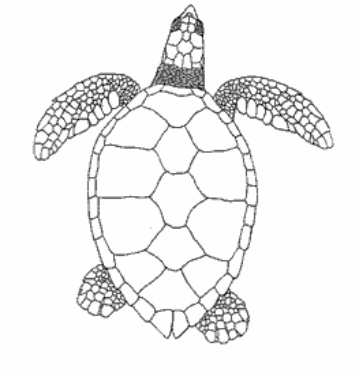
Caribbean Reproduction/Nesting

- Peak nesting: March-July
- Number of nests: On average, 6-9 times per year at 9-11 day intervals
- Average clutch size: 80-90 [yolked] eggs per nest
- Incubation time: 50-75 days

Global Status

- Critically Endangered (World Conservation Union: IUCN); international trade prohibited by CITES; protected under the Protocol concerning Specially Protected Areas and Wildlife (SPAW) to the UNEP Cartagena Convention; protected under the Inter-American Convention for the Protection and Conservation of Sea Turtles

***Eretmochelys imbricata*: Hawksbill (Eng), Tortuga Carey (Sp), Tortue imbriquée (Fr)**



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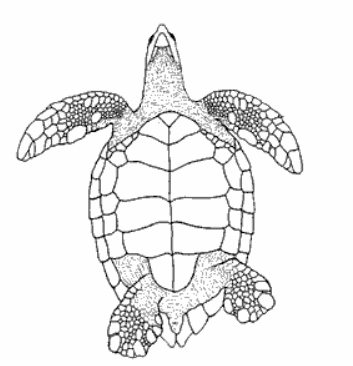

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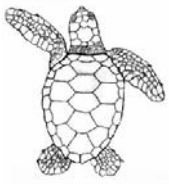

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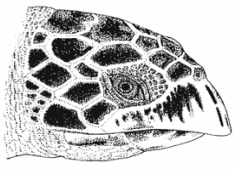


Head

Physical Characteristics

- Named for: Hawk-like beak
- Length-adult: Carapace (upper shell) length of 2-3 feet (ca. 60-90 cm)
- Length-hatchling: Carapace length of 1.6-1.8 in (ca. 40-45 mm)
- Weight-adult: 132-176 lb (ca. 60-80 kg)
- Color-adult: Carapace is brown, black, and amber; Plastron (belly) is yellow
- Color-hatchling: Uniform in color, grey or brown

Caribbean Reproduction/Nesting

- Peak nesting: April-November
- Number of nests: On average, 4-5 times per year at 14-15 day intervals
- Average clutch size: ca. 160 eggs per nest
- Incubation time: 50-75 days

Global Status

- Critically Endangered (World Conservation Union: IUCN); international trade prohibited by CITES; protected under the Protocol concerning Specially Protected Areas and Wildlife (SPAW) to the UNEP Cartagena Convention; protected under the Inter-American Convention for the Protection and Conservation of Sea Turtles

APPENDIX II: SEA TURTLE NESTING IN DOMINICA

The Commonwealth of Dominica's sea turtle nesting beach maps are presented for the three species known to nest on the island: Leatherback (*Dermochelys coriacea*), Hawksbill (*Eretmochelys imbricata*), and Green (*Chelonia mydas*) sea turtles. Natural fluctuations are observed in the numbers of sea turtles coming ashore to nest each year. These maps are designed to represent the number of crawls occurring at a particular beach in an 'average' year, according to the best available information.

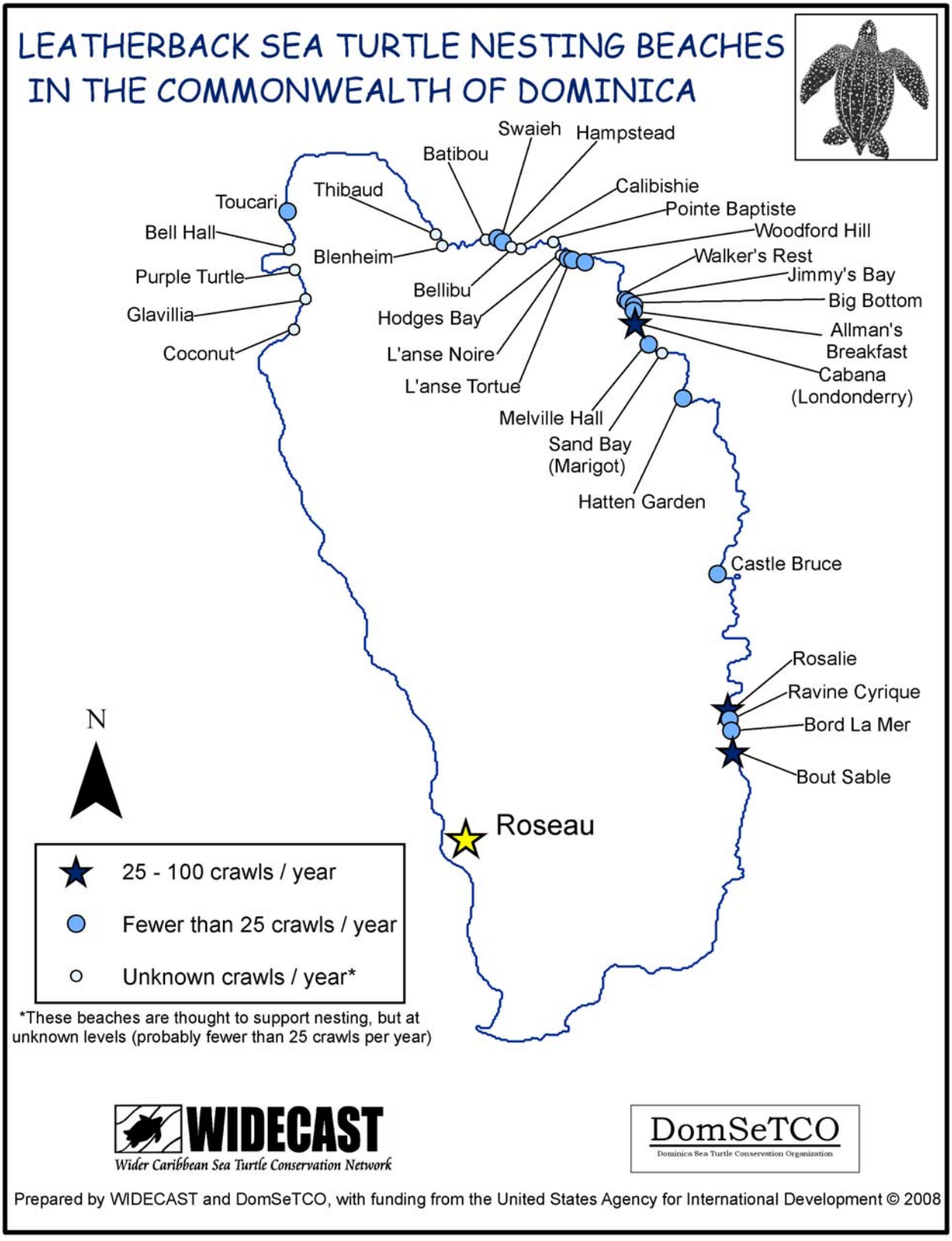
Information on the level of nesting occurring at the various sites was compiled from several sources, including: consultations with officers of the Forestry, Wildlife and Parks Division (particularly Stephen Durand and Charles Watty), the Dominica Sea Turtle Conservation Organization (Errol Harris), and the Fisheries Division (Harold Guiste); as well as informal discussions with local community members, original data and Annual Reports from the Rosalie Sea Turtle Initiative (Franklin et al. 2004, Byrne 2006, Byrne and Eckert 2006, Stapleton and Eckert 2007), and information summarized by Dow et al. (2007).

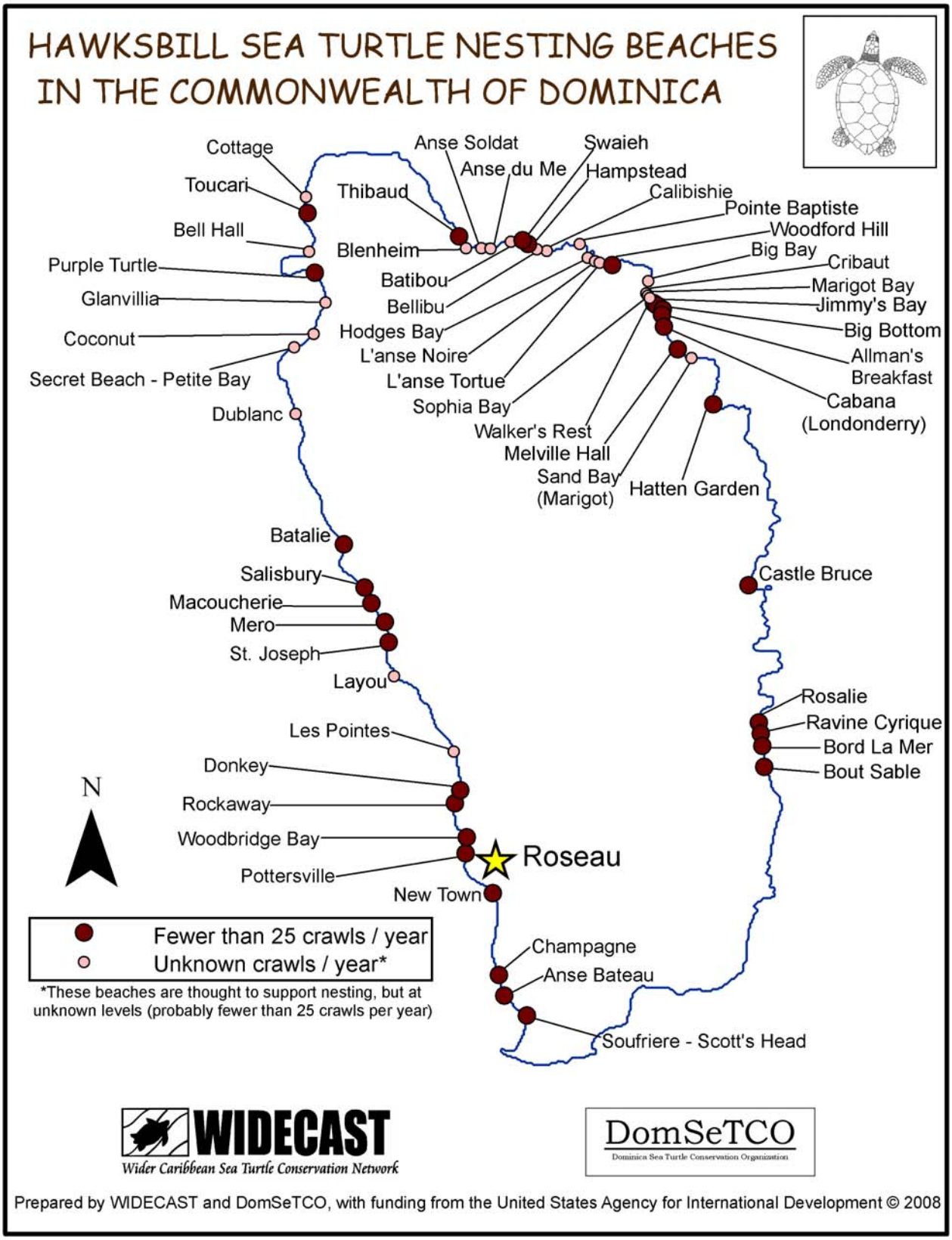
Beach coordinates were obtained using a handheld Global Positioning System unit (Garmin International, Inc., Olathe, KS, USA), supplemented with satellite imagery (Google Earth v. 4.2; www.earth.google.com) as needed. The Dominica shoreline was obtained from the World Vector Shoreline of the Caribbean Region (U.S. Geological Survey and National Geospatial-Intelligence Agency; http://woodshole.er.usgs.gov/pubs/of2005-1071/data/background/carib_bnds/carib_wvs_geo_wgs84meta.htm). Maps were constructed using ArcGIS 9.2 (Environmental Systems Research Institute, Redlands, California), and beaches are represented by a single point approximating the beach midpoint.

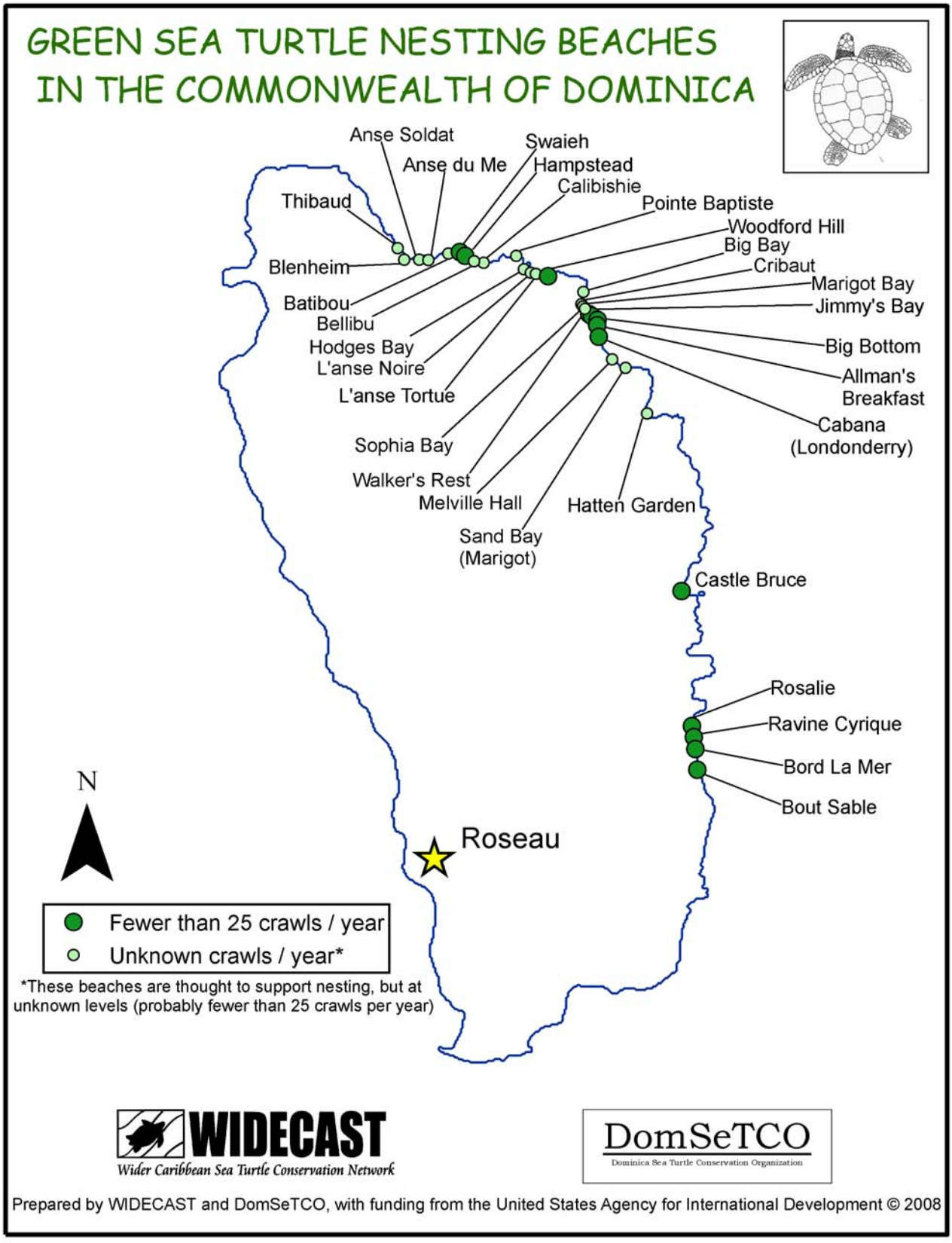
Beach length: Because the vast majority of beaches in Dominica are very small, beaches were more readily displayed as single points than as beach length segments. In all cases, however, data were also collected for beach endpoints so that beach length can be calculated from the dataset available.

Beach width: Based on regular cycles of erosion and accretion, as well as storm events, beach width changes in predictable and unpredictable ways each year. Therefore, estimates of beach width were not included in this mapping exercise.

These maps provide baseline data that should be continually reviewed and improved for maximal usefulness to management. Confirmation concerning the distribution and abundance of the annual nesting effort is still needed for beaches "thought to support nesting", and more confidence is needed in distinguishing between Hawksbill and Green turtle nesting sites, as it is clear that some observers still confuse the two species.


LEATHERBACK SEA TURTLE NESTING BEACHES
IN THE COMMONWEALTH OF DOMINICA
Swaieh
Hampstead
Batibou
Thibaud
Calibishie
Toucari
Pointe Baptiste
Bell Hall
Woodford Hill
Blenheim
Walker's Rest
Purple Turtle
Jimmy's Bay
Bellibu
Big Bottom
Glavillia
Hodges Bay
Allman's
Breakfast
Coconut
L'anse Noire
Cabana
(Londonderry)
L'anse Tortue
Melville Hall
Sand Bay
(Marigot)
Hatten Garden
Castle Bruce
Rosalie
Ravine Cyrique
N
Bord La Mer
Bout Sable
Roseau
25 - 100 crawls / year
Fewer than 25 crawls / year
Unknown crawls / year*
*These beaches are thought to support nesting, but at unknown levels (probably fewer than 25 crawls per year)
WIDECAST
Wider Caribbean Sea Turtle Conservation Network
DomSeTCO
Dominica Sea Turtle Conservation Organization
Prepared by WIDECAST and DomSeTCO, with funding from the United States Agency for International Development © 2008


HAWKSBILL SEA TURTLE NESTING BEACHES
IN THE COMMONWEALTH OF DOMINICA
Cottage
Toucari
Bell Hall
Purple Turtle
Glanvillia
Coconut
Secret Beach - Petite Bay
Dublanc
Batalie
Salisbury
Macoucherie
Mero
St. Joseph
Layou
Les Pointes
Donkey
Rockaway
Woodbridge Bay
Pottersville
New Town
Roseau
Champagne
Anse Bateau
Soufriere - Scott's Head
Thibaud
Anse Soldat
Anse du Me
Swaieh
Hampstead
Calibishie
Pointe Baptiste
Woodford Hill
Big Bay
Cribaut
Marigot Bay
Jimmy's Bay
Big Bottom
Allman's Breakfast
Cabana (Londonderry)
Blenheim
Batibou
Bellibu
Hodges Bay
L'anse Noire
L'anse Tortue
Sophia Bay
Walker's Rest
Melville Hall
Sand Bay (Marigot)
Hatten Garden
Castle Bruce
Rosalie
Ravine Cyrique
Bord La Mer
Bout Sable
N
Fewer than 25 crawls / year
Unknown crawls / year*
*These beaches are thought to support nesting, but at unknown levels (probably fewer than 25 crawls per year)
WIDECAST
Wider Caribbean Sea Turtle Conservation Network
DomSeTCO
Dominica Sea Turtle Conservation Organization
Prepared by WIDECAST and DomSeTCO, with funding from the United States Agency for International Development © 2008


GREEN SEA TURTLE NESTING BEACHES
IN THE COMMONWEALTH OF DOMINICA
Anse Soldat
Swaieh
Anse du Me
Hampstead
Calibishie
Thibaud
Pointe Baptiste
Woodford Hill
Big Bay
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APPENDIX III: TURTLE WATCHING GUIDELINES

TURTLE WATCHING

Sea turtles have lived in the world's oceans for more than 150 million years. Sadly these ancient reptiles are now globally threatened with extinction. Many populations are declining as a result of persistent hunting, increasing coastal development, incidental capture in fisheries, the degradation and destruction of nesting beaches, and marine pollution. You can help to protect them by following these simple guidelines.

Developed in collaboration with the Wider Caribbean Sea Turtle Conservation Network (WIDECAST), these guidelines are intended to give general advice only – be sure to find out about local rules and regulations.

TURTLE FACTS

- All species of sea turtle are endangered and need our protection
- Turtles breathe air just like us, which means they can drown if they are prevented from reaching the surface of the sea
- Litter is dangerous, especially plastic bags which can be mistaken for jellyfish – a favourite turtle food
- Turtles remain in the same area for years and, as adults, return to the same nesting area year after year – if a nesting colony is destroyed, the turtles may never return

WHAT YOU CAN DO

- Support local sea turtle conservation initiatives – consider volunteering!
- Participate in local sighting networks and complete all sighting forms
- Do not buy or sell sea turtle products – turtles are strictly protected under CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) and most national laws

ON THE WATER

- Keep a good look out for sea turtles while boating – boat strikes can kill
- When in the water, keep your distance and avoid startling turtles; avoid disturbing resting, sleeping or actively feeding turtles
- To ensure that encounters are as unthreatening as possible, approach turtles slowly and calmly and move away if the turtle shows signs of distress
- Never try to spear, harass, catch or ride turtles
- Experts advise not to touch or feed wild turtles
- Take all litter home with you: trash can kill, especially when it is mistaken for food

Participating in turtle watching programmes actually helps to protect turtles by raising awareness about them

Be sure to find out about local laws and regulations, as they may differ from these general guidelines

TURTLE WATCHING

ON THE BEACH

During breeding seasons, some special considerations apply to turtle nesting beaches.

- Avoid damage to incubating nests – for example, avoid driving on a turtle nesting beach or using these beaches for camp fires or barbecues
- Do not leave large items (such as chairs, umbrellas or recreational vehicles) on nesting beaches at night – these can obstruct a turtle's path and prevent egg-laying
- Keep pets, especially dogs, away as they can endanger eggs and hatchlings
- Keep beach lighting to a minimum – artificial lighting disorients turtles
- Shield or switch off lighting which is visible from the beach

Watching nesting turtles

Seeing an adult turtle come on shore to lay her eggs is an unforgettable experience. However, on land turtles are very vulnerable and if startled, a female turtle may return to the sea before her eggs can be successfully laid. Please follow these simple rules when watching nesting turtles.

- Keep disturbance to a minimum – stay quiet and move around slowly
- Do not approach turtles as they arrive from the sea: they are easily frightened off
- Turtles that have not yet laid their eggs must be left alone
- Make minimal use of flashlights; never shine lights directly into a turtle's face
- Try not to "trap" turtles – approach from behind and keep low to the ground
- Move away if the turtle shows signs of distress
- Turtle eggs and hatchlings should be left undisturbed
- Consider limiting viewing to 30 minutes at a time

Photography

Flash photography of nesting turtles is a controversial topic. In some places this constitutes harassment and is illegal. If using a camera flash, do so sparingly and:

- Never take photographs before a turtle has laid her eggs
- Only take photographs from behind the turtle – the flash will temporarily "blind" her and complicate her return to the sea

Hatchling turtles

- Try to shield hatchlings if they appear disoriented by beachfront lighting – place yourself between the hatchlings and the light source, and ask that the lights be turned off long enough for the hatchlings to reach the sea
- Do not interfere with their crawl to the sea as this could jeopardize their survival
- Never photograph hatchlings – they are very sensitive to light

The Coral Reef Alliance (CORAL) is a member-supported, non-profit international organization dedicated to keeping coral reefs alive around the world. Visit our website http://www.coral.org

Visit the Wider Caribbean Sea Turtle Conservation Network (WIDECAST) website at http://www.widecast.org for more information on marine turtles and turtle conservation

CORAL RP-102.2002

APPENDIX IV: SEA TURTLE DATA FORMS

Page _____

DOMINICA SEA TURTLE SIGHTING FORM

Date: _____ **Time Turtle is Encountered**: _____ AM / PM

Observers:_____ **No. Guests**:_____

Beach Name:_____ **Beach Section**: _____

Location (GPS): Latitude_____ Longitude_____

Turtle Species: _____ **Gender**: Female / Male / unknown

Identified by: ☐ Adult ☐ Juvenile ☐ Hatchling **Condition**: ☐ Alive ☐ Dead

or, ☐ Crawl/Nest **Crawl Width**: _____cm **Crawl Pattern**: Symmetrical / Alternating

Activity (*circle*): On shore: Crawling Digging Laying Covering Returning Stranded

At sea: Swimming Feeding/Resting Entangled

Tag #1: _____ ☐ OLD or ☐ NEW / ☐ RIGHT or ☐ LEFT / ☐ FRONT or ☐ REAR

Tag #2: _____ ☐ OLD or ☐ NEW / ☐ RIGHT or ☐ LEFT / ☐ FRONT or ☐ REAR

Tag 'scars'? ☐ Yes ☐ No **Destroyed or Lost tags?**_____

Result: ☐ Nest (eggs confirmed) ☐ Suspected Nest ☐ False Crawl (no eggs)

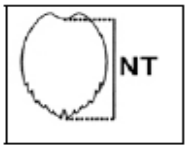
Egg Counts: Yolked (large) eggs _____ Unyolked (small) eggs _____

Were the eggs collected and reburied? ☐ Yes ☐ No

If yes, **Time**: Collected _____ AM / PM Reburied _____ AM / PM

Reburial Beach: _____ **Reburial Site (GPS)**: Lat_____ Long_____

Turtle Size: CCL-NT _____ cm CCW _____ cm **Carapace Damaged?** ☐ Yes ☐ No



Descriptions (parasites, injuries) and **Notes** (location landmarks, evidence of poaching or other threats, etc.). Please continue on reverse. (Write legibly!)

_____

_____

_____

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Page _____

DOMINICA SEA TURTLE NEST EXCAVATION FORM

Date Nest Hatch Observed: _____ Date Nest Excavated: _____

Time Nest Hatch Observed: _____ Time Nest Excavated: _____

Observers: _____

Beach Name:_____ Beach Section: _____

Location (GPS): Latitude _____ Longitude _____

Turtle Species: _____ Date Deposited: _____

Tag Number(s) for the Nesting Female: _____

Hatch Evidence: ☐ Tracks ☐ Hatchlings ☐ Depression ☐ None

Hatch Results

Live Hatchlings out of nest: _____ Dead Hatchlings out of nest: _____

Live Hatchlings in nest: _____ Dead Hatchlings in nest: _____

Hatched Shells: _____

Rotten: _____ Undeveloped (not rotten):_____

Pipped (partially hatched) Alive: _____ Pipped Dead: _____

Full-Term Embryo (unhatched) Alive: _____ Full-Term Embryo Dead: _____

Early-Term Embryo: _____

Yolkless: _____

Deformed Embryo (for example, twins, albino):_____

Hatchling Release

Date: _____ Time: _____

Number of Turtles: _____ Guests: _____

Notes: _____

_____

_____

_____

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APPENDIX VI: FORESTRY AND WILDLIFE ACT, CHAPTER 60:02

Laws of Dominica

Forestry and Wildlife Act

Chapter 60:02, Act 12 of 1976

Amended by Act 35 of 1982

Amended by Act 12 of 1990

Chapter 60:02

Section 21

Ninth Schedule

Regulations for the taking of sea turtles

1. The word 'turtle' shall be deemed not to include the tortoise or land turtle (*Geochelone carbonaria*).

2. No person shall:
   - Catch or take or attempt to catch or take any turtle between the 1st June and the 30th September both dates inclusive,
   - Catch or take or attempt to catch or take any turtle which is under twenty pounds in weight
   - Disturb any turtle nest or eggs or take any turtle eggs, or take or attempt to take any turtle laying eggs or on the shore engaged in nesting activities.

WIDECAST

Wider Caribbean Sea Turtle Conservation Network

"Working together to build a future where all inhabitants of the Wider Caribbean Region, human and sea turtle alike, can live together in balance."

The Wider Caribbean Sea Turtle Conservation Network (WIDECAST) is a regional coalition of experts and a Partner Organization to the U.N. Environment Programme's Caribbean Environment Programme. WIDECAST was founded in 1981 in response to a recommendation by the IUCN/CCA *Meeting of Non-Governmental Caribbean Organizations on Living Resources Conservation for Sustainable Development in the Wider Caribbean* (Santo Domingo, 26-29 August 1981) that a "Wider Caribbean Sea Turtle Recovery Action Plan should be prepared ... consistent with the Action Plan for the Caribbean Environment Programme."

WIDECAST's vision for achieving a regional recovery action plan has focused on bringing the best available science to bear on sea turtle management and conservation, empowering people to make effective use of that science in the policy-making process, and providing a mechanism and a framework for cooperation within and among nations. By involving stakeholders at all levels and encouraging policy-oriented research, WIDECAST puts science to practical use in conserving biodiversity and advocates for grassroots involvement in decision-making and project leadership.

Emphasizing initiatives that strengthen capacity within participating countries and institutions, the network develops and replicates pilot projects, provides technical assistance, enables coordination in the collection, sharing and use of information and data, and promotes strong linkages between science, policy, and public participation in the design and implementation of conservation actions. Working closely with local communities and resource managers, the network has also developed standard management guidelines and criteria that emphasize best practices and sustainability, ensuring that current utilization practices, whether consumptive or non-consumptive, do not undermine sea turtle survival over the long term.

With Country Coordinators in more than 40 Caribbean nations and territories, WIDECAST is uniquely able to facilitate complementary conservation action across range States, including strengthening legislation, encouraging community involvement, and raising public awareness of the endangered status of the region's six species of migratory sea turtles. As a result, most Caribbean nations have adopted a national sea turtle management plan, poaching and illegal product sales have been dramatically reduced or eliminated at key sites, many of the region's largest breeding colonies are monitored on an annual basis, alternative livelihood models are increasingly available for rural areas, and citizens are mobilized in support of conservation action. You can join us! Visit www.widecast.org for more information.

WWW.WIDECAST.ORG