"ROSALIE SEA TURTLE INITIATIVE" (RoSTI)

A project of the
Wider Caribbean Sea Turtle Conservation Network (WIDECAST)

ANNUAL REPORT 2003

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We are profoundly grateful for the welcoming and ongoing encouragement of the people of Dominica! A program such as this can only be successful if it has the support of all sectors of society, including local communities, government agencies, tourism sectors, and the media. It would be impossible to credit everyone who participated meaningfully in the project, and we must apologise in advance to anyone we have inadvertently left out.

Our volunteers and field staff shouldered the bulk of the workload, and without them the beach would not have been patrolled, turtles and their young would not have been protected, and data would not have been collected. In particular we are deeply grateful to our dedicated, professional field staff -- Beach Patrollers Mr. Francis 'Vae' Lawrence and Mr. Dexter George, as well as Bonifas Lawrence who assisted at various times. Volunteers like Errol and Marcia Harris also displayed great patience and endurance in patrolling the beach at night in all types of weather! We are also grateful to all of the residents and tourists that visited the beach, helped with patrols, and gave of their enthusiasm; and to the school children and community members of the South-East who so eagerly participated in beach clean-ups and other events.

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product in Dominica, was responsible for initiating the RoSTI project. In addition, we owe a great deal to Mr. Patrice Oscar, Mr. Edbert Jean-kere, and the rest of the staff at the Rosalie Bay Nature Resort for their contributions in ways far too numerous to mention.

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Local NGOs were also very helpful in getting the message out, and in particular we would like to acknowledge Dr. Sascha Steiner (President, Institute for Tropical Marine Ecology) and his students, and the Dominica Conservation Association. Dr. Alexander Burton James of UNESCO was instrumental in engaging community dialogue on important topics, and hosted three community workshops: in May, June and July at La Plaine, St. Joseph, and Roseau, respectively. These workshops were well attended and very informative, and had the result of encouraging discussions on a wide range of community issues.

We are also deeply grateful to other members of the WIDECAST network for providing training and field experience to project staff and Forestry officers. These include the Nature Seekers (Dennis Sammy, Manager) in Trinidad, the Barbados Sea Turtle Project (Dr. Julia Horrocks, Director), and the Jumby Bay Hawksbill Turtle Project (Keri Goodman and Allie Parrish, Field Directors) in Antigua. We are also grateful to Dr. Horrocks and Dr. Robert van Dam (Sea Turtle Conservation Bonaire) for their comments on the initial research design.

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Executive Summary and Major Recommendations

The Rosalie Sea Turtle Initiative ("RoSTI"), a new partnership between the Wider Caribbean Sea Turtle Conservation Network (WIDECAST), the Government of Dominica, and the communities of the South-East coast, achieved success on many fronts in 2003, in many ways surpassing Year 1 goals. The project answered some important management questions, and raised many others. It demonstrated what can be accomplished when the cooperation of stakeholders at all levels is achieved, and indeed how much more could be done if such cooperation were to be sustained over time.

From a science standpoint, RoSTI demonstrated that the major nesting beaches of the South-East coast can be regularly patrolled and surveyed to document the number (and species) of sea turtles nesting, their reproductive success (including nest fate), and major threats to their survival. Project staff documented three species of sea turtle (the leatherback, green turtle, and hawksbill) nesting on Rosalie (Coffee) and La Plaine (Bout Sable) beaches. Leatherback nesting peaked in May and early June, followed by green turtles (peak: late July and early August) and hawksbills (peak: late September and early October). As is the case elsewhere in the eastern Caribbean region, hawksbills showed the least defined nesting season, presumably nesting in low densities throughout most of the year.

A total of 16 turtles received identifying flipper tags (tags were provided by WIDECAST's regional Marine Turtle Tagging Centre in Barbados), including 7 leatherbacks, 4 green turtles, and 4 hawksbills tagged whilst nesting, and 1 juvenile green turtle stranded at Castle Bruce Beach and later tagged and released. Adult females came ashore at Rosalie and La Plaine beaches a total of 74 times over the course of the study (22 April to 15 December 2003), and about half of these landings are thought to have resulted in the successful laying of eggs. Ten nests were confirmed and 25 nests were listed as "suspected nests" (based on field characteristics) but could not be confirmed before beach erosion took its toll.

All sea turtles nest multiple times per season: generally an average of 3-7 nests per season, and in the case of leatherbacks as many as 12! Research throughout the world has shows that adult females repeatedly return to the same nesting area (at 2-7 year intervals) in order to nest. Based on tagging records, we know that this can continue for two decades or more -- meaning that each adult female produces thousands of eggs and is vitally important to the survival of her species. Hopefully in future years we will see our tagged turtles return! This will not be the case for one particular leatherback, however, who was tagged by RoSTI staff on 17 June and killed 10 days later while attempting to nest in La Plaine.

We cannot fully estimate the number of turtles nesting in Rosalie Bay because tagging can only be accomplished during all-night beach patrol (sea turtles nest at night) and only Rosalie Beach was consistently patrolled at night. In the case of La Plaine, nests and suspected nests were documented during early morning beach surveys. However, we estimate a nesting population (all three species, combined) of fewer than 20 adult females, of which 3 leatherbacks are known to have been killed. We also estimate that fewer than half of all eggs hatch, due to natural cycles of erosion. *Illegal killing is clearly the most important threat to the turtles, and beach erosion is clearly the most significant threat to their young.*

From a community standpoint, RoSTI demonstrated that there is considerable untapped passion for sea turtle conservation in the coastal communities of the South-East region, as well in Dominica as a whole. Hired staff, including former poachers, were thoroughly and professionally dedicated to the task of beach patrol and data collection from the very beginning. Their participation, often extending beyond salaried hours and duties, was the heartbeat of the project and the reason that illegal killing was immediately and

substantially reduced in the study site. The participation of local staff also encouraged others, including local youth, to volunteer on the beach, to participate in beach clean-ups, to serve as interns (conducting national surveys, for example), or simply to come to the beach to see a live sea turtle – something most members of the community had never done.

The larger (national) community also exhibited a genuine interest in the sea turtles' plight. This was demonstrated by frequent requests to participate in the beach patrol, expressions of opinion during call-in radio shows, the incessant ringing of the *Sea Turtle Hotline* (a mechanism enabling citizens to report nesting, hatching, stranding, and illegal acts), the support of local business (cash, advertising, in-kind services), requests by schools for presentations, and the times RoSTI staff were stopped in the street and asked questions about sea turtles. In a national Public Awareness Survey of nearly 200 Dominicans, fully *73% had never seen any species of sea turtle nest on the beach*, which certainly explains the wonder and awe of residents who joined RoSTI staff to see the ancient ritual for the first time.

Based on everything we've learned this year, we offer the following recommendations. See "Discussion with Management Recommendations" for further recommendations and more detail on the recommend-dations summarised here.

Extending Beach Coverage- Rosalie Bay was the geographic focus of the project. Research outside of this area was conducted in partnership with Forestry staff and other local communities, including Soufriere, Scott's Head, Salisbury, Calibishe, Woodfood Hill, several communities in North Eastern Dominica, and Portsmouth, among others. However, the low rate of return nesters (i.e. observing a tagged turtle more than once) across all species during 2003 may indicate that more attention should be given to the patrolling of other potential nesting beaches, especially those in relatively close proximity to the study site. We recommend early morning foot patrols of other potential nesting beaches, selected based on information provided by informed residents and existing government databases. As Forestry officers currently undertake habitat surveys on an island-wide basis approximately every three months, we recommend that RoSTI staff participate in and support these surveys to the maximum extent possible.

Nest Relocation- Of the three sea turtle species encountered at Rosalie Bay, the Leatherback nested most consistently near the high-water mark. *All* Leatherback nests, both confirmed and "suspected", were lost to erosion on Rosalie Beach and at times eggs were seen laid amongst rocks on La Plaine. This despite the fact every nest, with the exception of one Green turtle and one Hawksbill nest, was carefully relocated by RoSTI staff to higher (safer) areas of the beach platform. It is a recommendation that based on beach profile data collected in 2003, and the collective experience of RoSTI staff and beach patrollers, "safe zones" suitable for the relocation of otherwise doomed nests be identified prior to the 2004 nesting season. The site should be relatively safe from both ocean storm surge and inundation from local rivers.

Communication and Shelter- It is a priority recommendation that community beach patrollers be provided with cell phones. This would increase both the ability of beach patrollers to communicate with RoSTI Project Managers, and with enforcement personnel in the event of an emergency or the occurrence of illegal activity on the beach. It is also a recommendation that every effort be made to construct a 'turtle hut' on La Plaine beach, similar to the popular and useful structure already in place on Rosalie Beach. Currently, turtle watchers and patrollers have nowhere to rest or wait while waiting for a chance to see a nesting turtle on La Plaine beach.

In-water Research- A Turtle Sighting and Reporting Network was established in 2003 in collaboration with Dive Dominica, local boat captains, and other relevant experts. It is clear from observational and

anecdotal information that much could be learned from a more formal investigation of sea turtle distribution, abundance and behaviour in offshore waters. It is a recommendation that 2004 RoSTI staff design and prepare the methodology for in-water research at selected sites around the island (including Rosalie Bay). As WIDECAST will be designing in-water census programs to study foraging populations in selected Eastern Caribbean islands during 2004-2006 as a pilot project with UNEP funding, we recommend that Dominica be included in this programme.

Habitat protection- Regulated multiple use areas, buffer zones, and various forms of habitat protection are among the tools that managers and concerned communities emphasise when seeking to safeguard and restore depleted natural resources. In the case of sea turtles, where poaching continues to pose a serious threat, it is a recommendation that a "Rosalie Bay Reserve" (RBR) be considered, perhaps under the authority of the Fisheries Act, to encompass the entirety of nesting habitat from the Rosalie River to the southern boundary of La Plaine Beach and from the low water mark to the line of permanent vegetation.

The laws of the Commonwealth of Dominica protect the right of public access to the island's coastal beaches, and therefore any access and/or use restrictions associated with the beaches should be defined by regulations governing the RBR. A Management Plan for the reserve should define a Buffer Zone between the line of permanent vegetation (the landward boundary of the RBR) and the landward boundary of the natural rock dune at Rosalie (Coffee) Beach. It is a recommendation that no physical development should occur within the RBR or within the Buffer Zone. The natural integrity of the banks of the Rosalie River should also be protected from degradation, perhaps as part of the Buffer Zone.

Similarly, it is a recommendation that La Plaine Beach be designated as a conservation area of some kind, so that conditionalities specific to the protection of sea turtles could be enacted. For example, visitors to the beach (for the purpose of 'Turtle Watching') would be required to pay a local guide, beachfront lighting would be controlled, the beach would be regularly cleaned, etc. In addition, the conservation area would generate additional awareness of the plight of Dominica's sea turtles and the laws already in place that safeguard pregnant females and their eggs and young.

Poaching- This year has seen attempts to counteract poaching implemented, which is particularly important since if left unchecked, the entire nesting population of Rosalie Bay could be destroyed. It is a recommendation that RoSTI staff and volunteers provide timely and complete information to law enforcement officers concerning any illegal activity of which they are aware, and that RoSTI staff offer their full and complete cooperation in any investigation of these crimes. It is further a recommendation that, particularly where poaching is heavy, RoSTI staff investigate options available at the community level, including funding for indigenous industries or livelihood generation, and collaborate with relevant local and national agencies and groups to explore opportunities to provide poachers with alternative means of income.

Education and Outreach- The 2003 RoSTI program focused on the education of children inside the classroom though its School Programme. We recommend that RoSTI continue its Schools Programme (directly involving community teachers and other educators), and that the RoSTI Internship Programme, started in the latter part of 2003, be consolidated in 2004 and 2005. After a three-year pilot phase, RoSTI is scheduled to be run by local managers, which may be drawn from the Intern Programme! It is further a recommendation that the RoSTI Internship Programme strengthen ties with the island's Youth Division, and particularly with Mr. Terry Raymond of 'YES Corps'. The Youth Division has already been an invaluable asset to RoSTI, and, like RoSTI's relationship with Fisheries and Forestry officials, it

represents a sterling example of what RoSTI should continually strive for; that is, real and meaningful cooperation between groups and agencies that share the same vision.

Educational Materials- Outreach in 2003 involved teaching people (residents and visitors alike) about sea turtles, and involving them in stewardship and conservation initiatives. We recommend that RoSTI staff develop additional picture materials, particularly species identification sheets, posters, bookmarkers and thematic brochures. These materials will also be useful in schools where RoSTI staff work in partnership with local teachers. It is further a recommendation that materials be developed specifically for sharing with policy-makers. For example when visiting Village Councils, small packages or folders should be available for each Council member to keep.

'Turtle Watching' Venture- It is a foundational objective of the RoSTI project to "raise awareness of the biology and status of depleted sea turtle populations, as well as to encourage interest on the part of Dominicans to become involved in a locally run 'Turtle Watching' venture." Such a venture has the potential to provide sustainable livelihoods for community members, encourage leadership and entrepreneurial skills, and complement existing marketing strategies for Dominica as a tourist destination. It is a recommendation that RoSTI staff continue to work with community leaders and natural resource authorities to design an initiative that will accomplish conservation and community development goals.

Media Considerations- It is a recommendation that the project continue monthly turtle reports on the radio, but with more emphasis on featuring Dominicans along with RoSTI staff. The same is true for television, where opportunities to feature community beach patrollers and others directly involved in the project should be sought. General "media", in the sense of public visibility for overall sea turtle management issues, is also needed. For example, it is a recommendation that emphasis be placed on the posting of sea turtle billboard signs (such as already exist in La Plaine) at nesting beaches known for poaching activity.

Sponsorship of Community Events- Sponsorship of village activities is a way to emphasise partnerships, support community development (beyond conservation issues), and encourage leadership. Sponsorship might involve a local musical band, Forestry or Fisheries extension program, Creole music festival, DiveFest activities, village football league, assisting a contestant for a queen show or quadrille festival, supporting a youth camp or church summer school. This type of participation shows the practical benefits of conservation. One recommendation might be to sponsor a monthly workshop, each taking place in a different area; another might be to focus on outreach targeting tour guides, taxi drivers, hoteliers, dive shops, car rental agencies, eco-tourism promoters, etc.

Market Assessment- During 2003 a preliminary market assessment was undertaken in support of one of the main goals of RoSTI, which is to develop a viable 'Turtle Watching' program at the Rosalie Estate that could be used as a model for other communities elsewhere on the island. It is a recommendation that a more in-depth study be conducted in 2004, and that it incorporate data collected on the nesting beaches to evaluate whether the natural resources (sea turtles) are sufficient to support a sustainable venture.

Project Support/ Income generation- It is a recommendation that steps be taken to generate funding for sea turtle conservation at the local level, with an aim to provide sustainable income to the project in the future. Such steps might include unique product sales; a RoSTI 'turtle stand' at Emerald Pool which, during the cruise-ship season, has 700 visitors daily and is only 20 minutes' drive from Rosalie; and/or an 'Adopt-a-Turtle Campaign' targeted at visiting tourists and advertised during public presentations.

Introduction

In April 2003, the Wider Caribbean Sea Turtle Conservation Network (WIDECAST) launched a new community-based project in the Commonwealth of Dominica. This project, entitled the "Rosalie Sea Turtle Initiative" (hereafter referred to as "RoSTI"), is the first comprehensive attempt to research and conserve endangered sea turtles on the island, and adds Dominica to the list of more than 30 other Caribbean states and territories with existing WIDECAST-affiliated sea turtle programmes.

WIDECAST embraces the largest network of sea turtle research and conservation projects in the world, and is comprised of a regional network of scientists, managers, educators and other experts dedicated to the survival of sea turtles in the Caribbean Sea. This available pool of expertise provides a basis from which all Caribbean countries can actively participate in the conservation of endangered species at all levels, from fieldwork and the collection of data to the development of best practices and the dissemination of information directly relevant to management action.

Through its affiliation with the WIDECAST network, RoSTI, which was conceptualised to serve as a practical example of how the sustainable management of depleted sea turtle stocks can be accomplished at both community and national levels in Dominica, continues to benefit richly from the experience of others in the region. For example, data record forms and public outreach materials were based on materials in use in other Caribbean islands; project staff and partners had the opportunity to travel to neighbouring countries to learn from what others are doing; and members of the project, the Forestry Division, and the Rosalie Estate development team participated in the 2004 annual general meeting of WIDECAST in Costa Rica in February 2004.

RoSTI is but a first step in providing Dominicans with experience in developing their own research priorities, creating their own conservation successes, and looking to a future that includes healthy populations of sea turtles. The purpose of this Annual Project Report is to summarise progress to date, including the objectives, methods and results from 2003. With consistent and heartfelt support from Government, the business community, the communities of the South-East coast, and the citizenry of Dominica, the project accomplished far more than it had intended during the first year. The information collected and the results obtained have set the stage for additional work in the coming years, and the development of an integrated and science-based agenda for sustainable turtle management in the country.

Study Site

The "Rosalie Sea Turtle Initiative" (RoSTI) is based in Rosalie Bay on the South Eastern side of Dominica, commonly referred to as "The Nature Isle" of the Caribbean. Dominica (754 km^2 in area) is situated in the Windward Islands, flanked by the French Departments of Martinique to the south and Guadeloupe to the north. The island has a rugged, mountainous terrain reflecting its volcanic origins. The highest point, Morne Diablotins, reaches to 1,447 m. Dominica is forested and has many streams and rivers. The climate can be described as humid and tropical, with an average temperature of about 27^oC and an average annual rainfall of 175 inches (most falling during the rainy season). Rainfall increases towards the central parts of the island, which receive approximately 400 inches of rainfall annually. Rock falls and landslides, particularly in the more mountainous regions, are common during the wet season. Dominica's location also places it in the hurricane belt; as a result, the island is particularly vulnerable to storms and hurricanes from June to November.

Dominica boasts a wide range of flora and fauna. According to Dominica's First National Report to the Conference of Parties to the Convention on Biological Diversity (Government of Dominica, 2002), the plant diversity includes approximately 155 families, 672 genera and 1226 species of vascular plants and several plant species which are recorded as endemic to the island; e.g. (*Sabinea carinalis*), locally referred to as Bwa Kwaib. Dominica's birds include two single-island endemics and nine regional endemic species. Its two endemic parrots (the Imperial parrot or 'Sisserou', *Amazona imperialis*, and the Red-necked 'Jacquot', *Amazona arausiaca*) are both considered Threatened (cf. IUCN Red List). Eighteen species of wild terrestrial mammals, including one species of opossum and one species of feral pig, and 19 reptile species have been recorded in Dominica. Of these, the Ground Lizard (*Ameiva fuscata*), Tree Lizard (*Anolis oculatus*), a snake (*Typhlops dominicana*) and a small tree frog (*Eleutherodactylus amplinympha*) are endemic.

Politically Dominica is a member of the Organisation of Eastern Caribbean States (OECS). It has traditionally been an agriculturally based economy, focusing particularly on bananas until very recently. Still dependant on agriculture, the island remains highly vulnerable to climatic conditions and international market and economic developments. Tighter standards and costs associated with the banana industry, coupled with a shift in Government focus away from agriculture into areas such as tourism, have had an impact. Despite Government policy, however, development of the tourism industry remains slow. This has been attributed to its relatively few beaches, rugged coastline, and absence of an international airport. As a result of these and other factors, overall economic growth has been sluggish in recent years.

Rosalie Bay- The project's specific geographic focus is Rosalie Bay, an area that embraces four distinct sandy beaches: Rosalie Beach (also referred to as Coffee Beach), La Plaine (also referred to as Bout Sable Beach) and two much smaller 'pocket beaches' referred to as B'avine Cyrique and Secret Beach (Bot-la-me). Due to the bay's location on the Atlantic, rather than the Caribbean, coast, these beaches are typical windward facing "high energy" beaches.

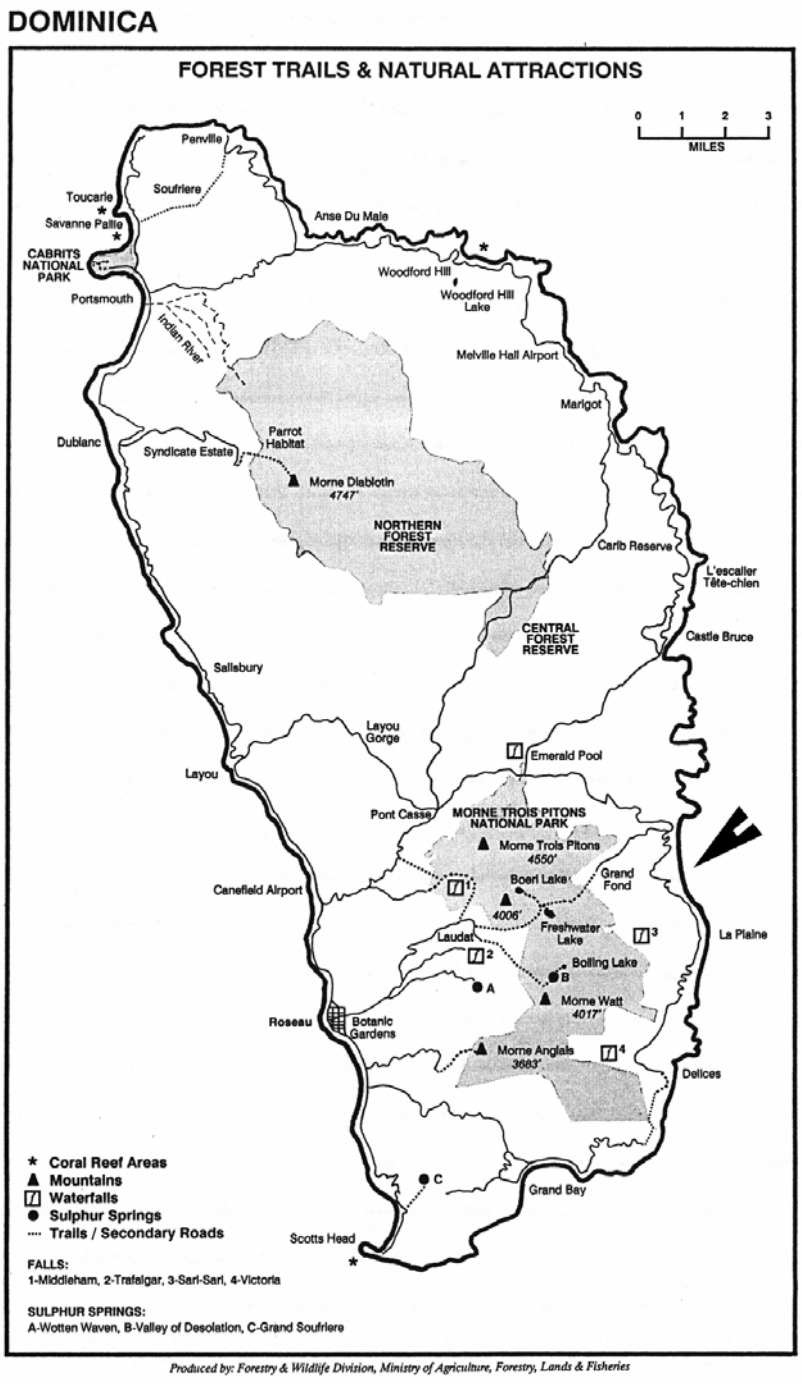
Surrounding Rosalie Bay are four villages. The largest of these, Grand Fond (to the north) and La Plaine (to the south), flank the smaller twin villages of Morne Jaune and Riviere Cyrique. Each village is at least 20 minutes' walk to the closest of the four beaches. Only La Plaine Beach and Rosalie Beach can be accessed by vehicle; the smaller beaches, B'avine Cyrique in particular, can only be accessed on foot during daylight in good weather.

Rosalie Beach is one of the larger, more popular beaches in the area. Adjoining the Rosalie Estate, a former copra (coconut) plantation, it is the first beach in Rosalie Bay to be reached when approaching the Rosalie area from the north. The beach, like all others in the area, is a black sand beach. On its northern border flows the Rosalie River, one of the larger rivers in the area, and on its southern flank the beach abuts a high cliff face. Crossing the beach are two small streams.

Rosalie Beach, like others in the area, is very dynamic and its profile changes rapidly. Cycles of sand deposition and erosion expose large rocks, create a pebble beach or vary the length, width and/or depth of the sandy substrate. This is mostly a function of the rough Atlantic Ocean, but the streams present on the beach play a large role as well, particularly during the wet season. Typically, as the sand disappears, the southern end of the beach becomes inaccessible during high tides, as the waves dash against the large rocks which have become exposed. To the north, towards the river, the beach is usually comprised of stones and rocks, in times of unusually high deposition there may be limited amounts of sand for short periods of time. On the opposite side of the Rosalie River is a small, well-defined bay having a stony beach.

Offshore Rosalie Bay is a coral reef system which protects the beach from powerful ocean swells and may provide important foraging habitat for resident sea turtle populations.

Figure 1. The Commonwealth of Dominica, indicating (by the arrow) the location of Rosalie Bay.



B'avine Cyrique is the next small pocket beach south of Rosalie Beach. It is a black sand beach at the bottom of a cliff with a small, high waterfall. It is closest to the La Crete area of Riviere Cyrique, and is accessed by single track and climbing down the cliff face using a tree for support. It is a very popular spot for line fishermen; however, even the fishermen avoid it when it is wet and at night. Secret Beach or "Bot-la-me" is also in the village of Riviere Cyrique. This beach is reached by passing through River Mahoe and following a single-track trail down the hillside to the beach. The actual beach is very small and has a tiny stream on one side.

La Plaine (Bout Sable) Beach is the other main beach in the area. The furthest south, it is closest to the village of La Plaine. It is accessible by road and is also crossed by two small streams. The first stream is near the access point, and south of the river's mouth is a usually stony beach that in periods of heavy deposition accumulates sand. It rounds off to form a small bay that marks the end of La Plaine beach. The beach north of the river mouth is long and narrow. This end of the beach is marked by a smaller but wider beach with a little stream bounded by a cliff. This stretch of beach is also very active; the depth of the sand varies enormously, sometimes eroding completely to create long sections of rocky beach. Typically at these times the waves lash against the cliff face, preventing access to the end of the beach. In addition, the cliff butting this beach is prone to some degree of landslides and rock falls during the wet season.

Traditionally the rivers and forests of the national landscape have been among the most important natural resources in Dominica's culture and psyche. Historically the coastal area of Rosalie (including the beaches) has been very important to the people in the surrounding villages. Years ago, even before the present settlements of Grand Fond, La Plaine, Morne Jaune and Riviere Cyrique existed, there was a single village in Rosalie; later the four present-day villages were formed. Most of the villagers still maintain a cultural link to Rosalie and it is a very popular area for picnics and get-togethers on Public Holidays. During the summer months, when a combination of no school and calm seas make the beach a popular spot, dozens of children and villagers, especially from Grand Fond, enjoy the area. As with B'avine Cyrique, Rosalie Beach is popular with line fishermen.

As a people very reliant upon, and with close ties to the land, Dominicans see harvesting their natural resources as their birthright. The fertile soil produces abundant crops, the rivers and streams crayfish, the forest manicou or opossum (*Didelphys marsupialis insularis*), agouti (*Dasyprocta leporinus*), and crapaud or mountain chicken (*Leptodactyllus fallax*), and the sea, fish and marine turtles. It is within this geographic, historical and cultural context that the RoSTI project was born and has flourished.

Project Objectives

RoSTI was planned as a three-year pilot project. To guide its development, several goals were set to ensure that the project stayed on course. These covered four basic areas - Research, Education, Conservation, and Community - and were outlined by WIDECAST at the project's inception as follows:

Research- to establish baseline information, and lay the foundation for obtaining the necessary scientific information for national management and conservation efforts directed toward sea turtles. The data will focus on the distribution, abundance, seasonality and species of sea turtles nesting along the South East coast of Dominica, and major threats to their survival. This information, combined with existing and historical data, will contribute to the development of a 'Sea Turtle Recovery Action Plan for Dominica' and support ongoing discussions about the protection of critical sea turtle habitat.

Education- to inform adults and children of the complex biology of sea turtles, their role in local ecosystems, and the importance of managing threats to their survival with the aim of ensuring stable populations and sustainable use options for the future. The education component is envisioned to include initiatives such as workshops, public presentations, internships, fieldtrips and summer camp for children.

Conservation- to identify current threats and make recommendations to local community organisations, to Government, and to other stakeholders regarding mitigating options and alternatives. The project will emphasise the involvement of local communities in the design of conservation programs, and local hoteliers in implementing "turtle friendly" beach management protocols, such as finding alternatives to artificial lights shining on nesting beaches.

Community- to raise awareness of the biology and status of depleted sea turtle stocks as well as to encourage interest on the part of Dominicans to become involved in a locally run 'Turtle Watching' venture. The project will work with community leaders to identify ways in which sea turtle conservation can benefit the community, and meet community development needs. The project will recruit residents, including current poachers, to contribute information to the project, to patrol nesting beaches, to safeguard turtles and nests, and to share their knowledge with the area's residents, children and visitors.

By the end of the pilot phase, the project will be managed by local staff and ideally will include a profit-making eco-tourism venture administered from within the community. With all of this in mind, RoSTI Project Managers and community beach patrollers were tasked to:

- Identify the sea turtle species that utilise the Rosalie Bay area,
- Evaluate the relative importance of Rosalie Bay habitats to sea turtles in Dominica,
- Design and implement a regular schedule of beach patrols for the purpose of estimating the abundance, distribution and seasonality of nesting activity (data that will ultimately lend themselves to trend assessments),
- Design and implement a nest monitoring program sufficient to estimate annual reproductive success and major causes of nest mortality,
- Document and report incidents of adult mortality (e.g. poaching, stranding resulting from incidental capture and drowning offshore),
- Participate in public awareness campaigns designed to eliminate illegal sale of sea turtle products, such as polished shells and jewellery, in Dominica,
- Collaborate with law enforcement to develop a strategy to deal with illegal activity,
- Print and distribute locally and nationally, at least two public education/awareness items, such as a slide show, brochure, poster and/or leaflet,
- Visit a minimum of two schools each month of the term,
- Participate in at least two media events to promote the project and involvement by the community
- Give at least two print and /or radio interviews on RoSTI, the sea turtles of Dominica, and current conservation issues,
- Involve community members in research, public education, and profit-making ventures (such as 'turtle watching'),
- Encourage community support for conservation efforts by sharing information about the biology and status of sea turtles in Dominica and worldwide, and by embracing community leaders in the development of specific conservation objectives, and
- Prepare preliminary recommendations to local stakeholders, including Government, based on the results of the research completed during Year 1.

Methodology

Field Research- To determine the sea turtle species using the beaches of Rosalie Bay, project staff established a schedule of foot patrols and designed record-keeping forms (Appendix I) to document the distribution, abundance, and seasonality of sea turtle nesting and the fate of eggs laid. It was envisioned that this would be accomplished mainly by early morning beach patrols, but it soon became evident that community staff hired to undertake beach assessments were eager and willing to participate in nocturnal (night-time) patrols, as well as early morning surveys.

The 2003 research season began on 22 April and ended on 15 December. At first, nocturnal patrols were conducted mainly on weekends, but night-time surveillance was soon extended to five nights per week on Rosalie Beach. The night-time presence of research personnel acted as a countermeasure and deterrent to repeated cases of leatherback turtle poaching (illegal under the law), as documented by RoSTI staff. While serving to immediately reduce the problem of poaching, the patrols also facilitated a Year 2 objective; namely, the tagging and measurement of nesting females. In order to conduct an accurate survey of nesting activity, the beach was patrolled hourly, meaning that no beach sector was left unattended for more than one hour (the average time required for nesting).

Night-time patrols rarely lasted until dawn, so early morning patrols were conducted each and every morning, commencing between 5:30 and 6:30 AM, to provide a complete record of the previous night's nesting activity on both Rosalie and La Plaine beaches. During these patrols, activities or factors present on the beach which might have affected nesting females or hatchlings were also noted. These included abiotic factors (e.g. beach erosion, pollution, beach litter/debris) as well as man-induced factors (e.g. poaching, sand mining, patterns of beach use, the presence of domestic animals).

Figure 2. RoSTI beach patrollers Mr. Francis 'Vae' Lawrence and Mr. Dexter George documenting a typical Green turtle (Chelonia mydas) nest at Rosalie Beach, Dominica. © Rowan Byrne/ RoSTI.

When a turtle crawl was encountered, RoSTI staff determined (or made an informed judgment) whether or not eggs had been laid. If egg-laying was not observed, RoSTI staff gently dug into the sand in the hopes of making contact with the eggs. If eggs were located, the site was triangulated for future reference and carefully refilled.

Eggs laid in high risk areas, such as too close to the surf, were carefully excavated within 12 hours of deposition and re-buried in a beach cavity dug to mimic the nest's original dimensions (depth, width), but placed higher on the beach platform. Training from WIDECAST's Director of Science was provided to all RoSTI staff for this and other field techniques. Best practices as described in Eckert et al. (1999) were followed at all times.

Record-keeping protocols for the field data were designed to ensure data accuracy, consistency, and the practicality of data organization, archival, and retrieval. The RoSTI data sheet (Appendix I) was used to record all sea turtle activity encountered during patrols, including nesting attempts, hatchings, and incidents of poaching. The reverse side featured a map drawn to aid in locating the nest site at a later date (such as at hatching, or to allow follow-up after a storm event).

Late in the season when it became evident that eggs were being lost even from relocation sites, Project Managers began to systematically monitor beach erosion. Data collection on seasonal changes in beach profile remains incomplete, and will be a priority in 2004.

In support of conservation objectives, and to further encourage community participation, locally popular beach clean-ups were held in May and again in July 2003. Activities were organized by visiting 'Goputney Kids' (www.goputney.com) from the US in partnership with local school children (Figure 3).

Figure 3. Community Beach Clean-Up, Rosalie Beach, May 2003. Beach clean-ups are an important part of sea turtle conservation … and community pride! © Scott Eckert/ WIDECAST.

Preliminary Market Assessment- The first step in attempting the Market Assessment is to obtain a general profile of the tourist industry in Dominica. The next step is to focus on what tourists generally do when in the country. For example, what are their spending habits? How do they travel around the island? What sites do they visit, and what do they expect?

To begin to answer these and other relevant questions, a short questionnaire (Appendix II) was designed to gather baseline information on visitors to Dominica. It was kept brief and simple, in keeping with the nature of a preliminary assessment.

Those who were targeted for this questionnaire represented a variety of relevant sources familiar with tourists and the tourism product in Dominica and these were narrowed to four main groups to be interviewed –

- visitors/ tourists
- persons involved in the transportation of visitors (e.g. taxis)
- attraction operators or managers
- persons providing accommodation (e.g. hotels and guest houses)

These categories were chosen because they represented the traveling public, or parties well-acquainted with the island's tourists and their behaviour.

Similar numbers of interviewees were selected from each group to minimise any potential bias. Within these four sectors, the interviewees were chosen randomly, from lists based on directory-listed operators. The questionnaire was applied over a one week period in early November to capture the start of the tourist season. Interviews were conducted by RoSTI interns by telephone or, where practical, in person at a place of business. The majority of the questionnaires applied to tourists were done in Roseau and at attractions such as the Springfield Guesthouse. Pilot testing of the forms were also done at these locations.

Before being conducted, the questionnaire was reviewed and tested on a number of local industry experts and their feedback and suggestions were incorporated.

Public Awareness Survey- In accordance with one of the project objectives, which was to "Conduct a national survey to determine the level of knowledge citizens have of sea turtles in their country and throughout the Caribbean region, and repeat the survey in Year 3 to evaluate the effect of the RoSTI project on national awareness", an island-wide survey was designed as follows. The island was divided into roughly four quarters (North East, South East, North West, South West) with the objective of conducting surveys in the main settlements in each sector. Setting a goal of completing 150 questionnaires for the entire island meant that each segment was estimated to yield approximately 35 questionnaires. There was an excellent response to this survey, with 180 questionnaires completed (see "Results: Public Awareness Survey")

Having incorporated the internship program into the island survey, working with six pairs of interns, RoSTI staff estimated that each questionnaire would require 15-20 minutes. After allowing for traveling time between small and isolated communities, each quarter was expected to take two days for the survey to be completed. The survey was conducted one sector at a time. In Roseau (South West sector) and in their local communities, interns were responsible for their own transport. For the more inaccessible communities in the north and along the east coast, transportation was organised by RoSTI.

The questionnaire used was provided by WIDECAST (Appendix III) and was based on one which had been used by young people polling their communities in Grenada (Shirley, 2002). Minor adjustments were made, such as in the use of local terms for sea turtles, the incorporation of photo identification sheets, and the re-phrasing of some questions which were consistently misinterpreted in initial trials.

Prior to being sent into the field, all participants/interns were given an introduction to and information on RoSTI, WIDECAST, and basic sea turtle biology. They were also shown the entire questionnaire; and particular attention was paid to which questions were essential and which questions might be most easily misinterpreted by respondents. Interview and surveying basics (see Tambiah, 1999) were also covered before the actual implementation of the survey. The final results of the questionnaire were compiled and analyzed using a combination of the spreadsheet program Microsoft Excel.

Results

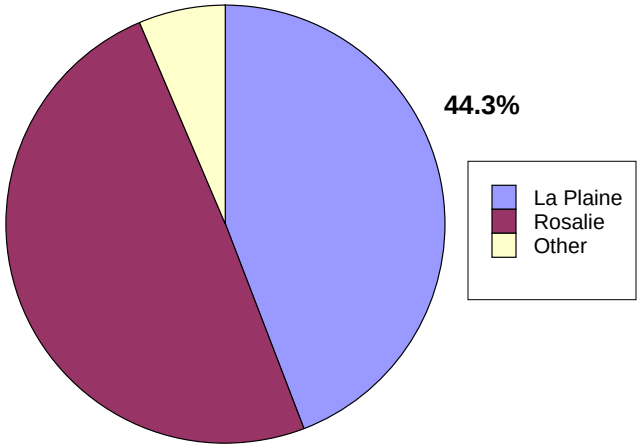
The 2003 research season began on 22 April and ended on 15 December. During this time, RoSTI staff documented a total of 74 separate sea turtle sightings within Rosalie Bay, as well as 5 activities at other beaches on the island, for a total of 79 (Table 1). The first recorded activity occurred on 25 April, the last on 2 November. Rosalie Beach was the most favoured site for these activities, with 39 (49.4%) sightings ranging from successful egg-laying to "suspected nests", false crawls, and poaching events. La Plaine accounted for 35 (44.3%) of the sightings, while the remaining approximately six percent (6.3%) were documented on other beaches in Dominica (Chart 1).

Table 1. 2003 Sea Turtle Sightings by Beach in the Commonwealth of Dominica, with an Emphasis on the Beaches of Rosalie Bay. (*)

	Sightings by Beach	
Beach	**Sightings**	**Percentage**
La Plaine Beach	35	44.30
Rosalie Beach	39	49.37
Other Beaches	05	06.33
Total	79	100.00

(*) *Table 1 note*: Activity occurring outside Rosalie Bay was reported opportunistically, and doesn't reflect an accurate total. Data from La Plaine and Rosalie beaches, however, is considered complete for the survey period, 22 April to 25 December 2003.

Chart 1. 2003 Sea Turtle Sightings by Beach in the Commonwealth of Dominica, with an Emphasis on the Beaches of Rosalie Bay. Sightings from "other" beaches were reported to the RoSTI *Sea Turtle Hotline* on an opportunistic basis and are not intended to reflect relative abundance island-wide.



Species- RoSTI confirmed three species of endangered sea turtles (Appendix IV) nesting on the beaches of Rosalie Bay. These are the Leatherback (*Dermochelys coriacea*), Hawksbill (*Eretmochelys imbricata*) and Green (*Chelonia mydas*) turtles. Island-wide (that is, including 74 sightings in Rosalie Bay and 5 from other locations), the most common reports were of Leatherbacks and Hawksbills; the least frequently seen was the Green turtle (Table 2, Chart 2).

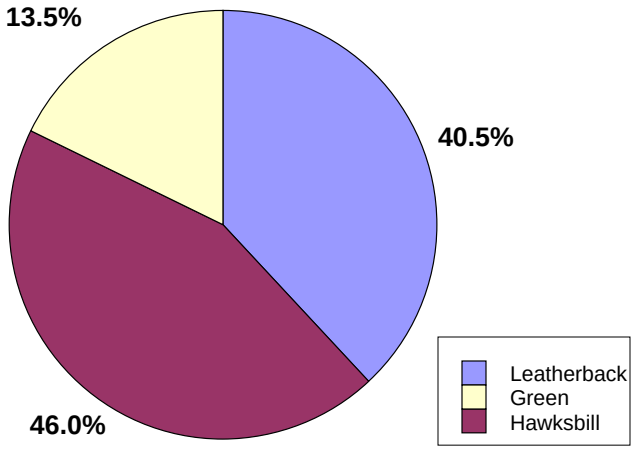
The discovery of crawls (tracks) during morning beach patrols provided evidence of the majority of sea turtle activity. In these cases, the size and pattern of the crawl left behind in the sand was used to identify the sea turtle species. Only 24, or approximately 30%, of the total number of activities were documented based on a visual sighting by RoSTI staff during night-time nest patrol.

Sightings included four poached turtles; all but one at La Plaine Beach. Poaching activity on both Rosalie and La Plaine beaches was substantially reduced as a result of beach patrolling. There was no evidence of poaching at La Plaine Beach from 26 May 2003 onwards; the last turtle to be poached was a female leatherback that had been tagged by the RoSTI program ten days previous to her untimely death.

Table 2. 2003 Sea Turtle Sightings by Species, with an Emphasis on the Beaches of Rosalie Bay (i.e. excluding the five sightings reported from other locales).

	Ratio of Species Activity	
Species	**Number of Encounters**	**Percentage**
Leatherback	30	40.5
Hawksbill	34	46.0
Green	10	13.5
Total	74	100.00

Chart 2. 2003 Sea Turtle Sightings by Species, with an Emphasis on the Beaches of Rosalie Bay.



Egg-laying- There were 10 confirmed nests at Rosalie and La Plaine beaches. A nest was documented as "confirmed" only when eggs were visually or physically verified in the nest chamber. Due to the immense size of Leatherback nests and the extent of their disguising, it was often not practical or possible to confirm eggs; as a result, many potential nests could only be labelled as "suspected nests". Ten activities were recorded as "confirmed nests" and 25 as "suspected nests" after careful examination by the researchers. Together these 35 confirmed and suspected nests comprised 50% of all recorded results, with "false crawls" (=unsuccessful nesting attempts) occurring at roughly the same frequency (Table 3).

Table 3. 2003 Results of Turtle Activities at Rosalie and La Plaine Beaches, Rosalie Bay. (*)

	Results of Turtle Activities	
Result	**Number of Cases**	**Percentage**
Confirmed Nests	10	14.1
Suspected Nests	25	35.2
False Crawl ('Dry Run')	36	50.7
Total	71	100.00

(*) *Table 3 note*: There are only 71 *results* included in Table 3 (vs. 74 *sightings* for Rosalie beaches documented in Table 1) because three gravid leatherbacks attempting to nest at La Plaine were illegally killed before egg-laying, meaning that there was no "result" to their effort.

Tagging- RoSTI staff tagged a total of 16 turtles (Chart 3): seven Leatherbacks, four Hawksbills, and five Green turtles, including a stranded juvenile tagged and later released. The first turtle to be tagged was a Leatherback on 15 May 2003, and the last one to receive tags was a Green turtle on 1 October 2003. For

this initial season tagging was only undertaken on Rosalie Beach patrols, with the exception of the juvenile Green turtle stranded on Castle Bruce and later released by RoSTI staff at Rosalie Beach.

Most turtles were tagged during "tamping" (=nest covering stages), and as a result it is definitely known that of the tagged females approximately 37.5% (a total of six) produced confirmed nests at the time of tagging. An equal number were positively identified as having *not* nested and were intercepted and tagged as they returned to the sea. Two tagged females (12.5%) were documented as having "suspected nests" after an examination of the nesting area.

Chart 3. 2003 Tagging Dates at Rosalie Bay. [LB=Leatherback; HB=Hawksbill; G=Green Turtle]

Number	Date	Species		
		LB	**HB**	**G**
1	15-May	**1**		
2	16-May	**1**		
3	22-May		**1**	
4	26-May	**1**		
5	05-Jun	**1**		
6	14-Jun		**1**	
7	17-Jun	**1**		
8	10-July			**1**
9	19-July	**1**		
10	19-Aug	**1**		
11	20-Aug			**1**
12	27-Aug			**1**
13	11-Sep			**1**
14	23-Sep		**1**	
15	23-Sep		**1**	
16	01-Oct			**1**
	Totals	**7**	**4**	**5**

Twenty percent of the turtle activities resulted in the application of identification tags. Of those turtles tagged, three (19%) of them were documented returning to nest again! Returning turtles included a Leatherback tagged on 16 May 2003 at Rosalie, and then killed at La Plaine beach 10 days later.

Measurements- Of the tagged turtles, the average Curved Carapace Length (CCL) and Curved Carapace Width (CCW) of adult female Leatherbacks was 152.50 cm and 120.50 cm, respectively. The maximum CCL was 165.0 cm and the minimum was 137.0 cm, for a range of 28.0 cm. The maximum CCW was 127.0 cm and the minimum was 112.0 cm, for a range of 15.0 cm.

The average CCL and CCW measurement for Hawksbills was 90.66 cm and 82.66 cm, respectively. The largest Hawksbill CCL was 95.0 cm and the smallest was 88.0 cm, producing a range of 7.0 cm. There was a range of just 3.0 cm between the maximum recorded CCW of 84.0 cm and the minimum measurement of 81.0 cm.

The average size for Green turtles encountered in 2003 was 86.3 cm in length (CCL) and 72.4 in width (CCW), including both nesting adults and a tagged juvenile Green turtle which measured 30.0 cm CCL and 26.0 cm CCW. The maximum dimensions for Green turtles encountered on the nesting beach were 107.0 cm CCL and 95.0 cm CCW.

Seasonality- A cursory glance at the data on tagging records, as well as the overall distribution of nesting at Rosalie Bay, reveals what may be a seasonal pattern. Leatherbacks nest mainly during the first half of the year and Green turtles mainly during the latter half of the year, with low density Hawksbill nesting extending over the longest period of time. For a rather brief period (June-July, see Chart 3) all three species were actively nesting; and this is broadly reflective of information gathered in more intensive studies in other Caribbean range states.

As data accumulate over the years, more precise information on the seasonality of nesting by the various species will surely accrue.

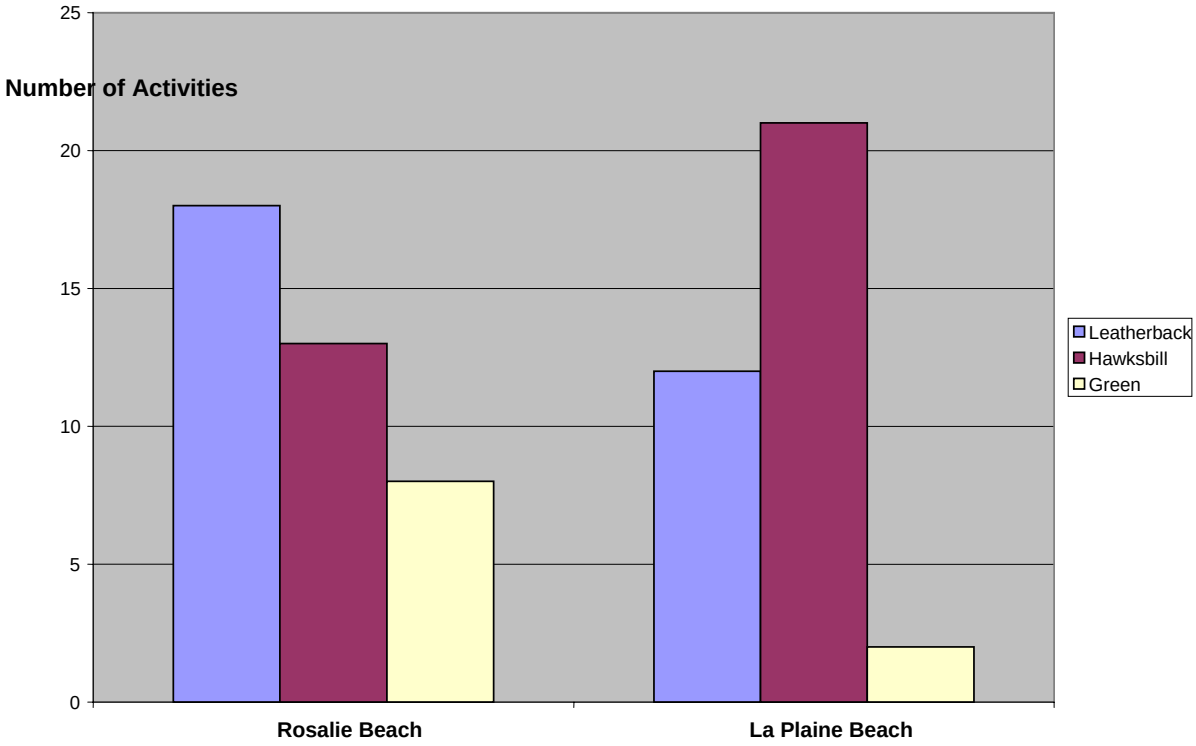
Geographic analysis- As noted in Table 1, Rosalie Beach had a total of 39 documented activities (49.4%) in comparison to La Plaine Beach, with 35 (44.3%) documented activities. Despite the close proximity of the two survey beaches, the pattern of nesting differed between them. For example, 60% of the nesting activity at La Plaine Beach was by Hawksbill turtles, almost twice the frequency evident on Rosalie Beach. Conversely, La Plaine received significantly fewer Leatherback nests compared with Rosalie (Table 4; Chart 4).

Table 4. Documented Sea Turtle Activity by Species by Location in Rosalie Bay, 2003.

	Rosalie Beach		La Plaine Beach	
Sea Turtle Species	**%**	**Number**	**%**	**Number**
Leatherback	46.15	18	34.29	12 (*)
Hawksbill	33.33	13	60.00	21
Green	20.51	08	05.71	02
Total	100.00	39	100.00	35

(*) *Table 4 note*: Including 3 (25%) egg-bearing leatherbacks killed illegally when they came ashore to nest at La Plaine Beach.

Chart 4. 2003 Documented Activity by Species by Location in Rosalie Bay, Dominica.



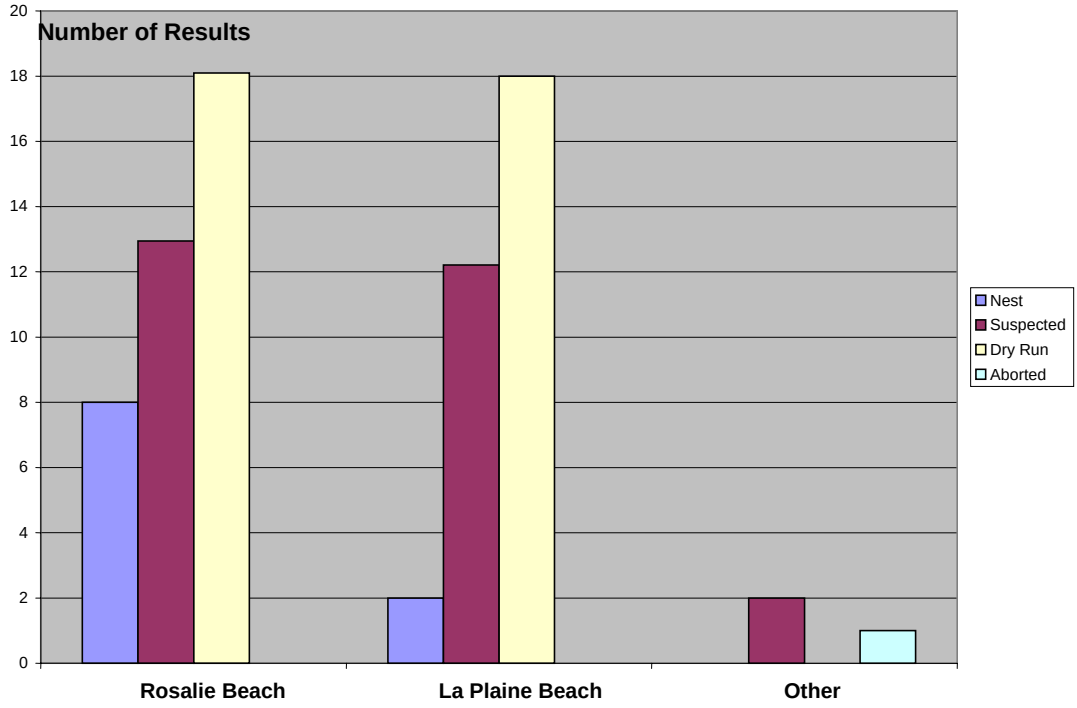
Looking more closely at the data reported in Table 3 (indicating a nearly equal number of confirmed and "suspected" nests, as compared to false crawls), we see that the percentage of "suspected nests" was high because Rosalie Bay is an area with a significant amount of Leatherback activity. It is difficult and often impractical to confirm Leatherback nests in comparison to the smaller species of turtles, due to the depth of the Leatherbacks' nests and the extent of their disguising activities. The number of confirmed nests was logically higher at Rosalie Beach, compared with La Plaine, because of the emphasis on night-time beach patrol at Rosalie Beach and therefore higher rates of encounter with noctural nesting females.

At La Plaine "false crawls" accounted for some 59% of all cases, a figure 10% higher than for Rosalie Beach (Table 5; Chart 5). The reasons for this most likely reflect physical beach characteristics.

Table 5. 2003 Nesting Results by Beach in Rosalie Bay, Dominica.

	Rosalie Beach		La Plaine Beach	
	Number	**%**	**Number**	**%**
Confirmed Nests	08	20.5	02	06.2
Suspected Nests	13	33.3	11	34.4
False Crawls	18	46.2	19	59.4
Total	39	100.00	32	100.00

Chart 5. 2003 Nesting Results by Beach with an Emphasis at Rosalie Bay, Dominica.



Results: Details by Species

Of the 30 Leatherback cases, 40% occurred at La Plaine and 60% at Rosalie. In all, 11 cases (38%) were identified by the direct observation of an adult during night-time patrol, and 62% by crawl identification during early morning beach patrols. Seven Leatherbacks (28%) had confirmed nests, 13 (48%) suspected nests, and there were 7 (28%) false crawls (Table 6a). There were nine encounters with nesting Leatherback females, two of these known from their flipper tags to be return nesters, indicating a total of seven uniquely identified individuals at Rosalie Bay in 2003. There were three confirmed cases of Leatherback poaching, all occurring on La Plaine Beach; as a result, three of 12 (25%) of Leatherback activities occurring on La Plaine Beach concerned poaching investigations.

Table 6a. 2003 Results by Species: Leatherback turtles, *Dermochelys coriacea*, at Rosalie Bay, Dominica.

	Leatherback Turtles	
Results	**Numbers of Cases**	**Percentage**
Confirmed Nests	07	25.9
Suspected nests	13	48.2
False Crawls	07	25.9
Total	27 (*)	100.00

(*) *Table 6a note*: 30 (total females, see Table 4) minus 3 females killed = 27.

Of the 34 Hawksbill cases, 62% occurred at La Plaine and 38% at Rosalie. Approximately 17% of these cases were identified by direct observation, and the balance identified from beach crawls. The percentage of false crawls was 67.6%. There were 2 (5.9%) confirmed nests and 9 (26.5%) "suspected nests" (see Table 6b), together representing only 32.4% of all activity recorded for this species.

Table 6b. 2003 Results by Species: Hawksbill turtles, *Eretmochelys imbricata*, at Rosalie Bay, Dominica.

	Hawksbill Turtles	
Results	**Numbers of Cases**	**Percentage**
Confirmed Nests	02	05.9
Suspected nests	09	26.5
False Crawls	23	67.6
Total	34	100.00

More Green turtles were documented at Rosalie Beach (80%) than were documented at La Plaine Beach (20%). In the case of Green turtles, a roughly equal number of sightings resulted from encounters with a nesting female and observations of nesting tracks in the sand. There was each a single case of a confirmed nest, a single case of an aborted nest, and a single juvenile tagged and released. False crawls were the most frequent occurrences, followed by "confirmed" and "suspected" nests (see Table 6c).

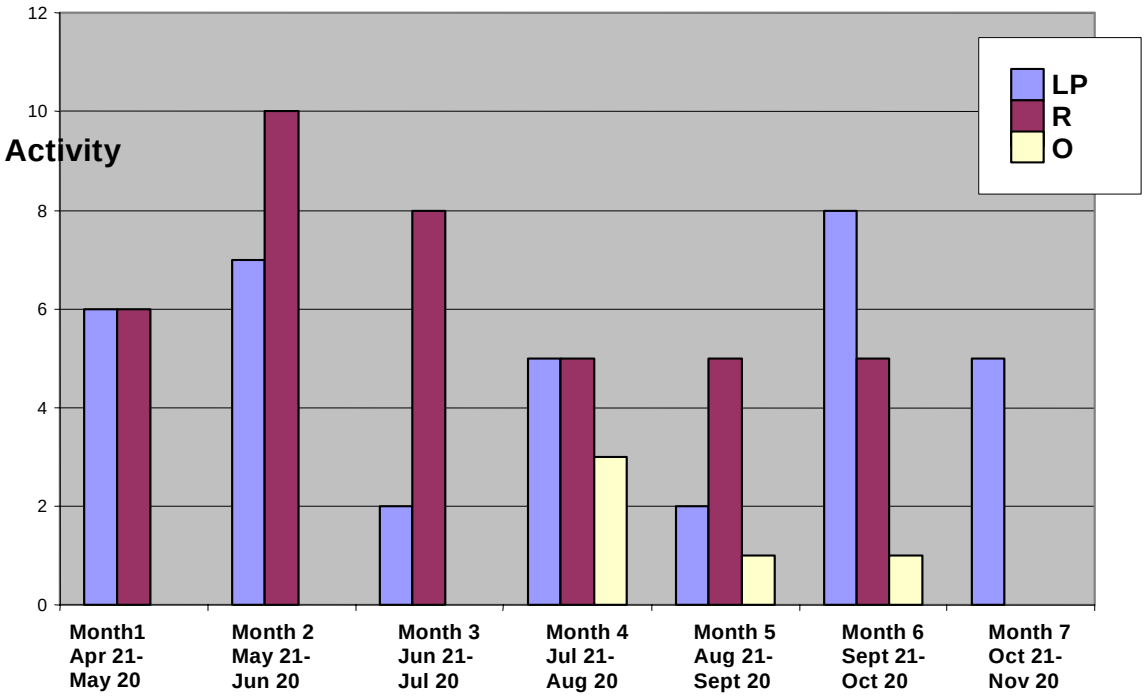
Table 6c. 2003 Results by Species: Green turtles, *Chelonia mydas*, at Rosalie Bay, Dominica.

	Green Turtles	
Results	**Numbers of Cases**	**Percentage**
Confirmed Nests	01	10.0
Suspected nests	02	20.0
False Crawls	07	70.0
Total	10	100.0

Results: Details by Month

For the first five of seven months of beach patrol, the amount of activity on Rosalie Beach exceeded or equalled that of La Plaine. The greatest difference occurred in Month 3 (April 21 to May 20), when four times as much activity occurred on Rosalie Beach (8 events) as opposed to La Plaine (2 events). Only in Months 6 and 7 was La Plaine more active than Rosalie, particularly in Month 7 when there were no turtles at Rosalie Beach. Activities were reported to the RoSTI Project from other beaches only in Months 4, 5 and 6, which accounted for 3, 1 and 1 cases, respectively.

Chart 6. 2003 Activity by Month and Beach, with an Emphasis on Rosalie Bay, Dominica. [LP=La Plane, R=Rosalie, O=Other beaches]



Regarding total turtle activity, Month 2, which saw a combination of Leatherback and Hawksbill turtles, was the busiest month for sea turtle nesting at Rosalie Bay. This was followed by Month 6, comprised of Hawksbill and Green nesting only. Month 4 was unique in experiencing activities by all three species of sea turtle.

Chart 7 illustrates some trends in species activity. Of the three species, Hawksbill activities were the most consistent throughout the season, averaging five activities per month with a maximum number of sightings in Month 6. In general (Windward Islands), Hawksbill nesting tends to peak later in the year, but the species is widely acknowledged to nest at low densities year around. This is the pattern seen at Rosalie.

The data indicate that Leatherbacks are the dominant nesting species in Rosalie Bay. Leatherback activity was limited to the first four months (20 April to 21 July), as was expected based on information available from other Windward Islands. The first two months of patrols documented very high levels of Leatherback activity, each month having 11 Leatherback cases, a figure more than double the activities experienced in the remaining months. It is clear, however, that beach monitoring began *after* Leatherback nesting had begun, as evidenced by evidence of earlier nesting pits and local reports that monitoring efforts began in the "middle" of the leatherback season.

Recorded activities for Green turtles document a nesting season extending from 11 July to 2 October, although a single activity was documented in Month 3.

Chart 7. 2003 Species Comparison by Month, with an Emphasis on Rosalie Bay, Dominica.

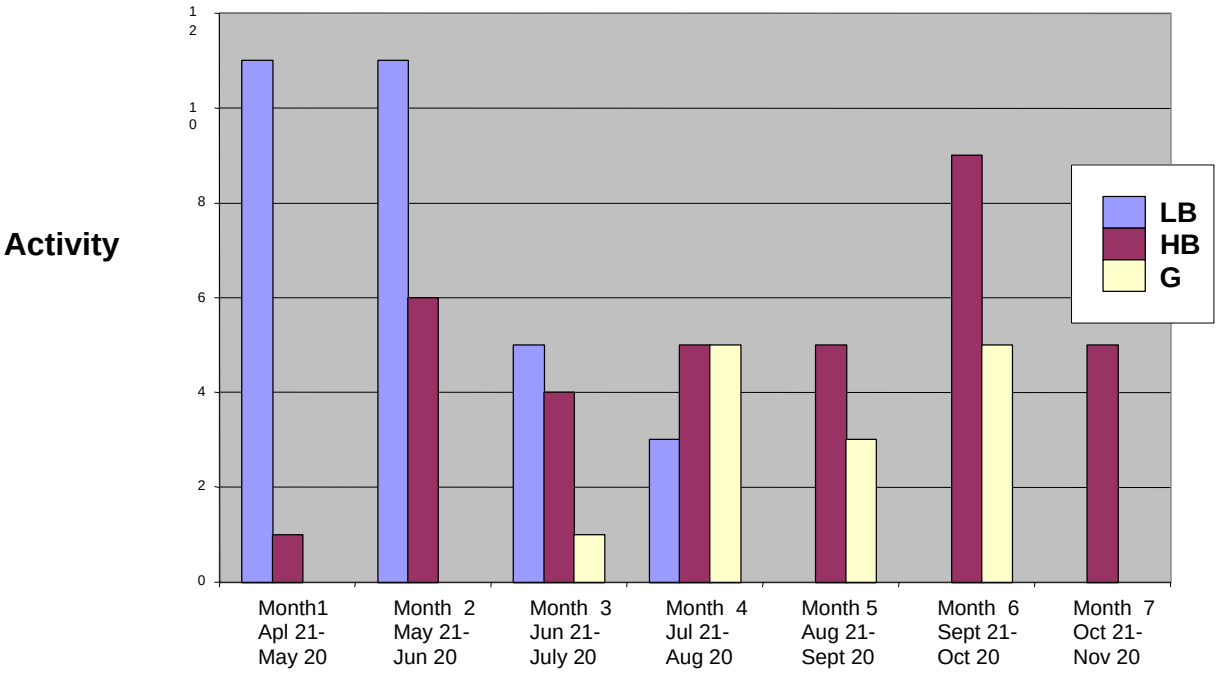


Chart 8 clearly shows a phenomenon that RoSTI staff witnessed in the field as the season progressed, and that is that as the beach eroded with time, and oftentimes severely so, the relative success of nesting declined. That is, the proportion of nesting attempts that failed (and therefore were classified as "false crawls" or "dry runs") increased relative to successful nesting attempts. Month 6 (October) was a particularly unsuccessful month for sea turtle nesting, with the preponderance of activities being false crawls on Rosalie Bay beaches.

Chart 8. 2003 Nesting Results by Month at Rosalie Bay, Dominica, all Species Combined. [N=Nest; S=Suspected Nest; F=False Crawl; A=Aborted Nest Attempt; R=Rescued/Released]

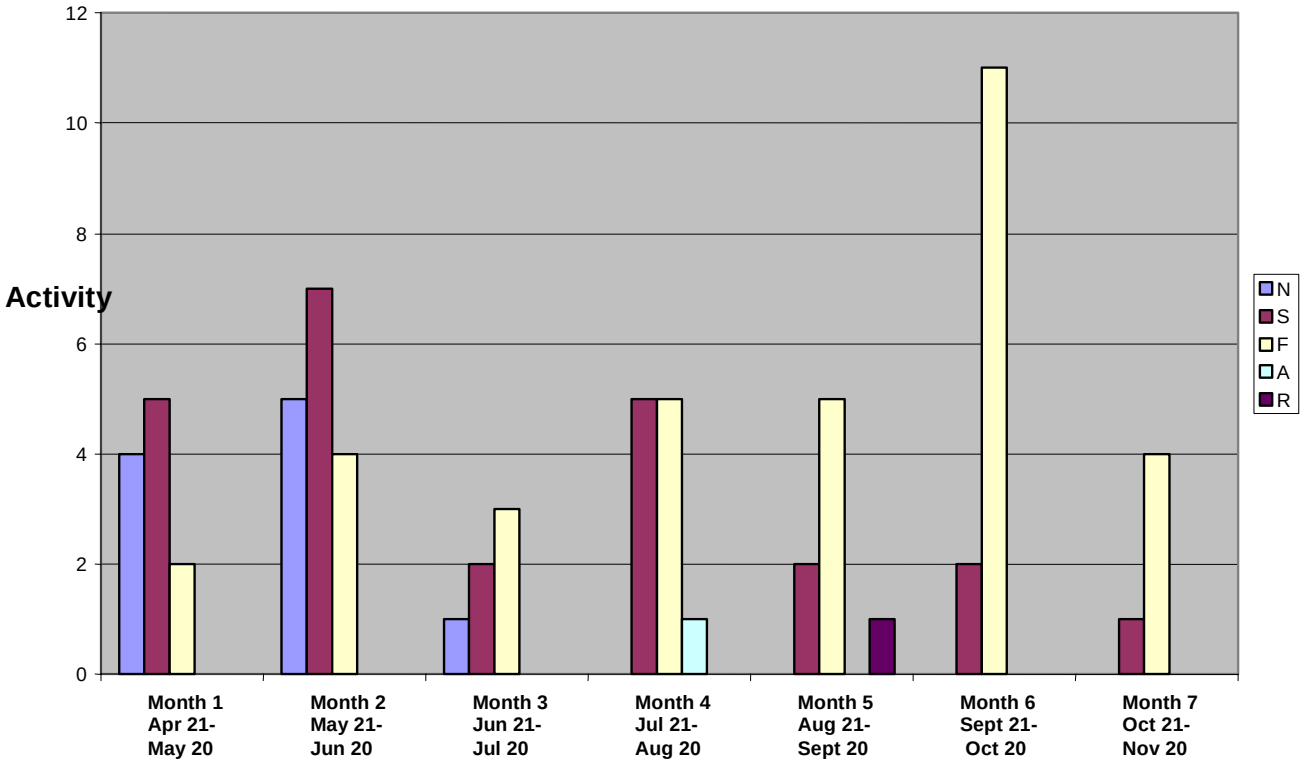
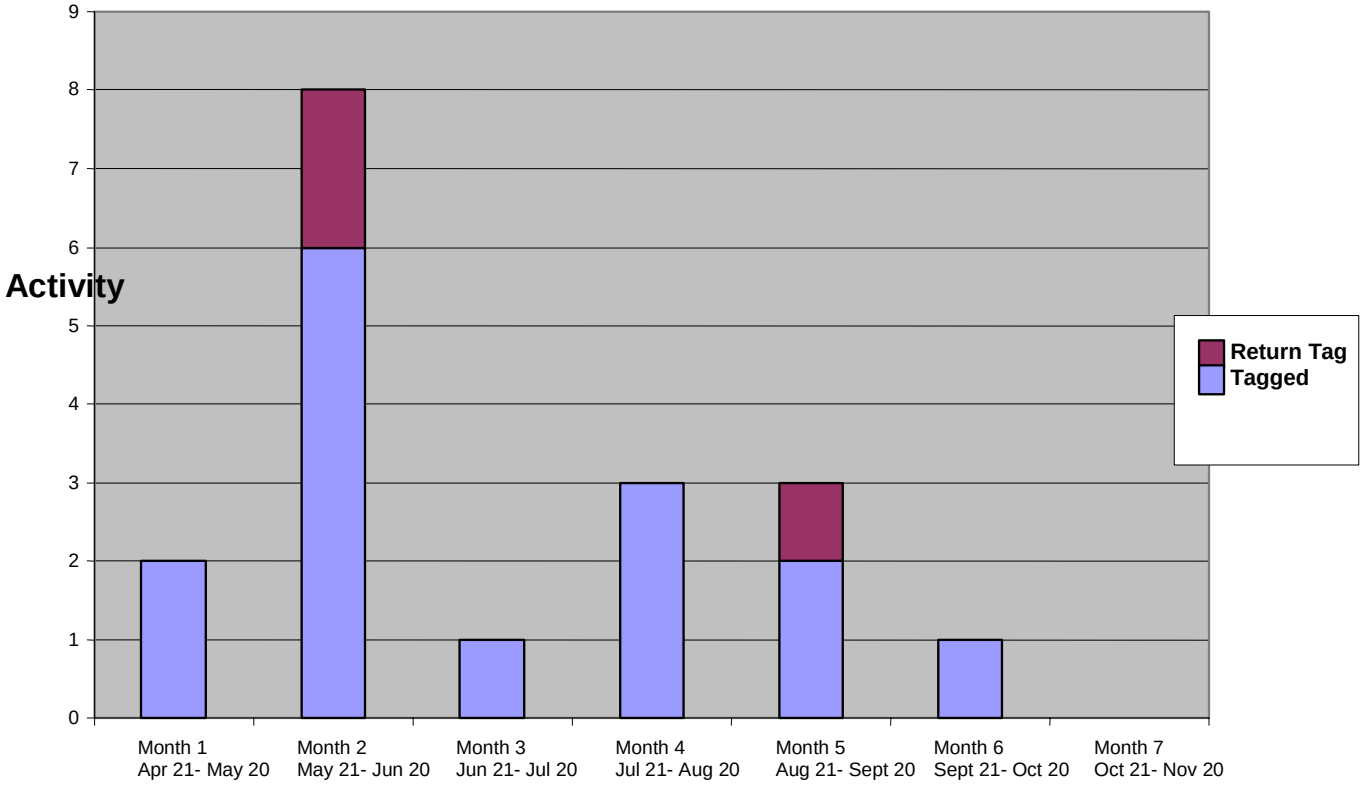


Chart 9 shows that that the majority of turtles (n=8) were tagged in Month 2, two (25%) of which were return nesters. The fact that they were return nesters was confirmed by the presence of their uniquely numbered tags. This period (Month 2) coincides with peak Leatherback nesting activity. The other return nester was in Month 5 which, combined with Month 6, was second most productive period in terms of turtles being tagged. It should be noted that whilst the number of turtles tagged has a general relation to nesting density, it is most directly correlated to effort (that is, the time spent in nocturnal beach patrol by RoSTI staff) rather than any biological aspect of nesting periodicity.

Chart 9. 2003 Tagging Results by Month at Rosalie Bay, Dominica, showing the Number of Adult Females Tagged and the Number Observed Returning to Nest Again.



Nest Hatching Success

Six nests (4 Leatherback, 2 Hawksbill) were lost to erosion, as were two "suspected" nests (both Leatherback), bringing the total to eight. A Green turtle nest is thought to have hatched in early September, and a second one (exhumed post-hatching by RoSTI Project Managers) showed that 120 eggs had successfully hatched! In this case, the addition of three undeveloped eggs (i.e. no evidence of an embryo) brought the total number of eggs laid to 123. The nest had been laid on 11 July 2003 on Rosalie Beach, and relocated at the time of egg-laying to an area of the beach less likely to be lost to seasonal erosion.

This aspect of the research (i.e. documentation of nest fate) will be closely monitored in 2004, and with luck there will be more hatching success. Post-hatching, each nest is exhumed and its contents categorised to determine hatch success (the number of live hatchlings emerging from the nest), suspended embryonic development (due to bacterial invasions, nest flooding, or other factors), genetic abnormalities (e.g. twinning, albinism), the proportion of undeveloped eggs, evidence of nest predation, etc.

Poaching

There were four documented cases of poaching during the research period; three of these involved the illegal killing of nesting Leatherbacks on La Plaine Beach. The fourth incident was that of a Green turtle shot by a spear-fisher on 10 August 2003, which subsequently died near Salisbury. The Laws of Dominica (Forestry and Wildlife Act, Chapter 60:02, Section 21, Ninth Schedule) prohibit the collection of eggs or the disturbance "of any turtle nest" and prohibit any "attempt to take any turtle laying eggs or on the shore engaged in nesting activities" at all times of the year. Furthermore, the law prohibits the killing of *any* sea turtle during an annual closed season from 1 June and 30 September (Appendix V).

In addition to the documented kills at La Plaine, calls to the Sea Turtle Hotline and verbal reports to RoSTI staff indicate that extensive poaching occurred during the research season in the areas of Woodford Hill, Calibishe, Anse de Mai and North Eastern Dominica.

Poaching was evident around the island, in some areas more than others, but as a result of the RoSTI project poaching was remarkably reduced within the study site (i.e. Rosalie Bay). The killing of nesting Leatherbacks occurred early in the year (25 and 28 April; 26 May) and thereafter all nesting sea turtles survived their nesting attempts (in the study area). It is noteworthy that, unlike previous instances, the last case of poaching on La Plaine included efforts on the part of the poachers to discard the remains of the carcass.

The loss of the three Leatherbacks was devastating to the 2003-nesting cohort because the population is so small, estimated to be less than 10 reproductively active adult females in 2003.

Prior to RoSTI's commitment to maintaining a presence on the nesting beaches in order to collect science-based management data, poaching on La Plaine (in particular) was very effective and organised, so that many turtles were killed on their first nesting attempt of the season. In most cases they were killed just having emerged from the water, meaning that no eggs were even produced. This is surely a death sentence for local nesting populations. Remembering that hatchlings return to the area of their birth when the time comes to lay their own eggs as adults, it's clear that Dominica will lose its nesting populations if a sufficient number of "Dominican" hatchlings are not born from local beaches.

The efforts of RoSTI staff to collaborate with law enforcement develop a strategy to deal with illegal activity intensified during peak Leatherback nesting season, when the threat of poaching activity was most severe. These efforts included providing the La Plaine Police Station with a schedule of expected Leatherback arrivals to facilitate more effective and consistent coverage of the beach by police officers.

Moreover, much was accomplished by public education … RoSTI staff received countless calls from citizens concerned about the poaching, willing to report illegal incidents, and expressing their commitment not to eat turtle eggs or meat in the future. These changes of attitude were not for the turtles' sake, but for the nation's sake. For the idea that future generations of children should have the opportunity to utilise sea turtles, an opportunity that could very easily be lost in the greed of the present.

Preliminary Market Assessment

Total tourist arrivals for the calendar year 2002 (1 January - 31 December) was 69,338 persons. Most visitors (40,332 persons, or 58% of all incoming tourists) came from other Caribbean states. The French West Indies and the USA contributed the largest numbers of visitors (16,935 and 15,491 people, respectively), accounting for nearly 22% and 21% (respectively) of the visitors to Dominica, making them relatively important markets. While statistics from the Dominica Tourism Department suggest that most visitors (60%) across all markets stay in private accommodation, 18,491 (27%) utilise hotels and guesthouses. Across countries most people seem to visit Dominica primarily for leisure. Data indicate that 54,719 (78.9%) of the 69,338 persons who came to Dominica did so to experience the natural attractions of the "Nature Isle".

Table 7. Relative Importance of Dominica's Five Largest Tourism Markets. Source: Dominica Tourism Department (2002). [*Note*: the percentages do not sum to 100% because there is geo-political overlap among some categories.]

	Largest Tourism Markets	
Country	**Visitors**	**Percentage of Total Visitors**
Caribbean	40,332	58.17
French West Indies	16,935	24.42
United States	15,491	22.34
CARICOM	14,361	20.71
Europe	10,193	14.70

RoSTI staff members have given a large number of public presentations to visiting tourists, especially SCUBA divers associated with Dive Dominica and Castle Comfort Lodge. All divers (and staff) have shown a great interest in seeing turtles and learning about their biology, both on the boat and on land. Every weekend at Dive Dominica, RoSTI Project Manager Rowan Byrne gave presentations aboard dive boats and shared facts on sea turtles with tourists. On several occasions these presentations resulted in tourists making the trip to Rosalie Beach to view sea turtles, with great support from Dive Dominica. Next year (2004) RoSTI is planning to host a "Turtle Safari" as part of DiveFest 2004, and more sea turtle presentations island-wide with an emphasis on dive resorts

Reassured by the interest of visiting divers, RoSTI staff initiated a preliminary "market assessment" on the proposed 'Turtle Watching' attraction (please refer to the "Methodology" section for background). Interviews were conducted with 19 respondents, 13 of whom were men (68.4%) and 6 women (31.6%). Most of the respondents (42%) were between 30 and 45 years of age, 31% were aged 46 years and over, and the rest (27%) were 20 years old or younger. Just over half (53%) of the respondents were "stay-over visitors". This is important because while Dominica presently receives many cruise-ship visitors, they are only on the island for one day and try to see as much of the island as possible (usually island tours), rather than choosing to visit one attraction. However, due to their sheer numbers it would be make sense to explore an alternative that would be of interest to them. By its very nature, a 'Turtle Watching' programme focused on nesting females would not be an option for this market (because nesting occurs at night), but perhaps some type of presentation or interpretative centre would be useful both from a profit-making standpoint and from a public awareness standpoint. Stay-over visitors, on the other hand, might participate in a 'Turtle Watch' and they should be the initial focus of any such initiative.

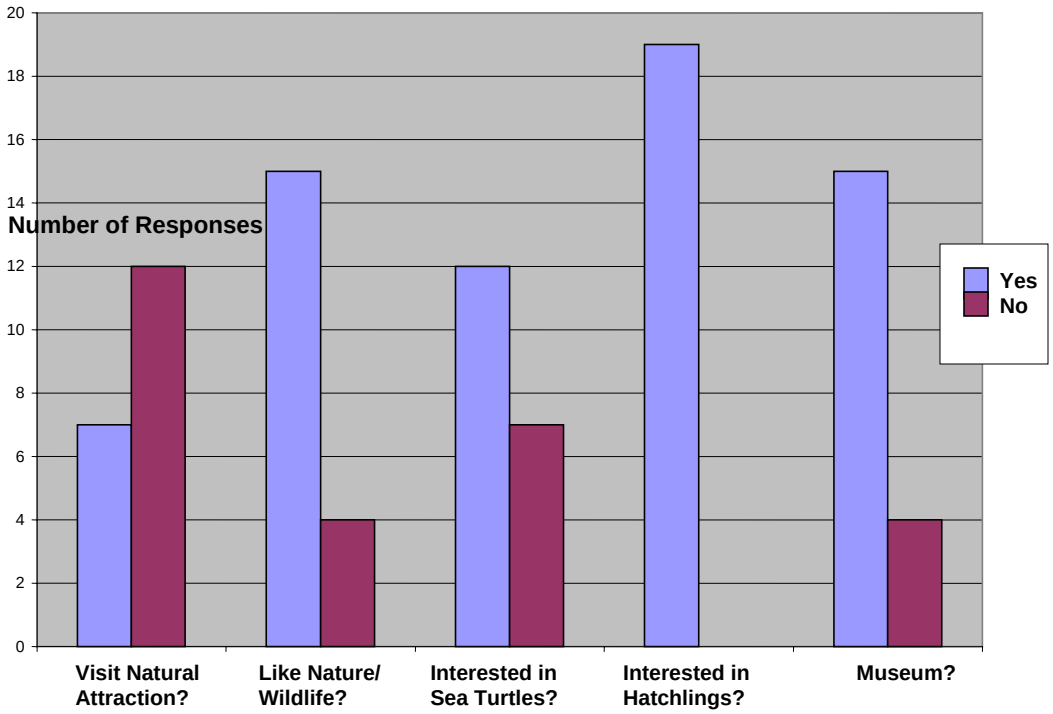
An overwhelming majority (79%) of those we questioned indicated they would like to see Dominica's unique wildlife (Table 8, Chart 10). When asked whether they would be interested in seeing endangered sea turtles nesting, 63% of visitors said 'yes'; when asked about their interest in observing hatchlings, 100% replied that they would like to do so. A clear majority (89%) agreed that it would be desirable to have refreshments and transportation provided as part of any package. Not surprisingly, when asked how much they would pay, most respondents (78%) picked the lowest cost option; however, there are several ways to get a figure which more accurately reflects their demand for this product. Only three (16%) respondents found the prospect of spending the whole night on the beach interesting, while most (84%) favoured spending a few hours on the beach.

The suggestion of having a turtle sanctuary/ museum was quite popular, 79% thought that this was a good idea. A small museum is planned as part of the Rosalie Bay Resort development and RoSTI staff and volunteers have already worked hard to collect natural history items island-wide for eventual display and the education of visitors (both local and foreign).

Table 8. 2003 Summary of Responses to RoSTI "Market Survey" of 19 visitors to Dominica.

	Market Survey Results			
	Response		**Percentage**	
Question	**Yes**	**No**	**Yes**	**No**
Visiting Natural Attractions	07	12	36.84	63.16
Interest in Natural Wildlife	15	04	78.95	21.05
Interest in Sea Turtles	12	07	63.16	36.84
Interest in Hatchlings	19	00	100.00	00.00
Interest in Museum	15	04	78.95	21.05

Chart 10. 2003 Summary of Responses to RoSTI "Market Survey" of 19 visitors to Dominica.



Public Awareness Survey

The Public Awareness Survey (Appendix III) revealed some very interesting results. In total, 180 surveys were completed by respondents, who represented a wide variety of Dominicans. The largest number of interviews (30.5%) was conducted with individuals aged between 20 and 34 years of age. Respondents in the '35-49 years of age' and the '50 years of age and over' categories were the next most abundant, comprising approximately 28% of the survey. Only 6% of those surveyed were 19 years and under, while 7% of people declined to submit their ages. The majority of those interviewed were male (70%) as opposed to female (30%). In terms of their occupations, only 12% of Dominicans involved in the survey were directly involved in the fishing industry.

The vast majority (81.7%) of those polled knew of the existence of between one and three species of sea turtle. Far fewer (6.7%) knew that there were more than five species of sea turtle, and 11% of Dominicans admitted that they could not name any sea turtles at all. Of those that knew sea turtles, many (73.9%) were able to correctly name them, either by the standard names or by their Creole/local equivalent, while 26.1% could not do this. Most Dominicans (64.0%) could identify the different species of sea turtles based on a combination of their size, shape, markings. As might be expected, this was particularly true for the giant leatherback. Respondents were far more mis-informed on the difference between male and female turtles. While most were confident that they could differentiate between the sexes, only 36.0% correctly knew the difference. This is not surprising, since most people would never see an adult male turtle with its distinguishing tail extending 20 cm or more beyond the rear of the carapace (shell). Most encounters with turtles are with nesting females. Curiously enough, these

encounters, too, must be relatively few since only 26.7% of those interviewed had seen a female sea turtle nesting.

Fully 73.0% of those Dominicans surveyed by the RoSTI project have never seen any species of sea turtle nest on the beach, which certainly explains the wonder and awe of residents who joined RoSTI staff on the beach this year and saw the ancient ritual for the first time.

Section Two of the questionnaire focussed on "Uses of Turtle, The Past". The first question in this section was whether sea turtles are important to the future of Dominica. An overwhelming majority (95%) agreed that they were. Eighty-one percent went further to say that they believe that sea turtles have been an important aspect of Dominican culture since they were children; only 15% disagreed. This influence of sea turtles in the culture of Dominica is supported by the more than 60% of Dominicans who recalled eating turtle meat and eggs on a regular basis. Many (56%) of those polled recalled that most turtle meat was shared within the village, and 27% noted that it was shared between villages as well.

In terms of the species of turtle eaten, 28% of respondents said that they ate any turtle species that was caught; 23% ate leatherbacks along with other species, while only 17% ate leatherback meat alone. A few individuals (16%) did not know what type(s) of sea turtles had been eaten. Although turtle meat was a highly enjoyed meal, relatively few people (25%) regarded it as a 'special meal'. While the price of turtle meat may have varied over the years, 40% of those interviewed (the largest segment) said that sea turtle meat normally cost between five and six EC$ per pound. A similar amount of people could not remember the price paid for turtle meat or how quickly it sold. Of those who could remember such details, 75% enthusiastically recalled how quickly it would be sold. Only 4% percent said that vendors of turtle meat would have to wait for a buyer.

Most people (74%) remembered that in years gone by, turtle shells would be used more for decoration than for utilitarian purposes. This mainly consisted of the polished shell being hung on a wall. Quite a few people (65%) also recalled the use of turtle scutes in the production of jewellery. Opinion was almost equally divided on whether these products were consumed locally, traded to merchants from the French Islands, or the respondent simply could not recall.

An interesting question centred on use of the giant leatherback. Data collected by the RoSTI project indicate that the leatherback and the hawksbill turtles are the most common species to nest on the shores of Dominica. Seventy-six percent of interviewees said that leatherback meat was eaten. When asked about its uses, 12% said that it was also noted for its oil (a product also savoured in years past in other Eastern Caribbean islands, including Grenada). A popular use for the oil was for medicinal purposes; 26% recalled this use from years past.

By far the most popular way to prepare sea turtle meat for a delicious meal is by stewing it, 84% of respondents readily agreed to this. Previously, many people indicated that they did not recall at what price turtle meat was sold, and this makes sense since respondents reveal that 76% of turtle meat was shared among family and friends (as opposed to just 12% which was sold).

Section Three focused on "Uses of Turtle, The Present" and how sea turtles are utilised as a resource today. When an interviewee was asked if s/he ate sea turtle meat at the present time, 49% said that they still do, 42% said that they do not, and 9% declined to respond. Interestingly, more people (47.2%, as opposed to 38.9%) thought that turtles were caught differently today than in previous years. Although responses indicated that turtle hunting was seasonal, most people did not know how many turtles were

taken daily. Similarly, the response to questions regarding the usage of nesting beaches was not well answered. Twenty-seven percent of those polled admitted to taking part in the hunt, while 70% did not. Seventy-one of those interviewed think that fewer sea turtles are caught today, while 18% think that more sea turtles are caught today. A majority (55%) of Dominicans polled believe that there are fewer sea turtles in Dominica today than in years past. Importantly, most Dominicans (76%, as opposed to 20%) know the law concerning sea turtles.

Questions posed as part of Section Four revealed that consistently high numbers of people are aware of the role of sea turtles in Dominica's stories and legends. The vast majority (71%) of respondents had heard of at least one turtle story or legend, while slightly more people (74%) had heard tales of hunters predicting whether turtles would nest by observing "signs" in the sky at night.

Section Five of the survey looked towards the future and Dominican's attitudes toward conserving sea turtles. Seventy percent of Dominicans reported that they would be saddened if sea turtles became extinct and their decedents were unable to see them. Twenty-three percent and 7%, respectively, of respondents would not have been saddened if turtles became extinct or were undecided. The majority (60%) of respondents replied that people should NOT fish for turtles and eggs, twice the number of those that believed that this should still be allowed (32%); 8% were undecided. If turtle fishing is allowed to continue, 49% of those surveyed indicated that the practice should be regulated based on how abundant sea turtles are in the wild. For this question, however, the number of respondents who were 'undecided' was high (39%); 12% felt there should be no regulation at all.

An overwhelming number (95%) of those surveyed, and this was true across age and employment categories, thought that using turtles for tourism, such as RoSTI's Turtle Venture, is an excellent idea. Ninety–three percent also thought that this type of eco-tourism had the potential to bring economic benefits to local villages, while sustaining an important part of Dominica's local culture.

Community Education and Outreach

Issues dealing with the community and the local environment were present at every level of operations. As such, much of the progress in community issues was intertwined with other aspects of the project, and has to some extent been addressed in previous sections. This is especially true in terms of education and community development, where, for example, much was accomplished by the hiring of community members including active (now former) poachers as beach patrollers, data collectors, and "presenters" to guests and children on the beach. The project hired members from several communities, including Mr. Julius Darroux (La Plaine village council leader), Mr. Osmond Cadette (Morne Jaurne), and Mr. Francis 'Vae' Lawrence and Mr. Dexter George (Riverie Cyrique). This was an attempt to ensure equity and diversity in hiring and its associated benefits.

We recommend that the project promote continuity by retaining the best of these staff members, and that whenever possible hiring be targeted in communities where jobs are most needed. An important advantage of hiring from multiple communities is that residents more readily approach the local patrollers to learn about the project; much of the information about the project and its objectives was spread in this manner and many educational materials were also shared!

Members of surrounding communities were routinely invited and encouraged to participate in 'Turtle Watching'. For example, on 25 May 2003 RoSTI staff organized an event where community members, Forestry officials and international visitors were present on the beach observing a nesting Leatherback.

All participated in the learning experience, and the community beach patrollers, even so early in the season, had great pride in their role as guides and interpreters. This was an especially unique evening for visiting members of the community, whom until that night had only seen poached and bloodied Leatherbacks in the back of a pick-up truck.

With regard to members of the community who were known to engage in the illegal killing of turtles and/or eggs from Rosalie and La Plaine beaches, RoSTI staff sought to gain knowledge and background information from them with an aim to better understand their situation and their receptivity to alternatives, including non-consumptive use options. To this end, formal interviews were conducted (in conjunction with the national survey, allowing more room for detail while following the questionnaire format) and on a more informal level (more open ended questions, less structured, more at the discretion of the interviewee). These were recorded with pen and paper at the same time or in the case of some informal sessions, retained in memory and written later.

UNESCO was instrumental in engaging community dialogue on important topics, and hosted three community workshops: in May, June and July at La Plaine, St. Joseph, and Roseau, respectively. These workshops were well attended and very informative, and had the result of encouraging discussions on a wide range of community issues. The workshops had strong support from local governing bodies, which was instrumental in their success. Hands-on community participation was also forthcoming in other ways; for example, beach clean-ups (see Figure 3) which also performed an important community service.

Finally, the media provided consistent opportunities for national airing of the issues, updates on the beach patrols, and dialogue through call-in shows, etc. Over the course of the 2003 nesting season RoSTI staff gave 15 radio interviews, made 15 television appearances, and featured prominently in at least four national newspaper articles. More than 30 invited presentations were given at community centres, schools, and various resorts around the island, sometimes in partnership with Forestry officials. More requests for presentations were received than could be accommodated, due to limited time and human resources. But the demand clearly shows that this is an important classroom topic!

Discussion with Management Recommendations

Based on research conducted and experiences now gained, the following recommendations (underlined for easy reference) are offered to address issues that arose during the pilot year of operations.

Field Research and Conservation

Extending Beach Coverage- Rosalie Bay was the geographic focus of the project. Research outside of this area was conducted in partnership with Forestry staff and other local communities, including Soufriere, Scott's Head, Salisbury, Calibishe, Woodfood Hill, several communities in North Eastern Dominica, and Portsmouth, among others. However, the low rate of return nesters (i.e. observing a tagged turtle more than once) across all species during 2003 may indicate that more attention should be given to the patrolling of other potential nesting beaches, especially those in relatively close proximity to the study site. It is therefore a recommendation that, at a minimum of twice weekly during peak nesting seasons, early morning foot patrols be conducted of other potential nesting beaches. Beaches should be prioritised and selected based on information provided by informed residents and existing government databases.

The geography of Dominica's coastline results in a series of small- to medium-length pocket beaches; there are relatively few expansive sandy beaches. This reality makes beach coverage problematic in many ways, making it impossible or at least impractical to conduct systematic patrols island-wide. Nonetheless, regular foot patrols (documenting nesting crawls, which are then obscured by patrollers to prevent them being counted twice) would result in valuable sampling data and useful insight into the distribution, abundance and behaviour of Dominica's sea turtles.

To this end, regular patrol is planned for 2004 in collaboration with local residents, including Mrs. Linda Harris (Mero Beach or Castaways Hotel), Mr. Harald Zan (East Carib Dive), Mr. Derek Perryman of Dive Dominica (Castle Comfort Lodge beach), Forestry officers (Point Michael beach), and the Woodford Hill police with Mr. Jerome Bruno, a member of the community, and fisheries co-operatives in Woodford Hill Anse de Mai. It is noteworthy as well that 2003 showed the value of night-time beach patrol as an effective deterrent against poaching, an advantage which will become relatively more important as more and more nesting beaches are routinely monitored.

Forestry officers currently undertake habitat surveys on an island-wide basis approximately every three months. It is our recommendation that RoSTI staff should participate in and support (e.g. data-sharing) these surveys to the maximum extent possible. Also, one way of reducing monotony during increasing "no-turtle nights" as the season progresses is to authorize RoSTI beach patrollers to survey other potential nesting beaches on a rotation basis.

***Nest Relocation*-** Of the three sea turtle species encountered at Rosalie Bay, the Leatherback nested most consistently near the high-water mark. All Leatherback nests, both confirmed and "suspected", were lost to erosion on Rosalie Beach and at times eggs were seen laid amongst rocks on La Plaine. This despite the fact every nest, with the exception of one Green turtle and one Hawksbill nest, were carefully relocated by RoSTI staff to higher (safer) areas of the beach platform.

Not all egg relocation efforts were futile, however. RoSTI staff saw one successful relocated nest (that of a Green turtle) produce 120 hatchlings from a total of 123 eggs laid, an excellent result! Green turtles are typically mid-beach nesters, and also face the risk of losing substantial numbers of clutches in the Rosalie Bay area. No Hawksbill nests were relocated, as it was thought at the time of egg-laying that all were safe. Subsequently, however, all were destroyed by high wave action (particularly storms in August).

The narrowness of these beaches, coupled with the very real threat of storm surges and high seas, resulted in many instances during this first year where virtually all the clutches incubating on the beach at that time were destroyed. This included nests relocated to higher ground, which had an almost nil chance of survival in their original location due to their proximity to the tide line.

It is a recommendation that based on beach profile data collected during 2003, and the collective experience of RoSTI staff and beach patrollers, an alternative "safe zone" suitable for the relocation of otherwise doomed nests be identified prior to the 2004 nesting season. The site should be relatively safe from both ocean storm surge and inundation from local rivers.

It is further a recommendation that RoSTI staff, Interns, Forestry officers and/or other interesting persons be dedicated in 2004 to the collection of beach profile data. Collected at regular intervals throughout the year, such data will document changes in beach width and slope. This information will provide insight into beach dynamics and will, over time, help to identify safe zones for otherwise doomed eggs.

Field Communication- It is a priority recommendation that community beach patrollers be provided with cell phones. This would increase both the ability of beach patrollers to communicate with RoSTI Project Managers, and with enforcement personnel in the event of an emergency or the occurrence of illegal activity on the beach. RoSTI staff are negotiating for the donation of cell phones with AT&T Wireless.

The provision of cell phones would serve another purpose, and that is to reduce somewhat the boredom associated with "no turtle nights". The information available this year suggests that Leatherbacks have a well-defined nesting season peaking from April to June (fully extending from late February through July), and that this may be the peak of turtle activity at Rosalie Bay. There was a pronounced dearth of sea turtle nesting activity from September to November, during which time a single Hawksbill is thought to have successfully nested on La Plaine. This results in long periods of monotonous patrolling on a relatively small beach, … a stark contrast to the excitement of the Leatherback season.

Shelter- It is a recommendation that every effort be made to construct a 'turtle hut' on La Plaine beach, similar to the popular and useful structure already in place on Rosalie Beach. Currently, turtle watchers and patrollers have nowhere to rest or wait while waiting for a chance to see a nesting turtle on La Plaine beach. AT&T wireless has expressed an interest in continuing support of the project, and this might be suggested as a collaboration in 2004. It is noteworthy that there is a piece of land owned by Government and close to the beach that might be used for this purpose, thus reducing possible conflict with private landowners.

Figure 4. RoSTI "Turtle Hut" at Rosalie Beach, Dominica. © Rowan Byrne/ RoSTI.

In-water Research- A local Turtle Sighting and Reporting Network was established in 2003 in collaboration with Dive Dominica, where RoSTI Project Manager Rowan Byrne encountered sea turtles firsthand during dives nearly every weekend. Boat captains also report very frequent sightings.

It is clear from observational and anecdotal information available from the 2003 research season that much could be learned from initiating a more formal investigation of sea turtle distribution, abundance and behaviour in offshore waters. With this in mind, RoSTI staff have on many occasions spoken with Chief Fisheries Officer Mr. Andrew Magloire and Marine Manager Mr. Arun Madsetti concerning more organized in-water surveys in 2004. RoSTI Project Managers have been asked to prepare Methods for such an initiative and submit the document to the CFO for consideration, and have been assured of the full support of the Fisheries office.

Such research may at first remain focused in Rosalie Bay, where RoSTI staff have logged observations of juvenile Green turtles, for example, apparently foraging on rock algae at the river mouth. This is an excellent opportunity for in-water research on juveniles. Fishermen at Fond St. Jean have also reported an "abundance" of juvenile Green turtles in the South of the island, as well as Loggerheads. There are further possibilities near Calibishe, Soufriere, Portsmouth, Salisbury, and Cabrits Marine Park, Anse de Mai, Woodford Hill, Hamstead Beach, and the Calibishe and Atkinson beach area in Carib territory.

These opportunities are not only very exciting avenues for research, but also represent an effective way to involve and work more closely with fishermen and fishing communities around the island, thus enhancing the mutual exchange of information and ideally garnering broader grassroots support for research, conservation and management activities with endangered sea turtles. There is a great potential for learning from fisher communities island-wide, as fishermen frequently catch turtles at sea (and during the hunting season, clean the turtle at sea). In one circumstance a fisherman in Point Michael reported to RoSTI staff that he had caught seven (7) turtles in his net in October 2003; all were reportedly released unharmed.

With all of this in mind, it is a recommendation that 2004 RoSTI staff design and prepare the methodology for in-water research at selected sites around the island (including Rosalie Bay). Such methodology should seek to incorporate livelihood generation activities, such as the opportunity offered by Mr. John Robins (Benjo's Sea Moss) to involve fishers in the cultivation of seamoss for his food and beverages industry, based in Dominica. Mr. Robins is very supportive of research activity, and with the help of RoSTI staff he sees a chance for his project to become involved, as well, with local communities island-wide.

It is noteworthy that WIDECAST will be designing in-water census programs to study foraging populations in selected Eastern Caribbean islands during 2004-2006 as a pilot project with UNEP funding. Participants will be trained in Barbados in partnership with the Barbados Sea Turtle Project, and also in Bermuda in partnership with the Bermuda Aquarium. It is a recommendation that Dominica be included in this pilot programme as soon as practicable.

Habitat protection- Regulated multiple use areas, buffer zones, and various forms of habitat protection are among the tools that managers and concerned communities emphasise when seeking to safeguard and restore depleted natural resources. In the case of sea turtles, where poaching continues to pose a serious threat, it is a recommendation that a "Rosalie Bay Reserve" (RBR) be considered, perhaps under the authority of the Fisheries Act.

The RBR should encompass the entirety of nesting habitat from the Rosalie River to the southern boundary of La Plaine Beach, and from the low water mark to the line of permanent vegetation. The laws of the Commonwealth of Dominica protect the right of public access to the island's coastal beaches, and therefore any access and/or use restrictions associated with the beaches should be defined by regulations governing the RBR. A Management Plan for the reserve should define a Buffer Zone between the line of permanent vegetation (the landward boundary of the RBR) and the landward boundary of the natural rock dune at Rosalie (Coffee) Beach. It is a recommendation that no physical development should occur within the RBR or within the Buffer Zone. The natural integrity of the banks of the Rosalie River should also be protected from degradation, perhaps as part of the Buffer Zone.

Similarly, it is a recommendation that La Plaine Beach be designated as a conservation area of some kind, so that conditionalities specific to the protection of sea turtles could be enacted. For example, visitors to the beach (for the purpose of 'Turtle Watching') would be required to pay a local guide, beachfront lighting would be controlled, the beach would be regularly cleaned, etc. In addition, the conservation area would generate additional awareness of the plight of Dominica's sea turtles and the laws already in place that safeguard pregnant females and their eggs and young.

Already the first steps have been taken, in that a sign (Figure 5) was dedicated in October 2003 to emphasise the importance of La Plaine to the sea turtles of Dominica, and to urge residents to respect the law protecting the egg-bearing females and their young.

Figure 5. RoSTI staff with Mrs. Justina Charles, AT&T staff, and Parliamentary Representative Mr. Ronald D. Green [La Plaine] dedicating the La Plaine beach sign. © A. Madisetti

Training- It is a recommendation that training in 2004 be provided to all field personnel by RoSTI and WIDECAST staff, and that training abroad be provided whenever possible.

It is a recommendation that the training of existing staff emphasise needed skills. For example, additional training for beach patrollers and Interns is needed for more effective handling of crowds, for taking a lead role in 'people management' on the beach, and for skills in accommodating turtle watching while at the same time preserving best practices with regard to protection of nesting turtles. Moreover, as more people are trained in data collection they can become directly involved in the fieldwork. Trained personnel are needed to extend the fieldwork and data collection to the north coast, where poaching is still pervasive. Some areas are particularly well suited for this; for example, Forestry has a shelter on the north coast where staff and volunteers could rest and a Fisheries Cooperative facility at Woodfood Hill could also be used, and even has shower and storage facilities.

In addition to hands-on training at the local level, it is a recommendation that additional project funds be allocated to travel, and that more effort be put into identifying local donors to underwrite these trips. It is important to the longevity of the project that local donors be identified and cultivated, and in 2003 such donors included AT&T, SSMR, Dive Dominica, UNESCO and other sponsors. Additional funds would enable community staff to participate firsthand in successful programs in neighbouring islands, giving confidence to local efforts and building a support network for project success.

Poaching- This year has seen attempts to counteract poaching implemented, which is particularly important since if left unchecked, the entire nesting population of Rosalie Bay could be completely destroyed. There were three confirmed Leatherback killings in 2003. While apparently significantly less than in previous years (some villagers report over 20 killed in one season a few years ago, and higher numbers are reported in the North East), on a beach where the nesting Leatherback population is estimated at fewer than 10 adults, the loss of some 30% of nesting females each year (see "Results/ Poaching") is clearly unsustainable.

Aside from the ecological implications, the economic impact of losing just three egg-bearing Leatherback turtles is clearly seen if we consider the potential income derived from non-consumptive use options. For example, if one Leatherback typically nests six times per season (as has been shown for the species in the Eastern Caribbean) and a hypothetical ten guests per evening pay US$20 each for a 'Turtle Watch' tour, that represents $200 per night. Multiplied by six (the average number of nests per turtle), the total is $1800 per animal. Thus calculated, the loss of three turtles in 2003 represents a loss of some US$5,400 to community tour guides in 2003.

Reducing the number of nesting females (through poaching) also affects visitor satisfaction (i.e. their chance of seeing a successful nesting). Simplistically, we can imagine that having three turtles lost from a possible ten individuals decreases a visitor's chance of encountering a nesting by 30%, quite a significant decrease.

The killing of nesting sea turtles is, and has been for several decades, a crime in Dominica. Aside from ecological and economic implications of this illegal activity, it is an important law enforcement issue which must be addressed by the appropriate authorities. It is a recommendation that RoSTI staff and volunteers provide timely and complete information to law enforcement officers concerning any illegal activity of which they are aware, and that RoSTI staff offer their full and complete cooperation in any investigation of these crimes.

It is further a recommendation that, particularly where poaching is heavy, RoSTI staff investigate options available at the community level, including funding for indigenous industries or livelihood generation, and collaborate with relevant local and national agencies and groups to explore opportunities to provide poachers with alternative means of income. One possibility currently under discussion is the seamoss cultivation industry in Marigot, Wesley, and Woodfood Hill, as industry representatives have already identified a ready market for seamoss products and the need for labor and community partnerships.

Education and Outreach

Involving Children- The RoSTI program focused very much in 2003 on the education of children inside the classroom though its School Programme. The start of an internship program (see below) will also draw youth into the area of conservation, but very often the smaller children are just as keen and knowledgeable about conservation issues and environmental problems. It is a strong recommendation that the RoSTI project continue its Schools Programme in 2004, and directly involve community teachers and other educators in the project as much as possible.

Internship Program/ Youth Division- It is recommendation that the RoSTI Internship Programme, started in the latter part of 2003, be consolidated in 2004 and 2005. After a three-year pilot phase, RoSTI is scheduled to be run by local managers. There is a high probability that current Interns are of the calibre necessary to fill these leadership positions. To attract and encourage a pool of motivated and skilled young people, the program must be challenging and organised to include a variety of tasks essential to a potential manager. For example, Interns should be involved in beach patrols, nest relocation, conducting beach profiles (i.e. documenting coastal erosion), assembling data, and talking to school children.

Beach patrols can be done on Rosalie Bay on a regular schedule, and also in collaboration with Forestry officers who undertake habitat surveys on an island-wide basis approximately every three months. Allowing Interns to be involved in this would expose them to another aspect of fieldwork, as well as give them a chance to work closely with the dedicated individuals of the Forestry Division. At the same time, such a program could be of a great assistance to Forestry.

Interns could also take leadership roles in organising and executing beach clean-ups. For example, RoSTI Interns could organise the beach clean-up for Coastal Clean-Up Day in the Rosalie Bay area in the villages of La Plaine, Morne Jaune, Riviere Cyrique and Grand Fond.

As they become more familiar with sea turtle biology and conservation, new opportunities for Interns to make public presentations should be arranged. For example, Mr. Glenn Balfor does presentations to school children every other Friday and is keen to have more information on sea turtles and conservation issues, and is excited about the prospect of having the assistance of RoSTI Interns.

It is a recommendation that the RoSTI Internship Programme strengthen ties with the island's Youth Division, and particularly with Mr. Terry Raymond of 'YES Corps'. The Youth Division has already been an invaluable asset to RoSTI, and, like RoSTI's relationship with Fisheries and Forestry officials, it represents a sterling example of what RoSTI should continually strive for; that is, real and meaningful cooperation between groups and agencies that share the same vision.

In 2003 the RoSTI Internship Programme started small, working with a dedicated corps of beach patrollers and eager Interns in the areas of both research and conservation. These individuals should become better integrated into the RoSTI programme, and should be exposed to more training. Off-island

training would be very useful, as it would provide a chance for youth to see firsthand how programmes in neighbouring countries have matured … having started from the same position as Dominica. The benefits of off-site training have already been seen from the experiences of the community beach patrollers who visited WIDECAST's Jumby Bay Hawksbill Project in Antigua, and Forestry staff who visited the Barbados Sea Turtle Project in 2003.

'Turtle Watching' Venture- It is a foundational objective of the RoSTI project to "raise awareness of the biology and status of depleted sea turtle populations, as well as to encourage interest on the part of Dominicans to become involved in a locally run 'Turtle Watching' venture." Such a venture has the potential to provide sustainable livelihoods for community members, encourage leadership and entrepreneurial skills, and complement existing marketing strategies for Dominica as a tourist destination. It is a recommendation that RoSTI staff continue to work with community leaders and natural resource authorities to design an initiative that will accomplish conservation and community development goals.

Throughout the year, RoSTI actively sought to encourage residents and visitors alike to visit the beach and witness nesting whenever possible. This was desirable for several reasons. First, it forges closer ties between the community and the project; second, the experience of seeing a nesting female offers people who have only ever seen turtle as "meat" a very moving experience and connection with their local sea turtle population; and third, it gradually prepares RoSTI staff for establishment of a more formal 'Turtle Watching' venture.

Notwithstanding, the 2003 experience suggests that it may be more feasible, at least in the early stages, to limit this activity to Leatherback viewing. These larger animals are less flighty and slower than the smaller turtles, particularly the shy Green turtles, which means that visitors can receive more attention as proper research is conducted. Leatherbacks are also larger, which means that more visitors can view the whole process comfortably for a longer period of time and can see the turtle from a greater distance, relieving any concern for crowding the egg-laying process. Finally, most of the excitement surrounding sea turtles comes from seeing these "giants", for most people that is the highlight of turtle viewing.

One possible constraint to fully profitable 'Turtle Watching' is that of timing. The 2003 experience suggests that the Leatherback nesting and hatchling season ends a few months prior to Dominica's main tourist season. However, 2003 "trials" proved that people are definitely interested in seeing sea turtles … including hatchlings. More than 25 persons consistently visited the beach on potential nesting nights. Starting beach patrolling earlier in the year, as Leatherbacks may start nesting in February, may increase overlap with peak tourism periods.

The fact that sea turtle viewing is a night-time activity poses a blend of challenges and advantages. Firstly, Dominica is a relatively quiet country, and the majority of visitors seek a relatively peaceful holiday in a natural setting. 'Turtle Watching' fits in comfortably with the marketing of Dominica as a tourism product. It also complements existing nature-oriented activities by offering a night-time option. At the same time, the remote location of many nesting beaches and the potentially late and long hours involved in a 'Turtle Watch' are factors which must be addressed by management.

Consideration of this was reflected in the questionnaire, which polled respondents' views on the provision of transportation and refreshments, as well as the time spent on the beach. Considering the response to this particular question, allowing visitors to spend some time on the beach, providing transportation and refreshments, *and* offering a blend of cultural experience (story-telling?) and themed products (T-shirts, sea turtle curios made locally) will likely produce a saleable product. While increasing the responsibility

and organisation necessary, these represent value added and also present an opportunity for local entrepreneurs (e.g. food, transportation, artisans) to benefit. A more comprehensive product may eventually provide overnight accommodations in local communities, as is already done in other Caribbean communities.

During peak Leatherback nesting season in 2003, turtle activity occurred, on average, every third night, which translates into a 33% chance of "seeing something". Knowing that Leatherbacks nest every 9-11 days can greatly improve these odds. There were 18 Leatherback turtle activities in Rosalie Bay during May and June, representing an average of one turtle every 3.4 days or two turtles a week. The odds of seeing something can also be improved by monitoring more beaches, and networking beach patrollers together (e.g. using cell phones) so that visitors waiting at an organised museum or interpretive centre at Rosalie could be called to nesting on Rosalie Beach, La Plaine Beach (15 minutes away), or Castle Bruce Beach (30 minutes away).

There are other creative means of increasing visitor satisfaction by compensating for inherent unpredictability. One is to embrace the idea of seeing hatchlings, which have a significant 'cuteness factor'. Hatchling emergences can be predicted with some accuracy, have the added advantage of usually occurring at earlier times during the evening. It is a recommendation that whatever "product" is marketed, best practices with regard to interaction with endangered sea turtles and their young be emphasised (e.g. Eckert et al., 1999).

Educational Materials- Outreach in 2003 involved teaching people (residents and visitors alike) about sea turtles, and involving them in stewardship and conservation initiatives. Most of this occurred not simply in scheduled school presentations and lectures, but informally and on an impromptu basis within communities throughout Dominica. One of the most valuable resources available to RoSTI staff was a suite of RoSTI and WIDECAST educational materials, particularly those with pictures. These were very popular among children and adults, and served as effective teaching aids and promotional tools. For example, RoSTI postcards printed with "turtle facts" and WIDECAST's species identification leaflets were in widespread demand!

It is a strong recommendation that RoSTI staff develop additional picture materials, particularly species identification sheets, posters, bookmarkers and thematic brochures. These materials will also be useful in schools where RoSTI staff are working in partnership with local teachers; e.g., curriculum units being developed in Pioneer school (Roseau) and SSMR co-visited schools by RoSTI Project Manager Rowan Byrne & Marine Manager Mr. Arun Madisetti. Printing bulk orders reduces printing, shipping and freight costs. Ideally the project should have a year's worth of materials on hand at the start of the nesting season.

It is a recommendation that materials be developed specifically for sharing with policy-makers. For example, when visiting Village Councils, small packages or folders should be available for each Council member to keep. These could contain photos of Dominicans working with turtles, information on local populations of sea turtles, a map of sea turtle nesting sites around Dominica, summaries of data collected by RoSTI, a copy of island legislation protecting nesting females and their young, and/or contact details for the Sea Turtle Hotline. Possibly a CD would be useful, particularly for media representatives (see also below).

Finally, it is a recommendation that the project have a large portable folding RoSTI logo banner for display at future DiveFest**,** eco-tourism conferences (planned for June 2004), the RoSTI Turtle Festival in

La Plaine, and other public meetings and conferences, such as sponsored workshops and outreach engagements.

Media Considerations- It is a recommendation that the project continue monthly turtle reports on the radio, but with more emphasis on featuring Dominicans along with RoSTI staff. The same is true for television, where opportunities to feature community beach patrollers and others directly involved in the project should be sought.

General "media", in the sense of public visibility for sea turtle management issues, is also needed. For example, it is a recommendation that emphasis be placed on the posting of sea turtle billboard signs (such as already exist in La Plaine) at nesting beaches known for poaching activity. RoSTI should provide bumper stickers to taxi drivers at the airport and bus transporters in Roseau at the bus gathering stations. A monthly or weekly outreach section in local papers (produced by RoSTI staff) might feature a specific character, such as "Creole the Turtle" or the adventures of a sea turtle character changing every week and based on actual events. The character for the story could be prepared by a local artist, in conjunction with RoSTI project staff.

Sponsorship of Community Events- Sponsorship of village activities is a way to emphasise partnerships, support community development (beyond conservation issues), and encourage leadership. Sponsorship might involve a local musical band, Forestry or Fisheries extension program, Creole music festival, DiveFest activity, village football league, assisting a contestant for a queen show or quadrille festival, supporting a youth camp or church summer school. This type of participation shows the practical benefits of conservation.

One recommendation might be to sponsor a monthly workshop, each taking place in a different area, especially along the North coast where sea turtle nesting is reported and poaching significant. Each workshop could be associated with a community donor, such as AT&T wireless. The cost would vary, but is estimated at EC$2500 per day. Gatherings such as this create good will, a chance for open-ended and frank discussion, and an opportunity for mutual learning. In a similarly way, RoSTI workshops designed for the tourism sector would encourage information exchange and enhance marketing of sea turtle related activities. To this end, it is a recommendation that outreach be designed in 2004 to target tour guides, taxi drivers, hoteliers, dive shops, car rental agencies, eco-tourism promoters, etc.

Preliminary Market Assessment

During 2003 a preliminary market assessment was undertaken in support of one of the main goals of RoSTI, which is to develop a viable 'Turtle Watching' program at the Rosalie Estate that can be used as a model for other communities elsewhere on the island. The importance of such a venture is rooted in the reality that in today's environment, conservation must offer practical alternatives and choices to local people. Particularly in Dominica's economic climate, entrepreneurial choices are important, especially at the community level. They also lend support to Government policy emphasising development of a sustainable tourism base.

Like any business venture, however, an assessment of the demand for such a product is an essential first step; analysing the viability of the venture can offer guidance as to the shape of the final product. It is a recommendation that the preliminary survey conducted to 2003 be followed by a more in depth study in 2004, and at the same time incorporate scientific data collected on the nesting beaches to evaluate whether the natural resources (sea turtles) are sufficient to support a sustainable venture.

James and Fournillier (1993) suggest these three objectives for sustainable sea turtle eco-tourism:

- To promote eco-tourism as a tool for conservation of ecosystems and endangered species, using the spectacular ecological behaviour of sea turtle nesting as the principal focus of this activity,
- To provide training for self-employment of young people in local communities as nature tour guides and other entrepreneurial activities, and
- To enhance the development of other sectors of the community by fostering the establishment of backward and forward linkages between eco-tourism and local agriculture, cuisine, culture, accommodation and other services.

These objectives should be kept in mind as 'Turtle Watching' develops in Dominica.

Project Support - Income generation

It is a recommendation that steps be taken to generate funding for sea turtle conservation at the local level, with an aim to provide sustainable income to the project in the future. Such steps might include:

- Unique product sales, such as T-shirts (for sale in 2003), postcards (remarkably, sea turtle postcard images are not currently available in Dominica), 35 mm slide sets, hats, etc. including items featuring the RoSTI logo. Items might even include a collector's edition of "Rowan's Turtle Diaries", chronicling the first year of the RoSTI project, or other VHF videos or CDs featuring sea turtle footage.

- A RoSTI 'turtle stand' at Emerald Pool which, during the cruise-ship season, has 700 visitors daily and is only 20 minutes' drive from Rosalie. Set-up costs would be low, and the stand could be maintained by Interns. Forestry officers have expressed an interest in helping, and in partnership with RoSTI could provide information on a variety of wildlife species in Dominica.

- 'Adopt-a-Turtle Campaign' targeted at visiting tourists, and could be advertised during public presentations to tourists island-wide and eventually those staying at the Rosalie Estate.

2004 Equipment Needed

- Stockpile of posters, bookmarks, brochures, and other outreach materials
- Dissection kit and callipers
- Digital video and still digital cameras
- Laptop computer for mobile and office-base work and ppt presentations
- Slide projector and/or PowerPoint projector
- PIT tags and reader to enhance tag longevity
- External CD burner with access through two USB ports
- A supply of burnable CD's, 52x

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WIDECAST

Wider Caribbean Sea Turtle Conservation Network

2003 Sea Turtle Sighting Form

Rosalie Sea Turtle Initiative (RoSTI)

Dominica, West Indies

Date _____ Time _____ AM / PM Page Number _____

Observer_____ Tel/contact: _____

Location: Lat _____ Long _____ Name/Locale: _____

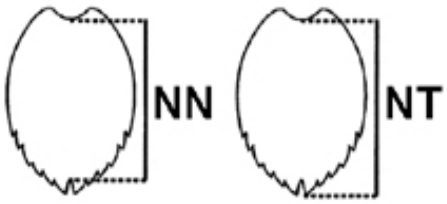
Distance between Nest (or Suspected Nest) and Landmarks, or Turtle and Landmarks:
Landmark A (name / distance) _____ / _____(m)
Landmark B (name / distance) _____ / _____(m)
Landmark C (name / distance) _____ / _____(m)

If at sea: Water Depth (m) _____ Water Temperature _____

Turtle Species: _____ Gender: ♂ / ♀ / unk

Identified by: ☐ Adult ☐ Juvenile ☐ Hatchling ☐ Alive ☐ Dead
or, ☐ Crawl/Nest Pit Crawl Width: _____ m Pattern: Symmetrical / Alternating

Size: CCL NT _____cm SCL NT _____cm CCL NN _____cm SCL NN _____cm
CCW _____cm SCW _____cm Carapace Intact? Y / N



Description / Illustration : Parasites and Injuries

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

Notes (e.g. evidence of poaching or other threats, contact information for observer):

_____
_____
_____
_____
_____

APPENIDX I

APPENDIX II

2003 RoSTI 'Preliminary Market Assessment Survey'

1. Are you a stay over or cruise visitor? Y ☐ N ☐
2. How long do you plan on staying in Dominica? ☐ days
3. At which hotel or guesthouse are you staying?
4. Have you visited or plan on visiting the natural attractions in South East of Dominica during your stay? Y ☐ N ☐
5. Are you interested in seeing Dominica's unique/ endemic wildlife? Y ☐ N ☐
6. Would you be interested in observing endangered sea turtles nest on the beach? Y ☐ N ☐
7. Would you also be interested in hatchlings (baby turtles) leaving their nest? Y ☐ N ☐
8. How much would you be willing to spend for this service?
   A) a) $20 U.S b) $30 U.S c) $50 U.S

   B) Would you prefer refreshments and transportation to be included? Y ☐ N ☐
9. Would you prefer spending the whole night on the beach or just spend 2 or 3 hours? W ☐ H ☐
10. Would you be interested in touring a turtle sanctuary/ heritage museum on the South East coast? Y ☐ N ☐

APPENDIX III

2003 RoSTI 'Public Awareness Survey'

INTERVIEWER INFORMATION:

Date:_____ Time: _____ Location: _____

Interviewer(s): _____

Introduce yourself to the interviewee. Explain that you are carrying out a survey as part of the *Rosalie Sea Turtle Initiative* (RoSTI) to find out about how important sea turtles are, and were, to the culture and everyday lives of the people of Dominica. Explain that it is important to find out about this historical relationship as many traditions are being lost as the country becomes more and more developed. Tell them that the results of the surveys will be made into a cultural book designed to share these important traditions and cultural heritage with the school children of today.

Hand them a leaflet and background information on the survey if they want it. Species identification sheets are also available for distribution.

Ask the interviewee if they mind being taped (show them the tape recorder), or if they would prefer for notes to be taken during the interview. Tell them that you need to do this to help you remember things to prepare the book at a later date. Tell them that the interview is confidential and that only members of RoSTI and WIDECAST staff will have access to the information. Their *name* will not be used in any publication with-out their permission.

Inform them of the time it should take to complete the questionnaire. Let them know that you can make it brief if they are busy and time is limited, or it may last longer if they are interested and have a lot of information to share.

INTERVIEWEE INFORMATION:

Name: _____

Do they wish to remain anonymous? Y☐ N☐

Occupation: _____ Age: _____ Sex: M☐ F☐

Area of Residence: _____

SECTION 1 – TURTLES, GENERAL INFORMATION

1. HOW MANY DIFFERENT KINDS OF SEA TURTLE DO YOU KNOW?
2. CAN YOU NAME THEM?
3. HOW DO YOU TELL ONE KIND FROM ANOTHER?
4. CAN YOU TELL A MALE FROM A FEMALE?
5. HAVE YOU EVER SEEN A SEA TURTLE NESTING?

SECTION 2 – USES OF TURTLE, THE PAST

1. DO YOU THINK SEA TURTLES ARE IMPORTANT TO THE PEOPLE OF DOMINICA?
2. DO YOU THINK THIS HAS CHANGED OVER THE PAST 70 YEARS / SINCE YOU WERE YOUNGER / A CHILD?
3. WHEN YOU WERE YOUNGER / A CHILD DID YOU EAT TURTLE MEAT OR EGGS REGULARLY?
4. WHEN TURTLE WAS CAUGHT, WAS IT SHARED WITHIN THE VILLAGE OR BETWEEN VILLAGES?
5. WHAT KINDS OF TURTLE WERE EATEN?
6. WAS TURTLE EATEN ON SPECIAL OCCASSIONS, OR WAS IT AN ORDINARY MEAL?
7. WHAT DID TURTLE MEAT SELL FOR?
8. WERE THE TURTLES SOLD RIGHT AWAY, OR KEPT UNTIL A BUYER WAS FOUND?
9. WERE ITEMS OF JEWLERY MADE FROM TURTLE SHELL?
10. DID PEOPLE USE TURTLE SHELLS AS DECORATION OR FOR “UTILITARIAN” PURPOSES, SUCH AS FOR BOWLS, ETC.?
11. WERE THESE ITEMS SOLD LOCALLY, OR TO TRADERS THAT WOULD COME TO THE ISLAND?
12. WHAT WAS THE GIANT LEATHERBACK TURTLE USED FOR?
13. WAS THE MEAT OF THIS TURTLE EATEN?
14. WAS THE OIL USED, IF SO WHAT FOR?
15. WAS THE OIL SOLD? HOW WAS IT STORED?
16. HOW WAS / IS TURTLE MEAT COOKED?
17. WHICH DISH IS BEST?
18. HOW WERE THE EGGS EATEN?
19. WERE THEY GIVEN AWAY TO FAMILY AND FRIENDS OR SOLD?

SECTION 3 – USES OF TURTLE, THE PRESENT

1. DO YOU STILL EAT TURTLE MEAT OR EGGS?
2. IF YES, HOW OFTEN?
3. ARE TURTLES CAUGHT DIFFERENTLY NOW TO WHEN YOU WERE YOUNGER?
4. HOW MANY TURTLES COULD BE CAUGHT PER DAY (AT SEA) OR PER NIGHT (ON THE NESTING BEACH) WHEN YOU WERE YOUNGER? WAS THE HUNT SEASONAL?
5. DID YOU EVER TAKE PART IN THE HUNT?
6. DO YOU THINK MORE OR FEWER TURTLES ARE CAUGHT TODAY?

7. DO YOU HAVE ANY OPINION AS TO WHETHER THERE ARE FEWER SEA TURTLES IN DOMINICA - OR MORE - THAN IN YEARS' PAST?
8. ARE THERE ANY BEACHES THAT USED TO BE USED FOR NESTING, BUT AREN'T ANY MORE?
9. IF SOME BEACHES ARE NO LONGER USED, WHY IS THAT?
10. DO YOU KNOW WHAT THE LAW IS REGARDING SEA TURTLES?

SECTION 4 – TURTLE STORIES AND LEGENDS

1. DO YOU KNOW OF ANY TURTLE STORIES OR LEGENDS?
2. COULD A HUNTER TELL FROM "SIGNS" IN THE EVENING OR NIGHT SKY WHETHER TURTLES WOULD BE ON THE BEACH THAT NIGHT?

SECTION 5 – THE FUTURE

1. WHAT DO YOU THINK THE FUTURE IS FOR TURTLES IN DOMINICA
2. WOULD YOU BE SAD IF TURTLES BECAME EXTINCT AND THERE WERE NONE FOR THE CHILDREN OF TOMORROW TO SEE?
3. DO YOU THINK PEOPLE SHOULD STILL FISH FOR TURTLE AND TAKE THE EGGS?
4. IF SO, DO YOU THINK THIS SHOULD BE REGULATED IN SOME WAY - BASED, FOR EXAMPLE, ON HOW MANY TURTLES ARE LEFT?
5. EVEN THOUGH THERE WERE NO FORMAL LAWS REGULATING TURTLE TAKE IN THE OLD DAYS, WERE THERE VILLAGE RULES GOVERNING HOW MANY (OR WHAT TYPE OF) TURTLES COULD BE TAKEN?
   FOR EXAMPLE, WERE THERE ANY RULES TO LET THE EGG-LAYING FEMALES LIVE SO THAT THEY COULD CONTINUE TO NEST IN THE FUTURE?
6. DO YOU THINK THAT USING THE TURTLES FOR TOURISM – SUCH AS TAKING TOURISTS ON "TURTLE WATCHES" - IS A GOOD IDEA?
7. DO YOU THINK THAT THIS TYPE OF "ECOTOURISM" COULD BRING ECONOMIC BENEFITS TO LOCAL VILLAGES, WHILE ALLOWING THE PEOPLE OF DOMINICA TO "KEEP ALIVE" AN IMPORTANT PART OF THEIR HERITAGE?

SECTION 6 – OTHER COMMENTS

ASK THE INTERVIEWEE IF THEY HAVE ANY MORE INFORMATION THAT THEY WOULD LIKE TO SHARE.

END OF INTERVIEW - Thank the interviewee for his / her time. Tell them that their information and experiences will be very useful in completing the project!

If they are interested in learning more about the RoSTI Project, invite them to participate in a beach patrol or attend a school lecture or other scheduled activity.

APPENDIX IV

AN OVERVIEW OF THE BIOLOGY OF LOCAL SEA TURTLES

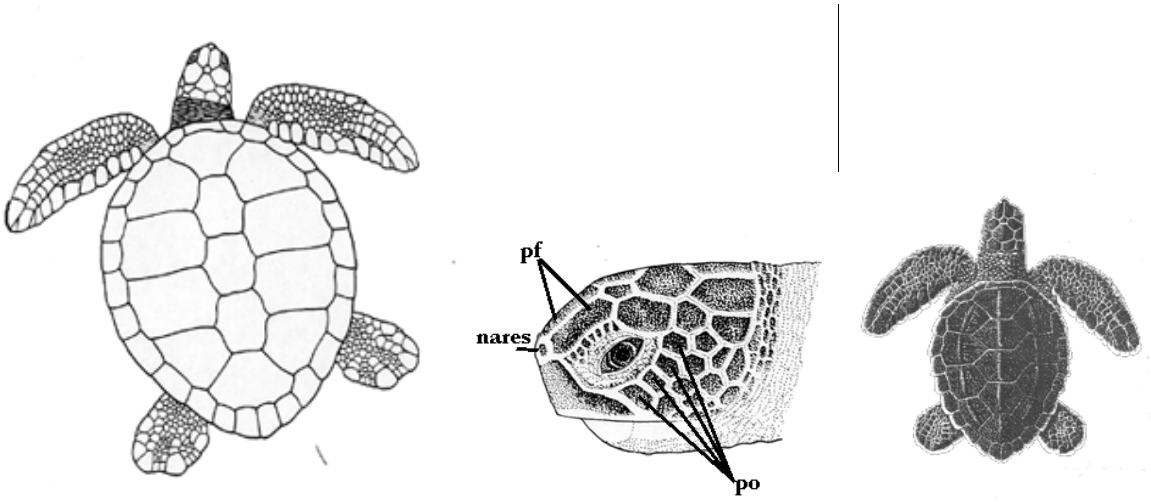
While there are six species of sea turtle in the Wider Caribbean Region, not all of them are present in Dominca. There has never been a comprehensive assessment of the abundance, distribution or status of sea turtles in Dominica, but data collected by the RoSTI project, as well as published reports and historical information available from informed residents, confirm that at least three species actively nest on local beaches. They are the Leatherback, Green turtle and Hawksbill. Feeding in nearshore waters by juvenile and adult Green and Hawksbill turtles occurs year-around in coastal waters; Loggerhead turtles, too, are occasionally encountered at sea. It is hoped that the following paragraphs (which have been excerpted and updated, for the most part, from Eckert 1995) will provide a basic understanding of the species that occur in Dominica, and that continued dedicated field work will result in a complete picture of the ecology of these ancient reptiles in modern Dominica.

Green Turtle, Chelonia mydas

Identity- The generic name Chelonia was introduced by Brongniart (1800). The specific name mydas was first used by Linnaeus (1758). In the Caribbean basin it is variously known as the green (or green back) turtle in English, *tortuga verde* in Spanish, and *tortue verte* in French.

The green turtle is recognized by a round, blunt beak with serrated cutting edges, one pair of enlarged scales between the eyes, and four pairs of lateral carapace scutes that do not overlap one another (Figure 4). The shell color is light to dark brown, sometimes shaded with olive, with radiating wavy or mottled markings of darker color or with large blotches of dark brown. It is generally devoid of barnacles. The plastron (=belly plate) is whitish or light yellow. On average, adults measure 100-120 cm in straight carapace length and range from 110 to 230 kg in Western Atlantic rookeries. As is the case with all sea turtle species, adult males are distinguished by a long prehensile tail.

Figure 4. Green turtle adult, head (close-up showing diagnostic scales between the eyes), and hatchling.



Hatchlings (Figure 4) are uniquely marked, being black above (dorsally) and white below (ventrally). Hatchlings range in size (straight carapace length) from 46-57 mm (Pritchard and Mortimer 1999). Nests hatch, most commonly after 50-60 days of incubation, with success rates of 60% to nearly 90% (summarized by Hirth 1997).

Biology- There are three major rookeries remaining in the Wider Caribbean. The largest is found on a 35 km beach at Tortuguero, Costa Rica where 4,128 to 27,041 nesting females were reported by Carr et al. (1982) "every [July-September] season for the past 25 years". Today scientists report an estimated average of 65,000 nests per year at Tortuguero (Bjorndal et al. 1999).

The second largest nesting colony in the region is in Suriname, where, in the two decades between 1969 and 1989, green turtle nesting (all beaches combined) fluctuated in an apparently stable manner between 2,495 and 8,465 nests per year (Reichart and Fretey 1993). Monitoring was interrupted by civil unrest in the early 1990s, and in recent years the annual number of green turtle nests has ranged from 4,242 in 1996 to 11,581 in 1999 (Kelle et al. 2000).

The third most significant known colony is Aves Island, Venezuela, where from 1979 to 1997, with monitoring resuming in 2001, an estimated 700 to 900 nests were laid each year (Vincent Vera, Aves Island Wildlife Refuge Coordinator, Dirección General de Fauna, Ministerio del Ambiente y de los Recursos Naturales, pers. comm., 2002). [*Note*: To estimate the number of females nesting per year based on the number of nests laid, divide the number of nests by 3.]

More moderate (fewer than 500 nests per year) but regionally significant levels of nesting are found in Cuba, Quintana Roo (Mexico), the Dominican Republic, French Guiana, and selected offshore islands of Brazil (Zurita et al. 1994, Hirth 1997, Nodarse et al. 2000), as well as eastern Florida (Ehrhart and Witherington 1992, Meylan et al. 1994, L. Ehrhart, Univ. Central Florida, unpubl. data). The green turtle may nest occasionally almost anywhere in the Caribbean Region, but throughout the Lesser Antilles it is generally considered much rarer than the hawksbill as a nesting species.

Nesting and feeding grounds are often separated by hundreds of kilometers; for example, Tortuguero nesters feed largely in Nicaraguan waters, with a smaller contingent migrating south to Colombia, Panama and Venezuela. Suriname turtles apparently feed exclusively in Brazil, where they may mingle with feeding turtles derived from the Ascension Island nesting colony. While the Lesser Antilles are not recognized as important nesting grounds, they provide critically important foraging pasture for juveniles and subadults.

Hatchlings emerge from their nests, scurry to the sea, orient offshore in a swimming frenzy that persists over a period of days, and ultimately enter an offshore convergence or weed line. For example, Sargassum seaweed rafts shelter hatchling green turtles and also harbour a diverse, specialized fauna, including many kinds of little fishes, crustaceans, worms, mollusks, tunicates, and coelenterates; these may provide food for the young turtles (Carr 1987). The turtles remain epipelagic (=surface-dwelling in the open sea) for an unknown period of time (one to several years) before taking up residence in continental shelf habitats.

Upon leaving the open sea existence that characterizes their earliest years, green turtles become herbivores and remain so for the rest of their lives (Bjorndal 1985, 1997). In the Caribbean Sea, green turtles feed primarily on the sea grass Thalassia testudinum (Bjorndal 1982), commonly referred to as "turtle grass." Field studies indicate that individual turtles maintain feeding "scars" by returning to the

same area of sea grass meadow to forage each day for a period of months before moving on to a new area. Green turtles travel extensively during the first decades of their lives and in the years preceding reproductive maturity take up temporary residence in many locations (Carr et al. 1978). They may travel thousands of kilometers throughout the region before the urge to reproduce impels them to migrate to mating and nesting grounds, the latter presumed to be their natal (=birth) beach.

Caribbean green turtles reach sexual maturity at an estimated 18-36 years of age (reviewed by Frazer and Ladner 1986). Females mate at the beginning of the nesting season and lay their eggs on sandy beaches under the cover of darkness. A female may lay 2-6 clutches of eggs every 2-3 years. At the well-studied Tortuguero, Costa Rica rookery, females deposit clutches averaging 112 eggs (range 3-219, n = 2,544) every two weeks (Bjorndal and Carr 1989). Green turtle nests are often recognized because the female creates a deep "body pit" before excavating her nest cavity. The eggs are well camouflaged, but the meter-wide body pit might remain visible for many months. Undisturbed eggs hatch after approximately two months of incubation, with incubation temperature determining the sex ratio of the hatchlings (Morreale et al. 1982). When nesting is over, adults return to resident foraging grounds.

Status- The species is classified as Endangered by the World Conservation Union (IUCN), where taxa so classified are considered to be "in danger of extinction and whose survival is unlikely if the causal factors continue operating" (Groombridge 1982). Threatened species are classified by IUCN into various categories, including Critically Endangered, Endangered, and Vulnerable, among others. The classification of a species rests on how well it meets a series of specific criteria, Criterion A being "reduction in population size". For a species to qualify for Critically Endangered status it has to have declined more than 80% in three generations (which, for marine turtles, is roughly 100 years, depending on the species). To qualify for Endangered status, the decline over three generations has to be at least 50%.

Green turtles are included in Annex II of the UNEP Protocol concerning Specially Protected Areas and Wildlife (a Protocol of the 'Cartagena Convention', the 1973 Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region), and Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a designation which effectively bans trade in specimens or products except by special permit. Green turtles are also included in the annexes to the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (the 'Western Hemisphere Convention'), a designation intended to convey that their protection is of "special urgency and importance."

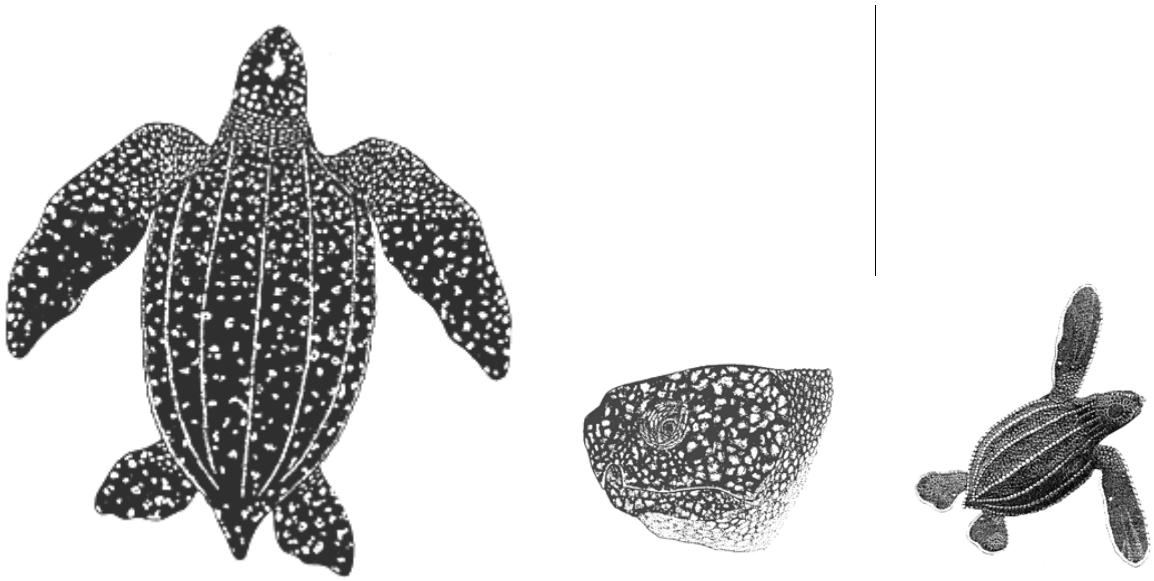
Leatherback Turtle, Dermochelys coriacea

Identity- The generic name Dermochelys was introduced by Blainville (1816). The specific name coriacea was first used by Vandelli (1761) and adopted by Linneaus (1766) (Rhodin and Smith 1982). The binomial refers to the distinctive leathery, scaleless skin of the adult turtle. For the most recent detailed discussion of taxonomy and synonymy, see Pritchard and Trebbau (1984). The people of the Wider Caribbean know Dermochelys by a variety of common names, the most prevalent being leatherback or trunk-back in English, *laud* (or *tora*) in Spanish, and *tortue luth* in French.

Leatherbacks (Figure 5) are the largest of all sea turtles. Caribbean-nesting females typically weigh 300-500 kg (660-1100 lb). An adult male weighing a record 916 kg (2015 lb) stranded on the coast of Wales, U. K. in 1988 (Morgan 1989). Leatherbacks lack a bony shell; their smooth black skin is spotted with white and the proportion of light to dark pigment is variable. The flexible carapace is strongly tapered,

typically measures 130-165 cm in straightline length, and is raised into seven prominent ridges (Figure 11). Powerful front flippers extend nearly the length of the body. Deep cusps form tooth-like projections on the upper jaw. Stomach contents from animals killed in various parts of the world indicate that the diet is mostly cnidarians (jellyfish, siphonophores) and tunicates (salps, pyrosomas) (Brongersma 1969, Hartog and van Nierop 1984, Davenport and Balazs 1991).

Figure 5. Leatherback adult, head (close-up showing typical spot pattern), and hatchling.



Hatchlings are covered with tiny scales and are predominately black with mottled undersides; the flippers are margined in white (Figure 5). Rows of white scales appear as stripes along the length of the back. The hatchlings range in size (straight carapace length) from 55 to 63 mm (Pritchard and Mortimer 1999). Nests hatch, most commonly after 50-60 days, showing success rates slightly lower than is common for other species.

Biology- Leatherbacks have the most extensive range of any reptile (71°N to 47°S: Pritchard and Trebbau 1984) and adults exhibit broad thermal tolerances. The species is commonly reported in New England waters and northward into eastern Canada, as well as occasionally sighted in British Columbia and northward into Alaska. In Trinity Bay, Newfoundland, an adult was encountered swimming in open water amongst ice (Goff and Lien 1988). The core body temperature in cold water has been shown to be several degrees C above ambient (Frair et al. 1972). This may be due to several features, including the thermal inertia of a large body mass, an insulating layer of subepidermal fat, counter-current heat exchangers in the flippers, potentially heat-generating brown adipose tissue, and a relatively low freezing point for lipids.

Leatherbacks are further unusual in that females engage in virtually continuous deep diving (maximum depths exceed 1000 m) in the general vicinity of the nesting ground, traversing inshore waters only to and from the beach (Eckert et al. 1986, 1989). Adults typically leave the Caribbean basin after nesting, demonstrated by long-distance tag returns (e.g., one adult female traveled 5,900 km to Ghana,

West Africa, after laying eggs in Suriname; see Pritchard 1973), patterns of barnacle colonization (Eckert and Eckert 1988) and, more recently, satellite telemetry studies from the Guianas and Trinidad indicating that adults forage during non-breeding years in the waters of the northern and eastern Atlantic Ocean (Eckert 1998, Ferraroli et al. In press a,b).

Despite advances in determining the geographic range of adults, neither the dispersal patterns of hatchlings nor the behavior and movements of juveniles are known. Recent information has established that young leatherbacks (smaller than 100 cm carapace length) occur only in waters warmer than 26º C (Eckert 2002). Survivability, growth rate, age at maturity and longevity have not been determined.

Nesting grounds are distributed circumglobally (approximately 40ºN to 35ºS). Gravid females are seasonal visitors to the Wider Caribbean region (males are rarely encountered) and observations are largely confined to peak breeding months of March to July. Mating is believed to occur prior to or during migration to the nesting ground (Eckert and Eckert 1988). Females generally nest at 9-10 days intervals, deposit an average of 5-7 nests (and as many as 11, see Boulon et al. 1996) per year, and remigrate at 2-3+ year intervals. Because relatively large numbers of nests are made by each turtle, and not all crawls result in a nest (that is, not all crawls result in the successful deposition of eggs), a tally of 100 crawls may translate into 70-80 nests – or the sum reproductive effort of only 10-15 females.

Females prefer to nest on beaches with deep, unobstructed access; contact with abrasive coral and rock is avoided. Nesting typically occurs at night. Approximately 70-90 yolked eggs are laid in each nest, along with a variable number of smaller yolkless eggs. Sex determination in leatherback hatchlings is temperature dependent and the "pivotal temperature" (approximately 1:1 sex ratio) has been estimated to be 29.25º - 29.50ºC in Suriname and French Guiana (Mrosovsky et al. 1984, Rimblot-Baly et al. 1986-1987). As is the case with all sea turtle species, warmer incubations favor females.

The largest colony in the Wider Caribbean Region is Yalimapo-Les Hattes, French Guiana. As is typical of long-term databases at well-studied nesting beaches, the French Guiana database demonstrates strong fluctuations in the number of nests laid each year, ranging (since 1978) from more than 50,000 nests to fewer than 10,000 (Girondot and Fretey 1996). As erosion has degraded the famous nesting beaches in French Guiana, the large colony there has declined and egg-bearing females have increasingly shifted to beaches in neighboring Suriname. Nests laid per year in Suriname numbered in the hundreds during the 1960s and early 1970s, and now number in the thousands, with an estimated 14,000 nests laid in 2000 (Hilterman et al. 2001).

Other important Caribbean colonies are found in Venezuela, Colombia, Panama, Costa Rica, Trinidad, and the Dominican Republic (Eckert 2001). With the exception of Trinidad and the Dominican Republic, nesting in the insular Caribbean is predictable but occurs nowhere in large numbers; there is considerable anecdotal evidence that nesting has dramatically declined in the Eastern Caribbean.

Status- The species is classified as Critically Endangered by the World Conservation Union (IUCN), where taxa so classified are believed to have experienced an 80% reduction in their global numbers in three (turtle) generations. Two other Caribbean species are classified by international authorities as Critically Endangered: the Hawksbill (Eretmochelys imbricata) and the Kemp's Ridley (Lepidochelys kempii). Kemp's Ridley has the smallest population of any sea turtle, and its range is largely confined to the Gulf of Mexico and Western North Atlantic (see Márquez 1994); it does not occur in Dominica.

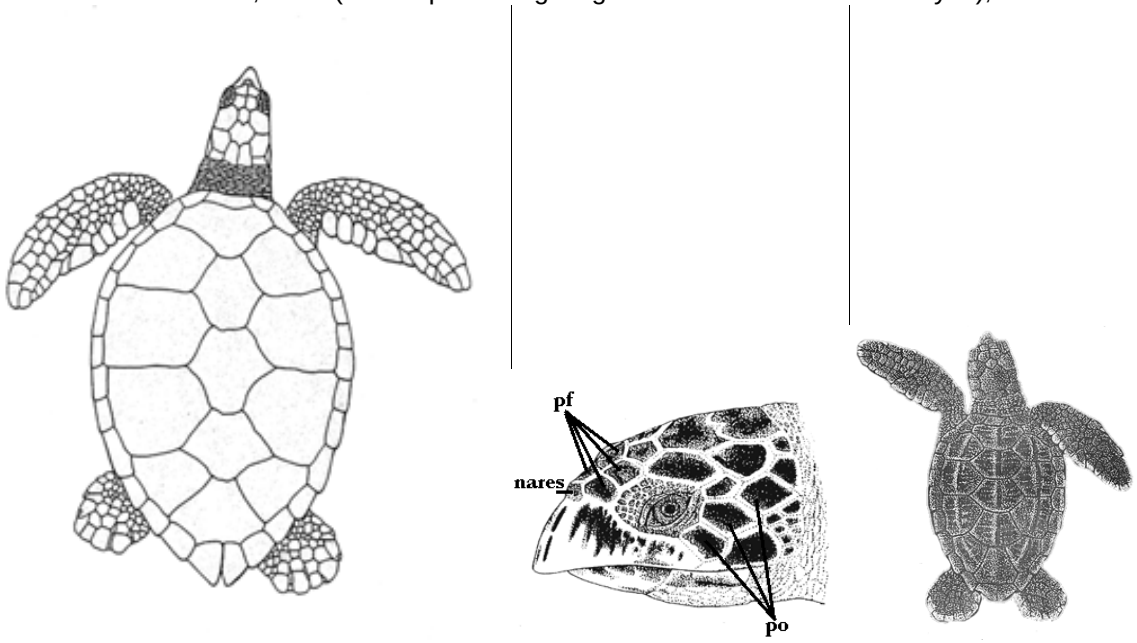
Leatherbacks are included in Annex II of the UNEP Protocol concerning Specially Protected Areas and Wildlife (a Protocol of the 'Cartagena Convention', the 1973 Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region), and Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a designation which effectively bans trade in specimens or products except by special permit. Green turtles are also included in the annexes to the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (the 'Western Hemisphere Convention'), a designation intended to convey that their protection is of "special urgency and importance."

Hawksbill Turtle, Eretmochelys imbricata

Identity- The generic name Eretmochelys was introduced by Fitzinger (1843). The specific name imbricata is attributed to Linnaeus (1766) and refers to the over-lapping nature of the carapace scutes. The Hawksbill turtle is generally referred to as *carey* in Spanish and *tortue imbriquée* in French.

Hawksbills are distinguished from other sea turtles by two pairs of prefrontal scales, posteriorly over-lapping carapace scutes, four pairs of lateral scutes (the anteriormost not in contact with the nuchal scute), and a relatively narrow head and pointed jaw (Figure 6). The carapace is typically serrated along the posterior margins and "tortoiseshell" in color and pattern (radiating streaks of brown, black and amber). Carapace color is geographically variable and may also change with age. Straight carapace length of adult females averages 75-85 cm in the Western Atlantic (Witzell 1983). Weight is typically to 80 kg (Pritchard and Mortimer 1999), with an historical record of a 280 pound (127 kg) individual caught at Great Sound, Grand Cayman (Carr 1952).

Figure 6. Hawksbill adult, head (close-up showing diagnostic scales between the eyes), and hatchling.



Hatchlings are uniform in color, usually gray or brown, above and below and typically measure 39-46 mm straight carapace length (average: 42 mm) (see Pritchard and Mortimer 1999).

Biology- Nesting beaches are distributed circumglobally, roughly from 30°N to 30°S. Nesting usually occurs at low densities. With the exception of Mexico, Cuba, and Puerto Rico, there are no documented nesting assemblages in the Wider Caribbean Region that exceed 100 nesting females (the equivalent of some 500 nests) per year. Smaller but regionally important nesting colonies exist in Nicaragua, Panama, Guatemala/Belize, the Dominican Republic, Jamaica (offshore cays), Martinique, and Long Island (Jumby Bay) in Antigua (summarized by Meylan 1999a).

Hawksbills feed in coral reefs and other hard-bottom habitats and specialize on sponges. Ten sponge species accounted for 79.1% of the dry mass of all sponges identified in the stomachs of hawksbills from seven Caribbean countries, suggesting a degree of dietary selectivity (Meylan 1988). During reproductive years females migrate to their nesting grounds, believed to be their natal beach. Preferred beaches are generally characterized by well-developed supralittoral vegetation. Isolated "pocket" beaches are commonly used, sometimes with exposed coral and rock offshore. Nesting is nocturnal. Nests are generally but not universally placed amongst woody vegetation, leaving little evidence of the visit aside from a faint asymmetrical crawl (0.7-0.8 m wide) leading to and from the ocean (asymmetry results because the fore flippers alternate with one another during crawling).

Ongoing research on Long Island, Antigua has shown that most hawksbills nest 4-6 times per year (averaging about 150 eggs per clutch), each nest separated by an interval of 14-15 days (range 13-18 days). Most females return to nest at intervals of 2-3 years (Richardson et al. 1999), but longer intervals are not uncommon. Average annual clutch size in Mona Island, Puerto Rico, has ranged from 141.0 (1989) to 157.6 (1984), with an incubation period of 47-63 days (Richardson 1990). These basic statistics do not vary appreciably by location within the Eastern Caribbean. As is the case with other species, hatchling sex is largely determined by sand temperature during a two-month incubation. Warmer temperatures favor females. Hatch success is often 80% or higher. It has been estimated from long-term datasets that a female must nest for at least 9 years to produce enough hatchlings to replace herself and her mate (thus maintaining a stable population) (Richardson et al. 1999).

Meylan (1999b) summarizes long distance tag returns (mostly of post-nesting females), and more recent satellite-tracking research has confirmed that adult females typically depart the nesting beach, return to distant foraging grounds after egg-laying, and remain in these foraging areas during non-breeding years. Long distance movement is also documented on the part of juveniles. For example, a young hawksbill tagged in Brazil was killed 3,700 km away by a fisherman in Dakar, Senegal, six months later (Marcovaldi and Filippini 1991). But it is also clear that some hawksbills remain resident in juvenile habitats for periods of several years before moving on to take advantage of new foraging grounds.

Hatchlings emerge from their nests at night, scurry to the sea (using light sensitive orientation mechanisms), and dwell in open ocean habitats for the first years of life (Lohmann et al. 1997). Once offshore and into oceanic currents, there is some evidence that post-hatchling stages are spent associated with Sargassum weed and other flotsam in the pelagic zone (Carr 1987, Bjorndal 1997). Juveniles of various size classes (larger than 25 cm) can be observed in hard bottom habitats throughout the Caribbean. Population models for hawksbills have estimated that the animals attain sexual maturity at 20-40 years of age (reviewed in Chaloupka and Limpus 1997).

Genetic analyses show that molecular markers (such as mitochondrial DNA haplotypes) can be used to distinguish among nesting populations. These studies, especially when coupled with data from tag returns, indicate that each nesting population forms a discrete demographic entity, genetically isolated from other populations. Aggregations of hawksbills at foraging grounds and other non-reproductive areas present a mixture of haplotypes, indicating that turtles from distinct genetic stocks coexist on feeding grounds and other areas distant from the nesting grounds. Consequently, each nesting population should be treated as a separate management unit. In contrast, foraging aggregations are of mixed stock, and, although individuals may occur together at the same reefs, they are likely to represent different management units. Hence, the status of both for nesting populations and non-reproductive aggregations depends on international cooperation (Eckert 1999, Frazier 2001; see also Bass 1999 and Díaz-Fernández et al. 1999.).

Status- "For centuries, the hawksbill turtle (Eretmochelys imbricata) has been sought after for the richly patterned scutes (tortoiseshell or bekko) that cover its shell. It has been pursued by, in turn, the ancient Egyptians, the Romans, the Chinese, the Japanese, and the modern Europeans (Parsons 1972). In the 20th century, prices for raw tortoiseshell have at times rivaled those of ivory (Mack et al. 1979)." (quoted from Meylan 1999a). Today the species is classified as Critically Endangered by the World Conservation Union (IUCN), where taxa so classified are believed to have experienced an 80% reduction in their global numbers in three (turtle) generations (see Meylan and Donnelly 1999).

Hawksbills are included in Annex II of the UNEP Protocol concerning Specially Protected Areas and Wildlife (a Protocol of the 'Cartagena Convention', the 1973 Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region), and Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a designation which effectively bans trade in specimens or products except by special permit. Green turtles are also included in the annexes to the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (the 'Western Hemisphere Convention'), a designation intended to convey that their protection is of "special urgency and importance."

Tortoiseshell trade in Dominica, an historical note: The following information, which pertains to hawksbill shell being exported from Dominica, is quoted from Milliken and Tokunaga (1987). "A total of 868 kg [of bekko, or raw tortoiseshell] was reported in Japanese Customs data between 1970 and 1986, but almost half was received during the last two years. Previous to that, minor imports, rarely exceeding 100 kg annually, were received for seven years during the period examined. The recent trend probably reflects Dominica's importance as an exporter not inhibited by CITES controls. … No average weight of bekko per animal was provided in the dealers' data, but one experienced importer suggested that bekko from Dominica averaged 1.50 kg per animal. Calculated accordingly, Customs data would translate into 570 hawksbills for the period examined. This figure is probably fairly accurate: TRAFFIC researchers examined a shipment of 42.4 kg of bekko from Dominica and obtained an average weight of 1.54 kg of bekko per animal." (Milliken and Tokunaga 1987: p.67).

APPENDIX V

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, or
   - 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.