Inter-American Convention for the Protection and Conservation of Sea Turtles

Caribbean Netherlands

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IAC Annual Report General Instructions

Annex IV of the Convention text states that each Contracting Party shall hand in an Annual Report. To complete this Annual Report, Focal Points should consult with various stakeholders involved in sea turtle issues. If you have any questions regarding this Annual Report, please write to the PT Secretariat at secretario@iacseaturtle.org

Please note that the date to submit this Annual Report is **September 15th of 2015.**

Part I (General Information)

Please fill out the following tables. Add additional rows if necessary.

a._ Focal Point

Institution	Ministry of Economic Affairs (EZ) National Office for the Caribbean Netherlands
Name	Paul Hoetjes
Date Annual Report submitted	18 september 2015

b._ Agency or Institution responsible for preparing this report

Name of Agency or Institution	Ministry of Economic Affairs (EZ) National Office for the Caribbean Netherlands
Name of the person responsible for completing this report	Paul Hoetjes
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E-mail	Paul.hoetjes@rijksdienstCN.com

c._ Others who participated in the preparation of this report

Name	Agency or Institution	E-mail
Mabel Nava	Sea Turtle Conservation Bonaire	stcb@bonaireturtles.org
Jessica Berkel	St. Eustatius National Parks Foundation	research@statiapark.org

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Part II (Policy and Management)

a._ General description of activities carried out for the protection and conservation of sea turtles

In accordance with Articles IX and XVIII of the text of the Convention, each Party shall establish monitoring programs, policies and plans for implementation at a national level for the protection and conservation of sea turtles and their habitat.

As a result, the Party shall report on the action plans, management plan or other types of instruments, describing their location, the species considered and the actions implemented by governmental, non-governmental and private institutions related to sea turtles.

In addition to the above, please fill out the following tables and explain the level of progress in the comments column.

	YES/NO/ In Progress	**Comments**
Does your country have a national plan of action in accordance with Article XVIII?	*yes*	*Nature Policy Plan 2013-2017*
Does your country have policies and programs at local and regional levels in accordance with Article XVIII?	*yes*	*Nature Policy Plan 2013-2017*
Does your country have monitoring programs in accordance with Article IX?	*yes*	*STCB* *STENAPA*

b._ National legislation and international instruments related to sea turtles adopted in the preceding year

Describe any national regulations, international agreements and other legal instruments adopted during the preceding year (April 30, 2014-April 30, 2015) related to sea turtles and/or relevant activities. Provide a reference and attach the digital file for the legislation and its corresponding number. The laws adopting the international legislation should be included, when they exist.

No new legislation, policy or IEAs

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Note: *If this is the first time a country is submitting this information, please include all pertinent national legislation and international instruments currently in force.*

c._ Actions for compliance with national and international legislation

c.1 IAC Resolutions

Fill in the following tables for each of the IAC Resolutions listed below. In the case that a Resolution does not apply to your country, please mark the box RESOLUTION DOES NOT APPLY, and if a specific question does not apply, please mark the column DOES NOT APPLY. If you need more space to describe these actions, please attach additional pages and note the resolution and question number to which you are responding.

Resolution CIT-COP7-2015-R2: Conservation of the Eastern Pacific Leatherback Turtle (*Dermochelys coriacea*)

ACCORDING TO RESOLUTION CIT-COP7-2015-R2, REPORT WHETHER YOUR COUNTRY:

			RESOLUTION DOES NOT APPLY	
IS COMPLYING WITH THE FOLLOWING:	**YES**	**NO**	**DESCRIBE ACTION (*)**	**DOES NOT APPLY**
1a) Have you created conservation plans and long-term programs that can reverse the critical situation of the leatherback turtle in the Eastern Pacific?				NA
1b) Are you implementing these conservation plans and monitoring programs?				NA
2. Have you taken conservation measures to eliminate poaching of leatherback turtles?				NA
3. If your country has leatherback turtle nesting beaches in the Eastern Pacific: Have you taken conservation measures to protect the nesting sites and their associated habitats?				NA
4. Has your country adopted fishing techniques that reduce incidental capture and mortality of this species?				NA

(*) Specify actions implemented, name of the project or relevant document, location, objective(s), institutions responsible, contact, financial or other support (optional), results (both positive and negative) and duration.

Resolution CIT-COP3-2006 R-1: Hawksbill turtle conservation *(Eretmochelys imbricata)*

ACCORDING TO RESOLUTION CIT-COP3-2006-R1, REPORT WHETHER YOUR COUNTRY:

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				RESOLUTION DOES NOT APPLY	
IS COMPLYING WITH THE FOLLOWING:		**YES**	**NO**	**DESCRIBE ACTION (*)**	**DOES NOT APPLY**
1. Are you strengthening monitoring of the illegal use and trade of hawksbill turtles and their products?					**NA**
2. Are you enforcing pertinent hawksbill legislation?		**Y**		**Ongoing enforcement of existing laws to protect sea turtles in general**	
3. Are activities being carried out in order to stop illegal trade of hawksbill products?					**NA**
4. Indicate if your country is strengthening the protection of important nesting and foraging habitats by declaring protected areas and regulating anthropogenic activities that adversely impact these habitats.	a) Protection of nesting habitats	**Y**		**All nesting beaches protected**	
	b) Protection of feeding habitats	**Y**		**Marine protected areas fully surround each of three islands**	

(*) Specify actions implemented, name of the project or relevant document, location, objective(s), institutions responsible, contact, financial or other support (optional), results (both positive and negative) and duration.

Resolution CIT-COP3-2006-R2: Reduction of the adverse impacts of fisheries on sea turtles

ACCORDING TO RESOLUTION CIT-COP3-2006-R2, REPORT WHETHER YOUR COUNTRY:

IS COMPLYING WITH THE FOLLOWING:	**YES**	**NO**	**DESCRIBE ACTION (*)**	**DOES NOT APPLY**
Adopted the "Guidelines to Reduce Sea Turtle Mortality induced by fisheries operations", of the United Nations Food and Agriculture Organization (FAO), including:				
A. Research and monitoring of adverse impact of fisheries on sea turtles				
• Collect information by fishery	Y		Fisheries monitoring in place on all islands	
• Observer programs			Only artisanal trap and handline fisheries, small boats, practically no interaction with sea turtles	NA
• Research on sea turtle/fishery interactions			Only artisanal fisheries, practically no interaction with sea turtles	NA
• Information on non-Party vessels				NA
• Cooperation with non-Party states to obtain information				NA

B. Mitigation measures for the following fisheries:					
i.	Long-line			No longline fisheries	NA
ii.	Gillnets			No gillnet fisheries	NA
iii.	Trawling (e.g., 1. TEDs: specify legally approved TEDs, their dimensions, material, and target species for that fishery, 2. time-area closures: specify geographical area, time of closure and target species for that fishery, 3. tow times and/or 4. other measures)			No trawling fisheries, Trawling prohibited	NA
iv.	Other fishing gear (indicate which one(s))				NA
v.	Training programs for fisherman about best practices for safe handling and release of sea turtles incidentally caught		N		
C. Socio-economic considerations					
•	Support socio-economic activities that help mitigate adverse impacts of fisheries on sea turtles				NA

(*) Specify actions implemented, name of the project or relevant document, location, objective(s), institutions responsible, contact, financial or other support (optional), results (both positive and negative) and duration.

c.2 National and International Mandates

List actions that are being carried out to comply with national and international mandates (Ex: inspections, confiscations, sanctions, etc.)

d._ Application[submission] of exceptions established in the Convention

Describe in detail the exceptions allowed in accordance with article IV, item 3(a,b,d) and Annex IV of the text of the Convention, in accordance to the procedure established by the COP (Doc. CIT-COP5-2011-R2). Attach management program.

Part III (Research information)

a._ Threats

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Indicate threats ***(Coastal development, incidental capture, direct use, contamination and pathogens, and climate change)*** *by species, with information on the area and activities taken to control them in the following table.* Lo = *Lepidochelys olivacea*; Lk = *Lepidochelys kempii*; Dc = *Dermochelys coriacea*; Ei = *Eretmochelys imbricata*; Cc = *Caretta caretta*; Cm = *Chelonia mydas*.

Specie	**Threat(s)**		**Actions**
Lo	☐Coastal development ☐Incidental capture ☐Direct use	☐Contamination ☐Pathogens ☐Climate change	
Lk	☐Coastal development ☐Incidental capture ☐Direct use	☐Contamination ☐Pathogens ☐Climate change	
Dc	☒Coastal development ☒Incidental capture ☐Direct use	☒Contamination ☒Pathogens ☒Climate change	**Monitoring of nests, nesting beach protected**
Ei	☒Coastal development ☒Incidental capture ☐Direct use	☐Contamination ☐Pathogens ☒Climate change	**Main nesting beaches protected, Ongoing monitoring of foraging sites, foraging areas protected**
Cm	☐Coastal development ☐Incidental capture ☐Direct use	☐Contamination ☐Pathogens ☐Climate change	**Main nesting beaches protected, Ongoing monitoring of foraging sites, foraging areas protected**
Cc	☒Coastal development ☒Incidental capture ☐Direct use	☐Contamination ☐Pathogens ☒Climate change	**Main nesting beaches protected**

b._ Research

Describe scientific research that is being carried out in the country relating to sea turtle population assessments including tagging, migration, and genetic studies, as well as those relating to conservation issues including habitat monitoring, fisheries interactions, disease, etc. Provide a list of references for the information used in this report and note how to obtain them when needed.

In addition to the above, please fill out the following table on the types of research being carried out in the country and with what specie(s).

Research		**Specie(s)(Lo, Lk, Cm, Ei, Cc, Dc)**
Choose an item.	***Tagging***	***Cm, Ei, Cc, Dc***
Choose an item.	***Migration***	***Cm, Ei, Cc***
Choose an item.	***Genetics***	***Cm, Ei, Cc***

Choose an item.	***Habitat Monitoring***	***Cm, Ei, Cc, Dc***
Choose an item.	***Disease***	***Cm***
Choose an item.	***Fisheries interactions***	***Cm, Ei, Cc***

c._ Other activities

Include information on: environmental education activities, programs to establish and manage protected areas, and cooperative activities with other Party countries.

- Environmental education programs on Bonaire by STCB and in Saba, St. Eustatius by the respective Marine Protected Area management organizations.
- Sea grass protection activities in main foraging area on Bonaire by STCB
- Ongoing management of marine parks comprising all coastal waters of all three islands.

Part IV: Annexes

Table 1: Species Present

Place an X in the box when the species listed is present in the oceanographic basins of your country as established in Article III of the text of the Convention. Lo = Lepidochelys olivacea; Lk = Lepidochelys kempii; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Cm = Chelonia mydas; Cc = Caretta caretta.

Species	Pacific Ocean	Atlantic Ocean	Caribbean Sea
Lo			X Incidental
Lk			
Dc			X
Ei			X
Cm			X
Cc			X

Table 2: Index nesting sites or beaches for sea turtle conservation

a. *This table is intended to report information on index nesting sites or beaches for each species. For beaches that have multiple species nesting, enter that beach under the list for the primary nesting species. When entering information on nesting site or beaches, information is to be entered for each species independently. Indicate the*

names of index nesting sites. On a separate sheet of paper, indicate the selection criteria used for identifying the index beach, for example, because it hosts a significant proportion of the overall nesting population within a region or other defined unit or genetic importance.

b. *Nesting season: Indicate the starting and finishing date of the nesting season.*
c. *Monitoring period: Indicate the starting and finishing date of monitoring efforts.*
d. *Survey frequency: Indicate the frequency with which the surveys are done (daily, weekly, bi-weekly, monthly, among others).*
e. *Geographic location: Specify latitude and longitude in decimal degrees.*
f. *Extension of beach monitored: Provide the total length (in Kilometers) of the nesting beach.*
g. *Declared protection area: Indicate (yes or no) if the area is declared as some type of protected area.*
h. *Annual nesting abundance: Provide information on the total number of females and/or clutches or nests deposited at the nesting site or beach in real numbers. Provide the exact count of females based on tagged or uniquely identified individuals. If the exact number of clutches is unknown provide total number of nests.*
i. *Information from tagging program: Indicate if there have been any tagging activities at the nesting beach by using the letters of the type of tagging being done: flipper tagging (FT), passive integrated transponder (PIT) tagging, and satellite telemetry (ST) programs. If possible, on a separate sheet or as attached reference provide greater detail about the type of tagging efforts conducted. Also provide satellite telemetry maps or flipper tag recovery information if available.*
j. *Tissue sampling: Indicate if there has been tissue sampling conducted at this site. This includes skin, blood, and other body tissues. On a separate sheet, or as attached references, describe these tissue sampling programs in greater detail. For example, were samples collected for genetic, contaminant, and/or stable isotope studies?*
k. *Indicate what organization or entity is providing the data.*
l. *When inserting new rows, please copy and paste the drop down menus when applicable.*

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Spp	Name of Index Nesting Site or Beach	Nesting season		Monitoring period		Survey Frequency	Geographic Location (Lat/Long) in Decimal Degrees				Extension of beach monitored (km)	Declared Protected Area (Yes/No)	Annual Nesting Abundance			Tagging Program (FT, ST, PIT)	Tissue Sampling (Yes/No)	Organization or entity providing data
		Start	Finish	Start	Finish		Latitude		Longitude				Females Exact Count	Clutches Exact Count	Number of Nests			
Lo								°		°		Choose an item.				Choose an item.	Choose an item.	
								°		°		Choose an item.				Choose an item.	Choose an item.	
								°		°		Choose an item.				Choose an item.	Choose an item.	
Lk								°		°		Choose an item.				Choose an item.	Choose an item.	
								°		°		Choose an item.				Choose an item.	Choose an item.	
Dc	Zeelandia	Mar	Jul	Mar	Jul	Daily	17.508	°	-62.981	°	1.4	yes			5	FT & PIT	No	STENAPA
Ei	Klein Bonaire	April	Jan	April	Nov	3 times per week	10.552	°	18.381	°	2	Yes			54	None	Yes	STCB*
	Zeelandia	Jul	Dec	Jul	Dec	Daily	17.508	°	-62.981	°	1.4	Yes			9	FT	No	STENAPA
Cm	Playa Chikitu	June	Nov	June	Nov	3 times per week	16.814	°	20.919	°		Yes			34	None	Yes	STCB*
	Zeelandia	Jun	Dec	June	Dec	Daily	17.508	°	-	°	1.4	yes			26	FT	No	STENAP

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									62.981									A
								°		°		Choose an item.				Choose an item.	Choose an item.	
Cc	Klein Bonaire	May	Oct.	April	Nov	3 times per week	10.552	°	18.381	°	2K	yes			23	none	yes	STCB

*) Skin samples were collected of hatchlings for genetic analysis

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Table 3: Important foraging sites for sea turtle conservation

a. *This table is intended to contain information for foraging sites being studied for each species. For marine habitats that have multiple species present, enter the specific site under the heading for the priority species at that site.*
b. *Name and geographic location: Provide the name of the site and geographic location in decimal degrees in Lat/Long (one reference point).*
c. *Area: Indicate the size of the study site (en Kilometers^2).*
d. *Declared protection area: Indicate if the area is declared as some type of protected area.*
e. *Life stage: Indicate the life stage or stages found in the study area (juvenile, subadult or adult).*
f. *Information from tagging program: Indicate if there have been any tagging activities at the in-water site by using the letters of the type of tagging being done: flipper tagging (FT), passive integrated transponder (PIT) tagging, and satellite telemetry (ST) programs. If possible, on a separate sheet, or as attached reference provide greater detail about the type of tagging efforts conducted. Also provide satellite telemetry maps or flipper tag recovery information if available.*
g. *Tissue sampling: Indicate if there has been tissue sampling conducted at this site. This includes skin, blood, and other body tissues. On a separate sheet, or as attached references describe these tissue sampling programs in greater detail. For example, were samples collected for genetic, contaminant, and/or stable isotope studies?*
h. *Indicate the organization or entity providing the data.*
i. *When adding new rows, please copy and paste the drop down menus when applicable.*

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Species	Name of the Study Site	Geographic Location (Lat/Long) in Decimal Degrees Latitude		Longitude		Area (Km^2)	Declared Protection Area (Yes/No)	Life Stages (Juvenile, Sub-adult, Adult)	Tagging Program (FT, ST, PIT)	Tissue Sampling (Yes/No)	Organization or entity providing data
			°		°		Choose an item.	Choose an item.	Choose an item.	Choose an item.	
Lo			°		°		Choose an item.	Choose an item.	Choose an item.	Choose an item.	
			°		°		Choose an item.	Choose an item.	Choose an item.	Choose an item.	
Lk			°		°		Choose an item.	Choose an item.	Choose an item.	Choose an item.	
			°		°		Choose an item.	Choose an item.	Choose an item.	Choose an item.	
Dc			°		°		Choose an item.	Choose an item.	Choose an item.	Choose an item.	
	Bonaire National Marine Park	13.449	°	28.005	°	27	Yes	All of above	All of above	Yes	STCB*
Ei	Statia Nationaal Marine Park	17.481	°	-62.995	°	27.5	Yes	Sub-adult & adult	None	No	STENAPA
	Bonaire National Marine Park	13.449	°	28.005	°	27	Yes	All of above	All of above	Yes	STCB*
Cm	Statia Nationaal Marine Park	17.481	°	-62.995	°	27.5	Yes	Sub-adult & adult	None	No	STENAPA
	Bonaire National Marine Park	13.449	°	28.005	°	27	yes	Sub-adult & adult	All of above	yes	STCB*
Cc			°	-	°		Choose an item.	Choose an item.	Choose an item.	Choose an item.	

*) Skin samples were collected of juveniles and sub-adults for genetic analysis

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Attached to this report

ANNEX 1: Sea Turtle Conservation Bonaire (STCB), research and monitoring report 2014

ANNEX 2: St. Eustatius National Parks Foundation (Stenapa) Sea Turtle Conservation Program Annual Report 2014

Research and Monitoring of Bonaire's Sea Turtles: 2014 Technical Report

Report prepared by
Seth Stapleton Ph.D, Mabel Nava MSc., Sue Willis Ph.D, & Bruce Brabec

To learn more, please contact:
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PO Box 492 • Kralendijk, Bonaire • Dutch Caribbean

STCB is a proud member of
WIDECAST
Wider Caribbean Sea Turtle Conservation Network

Executive Summary

Sea Turtle Conservation Bonaire (STCB) was initiated in the early 1990s to protect the island's marine turtle populations. Our current research and monitoring efforts, which were standardized more than a decade ago, include monitoring nesting beaches around Bonaire, conducting intensive in-water netting and snorkel surveys (capture-mark-recapture), and tracking post-breeding migration using satellite telemetry. These techniques provide us with a better understanding of Bonaire sea turtles' breeding success, abundance, health, growth rates, migratory paths and distant feeding grounds, residency duration, habitat quality, and threats.

During the 2014 season, we recorded 63 nests at our index beach on Klein Bonaire. Total hawksbill (45) and loggerhead (18) nests documented there were similar to numbers observed during recent years. Across Bonaire and Klein Bonaire, we observed three species crawling 260 times, including 83 confirmed or suspected nests. Only two green turtle nests were recorded in northeastern Bonaire, whereas hawksbills and loggerheads exclusively nested on Klein Bonaire and the beaches of southern Bonaire. Total nesting activities peaked during June through August, with nesting extending through December.

We documented a much higher number of false crawls (unsuccessful nesting attempts) for both hawksbills and loggerheads in 2014 than in 2013. This phenomenon may result from a small number of individuals which were inefficient nesters (i.e., false crawled multiple times before successfully laying a nest), disturbance to turtles during nesting, and / or indicate deterioration in the quality of particular nesting sites, perhaps due to factors such as removal of vegetation. Estimates of clutch size and hatch success suggest that nearly 8,700 turtles hatched on the beaches of Bonaire and Klein Bonaire during 2014, including some 6,300 hawksbills, 2,200 loggerheads and 160 green turtles.

During in-water snorkel surveys, we observed and captured green turtles and hawksbills in all regions sampled, including Klein Bonaire, along the west coast of Bonaire, and near the reef bordering Lac. Netting in Lac and Lagoen resulted in a record number of captures during 2014, primarily green turtles. The aggregation of green turtles near Lac remains much larger than sites along the west coast, and greens captured there were bigger than conspecifics elsewhere, perhaps a result of the composition and high densities of sea grasses in Lac. Analysis of the 2013 and 2014 capture data from Lac indicates that netting during the second week of a two-week session is less efficient at capturing turtles. These results suggest that conducting netting sessions during non-consecutive weeks may be a more effective sampling strategy.

We received reports from the WIDECAST Marine Turtle Tagging Centre of 5 green turtles caught in nets by Nicaraguan fishers in the sea turtle harvest during the past 18 months. These recoveries provide invaluable information about international movements and migratory behaviors. The prevalence of fibropapillomatosis (FP) among green turtles captured in and near Lac again increased in 2014, as roughly one-third of all captures were observed with external tumors. However, we recaptured two green turtles that were previously treated to eliminate the fibropapilloma tumors. In both cases, the results were positive, perhaps suggesting that removing tumors via surgery or ligation can improve the health of individual turtles and reduce the incidence of FP in Lac.

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Background

Twenty-three years ago, STCB began monitoring the status of and threats to Bonaire's sea turtles, using the resulting knowledge to protect them. Comprehensive local laws, as well as international treaties, now protect sea turtles, their nests, and eggs from harvest and harassment. The community and tourism industry generally understand the importance of sea turtles to a healthy ecosystem and their value to an economy centered on dive tourism. And it is a rare resident or guest who is not captivated by encounters with these beautiful and endangered species.

Today, the conservation landscape has changed. The most serious challenges facing Bonaire's sea turtles are not direct threats like poaching or lack of support for sea turtle protection. The main threats now are indirect, related to a rapidly increasing human population and the development that goes along with it. These indirect threats to sea turtles are also the major threats to Bonaire's rich ecosystems, biodiversity, and our own quality of life.

In this landscape, we no longer look at sea turtle conservation as something apart from society. To ensure a secure future for Bonaire's sea turtles, we must address the issues that threaten sea turtles, biodiversity and social well-being, because they are inter-related. Sea turtles can thrive only when their ecosystems are healthy and the human community thrives.

Conservation and applied research remain the core work of STCB, as is clear from our mission. Our work spans education and outreach, policy, and research and conservation. This technical report summarizes STCB's scientific findings from the 2014 season. STCB's research program is designed to better understand Bonaire's nesting population and foraging aggregations, to contribute to the body of scientific knowledge in the greater Caribbean region, and to inform sound management policies on national and regional scales. Our work includes regular foot patrols of nesting beaches to assess the volume of nesting activities, post-hatch nest excavations to estimate how many hatchlings are released from Bonaire's beaches each year, and extensive snorkel and netting surveys of key sea turtle foraging grounds.

Nesting Beach Surveys

Monitoring Bonaire's nesting beaches remains a fundamental component of our research program. No Name Beach on Klein Bonaire continues to serve as our index beach for assessing abundance and species composition. We patrolled this beach three mornings per week, beginning in early May and continuing through December. We documented all crawls, identified species, and recorded the outcome as a false crawl (unsuccessful nesting attempt; no eggs were laid), confirmed nest (eggs were sighted), or suspected nest (eggs were not observed, but site disturbance suggested that a nest was laid). We recorded 45 total (i.e., confirmed and suspected) hawksbill nests and 18 total loggerhead nests on No Name Beach. Although hawksbill numbers have modestly declined since 2012 (Figure 1), Bonaire's nesting populations are relatively small, and fluctuations in nesting numbers are not unexpected. The long-term trends in nesting for both hawksbills and loggerheads suggest relative stability (Figure 1).

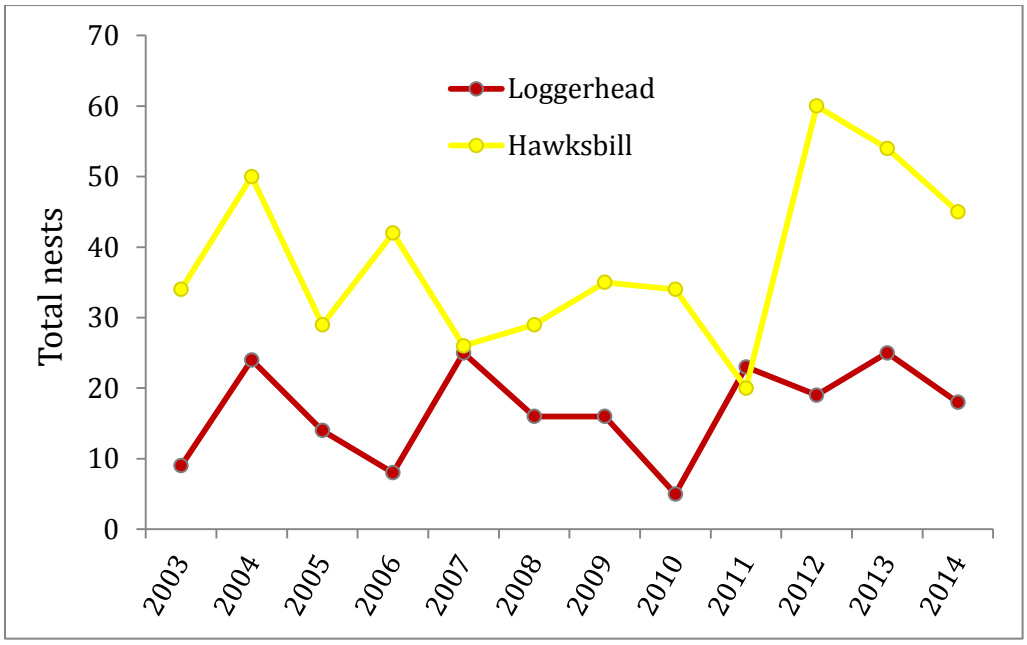

Figure 1. Historical nesting trends of loggerheads and hawksbills at No Name Beach on Klein Bonaire, which serves as the index site for nesting activities. Number of nests includes confirmed and suspected nests.

Sea turtles are late maturing and likely do not reproduce until at least 15 – 20 years of age. As such, hatchlings that crawled from Bonaire's beaches when monitoring began in 2003 and 2004 will only return to nest here in the next several years. Thus, although 2014 marked STCB's 12th year of standardized monitoring on Klein Bonaire, this is a relatively short time period from which to assess trends in our nesting populations. For example, colleagues studying a large hawksbill rookery at Jumby Bay in Antigua documented 15

years of stability in the nesting population before recording significant increases in numbers. Continued monitoring will provide a better understanding of long-term trends and allow us to realize the impacts of conservation efforts.

On Bonaire, we recorded 13 hawksbill nests, 5 loggerhead nests, and 2 green turtle nests. Species composition was consistent between Klein Bonaire (KB) and the beaches of southern Bonaire: hawksbills were the predominant species recorded, and loggerhead nesting was less common (Figures 2 and 3). Conversely, green turtles nested exclusively on Playa Chikitu in northeastern Bonaire. Green turtle nesting was markedly lower in 2014 than 2013, but such inter-annual fluctuations are common for greens in the Caribbean region.

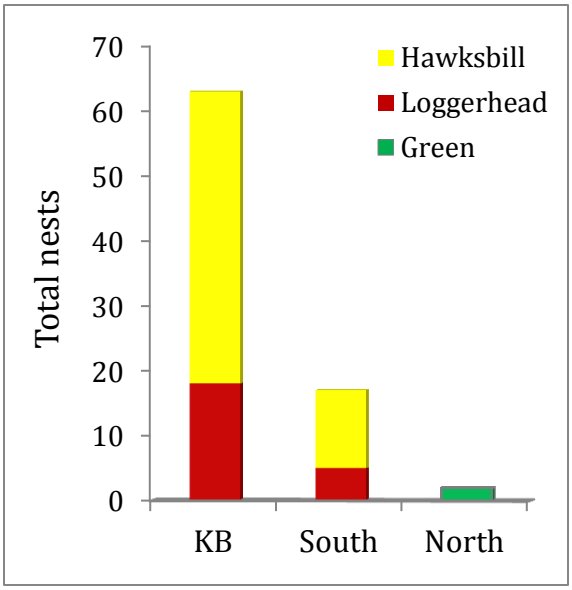

Figure 2. Total nests, categorized by geographic region, recorded during the 2014 research season. "North" and "South" denote general regions of mainland Bonaire.

Figure 3. Distribution of nests laid by green turtles (green), loggerheads (red), and hawksbills (yellow) on Bonaire and Klein Bonaire during the 2014 monitoring season.

On Klein Bonaire, loggerhead nesting was highly concentrated in the central portion of No Name Beach, whereas hawksbills nested across most of the beach (Figure 4). Nesting attempts on the western reaches (i.e., low beach marker numbers) were often unsuccessful and resulted in false crawls. The far eastern end of the site also appeared to provide less suitable nesting habitat; we infrequently observed crawls there and recorded only a single loggerhead nest.

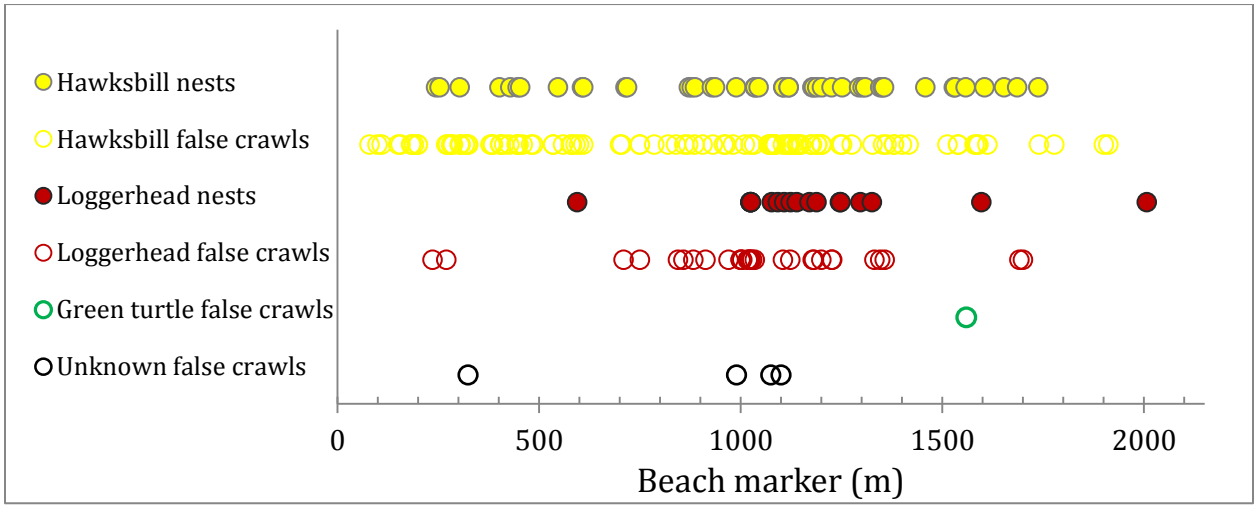

Figure 4. Distribution of nesting activities, including successful nests and false crawls, at No Name Beach on Klein Bonaire during the 2014 season.

Because Klein Bonaire is systemically monitored, these data provide the most reliable indicators of seasonality. We first observed nesting on Klein Bonaire in early May, and we documented hawksbill nests through December (Figure 5). Consistent with previous years, the loggerhead nesting season spanned May – September, whereas hawksbill nesting remained relatively stable from June – October and continued at lower levels through December.

Sea turtles may false crawl several times before laying a nest and individuals vary with respect to nesting efficiency. Hence, confirmed and suspected nests provide a more accurate picture of seasonal trends. False crawls can be informative, however. We recorded a much higher number of false crawls during 2014 than in 2013 for both loggerheads and hawksbills. The observed false crawl : nest ratio for loggerheads in southern Bonaire and Klein Bonaire was 2.1 false crawls / nest in 2014 versus 0.7 / nest in 2013; for hawksbills, ratios increased from 0.9 false crawls / nest to 2.1 false crawls / nest.

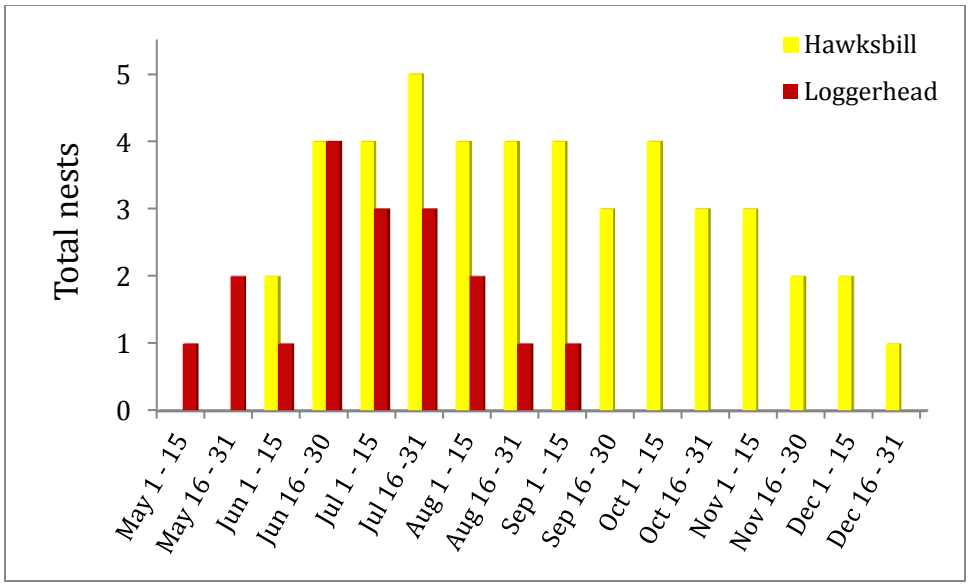

Figure 5. Seasonality of total nests (confirmed and suspected) recorded on Klein Bonaire during the 2014 research season.

Because Bonaire's nesting populations are small, we speculate that a few individuals who are inefficient nesters – in other words, turtles that false crawled several times before successfully nesting – may have contributed to this discrepancy. However, such a high volume of false crawls also may result from changes to nesting habitat and other challenges with beach management. During 2014, vegetation protecting the landward side of Te Amo Beach was removed. This landscape modification may have allowed the strong lighting in the area to reach the beach, thereby disorienting turtles, inhibiting successful nesting, and influencing the high false crawl to nest ratio.

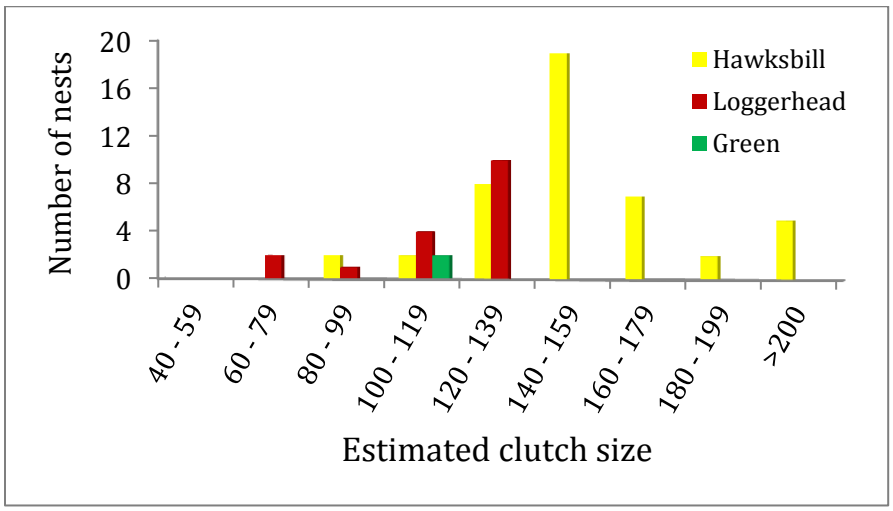

Figure 6. Clutch sizes of loggerhead, hawksbill, and green nests recorded on Bonaire and Klein Bonaire during the 2014 research season.

Evaluating reproductive success is another core component of our research program. Estimated clutch sizes (number of eggs / nest) varied by species [loggerhead (mean: 118; Standard Deviation: 21); hawksbill (mean: 154; SD: 29); green (mean: 115; SD: 35); Figure 6]. Hatch success, defined as the percentage of eggs per clutch that successfully hatch, was slightly less for hawksbill nests remaining in situ (mean: 73%; SD: 28%) than loggerheads (mean: 80%; SD: 19%; Figure 7). Loggerhead nests that were relocated due to proximity to the high water mark (i.e., potentially lost due to flooding) or other threats (n=2) had similar hatch success (mean: 84%), but hatch success of relocated hawksbill nests (n=6) was considerably lower (59%). Based on the clutch size and hatch success data, we estimate that a total of ~8,700 turtles hatched on Klein Bonaire and Bonaire in 2014, including about 6,300 hawksbills, 2,200 loggerheads, and 160 green turtles.

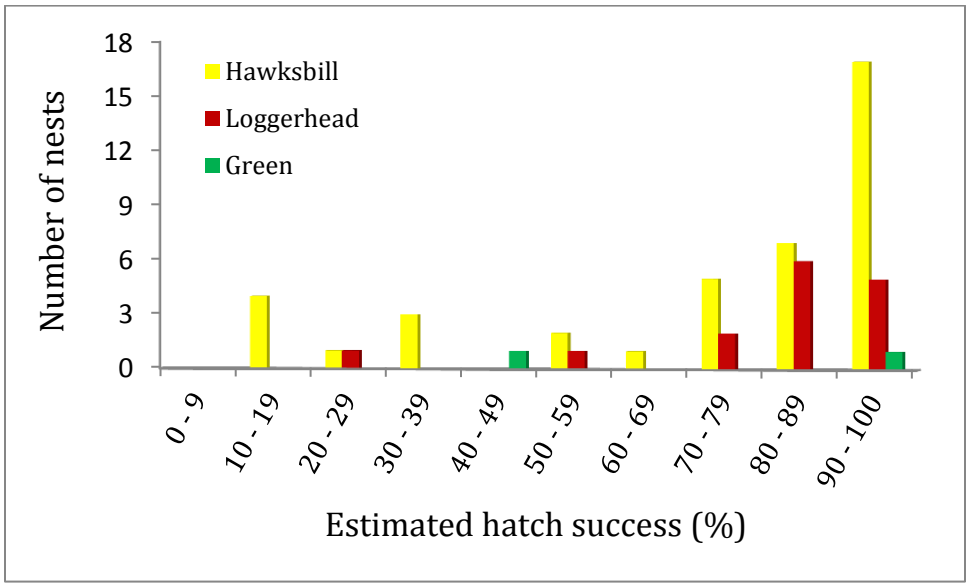

Figure 7. Estimated hatch success of loggerhead, hawksbill and green nests recorded on Bonaire and Klein Bonaire during the 2014 monitoring season. Nests that were relocated due to proximity to the high-water mark or other threats are excluded.

On Klein Bonaire, we observed spatial differences in hatch success for hawksbills: nests laid in the central portion of the beach had higher hatch success than nests at the ends of the beach [Central (nests remaining in situ between stakes 500 – 1500) mean: 80%; Ends: (nests remaining in situ beyond stakes 500 and 1500) mean: 38%; Figure 8). This finding does not necessarily indicate lower quality sites for incubation at the ends of the beach and simply may be an artefact of relatively small sample sizes. Alternatively, a few individuals who produce nests with lower hatch success due to some non-environmental reason (e.g., reduced fertility) may exhibit tendencies to nest at the ends of the beach. We note, however, that despite very small sample sizes, hatch success of loggerhead nests suggests similar spatial variability in hatch success (Figure 8).

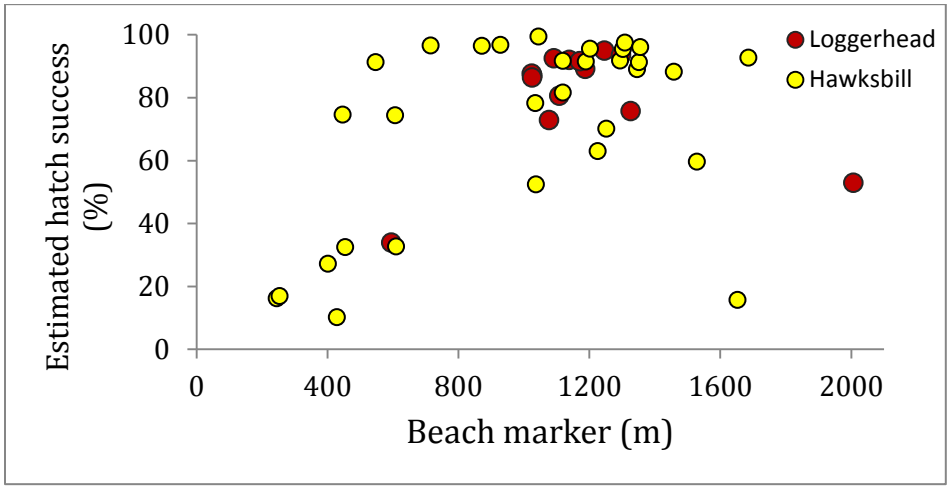

Figure 8. Estimated hatch success of hawksbill and loggerhead nests recorded on Klein Bonaire during the 2014 monitoring season. Nests that were relocated due to proximity to the high-water mark or other threats are excluded.

Foraging Ground Surveys

A rigorous in-water research program constitutes the other primary element of our work. This program, which seeks to better understand the sea turtle aggregations foraging in Bonaire's waters, collects both capture and observational data and is implemented with two techniques. First, we conduct snorkel surveys along the entire west coast, around Klein Bonaire, and on the reef outside Lac (Figure 9). During these surveys, turtle sightings are recorded and, when possible, turtles are captured for measuring and tagging by the research team. In 2014, sampling around Klein Bonaire and along the west coast was completed during February – March. The lone transect along the reef adjacent to Lac was sampled in December. Although we observed hawksbills and green turtles island-wide (Figure 9), densities of greens were much higher than hawksbills at all sites (Figure 10). Similar to previous years, we recorded the highest concentrations of green turtles outside Lac: an estimated 250 individuals were observed during sampling there.

Figure 9. Snorkel surveys (red lines) completed around Bonaire during 2014. Green turtles and hawksbills tagged during snorkel surveys are denoted in green and yellow, respectively.

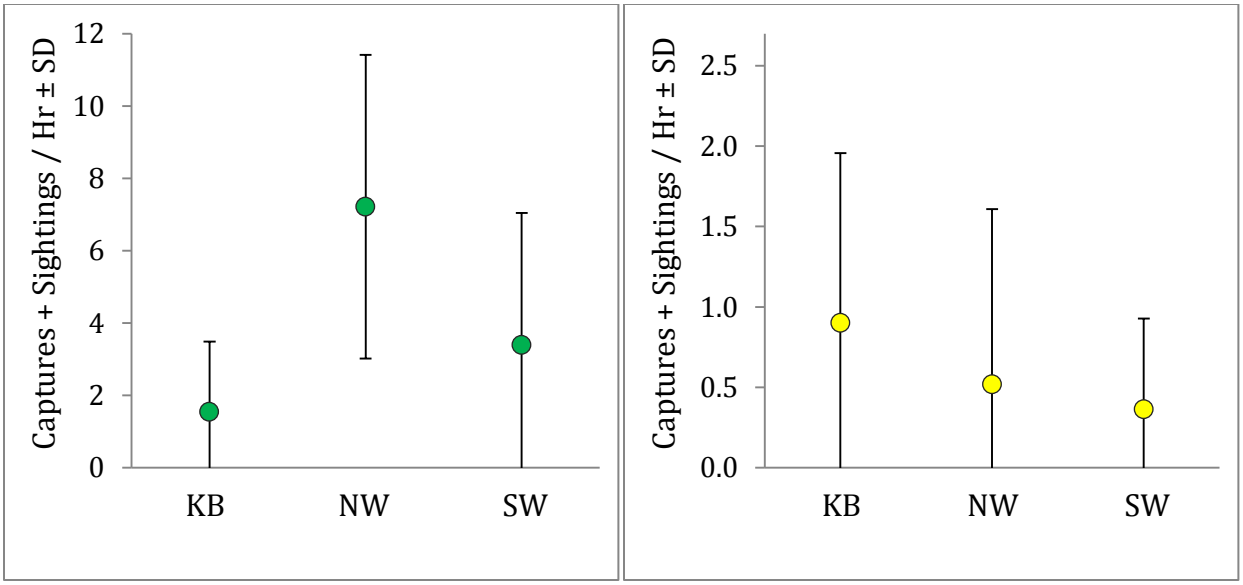

Figure 10. Captures per unit effort (total sightings and captures ± standard deviation) recorded during snorkel surveys for green turtles (green) and hawksbill turtles (yellow) in 2014, categorized by geographic region. KB: Klein Bonaire; NW: Northwestern Bonaire; SW: Southwestern Bonaire.

We conducted netting, the second in-water method used to gather information about Bonaire's sea turtle aggregations, in Lac (Figure 11) and, to a lesser extent, in Lagoen to the north. During 2014, we more widely distributed net sets across the north-central portion of Lac to ensure that our sampling reflected the entire region. Sampling near Sorobon (to the south) also allowed us to increase captures of hawksbills. Total captures during 2014 were the highest on record. However, capture rates for both species were consistent with 2013 levels, and we continued to document much higher capture rates for green turtles than hawksbills (Figure 12).

We suspected that the timing of our netting sessions might impact capture efficiency. Specifically, we hypothesized that capture rates during the second week of multi-week netting sessions were lower due to 'trap shyness' (i.e., turtles becoming accustomed to and avoiding nets). To evaluate this hypothesis, we examined netting data during 2013 and 2014. We calculated captures per hour for individual netting sessions in Lac and

Figure 11. Locations of net sets (black lines) at Lac in southeastern Bonaire to capture juvenile green and hawksbill turtles during the 2014 research season. The single snorkel survey transect completed in 2014 is denoted with a red line.

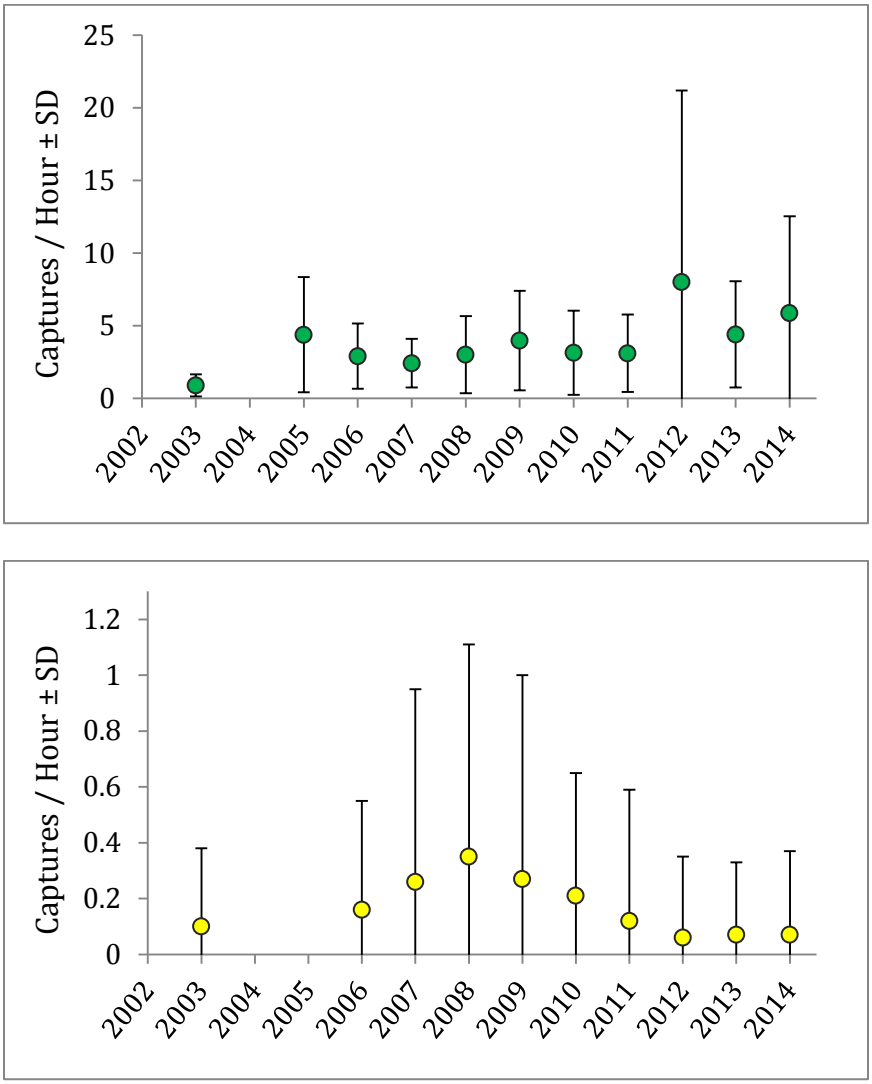

Figure 12. Captures per unit effort (total captures per hour ± standard deviation) recorded during net surveys for green turtles (green) and hawksbills (yellow) conducted at Lac in southeastern Bonaire, 2003 – 2014.

divided data into Week 1 and 2 categories. As hypothesized, capture rates were significantly lower for Week 2 sessions than Week 1 (Week 1 mean: 6.9 captures / hr; Week 2 mean: 3.3 captures / hr; non-parametric Mann-Whitney *U*-test: *U*-value = 335, z-score = 2.5, 1-tailed test, $P<0.01$). To improve netting efficiency, we will attempt to space our sessions such that sampling is not conducted in consecutive weeks. These results also suggest that assessing long-term trends in captures per unit effort requires using only data gathered in the initial week of sampling. During 2012, for example, sampling was not conducted in multi-week sessions; comparing data collected during the first week of netting will ensure that results are comparable across years.

Green turtles captured in and near Lac were significantly larger than those captured elsewhere during 2014 (Figure 13; Lac straight-line carapace length mean: 49.3, SD: 9.8; Other locations SCL mean: 34.3, SD: 6.0; *t*-test: t-value: 13.9, $P<0.0001$). We suspect that foraging conditions in Lac provide an environment that better promotes rapid growth. Consistent with this hypothesis, capture data indicate that green turtles travel to Lac from elsewhere around Bonaire, but generally do not emigrate from Lac to other sites in Bonaire. Captures in 2014 suggest that hawksbills observed in and near Lac may have been larger than those captured elsewhere, but small samples preclude reliable statistical inference.

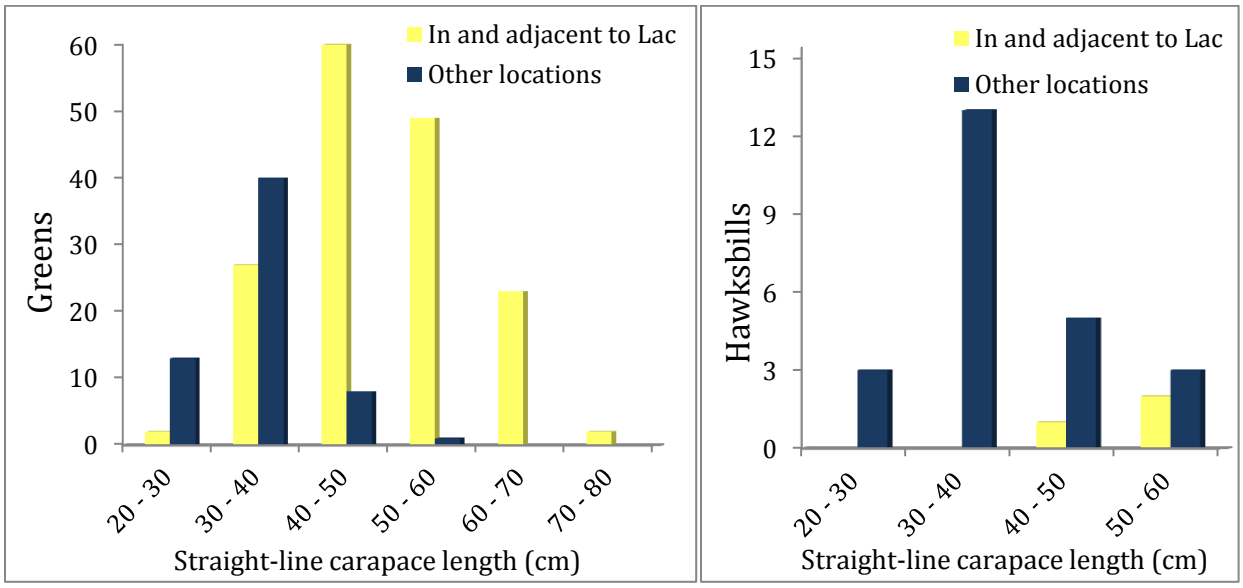

Figure 13. Size classes of green and hawksbill turtles captured in and around Lac in comparison to other locations around Bonaire and Klein Bonaire during the 2014 research season.

Prevalence of Disease

Fibropapillomatosis (FP) is a disease characterized by tumors concentrated around soft skin tissues, the eyes, and the base of flippers. FP tumors, which primarily afflict green turtles, interfere with daily functions and ultimately may result in death. Causes of the disease are not fully understood, but factors such as environmental pollutants and urbanization may be associated with FP's occurrence (e.g., Aguirre and Lutz 2004: EcoHealth 1:275-285). Unfortunately, the proportion of green turtles captured in and adjacent to Lac that were infected with FP tumors exceeded 33% in 2014 (Figure 14). This continues a 4-year trend of increasing prevalence of the disease.

In an effort to curb the spread of FP and improve the health of individual turtles afflicted with the disease, STCB has been collaborating with a local veterinarian to remove tumors through surgery or ligation (i.e., tying off). Thus far, the results are encouraging. During 2014, we recaptured two previously treated green turtles. The treatments proved effective in both cases, perhaps suggesting that removal of tumors can provide an effective means to counteract FP at the individual and population-levels.

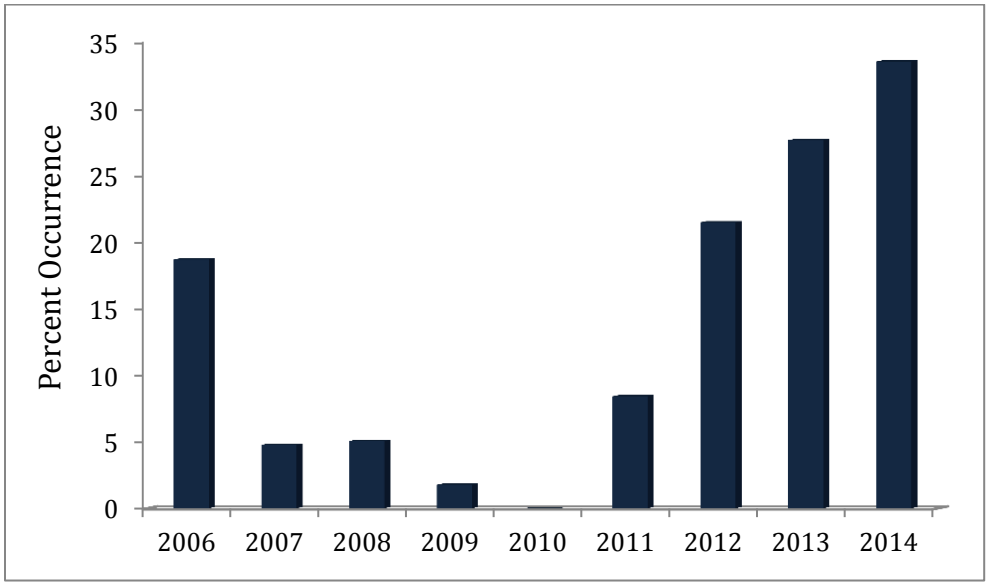

Figure 14. Occurrence of visible fibropapilloma tumors on green turtles captured in and near Lac, Bonaire during 2006 – 2014.

International Tag Returns

Tagging turtles allows us to track individuals over time, yielding valuable information about growth, foraging aggregation and population size, migratory behaviors and residency in specific regions. Tagging also provides a means for researchers and fishermen elsewhere in the Caribbean to identify turtles when they are captured or observed. Sharing these data helps us to better understand where our foraging and nesting populations travel after leaving Bonaire.

Between July, 2013 and April, 2014, we received reports from the WIDECAST Marine Turtle Tagging Centre of five green turtles initially tagged in Bonaire that were subsequently harvested in Nicaragua. Two of these individuals were first tagged during 2005, one was initially tagged during 2006, and one each during 2007 and 2009. Carapace lengths at initial capture varied from ~43 cm to ~58 cm. Tag returns help to improve our understanding of the regional movements of sea turtles and underscore the importance of

continued international collaboration to ensure wise and sustainable management policies and conservation practices.

Turtle Strandings

Stranded turtles are animals found dead, injured, or sick, or sometimes apparently healthy but in an unsuitable circumstance, such as entangled in debris along the shoreline. Strandings are reported to STCB directly via the Sea Turtle Hotline (599-780-0433).

In 2014, there were a total of 16 stranding incidents reported. Four of these 16 turtles were found dead (all green turtles), and one other green turtle that was stranded with severe fibropapillomatosis died in surgery during treatment by the veterinarian. Necropsy was carried out on all the dead turtles, unless decomposition was too severe. Trauma was established as the cause of death in one green turtle found in Lac Bay in May 2014, likely caused by a strike by a boat or windsurf board. One green turtle was also found to have died due to entrapment in fishing lines. The green turtle with fibropapillomatosis was found to have severe internal tumors. The other two greens died of unknown causes.

One of the biggest threats Caribbean-wide to sea turtles continues to be the fishing industry and associated by-catch. In 2014, of the 16 incidents, five (31%) were related to fisheries, including three turtles with fishing hooks in their mouths, one hawksbill that was caught and untangled from fishing lines that were wrapped around its flippers, and the dead green turtle that was snared by fishing lines already mentioned above.

One particularly noteworthy stranding event occurred on 22nd September, 2014. The regular STCB nest monitoring patrol arrived on Klein Bonaire around 7am and saw a nesting crawl going towards a nest, but no return track could be seen. The turtle's tracks were followed into the bushes on Klein Bonaire and, after searching for an hour, STCB staff and volunteers located a tagged, adult female hawksbill ("Piffie" – ID 10-176) stranded and motionless in the full sun. With help from volunteers, she was carried back to the shore and released, undoubtedly saving her life.

Three of the "stranding" incidents involved hatchlings found in unsuitable situations, generally in the mangroves on the East Coast of Bonaire. STCB has a strict protocol for these incidents which was followed in each of these cases.

In five cases in 2014, it was not possible to locate the turtle that was reported as being in trouble, often despite extensive searching.

Once again STCB is very grateful to volunteer Sjoukje Hiemstra for her help in conducting necropsies and with the data management of turtle strandings. Thanks also go to Craig

Dewey and Kathy Pound for housing the STCB rehabilitation pool and to volunteers Hans & Jannie Koning who act as STCB "First Responders" to assist STCB staff.

Figure 15. "Piffie" (turtle ID 10-176) being returned to the sea after her disorientation and stranding incident.

Appendix I. 2014 Funders and Donors

STCB is a non-profit, non-governmental organization. We raise funds through conservation and research grants and contracts, merchandise sales and from individual and business donors.

Flagship Funder 2008 – 2016

Since 2008, WWF - Netherlands has been the flagship funder for STCB's sea turtle conservation work on Bonaire. The WWF-NL grant is administered through STINAPA Bonaire.

Major Funder
Dutch Ministry of Economic Affairs, Agriculture and Innovation (EZ)

Platinum Funders/Donors
Dutch Caribbean Nature Alliance (DCNA)
STINAPA Bonaire
Foundation to Preserve Klein Bonaire
Pieter de Joode Stichting
Botman family
Rob Hulsbergen
The Institute for Marine Resources and Ecosystem Studies in the Netherlands (IMARES)
Serena Black
Menta Capital B.V. (Botman)
Marlene Robinson / Bruce Brabec
Barbara Chu

Gold Funders/Donors
Dr Robert Andrew Rutherford Trust
Broadreach Global Summer Education Adventures
Eva Tijsma and Arjen Kramer
Dive Friends Bonaire
East Coast Diving Bonaire
Maduro & Curiel's Bank (Bonaire)
Kevin and Sharon Pursley
Alan and Jane Gross

Letitia Dace
Hans Bongers (in memory of)
Charities Aid Foundation
Road Less Travelled

Silver Donors
In memory of Serena Black
Raymond Lefort
Rick and Lila Nicholson
Emily O'Brien
Bruce Zavon
Marleen Schouten and Ewald Gartner
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Jongenelis Jacobus
In memory of Adrie Hulsbergen
Hans and Jannie Koning
Notaris Nijland
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Carli van Mil
William Holman
Valentina Brenzini
Francis Tjaarda
Pam and Val Bezic

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Thomas, Anika, Daniel, Pauline van der Byll
James Nuckolls
Tom and Gigi Quinby
Sand Dollar Condo Association
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Iris
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Aja and Natasha Radl
Joep and Gidion Abaum
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Fred, Carmen, Jap and Hincka
Frans de Jong
Gutlieb Arno
Cynthia Dassan
Mabel Nava
Richard and Sue Willis
Dymphie Bux

Anonymous donors

Appendix II. 2014 Staff, Interns and Board(s) of Directors

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Dr Sue Willis, Project Coordinator
Gielmon Egbreghts, Contractor Field Technician

Scientific Advisor
Dr Seth Stapleton

Interns
Carli van Mil
Irene van der Sluis
Valentina Brenzini

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Albert de Soet, *Advisor and STCB Founder*
Guido Wiersma
Tom van Eijck, *Advisor, first field project coordinator (1993)*

Appendix III. 2014 STCB Partners, Supporters and Volunteers

International Partners
Wider Caribbean Sea Turtle Conservation Network (WIDECAST)
World Wildlife Fund Netherlands (WWF-NL)

Regional Partners
Dutch Caribbean Nature Alliance (DCNA)
Nature Foundation St. Maarten
Parke Nacional Arikok (Aruba)
Saba Conservation Foundation
St. Eustatius National Parks Foundation
Turtugaruba
Sea Turtle Conservation Curacao (Carmabi)
Environmental Protection in the Caribbean (EPIC)
Barbados Sea Turtle Project

Local Partners
Bonaire Department of Environment and Natural Resources (DROB)
CIEE Research Station Bonaire
Echo Bonaire
Jong Bonaire
EZ Ministry of Economic Affairs
NGO Platform
STINAPA Bonaire
- Bonaire National Marine Park
- Washington-Slagbaai National Park
- STINAPA Junior Rangers

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These businesses provide ongoing support to STCB programs and activities through the donation of in-kind materials and/or services:

Administratiekantoor Brandaris
Addo's Bookstore
Antillean Wine Company/Le Garage
At Sea Restaurant
Beauty Inside Out
Bonaire Affair
Bistro di Paris
Buddy Dive Resort

Bonaire Marine Center BV
Bonaire Rent a Car
Bonaire East Coast Diving
BonPhoto & FLOW
Buddy Dive Resort
Bonaire Clock Design (BCD)
Cactus Blue on the Beach
Captain Don's Habitat
Carib Inn (Bruce Bowker)
Caribe Car Rental
CARGILL Salt Bonaire
Compass
Dive Friends Bonaire
Div'Ocean
Elements
Elle Lui Hairdresser
Firgos Bonaire
FIT Sound Rental
Flamingo Communications
Harbour Village Beach Resort
FIT Sound Rental
Harbour Village Marina
Hotel Roomer
Kantika di Amor
JanArt Gallery
Krioyo Paint
KPMG
Littman's Jewelers
Mangrove Kayak Center
Nancy Reuten Photography
NetTech
Nos Consuelo
Seacow
SELIBON
Tony Merchanie
Tung Fong Store
VanEpKunneman Van Doorne
VIP Diving
Wannadive Bonaire
Wil's Tropical Grill

Woodwind Snorkel Sail

2014 Volunteers

Adi Figaroa
Annemarie Rozendal
Arjen Kramer & Eva Tijsma
Art auction fundraiser volunteers & artists
BEACHKEEPER PROGRAM VOLUNTEERS
Carla Hay
Casper Douma
Catrien van Manen
Craig Dewey & Kathy Pound
Dion
Erwin Plessers & Marijke Polspoel
Eddy Thielman
Ewald Freij
FISHING LINE PROJECT VOLUNTEERS
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Fulco de Vries
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Junior Rangers
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Linda Maas
Liseo Boneiru students
Louise Holder
Mamita Fox
Marianne Jacobs
Nat Miller
Nicole, Martin & Noa Roomer
Papa Cornes students
Patrick Holian
Patti Dougherty
Paul Westerbeek
Ralph 'Moogie' Stewart
Richard Willis
Rick & Lila Nicholson
Rob & Adrie Hulsbergen
Sjoukje Heimstra
SGB students

Appendix IV. Ways to donate

You can help protect Bonaire's sea turtle populations by donating to STCB. We welcome – and depend on – the financial support of people like you. Whether it's $10, $100, or $10,000, whatever you give makes an important difference.

Online

Go to our website at www.bonaireturtles.org

Donate by mail

Make check payable to: Sea Turtle Conservation Bonaire
Then mail to:

STCB
PO Box 492
Kralendijk, Bonaire
Dutch Caribbean (Netherlands Antilles)

Donate by bank transfer

To make a donation locally on Bonaire:

Maduro&Curiel's Bank (Bonaire) N.V.
Account name: Sea Turtle Conservation Bonaire
Account number: 101.169.209

To make a donation from the USA:

Beneficiary: Sea Turtle Conservation Bonaire
Account number: 101.169.209
Beneficiary Bank: Maduro&Curiel's Bank (Bonaire) N.V.
Swift code: MCBKBQBN
Correspondent Bank: Standard Chartered Bank
ABA # 026002561
Swift Code: SCBLUS33

To make a donation from Europe:

Beneficiary: Sea Turtle Conservation Bonaire
Account number: 101.169.209
Beneficiary Bank: Maduro&Curiel's Bank (Bonaire) N.V.
Swift code: MCBKBQBN
Correspondent Bank for Euro: Rabo Bank Nederland
Swift Code: BBRUBEBB

To discuss other ideas for giving, please call STCB Manager, Mabel Nava, on +599-717-2225, or email us at stcb@bonaireturtles.org

St. Eustatius National Parks Foundation
Sea Turtle Conservation Program
Annual Report 2014

Jessica Berkel
Sea Turtle Conservation Program Coordinator
St. Eustatius National Parks Foundation
Gallows Bay, St. Eustatius
Dutch Caribbean
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FOREWORD

The 2014 Sea Turtle nesting season continued in the up and down trend of busy and slow years. It was a year with less than 50 activities per species. With 8 recorded leatherback activities it was a small improvement as the past years have seen only 1 or no nesting activity by that species.
A greater effort was made to perform excavations as soon as possible and this year every confirmed nest was excavated and checked for outcome. One nest was lost to Tropical Storm Gonzalo and 1 nest was destroyed by a cliff fall.

Hoping to have submitted a complete report,

Respectfully yours,

Jessica Berkel
Sea Turtle Conservation Program Coordinator

On the cover: View of Zeelandia Beach looking north from Stake #54

Introduction

The St Eustatius National Parks Foundation (STENAPA) established the Sea Turtle Conservation Program following concerns that the island's sea turtle populations were being threatened by anthropogenic disturbance and destruction of nesting beach habitats through sand mining, joy riding and pollution.

A community outreach campaign was organized in 2001 to begin raising public awareness about sea turtle conservation issues. Subsequent to this initiative, a beach monitoring program was started in 2002 in affiliation with the Wider Caribbean Sea Turtle Conservation Network (WIDECAST). The first two years of the program saw very sporadic monitoring of the index beach due to a lack of personnel. In 2003 however, regular night patrols were conducted following the introduction of the Working Abroad Program, which brings groups of international volunteers to assist with projects in the National and Marine Parks. By 2004 the program had expanded to include morning track surveys on several of the island's nesting beaches, with a dedicated vehicle and a full-time project coordinator during the nesting season.

Data from the Sea Turtle Conservation Program have shown that three species of sea turtle regularly nest on St Eustatius; the leatherback (*Dermochelys coriacea*), the green (*Chelonia mydas*) and the hawksbill (*Eretmochelys imbricata*), all of which are classified as either endangered or critically endangered by the IUCN. There was also an unconfirmed 2004 report of nesting by a fourth species, the loggerhead (*Caretta caretta*), which IUCN classes as threatened.

The ultimate objective of the St Eustatius Sea Turtle Conservation Program is to promote long-term survival of the sea turtle populations on and around the island. This goal is achieved by safeguarding critical sea turtle habitats, conducting research to provide policy and decision makers with current, relevant data on the status of sea turtles in the region, and limiting environmental impacts on nesting beaches and near-shore waters. One of the most important factors to ensure the success of the project is the direct involvement of the local community in the program to promote a better understanding of the importance of long-term conservation, not just for sea turtles but for other locally threatened species.

The aims of this Annual Report include the following:

- Summarize the activities of the 2014 Sea Turtle Conservation Program.
- Review the accomplishments and deficiencies of the program in 2014.
- Suggest recommendations for the 2015 program.
- Present information locally, regionally and internationally about the research and monitoring program on the island.
- Produce a progress report for the Island Government, potential program funding organizations, the local community and international volunteers.

Participating organisations

St Eustatius National Parks Foundation (STENAPA)

The Sea Turtle Conservation Program is coordinated by the St Eustatius National Parks Foundation (STENAPA), which is the main non-governmental environmental organization on the island of St Eustatius (known locally as Statia). In 1996 STENAPA was given a legal mandate by the Island Government to administer a new Marine Park and, in 1998, a new terrestrial National Park. STENAPA also manages the Miriam C. Schmidt Botanical Garden. The Statia National Marine Park surrounds St Eustatius from the high water mark to the 30 meter depth contour. There are two marine reserves within the Marine Park which are designated no-take zones and are in place to protect marine habitats and reduce fishing pressures. Marine Park staff conducts regular patrols and enforcement, maintains dive, snorkel and yacht moorings and conducts several educational programs, such as the Snorkel Club and Junior Ranger Clubs. The Marine Park is responsible for many research and monitoring activities including the Sea Turtle Conservation Program.

STENAPA is a not-for-profit foundation, relying on government subsidies, grants and minimal income from divers, yachts and hikers to conduct its activities. STENAPA has only eight staff and relies on volunteers to assist with conducting field work for projects such as the Sea Turtle Conservation Program. The organization is supported by two international volunteer programs; the STENAPA Intern Program and the Working Abroad Program, which are discussed in more detail below.

STENAPA Intern Program

Since the inception of the Intern Program in September 2001, over 60 persons from various countries including Great Britain, the USA, Canada, Holland, Belgium, Hungary, Poland, Australia, Germany and New Zealand have helped accomplish projects at the Botanical Garden, in the Quill National Park and the Statia National Marine Park. Interns are responsible for overseeing the daily activities of volunteers from the Working Abroad Program, in addition to managing and completing individual assignments.

Interns are required to pay accommodation costs and are personally responsible for all travel costs and living expenses while on the island. The internships allow students and professionals to gain valuable practical experience in their chosen field. Without these dedicated volunteers STENAPA would not be able to conduct many of its projects, since the Foundation cannot afford the manpower or expertise.

Working Abroad Program – Statia Conservation Project

Working Abroad is an international networking service based in the UK that, since it was founded in 1997, has established volunteer projects in over 150 countries worldwide. STENAPA started its collaboration with the Working Abroad Program in January 2003, and to date more than 200 volunteers have been recruited via their organization. Groups of up to eight volunteers stay for two months and assist in the development of the Botanical Garden, conduct maintenance of the National Park trails, and during turtle

season, participate in night-time beach patrols. For their two month stay each volunteer pays approximately US$1700 towards food, water, lodging, fuel and a project expense fee (this does not include international travelling costs or personal living expenses during their stay).

Wider Caribbean Sea Turtle Conservation Network (WIDECAST)

The St Eustatius Sea Turtle Conservation Program is affiliated with the Wider Caribbean Sea Turtle Conservation Network (WIDECAST). Founded in 1981, WIDECAST represents the largest network of sea turtle research and conservation projects in the world; with members in over 40 Caribbean states and territories. Affiliation provides access to a collaborative framework of organizations within the region, with emphasis on information exchange, training and active community participation. WIDECAST promotes interaction between different stakeholder groups to ensure effective management and conservation of turtle populations in the Caribbean.

In June 2003, STENAPA Manager Nicole Esteban was appointed WIDECAST Country Coordinator for St Eustatius, following completion of a training course on St Croix (US Virgin Islands). Subsequent to this, the St Eustatius Sea Turtle Conservation Program implemented WIDECAST-approved protocols for monitoring and data collection. WIDECAST has assisted the program through donation of tags and purchase of PIT tag applicator. The Sea Turtle Program Coordinator attended the WIDECAST Annual General Meetings in 2004-2006, 2008 and 2011 with funding and logistical assistance provided in part through WIDECAST. In 2011, 2013 and 2014, the Sea Turtle Program Coordinator attended the International Sea Turtle Symposium. In October 2010, Marine Park Manager Jessica Berkel was appointed WIDECAST Country Coordinator after Nicole Esteban returned to the UK.

Dutch Caribbean Nature Alliance (DCNA)

Founded in 2005, DCNA represents a formal coalition of the six nature conservation management organizations of the Caribbean Netherlands, with representation from international agencies, central government and financial experts. Their main goals are to safeguard the biodiversity and promote sustainable management of the natural resources of the islands, through the establishment of long-term, sustainable funding sources. The former Director of STENAPA held the position of chairperson of the DCNA for 2 consecutive terms.

Funding agencies and donors

To effectively run the Sea Turtle Conservation Program, the Sea Turtle Conservation Project Coordinator allocates approximately 10% of their time to raise funds to cover the annual program costs. Fundraising occurs both locally and internationally by soliciting specific organizations, and by donation requests through newsletters and turtle awareness campaigns.

Study Sites

St Eustatius

The island of St Eustatius is part of the Netherlands Caribbean which includes Bonaire, Saba and St Eustatius. It lies in the North-eastern Caribbean, and is located in the Windward Islands; lying within the longitude and latitude median of 17º30 North and 62º58 West. The sister islands of Saba and St Maarten stretch out 30km north-west and 63km north, respectively (Figure 1).

St Eustatius is 21km² in size and is dominated by two volcanoes; an extinct volcano comprising the Northern Hills (150 million years old) and a dormant volcano called the Quill in the South, formed 2200 to 3200 years ago. As a result of its volcanic origin, the beaches of St Eustatius all have dark sand.

Figure 1. Map showing location of St Eustatius in the Eastern Caribbean

Sea Turtle Nesting Beaches: Description and activities in 2014

Sea Turtle activity has been recorded at eight beaches on St Eustatius: Zeelandia Beach, Turtle Beach, Lynch Bay and Compagnie Bay on the Atlantic side of the island, and Oranjebaai, Tumble Down Dick Bay, Crooks Castle and Kay Bay on the Caribbean side.

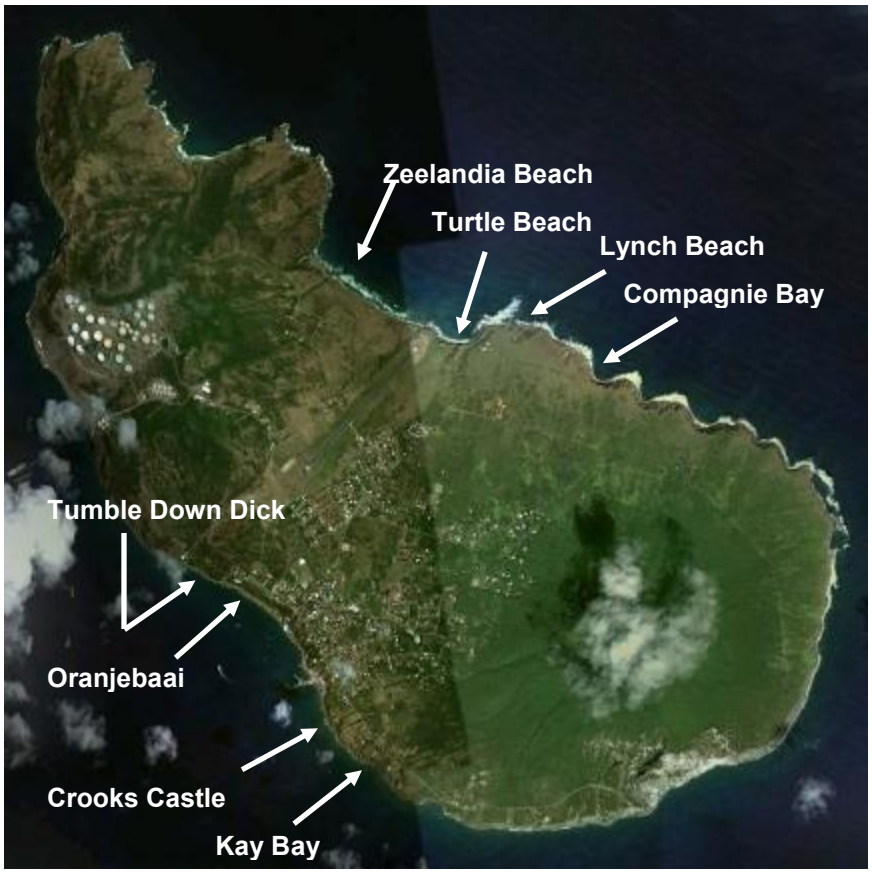


Figure 2. Nesting beaches on St. Eustatius

KAY BAY/CROOKS CASTLE

Figure 3 Rocky beach at Kay Bay

This beach on the Western or Caribbean coast of the island is somewhat neglected during the season as it is not easily accessible and because the bulk of nesting activity occurs on the Atlantic or Eastern side of the island.

Formerly, due to the lack of stakes and or clear landmarks on Kay Bay several confirmed nests could not be found when the time came for them to be excavated. Because the nests were marked only with GPS coordinates, they proved absolutely impossible to find. A greater effort is now made to make clear sketches in order to find the nests.

Kay Bay is a very small narrow beach where erosion and cliff falls is very common. The sand at Kay Bay is very rocky and makes it difficult to dig when trying to confirm a nest. The bulk of activities at Kay Bay are attributed to Hawksbill turtles.
Crooks Castle which lies to the north of Kay Bay sees the occasional Green turtle track and nesting attempt but again the majority of the activity is Hawksbill activity.

From the experiences over the years, several conditions remain in place for Kay Bay

1. The cliff at Kay Bay is so fragile that stakes are continuously buried or destroyed by cliff falls. Re-staking makes no sense so a detailed sketch with measurements and/or photos must suffice for this beach.
2. Conduct morning patrols at least once every three to four weeks on Kay Bay/Crooks Castle during the Green and Hawksbill nesting season. The previous recommendation of a survey every week is unattainable and too frequent for the small volume of turtle activities on that beach.
3. Conduct several targeted night patrols on Kay Bay/Crooks when personnel numbers allow or split the patrol if enough volunteers available.

ORANJEBAAI

Figure 4 Oranjebaai is monitored daily as the Parks office is located at its far end

This is a very dynamic sandy beach on the Caribbean side of the island as it experiences considerable sand movement throughout the year. It stretches for almost 2km and runs into the harbor at its southern end. The beach is bordered by grass and the occasional Coconut Palm (*Cocos nucifera*). In addition to several hotels and shops; there are also ruins of warehouses on the sand and in the near-shore waters along its entire length. Very little nesting of green and hawksbill turtles occurs on this beach due to the passing traffic, street lights and near shore restaurants and terraces. This is most likely a deterrent to females looking for a quiet area to nest.

For a large part of 2014, there was minimal sand on this beach due to rough seas and ground seas. Besides there being a few longer stretches of sandy areas during the Easter period, sand was present only in small pockets between some standing walls of ruins, in front of a section of beach where the dive shop “Scubaqua” is located and on the small beach next to the City pier.

Another aspect of Oranjebaai is that the shoreline is very minimal and slanted toward the water so that in the morning any tracks that would have been visible on a flatter beach have long been washed away by the high tide surge. In that way, although you can

monitor almost the entire length of the bay very easily, there are usually no tracks visible on this beach.
During the 2014 nesting season there were only 3 activities on Oranjebaai and they were all Hawksbills.

LYNCH BAY, COMPAGNIE BEACH

Isolated Lynch Bay

This very small, rocky beach is located around the point to the south of Turtle Beach; it is approximately 200m long. There is minimal ground vegetation cover, primarily Beach Morning Glory and is backed by a sloping cliff which provides the only access when tides prohibit movement from Turtle Beach. Unlike many of the other beaches on the island, Lynch Bay is stable due to the adjacent reef barrier that provides a natural shelter and aids sand retention.

Green and hawksbill nesting activity has been recorded at this beach, and it was the site of an unconfirmed loggerhead nesting event in 2004 (I. Berkel, Pers. Comm.). Due to access issues, Lynch Bay can only be monitored safely during the day.

During the 2014 season Lynch Bay was monitored five times for activities. This beach is monitored in combination with Compagnie beach. There were no tracks recorded. The sand is of a very gritty texture and tracks are not very clearly visible even when viewing them the day after they were made. Further to the south of this beach is the Compagnie Beach which has only been monitored since 2012 due to a reported track by an off duty member of staff. There was only 1 track seen in 2014.

TURTLE BEACH

Turtle Beach

This is the second longest continuous beach on the Atlantic side, measuring approximately 400m. It links to Zeelandia Beach at its northern point, and connects to Lynch Bay around a point to the south. It is a steeply sloping bay subject to considerable sand movement, especially during the hurricane season (July – November). It is backed by cliffs and there is virtually no vegetation except for occasional Sea Grape trees on the cliffs. There is a storm water ghaut in the middle of the beach which was formerly used as the land-fill for the island. Although not currently used, this ghaut still contains a large amount of refuse and is open to the beach. Unfortunately, access to this beach at night is often prohibited due to strong surge, and therefore it is patrolled only when conditions permit. In the 2014 nesting season, the beach was monitored over 200 times. Several Green as well as Hawksbill nests and one rare leatherback nest were deposited on this beach in 2014.

ZEELANDIA BEACH

Zeelandia Beach

At over 1 km this is the longest beach on St Eustatius and is directly linked to Turtle Beach at its Southern end. It is a narrow beach backed by cliffs on some stretches, except in the northern 300m where there is a relatively sparse border of Sea Grape trees (*Coccoloba uvifera*). In this region there are also the remains of an abandoned hotel behind the beach and the principal public access area. Ground vegetation is not extensive, limited to small patches of Beach Morning Glory (*Ipomoea pes-caprae*) and the succulent plant, Purslaine *(Portulaca oleracea)* which are both grazed by cows that occasionally shelter under the sea grape trees. The beach is very dynamic with considerable sand movement throughout the year. Despite this, the Northern end is the most stable, permanent beach on the island. Erosion is extensive close to the access area, especially following heavy rains. This problem is exacerbated by illegal sand removal in that section.

Close to the Southern end of the beach is a large storm water ghaut which acts as the landfill for the island's household waste. Zeelandia is the primary turtle nesting beach hosting four species of turtle (green, leatherback, hawksbill and loggerhead), and the only place on the island where leatherbacks have been recorded nesting. It is the only beach regularly monitored at night by the Sea Turtle Conservation Program because of easy access and the volume of activity. It was a very quiet nesting season for Zeelandia beach in 2014 with only 50 recorded activities.

Pre-Season Preparations

The 2014 Sea Turtle Conservation Program began with the following activities:

Beach Preparation

To prepare the primary nesting beach for patrols, numbered stakes were positioned at 20m intervals along Zeelandia Beach. These stakes are used to mark the location of all nests or false crawls recorded during day or night patrols. Each stake was placed as close as possible to the vegetation or cliff behind the beach. Stakes remaining from the 2013 season were repainted and any missing stakes were replaced. As per the previous year's recommendations, the stake number was also painted on the cliff wall to facilitate measurements when the surge has removed both stake and sand in an area.

Material Preparation

The designated turtle bag for nightly patrols and all other equipment for the program were inventoried. Missing materials such as gloves, tape measures etc. were purchased.

Training of Volunteers

The materials used for teaching volunteers about the Sea Turtle Conservation Program are 2 presentations and a demonstration of the use of the equipment in the turtle bag. The two existing short presentations consist of a basic introduction to sea turtles, their biology and nesting behavior; the second focuses on beach monitoring protocols and the correct use of the data collection sheets. Every volunteer receives training before assisting with beach monitoring. At times, the group of trainees is taken to Zeelandia beach after the presentations to practice measuring on the giant concrete leatherback and to be shown the beach and explained the dynamics and the work that the program carries out there.

2014 Turtle Program intern




L to r: Olga Schats, Elsbeth Feenstra, Thomas Smith, Linda "Jackie" Berkel

A search for an intern for the program went out on the website Environmental Jobs (formerly known as StopDodo) late in 2013. There were many applicants and several were offered the job but ultimately it proved to be too expensive to travel for all the persons who were offered the internship.

In the end the field work was carried out in the main by the program coordinator and volunteers Linda Berkel, Olga Schats and Elsbeth Feenstra. The marine park intern Thomas Smith performed a dual role at the start of his internship and was very valuable in assisting the program with morning surveys and night patrols.

Protection of Zeelandia beach in 2014

The concrete turtle, a replica of a leatherback, was produced as part of the Zeelandia Beach Beautification project and has a three part function; it provides a great visual representation of the endangered Leatherback turtle while offering a protective barrier against sand miners wishing to drive on to the beach using that particular access point. It also proves an invaluable tool in training the Working Abroad volunteers and interns in biometric sampling and nesting protocol.
Protection of the beach also involved maintaining and cleaning the sea turtle information signs.

Sand mining incidents continued unabated in 2014 and therefore assistance was asked of the local government in barricading the beach entrances at Zeelandia to prevent vehicles going on to the sand to load up. Persons that are busy with construction take sand from Zeelandia beach and Oranjebaai.
The government requested Nustar's assistance for the turtle program. Nustar then contracted TRICO to close off the beach to vehicular traffic.

Refurbished sign

The maintenance of the signs at the main entrance with instructions to dog owners to keep a close watch on their dogs, and drivers to not drive on the beach is ongoing. In late 2013 the large information sign disappeared and it was thought that it was removed by vandals. However it soon became clear that the sign was removed by the woodworking teacher at the local high school. Teacher Dennis van Nielen and his students did a fantastic job of replacing the frame of the sign which had completely rotted away since it was first placed in 2007. A huge thank you to the group from the Sea Turtle program.

Persons continue to take advantage of the isolation of the beach to drive on the sand. Though there are several signs indicating the harm that this activity can cause to hatchlings both on the sand and in the egg chamber and the un-hatched eggs in the nest.

Truck tracks on sand

Warning sign for drivers

Beach Cleanups 2014

Bottles at the parking area on Zeelandia

Trash at the picnic area on Oranjebaai

As Zeelandia beach is the primary nesting beach, a beach cleanup is performed at the beginning of the sea turtle nesting season and usually once a month during the entire season if it is warranted. Other beaches such as Oranjebaai and Lynch were also cleaned in 2014. Lynch was cleaned as part of the Coast to Coast cleanup.
This year due to the enormous amounts of garbage, we were able to collect the amounts shown. It is the plan to collaborate with government on an anti-littering campaign.

Following is a summary beach clean ups for 2014:

Date	Clean-up C'rdinator	Nesting season?	Clean-up Category	Clean-up Location	Nr of people	Estimated distance cleaned (m)	Estimated time (h)	Nr of bags	Total weight (kg)
Feb 02 14	J. Berkel	No	Shoreline	Zeelandia	8	500	2	25	286
Oct 10 14	M. Davies	Yes	Shoreline	Zeelandia	6	600	1.15	8	68
Oct 10 14	Claire Blair	Yes	Beach	Oranjebay	9	1500	2	14	114
Oct 10 14	Ambrosius	Yes	In-water	Oranjebay	4	20	.20	0	0

Weighing and counting of the garbage collected

Beach Cleanup on Zeelandia

Beach Cleanup on Lynch Beach

Underwater trash

Education, Community Outreach and Media Exposure

Two Snorkel Club kids come in for a closer look at a nest excavation

The annual STENAPA Snorkel Club program took place from July to the end of the year after school on Mondays. On one occasion, there was an excavation in the afternoon which afforded the children the perfect opportunity to see sea turtle hatchlings and observe the Marine Park staff in action.

Some groups of school children were given the opportunity to visit the beach to witness an excavation. Most of the schools took advantage of this.

Statia Terminal school children and staff filming the hatchlings emerging

Governor de Graaff school children watching the hatchlings swim away

Group of school teachers from GVP watching hatchlings make their way to the sea.

The Sea Turtle Conservation Program tries to involve the general public as much as possible in its activities to generate interest and support for sea turtles.

On October 6th, members of the public were invited to a Green turtle hatchling release and there were 20 persons present on the beach apart from program staff. On Nov 1st, 21 persons were on hand for the excavation which produced just 1 live hatchling much to the delight and relief of all present. On the 19th of November 29 persons were on the beach for an excavation which turned out to be very disappointing as there were no live hatchlings left in the nest.

Written publication of Sea Turtle program activities in 2014:

The Daily Herald Newspaper Articles 2014

- Friday, January 31st – St Eustatius Turtle season possibly year round now
- Tuesday, February 11th – Stenapa cleans record amount of garbage from Zeelandia Beach
- Tuesday, March 18th – St Eustatius sea turtle nesting season starts
- Saturday , September 27th – People and Parks at the Lion's Den
- Saturday, September 27th (Weekender Article) – St. Eustatius, a trip to an island for connoisseurs – Part 1
- Tuesday, September 30th – Stenapa makes plea for leatherback protection
- Tuesday, October 7th – Marine Park's staff assist turtle in need
- Friday, November 7th – Sea Turtle nest bears brunt of Gonzalo

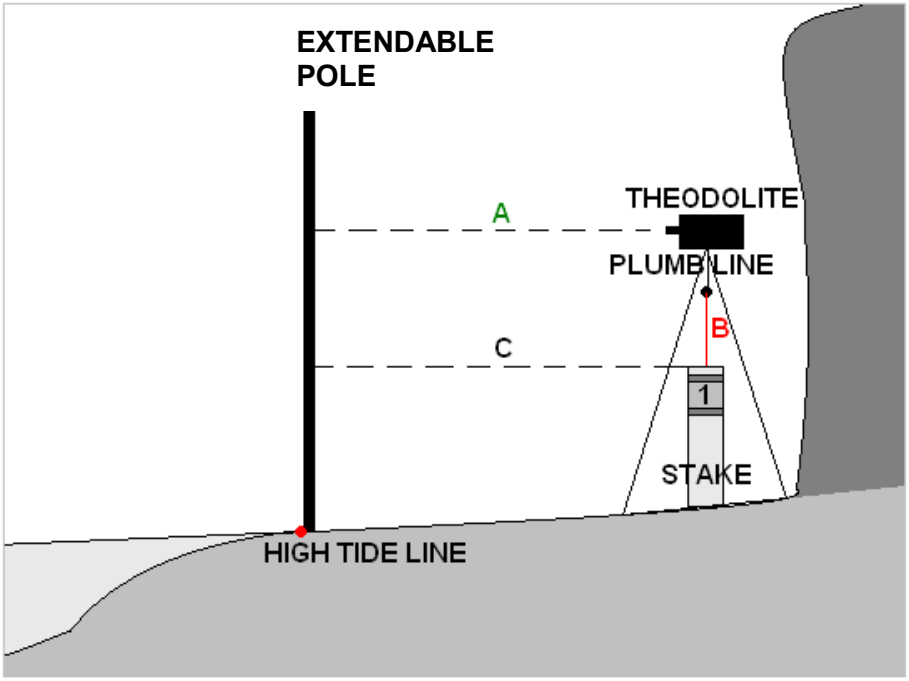
"STENAPA Update" Newsletter articles 2014

- Newsletter 2/2014 March – First Leatherback nest 2014 (front page)

Beach Mapping and Erosion measurements

Due to the highly dynamic nature of Zeelandia beach, periodic beach mapping is carried out to measure the shifting of the sand. Using the stakes which are placed for nest triangulation and that are situated 20 meters apart measurements are taken using the following method:

A team of two people measure the distance from the high tide line (HTL) to each stake. Then using a Theodolite mounted on a tripod, the height of the stake against the high tide line (sea level) is recorded at every fifth stake. This is best done with one researcher deciding the HTL and the other person reading the Theodolite. The researcher on the HTL (marked by highest ocean debris) stands with an extendable pole, marked in feet and inches. While this is being done the Theodolite is placed above the stake (as close as possible as in some places the stake was in the cliff or at an angle making placing the centre of the Theodolite base directly above the top of the stake impossible to achieve) and leveled using the adjustable legs on the tripod and the leveling devices on the Theodolite. Once the built-in spirit level was set with the air bubble in the middle, the lens cap was removed, focused and a reading at the central cross-hair taken.



The distance between the base of the Theodolite and the top of each stake is measured using the plumb line. The distance between the top of each stake and the sand is also measured. By taking these measurements, combining them and then subtracting from the height measurement recorded from the Theodolite (which was converted into meters from feet) we get the actual height of the beach above sea level (HTL). All data was recorded and logged on a specific data sheet and entered into the computer – averages calculated and recorded. This data shows a trend of beach movement and erosion over the years.

Beach mapping took place in the months of March, July and October 2014. A report comparing the data from 2006 up to 2011 is available as a separate document.

BEACH EROSION

Painting stake numbers on the cliff

Water coming up to cliff, stakes are gone

Loss of the numbered stakes continued throughout the entire season and was particularly a problem during the high surges caused by passing storms.
Corresponding numbers are now painted on the cliff face above the stakes so that in the event the stake is lost measurements can still be made for triangulation.
Fortunately the currents at Zeelandia are such that uprooted stakes can more often than not be retrieved as they tend to get washed ashore later on. Due to high sand movement certain stakes, usually stake #1, #42 to 51 are buried beneath the sand for a period of months. Towards the end of December many of the 70 stakes are not in place. For a high percentage of the season there are very few suitable nesting areas on Zeelandia. The beach from stake #28 to 51 is usually completely eroded. Patrolling is difficult as the waves reach the cliff and one has to walk in the surf to get to Turtle beach.

CLIFF FALLS

If a significant landslide or cliff fall was encountered during a patrol on any nesting beach, the following data were recorded; the date, time (if known), amount of cliff affected and a description of the damage, including a photograph whenever possible. Areas of sand mining were also recorded and amounts of sand removed estimated.

Cliff falls for the year 2014:

Cliff fall stake #24-25 January 29 2014

Cliff fall stake #24-25 July 2014

Because of the cliff falls both this season and in previous seasons, when the beach is severely eroded and the patrol will be forced to walk against the cliff, patrols are usually ended in the area of stake #42 near the Smith's Gut public dumpsite. It is dangerous to patrol further. Any tracks can be found in the morning if the tide was not too high. The consequences of walking or sitting too near the cliff while on patrol are repeatedly stressed during training of volunteers and interns.
In 2016 an intern will be looking in to the cliff falls and erosion on this beach and tying that in to the yearly loss of land at Zeelandia.

Date	**# Stakes**	**Approx Area/amt**
Unknown	52	150 ton
April, 24th	44	Massive
December 28th	24 - 25	Massive

SARGASSUM

June 06 2014 No Sargassum on the beach

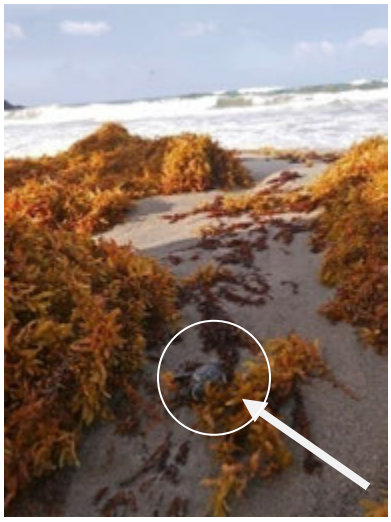
August 2014 Sargassum is several feet thick on the beach

In 2014, as in past years Zeelandia beach has seen an abundance of Sargasso seaweed washing ashore.

Up to the month of June, there was no evidence of Sargassum on the beaches but thereafter it came ashore and covered the beach at Zeelandia predominantly from Stake #30 all the way to Stake #1 at the northernmost tip of the beach.

The program has seen no evidence that the sargassum in any way interferes with the adult females coming to nest or the hatchlings that have to make their way to the sea.

It appears to slow down the hatchlings as they take longer to reach the shoreline but they do make it unassisted to the sea over the seaweed.



Monitoring and Research Activities

During the 2014 nesting season several different monitoring activities were conducted as part of the Sea Turtle Conservation Program:

Morning Track Surveys

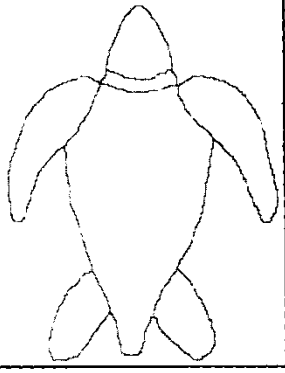
Morning track surveys were carried out from March 5th 2014 to December 5th, 2014 on the primary nesting beach (Zeelandia Beach) and Turtle Beach. Besides the index beach, only Oranjebaai could be monitored on a daily basis because of its proximity to the National Parks Visitor Center. Surveys of the remaining beaches, Lynch, Compagnie, Tumble Down Dick and Crooks Castle/Kay Bay were performed on an irregular basis.

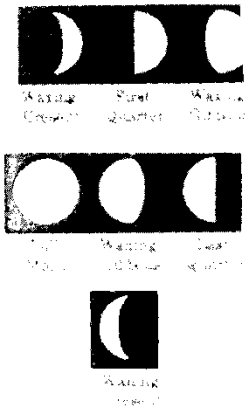
For each track observed the following information is recorded:

- Observer – Name of observer recording data.
- Date
- Weather – Brief description of weather conditions.
- Moon phase – Based on the previous night's moon; this information is recorded to determine whether there is a relationship between moon phase and emergence.
- Species – If possible to determine from the track.
- Track width – Measured as the straight-line distance between the outer flipper edge marks; taken to the nearest millimeter. For each track the width is measured at three random locations and the average used in analyses.
- GPS location – Measured either at the centre of the nest or at the apex of a false crawl track.
- Locale name – Name of the beach.
- Triangulation measurements to two landmarks – Straight-line distance to the two nearest numbered stakes; taken to the nearest centimeter. Measured either from the centre of the nest or at the apex of a false crawl track.
- Distance to vegetation – Straight-line distance to the vegetation behind the beach or to the cliff if no vegetation; taken to the nearest centimeter. Measured either from the centre of the nest or at the apex of a false crawl track.
- Distance to high tide line – This data is not collected
- Number of unsuccessful nest cavities – If the turtle made more than one attempt at nesting during the same emergence.
- Result of nesting attempt – Recorded as either lay, probable lay, false crawl (when some nesting activity observed) or track only (no nesting activity at all). A lay can only be determined if the eggs are found or in hindsight upon hatching.

All nests were monitored daily during morning track surveys; disturbed or destroyed nests were noted. After recording a track it is erased to ensure that data is not collected twice for the same track. During the regular season which normally ends on Oct 30th, surveys were conducted as early as possible in the morning to prevent tracks from being disturbed or washed away. For continuity, and to increase the accuracy of data

Record Number:	Date:
Observer(s):	Time:
Weather:	Moon Phase:

TURTLE IDENTIFICATION, SIZE AND HEALTH	
Species:	PIT Tag:
Tagged before: YES/NO	Tag Locale:
Flipper Tag(L):	Circle Activity: Emerging/ Body Pitting/ Digging Egg Chamber/Laying/ Covering/ Disguising / Leaving / Gone
Flipper Tag(R):	
Carapace (L):	Carapace (W):
Carapace Damage:	
	Parasites/Ectobiota:
	Injuries:
Notes:	
IN ABSENCE OF TURTLE	
Track Width (M):	



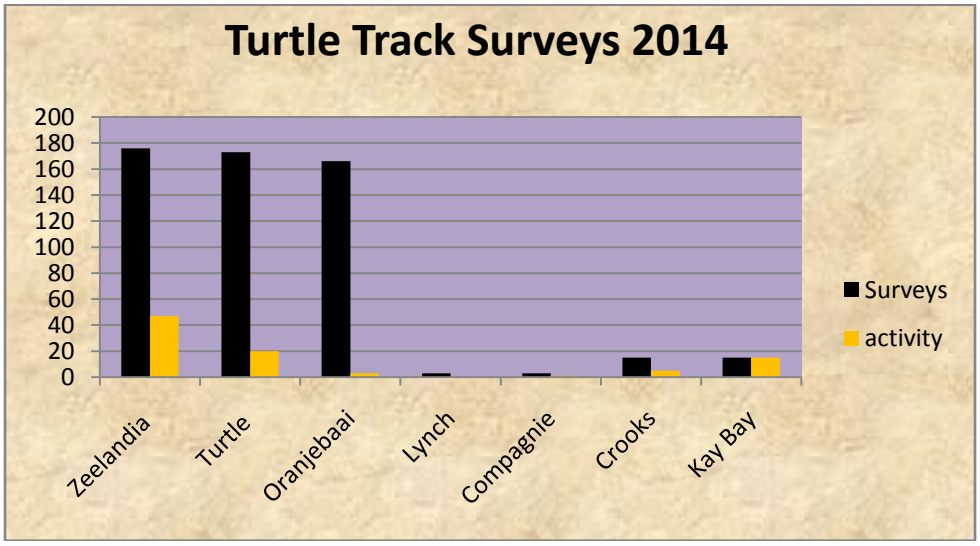
NESTING/SIGHTING INFORMATION		
Please Circle One: Relocated / Natural	Triangulation (M)	
Longitude (W):	Landmark 1:	
Latitude (N):	Landmark 2:	
Locale Name:		
Nest Depth:	Nest Width:	
Highwater (M):	Vegetation (M):	
Unsuccessful Nest Cavities:		
Result (please circle): Lay / Probably Lay / Dry Run / Track Only		
NEST RELOCATION INFORMATION		
Total Number of Eggs:	Normal:	Yolkless:
Time Laid:	Time Removed:	
Time Reburied:		

collection, surveys were conducted by the Program Coordinator, intern or trained personnel.

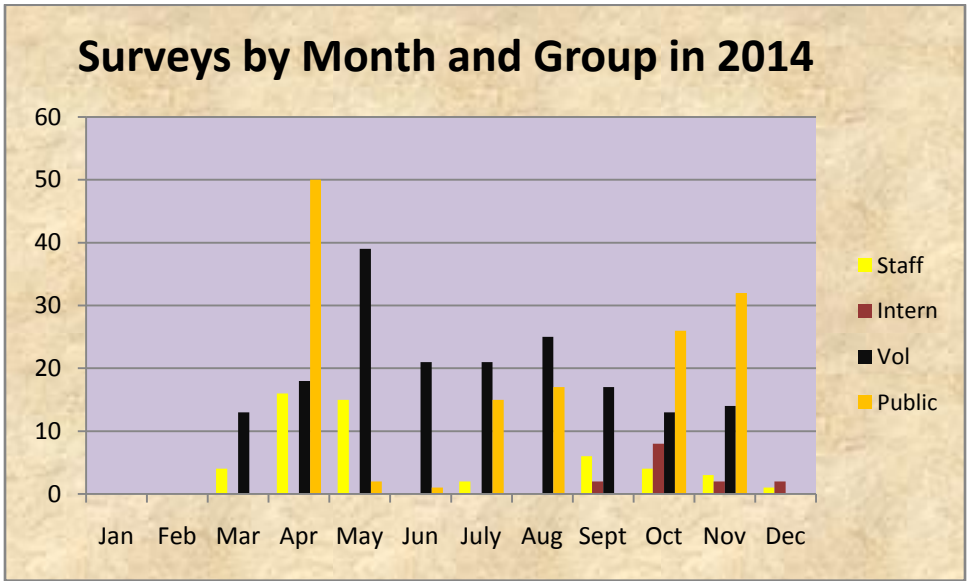
Data sheet used for both morning track surveys and nightly beach patrols

Results Morning/Afternoon Track Surveys 2014 nesting season:

The count for Turtle Beach may be a bit confusing as the majority of the times it is accessed by walking the length of Zeelandia Beach. However if the Zeelandia beach figure is not included it will seem as if Turtle Beach was monitored only a few times in the season which is NOT the case.



Oranjebaai is surveyed by vehicle every weekday morning, as it is on the way to the office, and on some weekends. When included in the count it brings the morning surveys to a total of 393.



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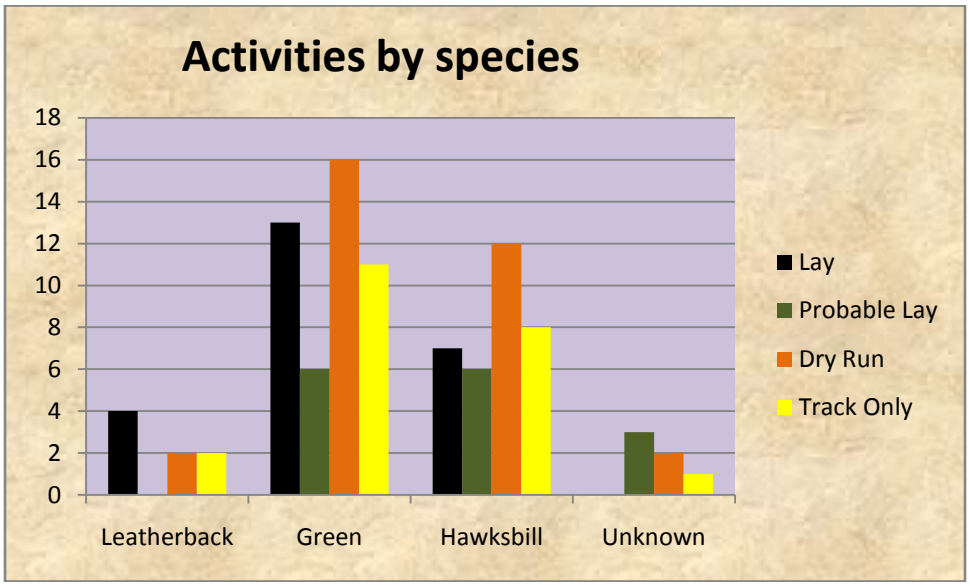
A breakdown of the total morning survey effort is shown above. There was an encouraging amount of persons from the public walking along with morning surveys especially in the weekend. Some surveys were done in the afternoon due to time constraints.

As well as patrolling, many persons were interested in seeing the actual excavations. April is the busiest month with the most members of the public on the beach due to the various school classes that came to see excavations. The same goes for the month of November.

Most excavations took place in the weekends or after work in the afternoons which accounts for the low intern number. Additionally, there was no Sea Turtle Program intern until September.

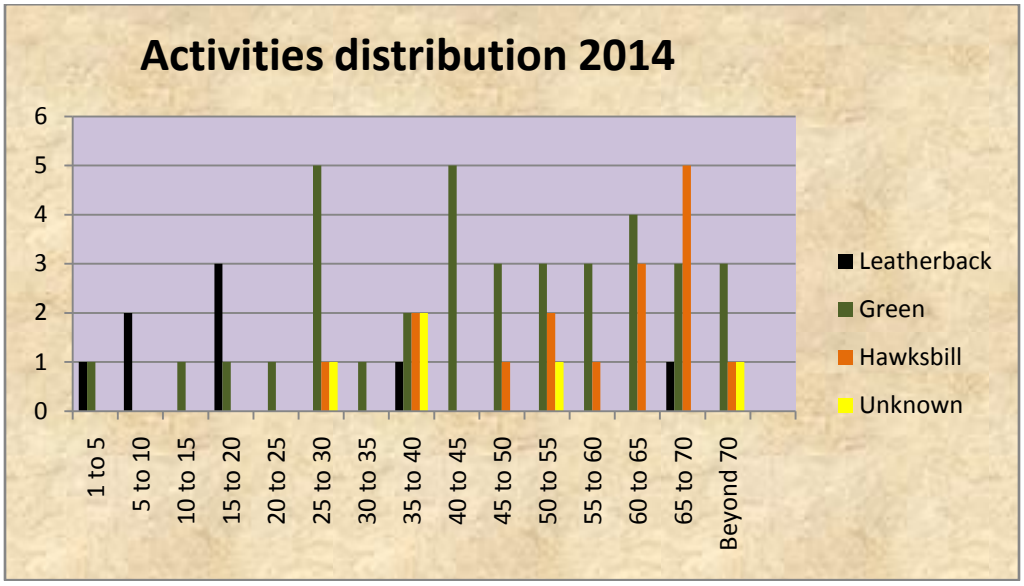
The start of the 2014 nesting season came on March 5th with the first leatherback track. The Leatherback nesting season was from March 5th to June 16th. Green turtle activities were recorded from April 12th to October 28th 2014 and Hawksbills appeared from as early as January 5th up until December 18th which turned out to be the last activity, a dry run, observed in 2014.

The breakdown of activities per sea turtle species is as follows:



The chart above, especially in the case of the Greens, translates into a decrease compared to the previous season. In 2013, Leatherbacks had 11 total activities; Greens had 111 and Hawksbills 44 activities. Total activities for 2014; Leatherbacks 8, Greens 44 and Hawksbills 34.

Zeelandia beach is a stretch of 1.4 kilometers. Some areas are very narrow stretches of sand. For each stretch, the distribution of activities is shown in the graph below.



The grouped numbers on the x-axis signify the earlier described numbered beach stakes that are used for triangulation.
There is a definite pattern of activity by species on Zeelandia. Leatherbacks tend to nest in the open area from stakes 3 to 15. This tendency is recorded annually.
From the graph it is obvious that this year the majority of the Green turtle activity was concentrated from stake #28 southwards and on to Turtle Beach which stretches from stake #62 to 70.
Turtle beach, a mere 160 meters long, saw a rise in Green turtle activity this year with 17 activities being recorded on that small stretch of beach.
Hawksbills tended to favor the area at the southernmost tip of Zeelandia, just before the beach bends toward Turtle beach.

Beach Patrols

Nightly beach patrols were conducted on Zeelandia Beach and, when sea conditions permitted, Turtle Beach. Due to the low nesting densities at other beaches, it is an inefficient use of resources to carry out regular nightly patrols at these other locations. Each patrol consisted of a minimum of two people; including the Program Coordinator, sea turtle intern or Marine Park intern. A stretch of beach approximately 1.2kms in length was monitored on Zeelandia Beach (up to 1.4km when Turtle Beach was included). Hourly patrols were conducted between 9.00pm - 3.30am.

The primary objective of the beach patrols was to encounter as many nesting turtles as possible. Apply flipper and/or internal tags as appropriate, collect carapace measurements, mark the location of the nest for inclusion in a nesting success survey and relocate any nests laid in suspected erosion zones. The data collected when a turtle was observed is identical to that collected on morning track surveys except for the following additional data and considerations:

- Observer – Name of observer recording data.
- Date – Patrols span two dates but to avoid confusion the first date is used throughout the entire patrol.
- Time – At the moment the turtle is first encountered
- Weather – Brief description of weather conditions.
- Moon phase – This information is recorded to determine whether there is a relationship between moon phase and nesting emergence.
- Species – If the turtle is not observed the species is determined from the track, where possible.
- Tag information – Any tags already present are recorded, new tags placed are also recorded on the sheet.
- Activity – At the moment the turtle is first encountered. Classed as emerging, searching, body pitting, digging egg chamber, laying, covering, disguising, gone (used if turtle has returned to the sea).
- Carapace Length – Measured from the notch to the tip of the carapace.
- Carapace Width - Measured at the widest point of the carapace.
- Parasites/Ectobiota – The presence of any parasites on the turtle are recorded, with a brief description of the parasite; its location is indicated on a diagram on the data collection sheet.
- Injuries – Any injury to the turtle is described and the location indicated on a diagram on the data collection sheet.
- Notes – Any additional pertinent information about the turtle or their behavior
- Track width – This is only recorded if the turtle is not observed during the patrol. Measured as the straight-line distance between the outer flipper edge marks; taken to the nearest millimeter. For each track the width is measured at three random locations and the average used in analyses.
- Nest depth – measured as a straight-line distance from the peduncle or cloacae (if turtle is present) to the bottom of the nest.

- GPS location – Measured either at the centre of the nest or at the apex of a false crawl track. When possible this is taken while the turtle is depositing eggs, when the egg chamber is open and the exact location of the eggs are known.
- Locale name – Name of the beach.
- Triangulation measurements to two landmarks – Straight-line distance to the two nearest numbered stakes; taken to the nearest centimeter. Measured either from the centre of the nest or at the apex of a false crawl track. When possible these measurements are made while the turtle is depositing eggs so that the exact location of the eggs is known.
- Distance to vegetation – Straight-line distance to the vegetation behind the beach or to the cliff if no vegetation; taken to the nearest centimeter. Measured either from the centre of the nest or at the apex of a false crawl track. When possible this measurement is made while the turtle is depositing eggs so that the exact location of the eggs is known.
- Number of unsuccessful nest cavities – If the turtle made more than one attempt at nesting during the same emergence.
- Result of nesting attempt – Recorded as either lay (when the turtle was seen laying), probable lay (if the nest site suggests that the turtle laid but no eggs were seen), false crawl (when some disturbed sand observed) or track only (no nesting activity at all, no disturbed sand).
- Relocation data – If the nest is laid in an unsuitable location which is prone to erosion or flooding the eggs are relocated to a more secure section of the beach. The following data are recorded for this new nest site.

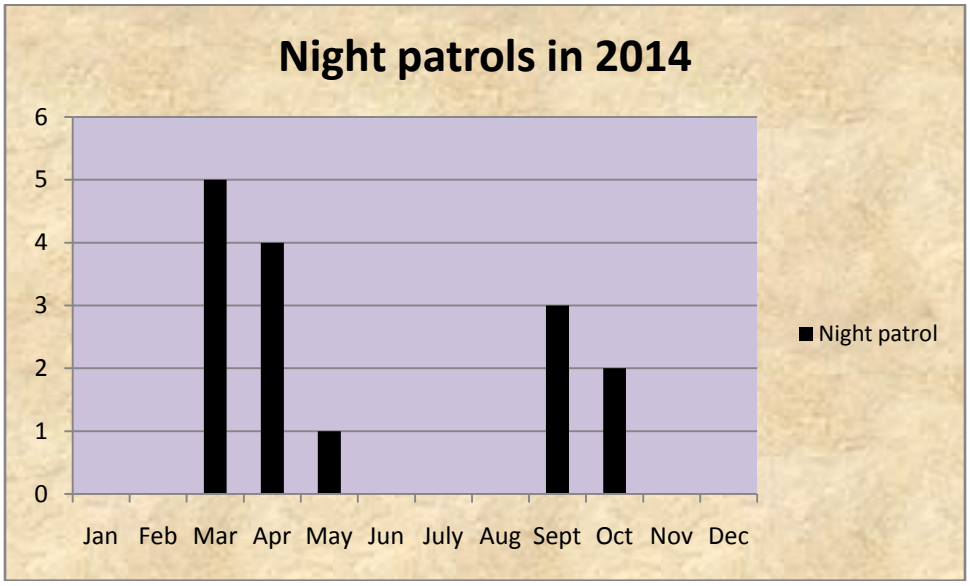
    - New GPS location – Taken at the centre of the new egg chamber.
    - Triangulation measurements to two landmarks – Straight-line distance to the two numbered stakes closest to the new nest location; taken from the centre of the new egg chamber.
    - Distance to vegetation – Taken from the centre of the new egg chamber.
    - Distance to high tide line – Taken from the centre of the new egg chamber.
    - The number of eggs – The total number of eggs; also recorded separately are the number of yolked and yolkless eggs if applicable.
    - Time eggs deposited – The time the turtle began to lay eggs.
    - Time eggs reburied – The time the eggs were placed in the new egg chamber.

All data were collected either while the turtle was laying or immediately afterwards when she was covering the nest site. No turtle was touched or approached before she had started to deposit her eggs.

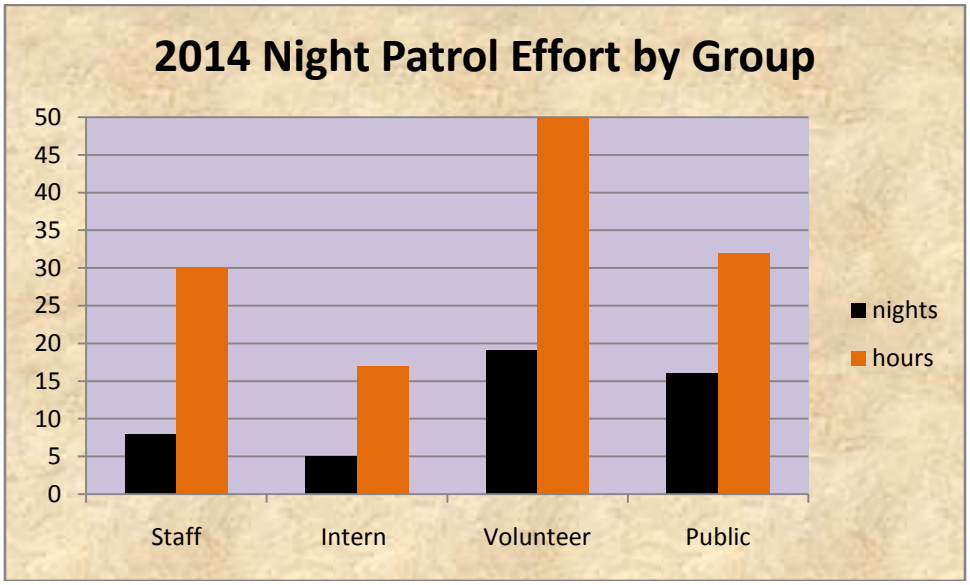
Once the turtle had returned to the sea, a line was drawn in the sand through both tracks or they were erased to indicate to the person conducting the morning track survey that data had been collected, preventing data repetition for the same track or nest.

Results of 2014 Nightly Beach Patrols:

Nightly monitoring of Zeelandia beach began on March 14th and ended on October 12th. Patrols were cancelled due to impending bad weather (storms/hurricanes), lightning strikes in the Zeelandia area and resorting to targeted patrols because of lack of personnel. In all there were only 15 nightly patrols, totaling 54 hours, during the 2014 season mainly due to lack of nesting females.



As can be seen above, there were no night patrols in June and July because the volume of nesting females was very low.



In 2014 there were only two actual sightings on the beach and it was of the same female. A green turtle came up at 8:25pm on September 13th bearing no tags. She was seen as she was emerging from the sea. She started body pitting then abandoned the attempt and returned to sea. The night patrol was able to take measurements and she had a curved carapace length (CCL) of 114cm and a curved carapace width (CCW) of 100cm. Almost two hours later at 10:13pm she was seen again on the beach and measured again just to compare for accuracy. Her measurements the second time were CCL 114cm and CCW 99cm.
Both times the members of the night patrol were unable to tag the female as she did not remain on the beach long enough.

It is not only beneficial to the program to be able to record and tag female turtles but it is also a good morale booster for the personnel who are on the beach night after night to have the opportunity to actually work with the turtles.

Tagging Methods

Flipper Tags

Metal flipper tags (National Band and Tag Company, MONEL Style #49: WC251 – WC350 and INCONEL Style #681: WE1 – WE100) were donated by the Marine Turtle Tagging Centre, Barbados, which is affiliated with WIDECAST. All tag applicators are inspected and cleaned on a routine basis and replaced when they cease to function properly.

Standard tagging methods are used, based on protocols of the Turtle Monitoring Program in St Croix, USVI. For leatherbacks, external flipper tags are applied to the centre of the fleshy skin located between the back flipper and the tail. For hard shell species, tags are applied adjacent to the first large scale on the proximal part of the front flipper where the swimming stroke will cause minimal tag movement (Balazs, G. H, 1999). Tags are applied while the turtle is covering her nest, immediately after she has finished laying eggs. This is done so that the turtle is not disturbed prior to laying. Two metal tags are attached to each turtle, both leatherbacks and hard-shelled species to ensure that if one tag is lost the individual can still be recognized. External flipper tags were only applied by the Program Coordinator and the turtle intern.

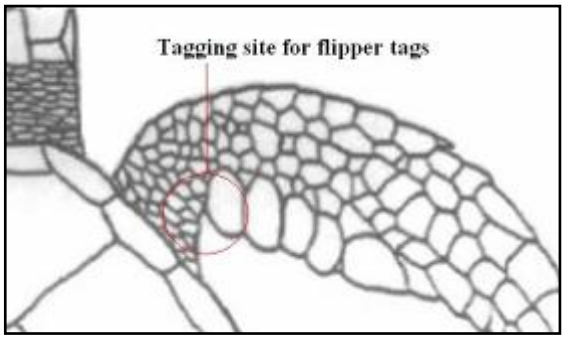
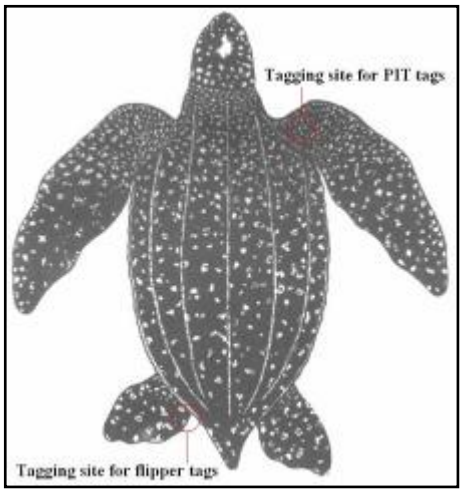


Figure 5: Tagging site Hard shells



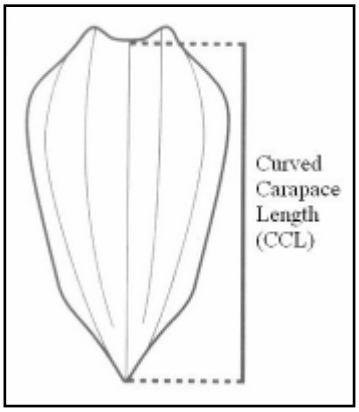
Tagging sites for Leatherback

Passive Integrated Transponder (PIT) Tags

The program still has PIT tags which were purchased with funding from KNAP Fund, MINA. For leatherbacks only, in addition to the two external flipper tags, one PIT tag is also applied. A PIT tag is a small microprocessor which transmits a unique identification number when read using a hand-held scanner. While the turtle is depositing eggs, a single PIT tag is inserted under the skin in the right front shoulder muscle of the turtle using an applicator. All leatherbacks encountered were scanned for the presence of PIT tags using an AVID scanner before a PIT tag was inserted, to avoid double-tagging individuals. Only the Program Coordinator and trained staff should apply PIT tags.

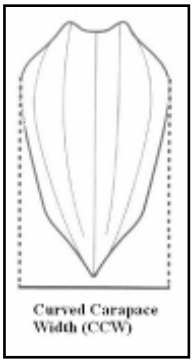
Carapace Measurements

Standard carapace length and width measurements (as of Bolten, 1999) were taken of each nesting turtle encountered, after she had finished laying and at every encounter thereafter when possible. Measurements were made using a flexible tape measure; each measurement was taken once, to the nearest millimeter.



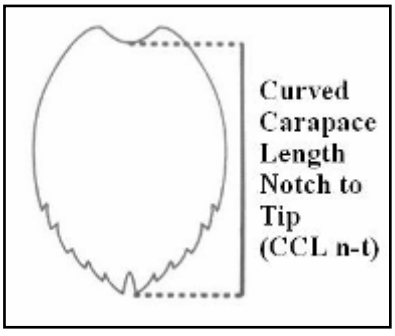
Leatherbacks

Curved carapace length (CCL) was measured from the nuchal notch (the anterior edge of the carapace where it meets the skin) in a straight line to the most posterior tip of the caudal projection When the caudal projection is not symmetrical the measurement is made to the longest point (any such irregularity would be noted on the data collection sheet as influencing the measurement). Measurements were taken just to the right of the central ridge, not along its crest, to avoid errors associated with carapace surface irregularities.

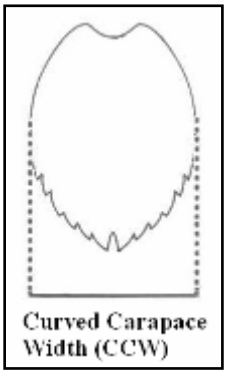


Curved carapace width (CCW) is measured at the widest point, but there are no standard features delineating the end points. The tape measure passes over the ridges and does not follow their contours.

Hard Shell species



For green and hawksbill turtles the curved carapace length notch to tip (CCL n-t) was measured. It is measured in a straight line from the anterior point at the mid-line (where the carapace and skin meet) to the posterior tip of the supracaudal scutes. Because the supracaudals are often asymmetrical CCL n-t is taken to the longest tip.



Curved carapace width (CCW) is measured in a straight line between the widest points of the carapace, there are no anatomical features marking the end points.

Nest Survival and Hatching Success

All nests recorded were included in a study on nest survival and hatching success. Nests were monitored during the daily morning track surveys. Close to the predicted hatching dates (approx. 50 days for hard shells and 60 days for leatherbacks) the triangulation data were used to mark the site of the egg chamber; to prevent the surveyor having to re-measure the nest each day a small "V" of sticks or some other clearly identified mark was placed on the sand behind the nest site. This area was closely monitored for evidence of hatching; a depression, hatchling tracks or hatchlings. After signs of hatching were observed the nest was excavated within 48 hours; if no signs of hatching were recorded the nest was excavated after at least 70 days from the date the eggs were deposited. All excavations were conducted by the Program Coordinator or trained personnel to ensure accuracy of data collection.

If a depression or other sign of hatching was present the excavator carefully dug down at this point until the first egg was encountered; if hatching had not been observed the triangulation data were used to locate the egg chamber. Using gloves, the nest contents were carefully removed from the egg chamber and inventoried. The following data were recorded for each excavated nest:

- Nest code – Each nest was given a unique identification number.
- Observers – Names of people present during excavation.
- Date – The date the nest was laid; when hatching was observed and the date the excavation was conducted.
- Number of empty shells – Only shells corresponding to more than 50% of the egg were counted; representing the number of hatched eggs.
- Number of hatchlings – Any hatchlings found in the egg chamber were recorded; dead or alive.
- Number of un-hatched eggs – Eggs were opened to search for the presence of embryos and categorized as:
    - No embryo – No obvious embryo present.
    - Embryo – Embryo present; includes all stages of development.
    - Full embryo – Embryo in final stages of development and ready to hatch.
- Number of pipped eggs – Eggs where hatchling had broken the egg shell but failed to hatch; characterized by triangular hole in the shell. Whether hatchling was alive or dead was also recorded.
- Number of predated eggs – If possible the type of predator was noted; often characterized by a circular hole in the shell.
- Number of deformed embryos – Any deformities were recorded such as missing flippers, additional scutes on carapace, albinism or the presence of multiple embryos in a single egg
- Number of yolkless eggs – Small, yolkless eggs were counted separately.
- Notes – Any additional pertinent information was recorded.
- Depth of nest – To the top of the egg chamber (first egg encountered) and the bottom of the egg chamber (after final egg removed); measure to nearest centimeter.

Any hatchlings found alive were released to the sea. When the inventory was complete the nest contents were discarded in the surf to prevent bacterial infection of the sand.

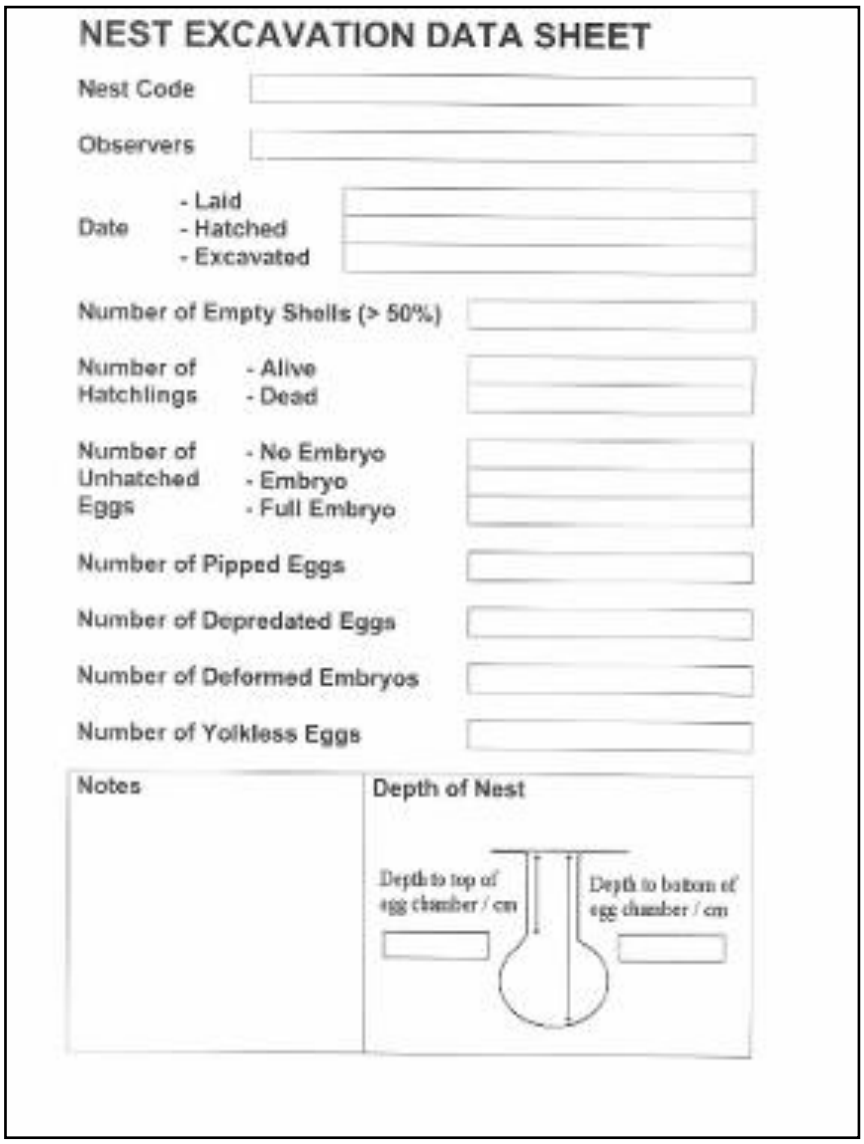


Figure 7: Data sheet used for recording nest excavation information

LEATHERBACK SUMMARY

Nest Survival and Hatching Success

The leatherback season started early March with the appearance of the 1st Leatherback track. There was no leatherback activity in May but then there were two activities in the last two weeks of June.
This has led to the decision of scheduling future interns to come a few months later in the year so that they are on island for the hard shell season which is more difficult to predict. The program can easily cope with Leatherbacks that are very easy to target therefore any assistance is better left until the leatherback season is almost over in June.

2014 leatherback numbers were very low as in the previous 3 years therefore they are only included here to give an overview of the activities and dates.
There were 8 recorded activities in 2014, 2 dry runs, 2 tracks and 4 confirmed lays.

Nest code	Date	Activity	Track Width	Encountered
DC1401	5-Mar	Lay	197.30	Unseen
DC1402	20-Mar	Dry run	205.66	Unseen
DC1403	27-Mar	Dry run	211.66	Unseen
DC1404	6-Apr	Lay	180.00	Unseen
DC1405	10-Apr	Track Only	169.00	Unseen
DC1406	15-Apr	Lay	172.66	Unseen
DC1407	23-Jun	Lay	181.00	Unseen
DC1408	16-Jun	Track Only	189.66	Unseen

The track widths suggest at least 3 different females visited Zeelandia during this season.

Infected eggs Nest DC1204

As is usual, the leatherback hatching success was abysmal at just 4%.
DC1401 was excavated and of the 93 eggs laid, there were 58 shells, 3 live hatchlings, 1 dead hatchling, 2 embryos, 1 full embryo, 2 predated, 30 yolkless. None of the eggs showed signs of bacterial infection.
Nest DC1204 contained 119 eggs and was unsuccessful with the following: 0 shells, 0 eggs no embryo, 80 eggs with embryo, 11 full embryos, 28 yolkless, 67 infected and 70 partially cooked.
Nest DC1406 contained 120 eggs and was a bit successful with the following: 3 live hatchlings, 3 dead hatchlings, 13 shells, 0 eggs no embryo, 51 eggs with embryo, 5 full embryos, 1 pipped dead, 2 predated, 48 yolkless, 0 infected and 0 cooked.

Nest DC1407 contained 92 eggs and was unsuccessful with the following: 0 shells, 34 eggs no embryo, 52 eggs with embryo, 6 yolkless, 25 infected and 37 cooked.
See table below.

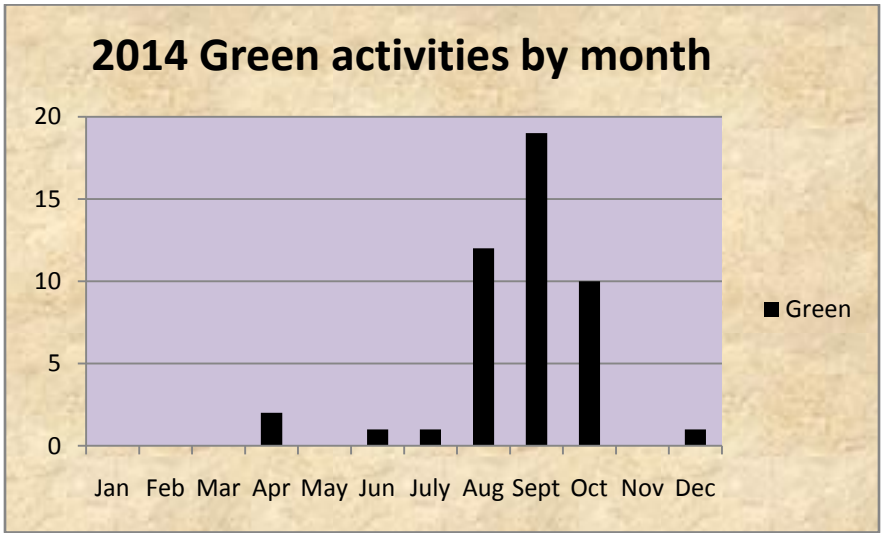
Table 1 Information on Leatherback nests

Nest Code	Hatchlings	Shells	Total eggs	Nest Fate
DC1401	3	58	93	hatched
DC1404	0	0	119	unhatched
DC1406	3	13	120	hatched
DC1407	0	0	92	unhatched

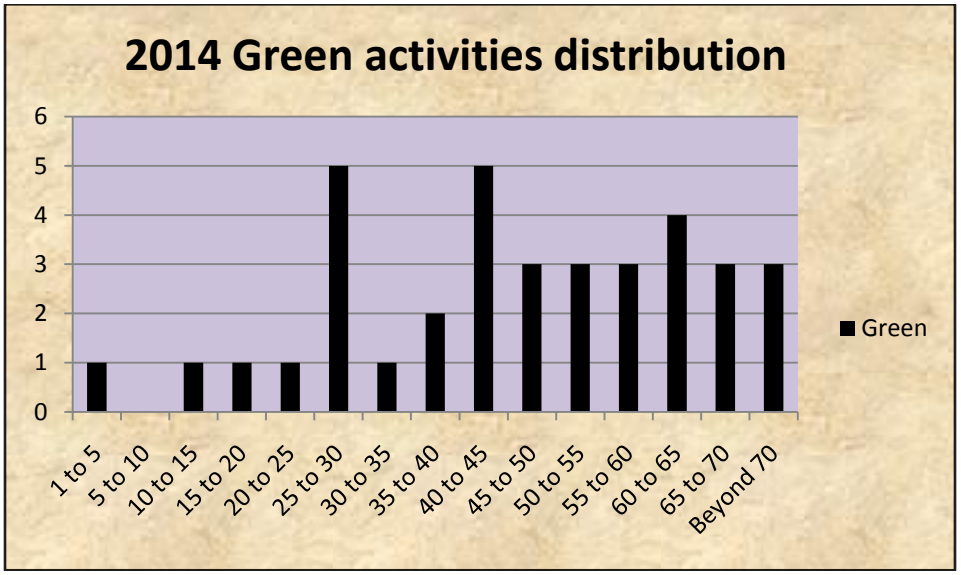
GREEN TURTLE SUMMARY

Nest Survival and Hatching Success

There were a total of 13 confirmed green turtle nests, 6 probable nests were unconfirmed and therefore not included. There were 16 dry runs recorded and 11 track only sightings. This brought the total of CM activities to 46 for the 2014 season.



2014 was a slow season for the Greens on the whole but things picked up in August with a slight increase in Green activities. As in previous years the months of August, September and October were the busiest for Greens. November remains a month in which the main activity is nest monitoring and maintenance.



Because of the widely distributed activities of the Green turtle, once the hard shell season starts which is usually in late June to July, the entire beach must be patrolled each evening. Because the length of the beach is 1.4km, and because hard shells are harder to target than leatherbacks, this part of the season is very taxing for the night patrol. For that reason the program focuses mostly on targeting of leatherbacks at the beginning of the season, in order to conserve manpower and prevent burnout before the nesting season ends.

Looking at the distribution graph above, it is fortunate that the Greens did not deposit any nests between stakes #31 to #36 as this area is regularly washed away by tidal surges. It is one of the most constantly changing areas of the beach. In the space of a few weeks, the water can be either up to the cliff or it could have deposited a 30 meter wide stretch of sand.

This stretch also experiences constant cliff falls. Some of the largest cliff falls on Zeelandia occur on this stretch of beach.

Stake #31-36 area. Saturated sand as waves are coming up to the cliff and a cliff fall in the background.

The table below provides a summary of the nest survival data obtained from each excavated green turtle nest of 2014; the table details nest code, turtle identification number and fate of the nest if known. All the confirmed nests in question except one were located on the Zeelandia beach/Turtle beach stretch.

Table 2 Green Turtle nest fate information

Nest code	Result	Date	Hatched	Nest fate
CM1401	Lay	12-Apr	June 25 2014	Hatched
CM1402?	Probable	12-Apr		Washed
CM1403A	Lay	28-Jul	Sept 30 2014	Hatched
CM1404?	Probable	1-Aug		Unknown
CM1408	Lay	13-Aug	Oct 03 2014	Hatched
CM1410	Lay	21-Aug		Unhatched
CM1411	Lay	24-Aug	Unknown	Hatched
CM1414?	Probable	30-Aug		Unknown
CM1417R	Lay	2-Sep		Tropical Storm
CM1418	Lay	4-Sep		Hatched

CM1420R	Lay	12-Sep		Unhatched
CM1425	Lay	14-Sep		Unhatched
CM1429	Lay	24-Sep		Hatched
CM1433	Lay	30-Sep	Oct 27 2013/ Nov 03 2013	Hatched
CM1434?	Probable	30-Sep		Unknown
CM1435?	Probable	1-Oct		Unknown
CM1438R	Lay	2-Oct	Nov 03 2013/	Hatched
CM1441?	Probable	17-Oct		Unknown
CMUN1401	Lay	Unknown	Unknown	Hatched

The nest codes that end with an "R" were those relocated to a safer location. The nests that end with A are those that were inadvertently given the wrong number and instead of redoing all the sequencing in the database, the nest code simply received a letter behind it to distinguish it. Codes ending in a "?" mean that the nest is probably a lay but has not been confirmed.

It was a very slow year for greens with only 13 nests confirmed.
The survival rate of nests for green turtles was encouraging. Nests whose fate was unknown were either washed away during storm surges or could not be relocated for excavation, even after extensive digging, due to inexact measurements on the data sheets. The average incubation period was determined from the 13 nests that hatched with known incubation days to be 54.8 days.

Species	**Mean depth to bottom/cm**	**Mean # eggs / nest**	**Mean % hatching**	**Mean % emergence**	**Mean days Incubation**
CM	68	86	55%	60.3%	55.3

Below is a summary of nest content data from excavated green turtle nests of 2014.
There were again yolkless eggs encountered during Green nest excavations in 2014.

Table 3 Green turtle nests excavation results

Nest code	Laid	Excavated	Alive	Dead	Shells	No Embryo	Embryo	Full Embryo
CM1401	12-Apr	June 25 2014	0	1	27	0	29	57
CM1403A	28 Jul	Sept 13 2014	0	0	32	0	6	0
CM1408	13 Aug	Oct 06 2014	2	5	106	0	2	9
CM1410	21-Aug	Nov 17 2014	0	0	0	0	77	4
CM1411	24-Aug	Dec 22 2014	0	2	47	39	9	1
CM1417R	2-Sep	Dec 18 2014	0	0	0	2	7	0
CM1418	4-Sep	Nov 01 2014	1	0	2	0	12	114
CM1420R	12-Sep	Dec 18 2014	0	0	0	0	117	0
CM1425	14-Sep	Dec 23 2014	0	0	0	28	94	4
CM1429	24-Sep	Nov 19 2014	0	0	52	7	34	9
CM1433	30-Sep	Dec 05 2014	0	0	6	0	0	0
CM1438R	02 Oct	Nov 19 2014	0	1	94	0	16	2
CMUN1401	Unknown	Dec 05 2014	0	0	14	0	0	1

Relocated Green nests in 2014

There were 3 Green turtle nests relocated in 2014. The results of the relocations are shown in the table below. The circumstances surrounding the relocations are explained individually.

Table 4 Relocated Green Turtle nests information

Nest Code	Date Laid	Hatching success
CM1417R	2-Sep	0%
CM1420R	12-Sep	0%
CM1438R	02 Oct	82%

The green nest CM1417R was found on September 2nd 2014 and recorded as a probable lay. It was confirmed a few weeks later on September 20th. During a subsequent morning patrol a few weeks after that, most of the sand in the area had disappeared due to a high tidal surge which is not uncommon on Zeelandia beach. On checking it was revealed that most of the nest had already been taken by the sea. An attempt was made to save the remaining 8 eggs by relocating them further up the beach. They were unfortunately unsuccessful. The total original egg count is unknown.

The nest CM1420R was recorded during a night patrol on September 12th 2014 and confirmed during the morning track survey the next day. It was deposited about 10 meters from the shoreline on an elevated stretch of sand. Over the weeks the sand ridge kept being eroded until the nest was only a few centimeters from the edge. The lint was found to be exposed during a morning walk and the nest was subsequently relocated 40 meters to the southwest. The nest was excavated for the public on the 18th of December and was completely unsuccessful. Every egg was partially cooked due to the high temperature of the sand. The depth to the top of the eggs in the new nest was 51cm which is slightly deeper than average for a Green nest so it is supposed that the eggs were cooked in the original nest position.

CM1438R was found during a morning track survey on October 2nd 2014, confirmed 2 days later on October 4th and due to a sudden heavy surge on the morning of the 7th of October had to be re-located to an area nearby, the same area in fact where CM1420R was placed. The nest was very successful with 94 shells out of a total of 115 eggs resulting in a hatching success of 82%.

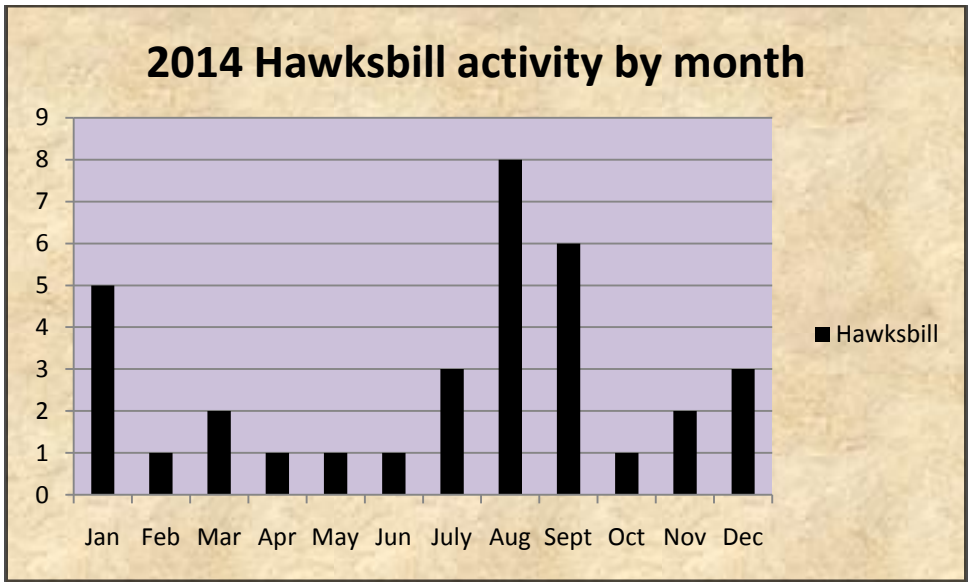
There were no re-migrant Green Turtles during the 2014 season that the program is aware of.

HAWKSBILL SUMMARY

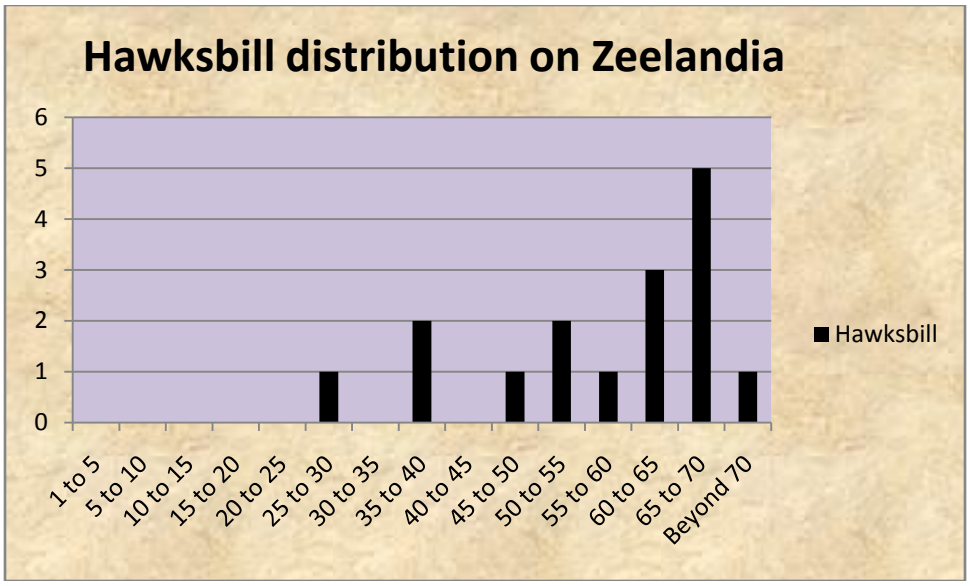
Nest Survival and Hatching Success

7 Hawksbill nests were confirmed in 2014. There were 8 tracks recorded and 12 dry runs. Another 6 nests were probable lays of which the eggs were never found. To the total activities must be added the stranded juvenile hawksbill discussed later on. That brings the total number of activities for Hawksbills in 2014 to 34.

The Hawksbill activity tends to pick up in July and they seem to come as late as December, long after the Greens have stopped nesting. They also tend to favor the southern end of Zeelandia beach which is not easy to patrol at night due to eroded sand and potential cliff falls.



More so than the other species that nest on St Eustatius, Hawksbills tend to nest throughout the year. While this is not done in great numbers it is noticeable that only the hawksbills nest outside of the known nesting season of March to November. The program can usually count on a hawksbill nest or two in January.
As with the Greens, the bulk of activity occurs in the August and September months.



Contrary to the other species that seem to favor nesting on Zeelandia beach, the 2014 hawksbills nested mostly near or on turtle beach and on the western side of the island. There were only a few activities on Zeelandia. Zeelandia beach becomes Turtle beach at the last corner at stake #62.

The tables below provide a summary of the nest survival data obtained from each excavated Hawksbill turtle nest of 2014; the table contains nest code, turtle identification number if available and the fate of the nest. The confirmed nests were located on various beaches around the island as Hawksbills do not shy away from rocky beaches.

Table 5 Hawksbill nest results 2014

Nest code	Location	Date	Excavated	Nest Fate
EI1401?	Turtle Beach	5 Jan		Unknown
EI1403	Turtle Beach	8 Jan	20 march	Hatched
EI1405	Turtle Beach	28 Jan	20 april	Hatched
EI1406	Turtle Beach	15 Feb	20 Apr	Hatched
EI1407	Turtle Beach	5 Mar	3 May	Hatched
EI1408	Turtle Beach	25 Mar	23 May	Hatched
EI1409	Oranjebaai	30 May	10 Nov	Hatched
EI1411?	Kay Bay	6 Jul		Unknown
EI1412?	Crooks	6 Jul		Unknown
EI1416?	Zeelandia	1 Aug		Unknown
EI1421?	Kay Bay	27 Aug		Unknown
EIUN1401	Turtle Beach	Unknown	3 Apr	Hatched

Below is a summary of nest content data obtained from excavated hawksbill turtle nests of 2014.

Table 6 Summary of Hawksbill nest excavation data

Nest code	Date laid	Excavated	Alive	Dead	Shells	No Embryo	Embryo	Full Embryo
EI1403	8 Jan	20 March	17	1	143	0	9	0
EI1405	28 Jan	20 April	84	27	166	0	17	1
EI1406	15 Feb	20 Apr	0	1	146	0	26	2
EI1407	5 Mar	3 May	5	18	141	0	21	0
EI1408	25 Mar	23 May	3	4	49	0	48	0
EI1409	30 May	10 Nov	0	0	133	0	11	0
EIUN1401	Unknown	3 Apr	13	6	149	0	21	5

Species	**Mean depth to bottom/cm**	**Mean # eggs / nest**	**Mean % hatching**	**Mean % emergence**
Hawksbill	56 cm	159	81.3%	67.1%

EI1409 was deposited around the end of May but could not be confirmed even after extensive digging. Only after a Tropical storm in early November were the eggs exposed. It is highly likely that some eggs had already washed away.

INFECTED AND (PARTIALLY) COOKED EGGS

Since 2009 when a number of nests were found to contain infected eggs the program has been properly documenting the occurrence of infected and (partially) cooked eggs throughout the entire season.
Since we have been paying attention it can be quickly noted if there is an increase or decrease in the amount of infected eggs seen and also of partially cooked or cooked eggs. The program will continue to record this data in the future as in some years there is a considerable amount of nests lost due to the two factors of bacterial infection and excessively high sand temperatures. With the predicted increase in temperatures the program will be in a position to best determine from combined years' data what mitigating measures can be taken to address the problem.

The summary below contains a breakdown of infected and (partially) cooked eggs from the nests excavated during the 2014 season and a breakdown by species. The figures for previous years are shown for comparison. There was such a low volume of nests in 2011 that the figures for that year are not included.

	2010	2012	2013	2014
Mean % of infected CM eggs	20%	7,56%	12%	12 %
Mean % of cooked CM eggs	20%	12,75%	9%	35%
Mean % of infected EI eggs	17%	6,9%	4%	1.5%
Mean % of cooked EI eggs	19%	9%	12%	9.8%
Mean % of infected DC eggs	-	-	13%	21%
Mean % of cooked DC eggs	-	-	16%	25%

While there is very little data recorded in the past, the percentages are still somewhat high for the low nesting population that we have locally. Some research has gone into determining why this happens as well as trying to determine if this occurs only in particular areas.

Total amount of hatchlings survived in

	2010:	2012:	2013:	2014:
• Leatherback	0	7	92	67
• Green	1850	2074	1385	371
• Hawksbill	962	816	473	870
• Unknown	61	0	205	0

TURTLE STRANDINGS

There were two turtle strandings in 2014. One stranding was reported by a member of the public who luckily had a camera at hand. The turtle was seen past Compagnie beach.

The program was informed by an expert that it is impossible to identify the remains because this is usually done by the prefrontal scales and they are gone.
Another expert, Dr Peter Meylan, was consulted through the WIDECAST directorate and he subsequently identified the carcass as that of a hawksbill.

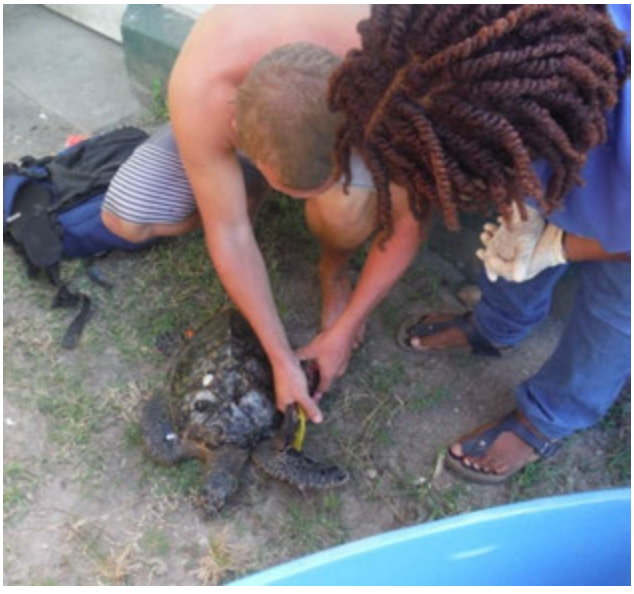
On October 1st 2014, the Marine Park staff brought a juvenile hawksbill to the office after seeing it in distress in the water. The turtle was floating on the surface and not reacting when they swam closer to it. On closer inspection they could see fishing line protruding from its anus.
It was placed in a tub with some fresh water for quick hydration and then examined by the Sea Turtle program coordinator. All the reflex tests were good, such as pulling gently on the flipper and the turtle tugging the flipper back strongly. It was also noticed that the turtle could easily raise its head to take a breath and exhibited the swimming reflex when held up. Therefore the decision was made to release the turtle after treatment.
Since the line was protruding from the anus by some inches, a gentle tug was done to see if the line could be extracted or not. Unfortunately the line was not moving very much so it was cut off as close to the anus as possible. This is the recommended procedure in the Sea Turtle Trauma Response guide prepared by WIDECAST.

The turtle was tagged with the tag numbers (L) WE68 and (R) WE69. The carapace measured CCL 40 cm and CCW 32cm.

Hawksbill with fishing line protruding from anus

Quick rehydration in some fresh water

The hanging section of fishing line that could be cut away



The turtle was able to be tagged before being released

Recommendations for the 2015 nesting season

PREPARATIONS & CONSIDERATIONS:

- Provide adequate training for the turtle program interns and volunteers. Emphasize the need to fill in all data fields on the forms.
- Regardless of training given to program assistants, Program Coordinator should be present at initial tagging events.
- Program coordinator is responsible for excavations and relocations unless confident that assistant can carry them out in their absence.
- Service the truck that is dedicated to the program as it should be in ready condition to use when on call.
- Re-stake the beach. Stakes also need to be repainted. In addition to replacing and repainting missing stakes, the stake number must be painted on to the cliff face as it is inevitable that stakes will be removed by storm surge.
- Maintain the signs placed at the entrances to the beach urging dog owners to be vigilant when letting their dogs loose
- Publicize the start of the season via all available media with a reminder that Zeelandia is a protected sea turtle habitat and all that implies.
- Notify the police and public prosecutor of the start of the season and the anticipation of their cooperation in the event of violations.

COMMUNITY AWARENESS

- Revitalize Summer Club activities as many children are repeat participants and find themselves involved in the same activities every year.
- Organize at least one evening presentation on sea turtles and the Program for the general public. If well attended, repeat.
- Dedicate at least two radio programs to sea turtles if there are no other pressing topics to be discussed.
- Update and utilize the list of persons wishing to view a nesting turtle, hatchling release or accompany the patrols.
- Publicize any notable events occurring during the season in the regional newspaper.
- Highlight the turtle program on the local television stations along with current footage.

ACTIVITIES:

- Continue with the beach beautification project as planting trees can also help to minimize runoff on the beach.
- Step up morning patrols on Kay Bay and Lynch beach to at least once a week during Green and Hawksbill season.

- Continue to lobby the company NuStar Energy NV to reduce the bright lighting on their storage tanks facing the beach.
- Continue to work on a light pollution solution to the buildings along the cliff.
- As much as possible try to leave nests in situ. Only in extreme situations should a nest be relocated.
- Relocation should be done to a site that is at least partially shaded during the day.
- Discard all remains from excavations into the surf instead of reburying them on the beach to avoid bacterial contamination of the sand.
- Take more accurate measurements when triangulating a nest location including the distance to the cliff face if applicable.
- Continue the use of the stick and lint system to re-locate the nest chamber. The use of only the one lint straight down was discontinued in mid-season in 2012.
- Survey Tumble Down Dick beach to the north of Smoke Alley
- As much as possible, every confirmed nest should be excavated and the eggs examined to determine the true fate of the nest.
- As much as possible check for living tags on Sea Turtles. This has not been done previously in the program.
- Beach mapping should be carried out as and when it was done in previous years to have a more long term view of sand movement and erosion on Zeelandia beach.
- Utilize the new and improved data entry fields on the computer. The entire system has been modified for easier analysis at the end of the season. All data field are now in one file instead of having separate files for every data type.

Acknowledgements

The St. Eustatius Sea Turtle Conservation Program wishes to recognize the following persons that have contributed and offered support during the 2014 nesting season.

The St Eustatius Sea Turtle Conservation program would not be operational without assistance from WIDECAST, Working Abroad and our international intern program. Additionally we would like thank Nustar Energy and the Ministry of EL & I for their support and donations towards the program.

The program wishes to recognize the following two people: Ms. Olga Schats who joined the program as a volunteer in 2012, and spent many hours of the day and night in 2014 assisting on Zeelandia Beach. She was invaluable as the person to do the morning track surveys. STENAPA board member Elsbeth Feenstra also devoted many mornings to doing track surveys.

Sheri Wright, a turtle enthusiast from Canada who came down to the island for two weeks to assist with the program. We suspect it was mostly to escape the harsh Canadian winter but we were very grateful for the assistance nonetheless.

For advice, recommendations and support we wish to specially thank Dr Karen Eckert, executive director of the Wider Caribbean Sea Turtle Conservation Network (WIDECAST).

Thank you to Anouk and Peter from Alterra for redesigning our database for easier record keeping and analysis.

For the general public, a special thank you to those who show interest and support. Looking forward to your participation in many seasons to come.