EMD
"Our Island. Our Environment. Our Responsibility."

Environmental Management Division

Monitoring Population Size of St. Helena Cetaceans

2003 - 2012

Elizabeth Clingham, Leeann Henry and Annalea Beard
June 2013

1. Executive Summary

This report summaries the monitoring of whales and dolphins (Cetaceans) in the waters of St. Helena. The monitoring was undertaken by the St. Helena Marine section staff from April 2003 until January 2012. Dedicated monitoring was undertaken via boat and land surveys. The Marine sighting scheme has greatly contributed to the information that we have on cetaceans present in St. Helena

St. Helena has a resident population of Pantropical spotted, Roughtoothed and Bottlenose dolphins. Seasonally Humpback whales visit to give birth to their young. In addition throughout the years St. Helena has records of a number of other cetacean species.

The baseline of cetacean presence and distribution has been established. From the analysis of the data collected it has highlighted that dedicated cetacean surveys are no longer required but ideally be repeated in 3 to 5 years' time. Nevertheless in and effort to remain vigilant of cetaceans it is important that the marine sighting scheme becomes the focal point in collecting cetacean data and take precedence in promotion.

The presence of Humpback whales and the evidence that they calf in St. Helena waters is of significant international importance and every effort must be made to ensure that a paper be prepared for publication in a scientific journal to recognise this importance.

Two species namely Roughtoothed dolphins and Humpback whales have been identified as not having protection in the Endangered Species and Protection Ordinance Schedule and should therefore be updated to reflect their significance to the island.

Most importantly this monitoring has highlighted a need to address all potential threats posed to cetaceans and the necessary management plans policies, procedure and law should be enacted as soon as possible.

Specific study on each species is the next step in cetacean monitoring however this is not restricted by finances and staff time. There are many people and/or organisations that specialise cetacean studies and in an effort to learn more it would be of benefit to St. Helena to support and encourage scientists with interests in St. Helena's cetacean species to visit and conduct research here to help enhance our knowledge.

2. Background

In April 2003 the Foreign Commonwealth Environmental Fund awarded St. Helena a grant to obtain external specialist support to train local personnel and set up a basic monitoring

scheme for cetaceans in St Helena waters. The aim of this project was to promote and support the sustainable development and environmental protection of the cetacean fauna in and around St Helena. This specialist came to the island for a period of six weeks to establish the monitoring scheme which was continued for a further eight years by the marine section of St Helena Government.

The monitoring scheme comprised of two parts

1) Land and sea based monitoring undertaken by the marine section
2) A marine public sightings scheme

Although the monitoring had different methodologies they both identified the type, number and location of dolphins and whales.

3. Methods

The monitoring of cetaceans was undertaken using two main methodologies: one land based and one boat based:

3.1 Land surveys:

All land surveys were undertaken from a fixed point at Ladder Hill, approx 190m above sea level, twice a month from 9am to 12noon. Binoculars were used to provide accuracy in species identification. The following environmental data was recorded every 15mins; survey start time, sea state, swell height, cloud cover, visibility, and sunglare percentage. If cetaceans were present the following information was recorded: species, group size, time of sightings and position (calculated using angle that cetacean/s could be seen from horizon (by use of handheld clinometers) and compass bearing in the direction that the cetaceans were (by use of a handheld electronic compass). When cetaceans were sighted this data was collected every five minutes until the cetaceans could no longer been seen.

3.2 Boat surveys:

Cetacean monitoring from the boat was undertaken twice a month starting approximately at 9am with two slightly different survey routes (Figure 1 and 2).

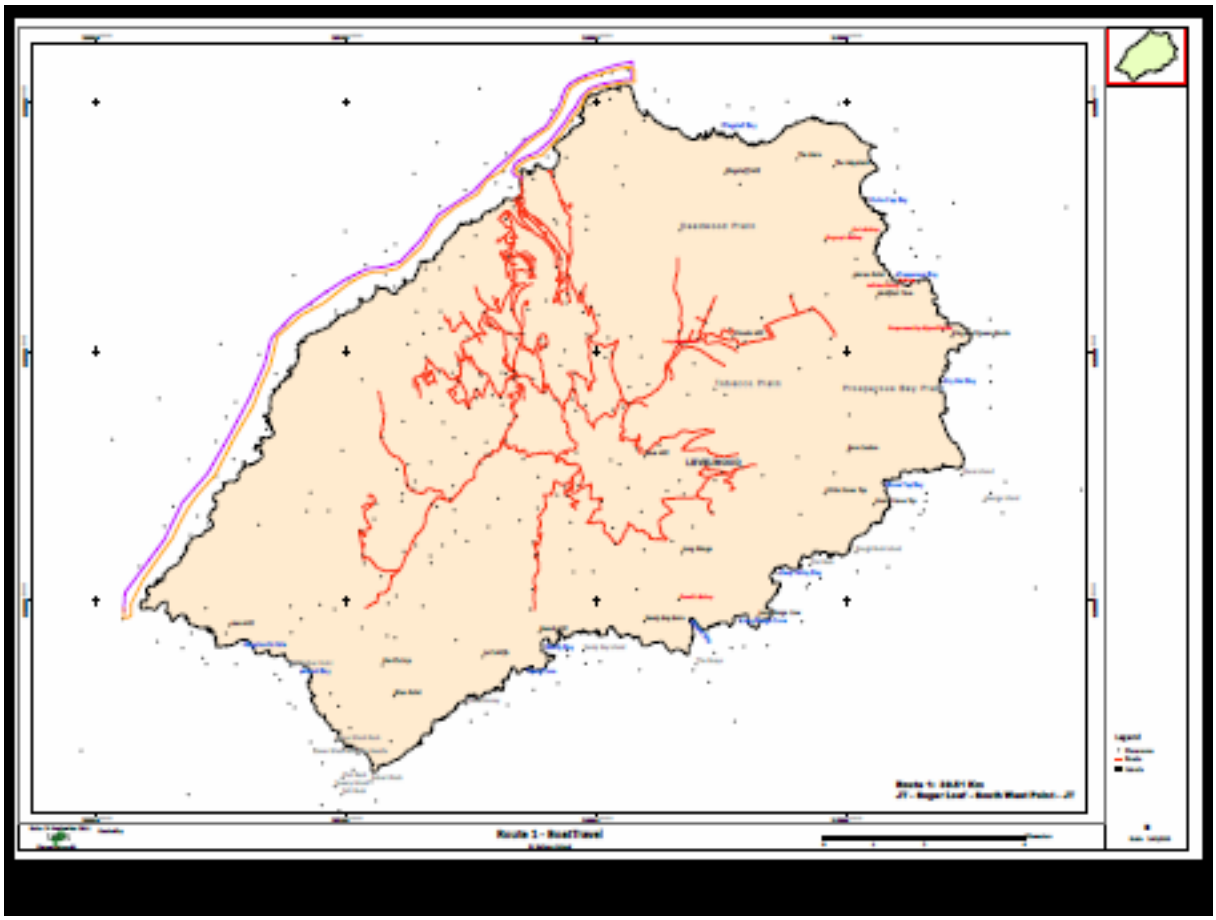


Figure 1: Survey route one: started from James Bay, along the coast up to Sugar Loaf Point, the boat was steered out to sea to about half a mile and then travel back continued until we reached a point just off Egg Island/South West Point - at this point the boat was turned 180 degrees and would travel back to James Bay along the same route (average distance of 20.96 nm)

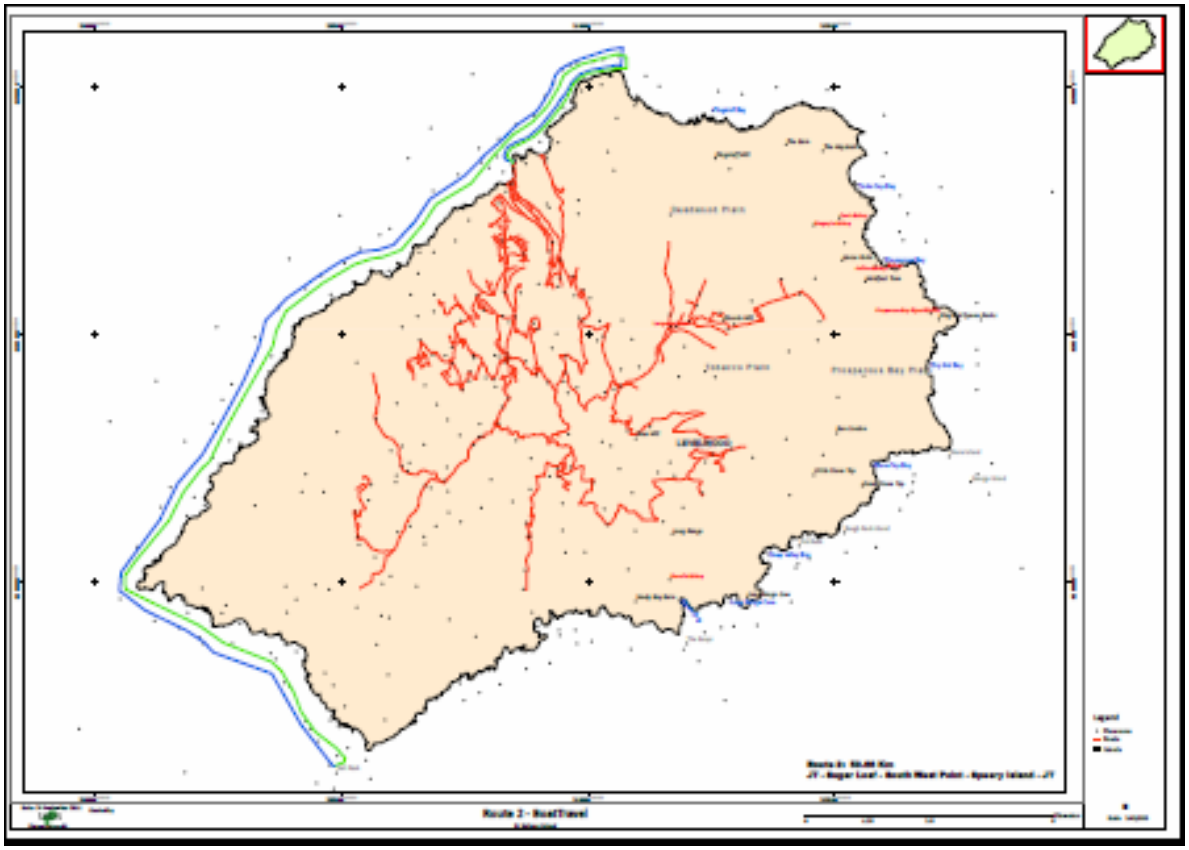


Figure 2: Survey route two: started from James Bay, along the coast up to Sugar Loaf Point, the boat was steered out to sea to about half a mile and then travel back continued until we reached Speery Island. This offshore island was circumnavigated and the boat steered back to the starting point along the same route (average distance of 28.02 nm).

For both routes the speed of the boat was 16km/hr or 8-10knots. The initial start position was recorded and once every 15min the boats position and environmental conditions were recorded the same as for the land surveys. Cetacean sightings (species and number) were recorded and if, encountered the environmental conditions were noted (environmental conditions were recorded as higher seastates and high glare could impair sighting rates and counting accuracies).

In addition once every 30mins the number of times the dolphins breached was recorded. Photos of the cetaceans were taken for later identification. At the end of the survey the final position and environmental parameters were recorded.

A dictaphone was used to record the results.

2.3 Marine Sightings Scheme

Members of the public, fisherman etc where asked to submit their sightings to the marine section either by telephone, email or the submission of a dedicated marine sighting booklet. They were asked to record the time that the sighting was noted, the location (as best they could describe it or in a predefined zone), what species they saw and the number of each

species they saw (see Appendix 4 for sighting booklet template). The marine sightings scheme was promoted via local media.

3.4 Analysis

All cetacean survey data was input into customised excel worksheets. The resulting data has been analysed where possible to establish;

- Effort involved in collecting data per data set and by species
- Sighting numbers
- Actual group size by sighting numbers
- Average group size
- Sighting rate
- Relative abundance
- Calf presence (number seen and sighting rate)

All data have been presented per species by month or by year.

All marine sighting records where entered into the marine sightings database as and when received. This data has been used to provide extra information where appropriate on the species but has not been used in the analysis.

4. Results

4.1 Species list of cetaceans present on St. Helena :

Resident

Pan Tropical Spotted Dolphins	*Stenella attenuatta*
Bottlenose Dolphins	*Tursiops truncates*
Rough Toothed Dolphins	*Steno bredanensis*

Seasonal

Humpback Whales	*Megaptera novaeangliae*

Occasional sightings of species positively identified

Blainville Beaked Whale	*Mesoplodon densirostris*
Sperm Whales	*Physeter macrocepalus*
Pigmy Sperm Whales	*Kogia Breviceps*
Dwarf Pigmy Sperm Whale	*Kogia sima*

4.2. Abundance, distribution, group size and trends of St. Helena cetaceans

By species the paragraphs below will indicate details on the following:

- Species Abundance
- Distribution
- Groups Sizes
- Any noted trends associated with each.

4.2.1 Pantropical Spotted Dolphins *(Stenella attenuatta)*

Pantropical Spotted dolphins (*Stenella attenuatta)* referred to locally as "porpoise" are seen on the leeward side of the island all year round were the most frequently recorded species.

Throughout the monitoring project, a total of 383 sightings of Pantropical dolphins were recorded. Pod or group sizes seen ranged from 5 – 425 individuals at any one time. The most commonly estimated group size ranges from 210 individuals to 290.). There is no clear evidence to suggest seasonal trends in Pantropical dolphin numbers. The annual average group size has been calculated and suggests that the resident population of Pantropical dolphins are on a steady increase (which is a view long shared by local fisherman (Fig. 3 & 4)).

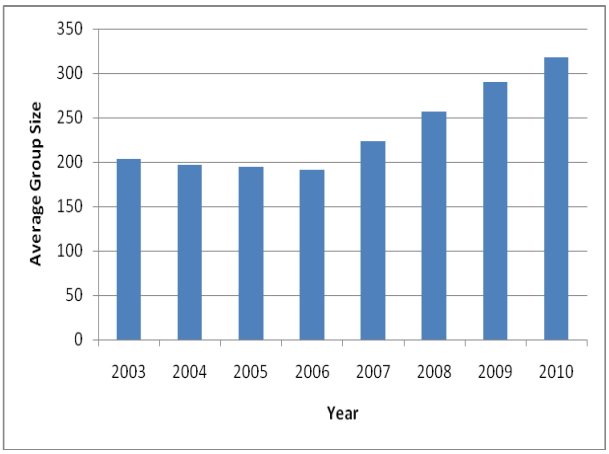


Figure 3: Average group size of Pan Tropical Dolphins 2003 -2010 (Boat Surveys)

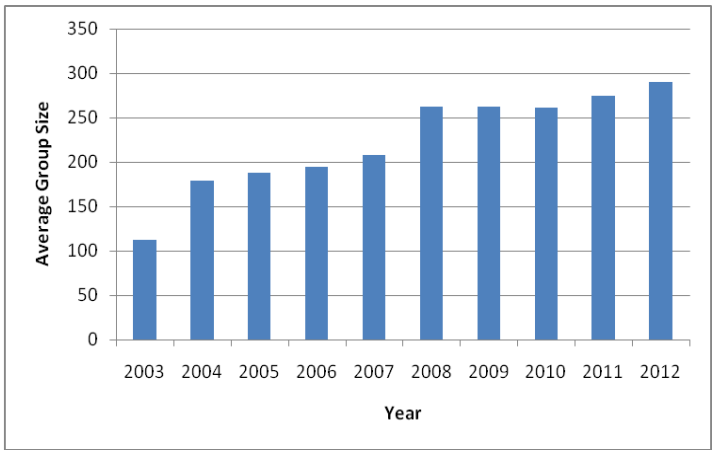


Figure 4: Average group size of Pan Tropical Dolphins 2003 -2012 (Land Surveys)

Calves and juveniles are generally present all year round with no clear peaks that would imply a potential breeding season. The data suggests that 59% of the time calves and

juveniles make up about 1% of a group (statistic calculated from boat survey data only from 2003 - 2010) (Figure 5).

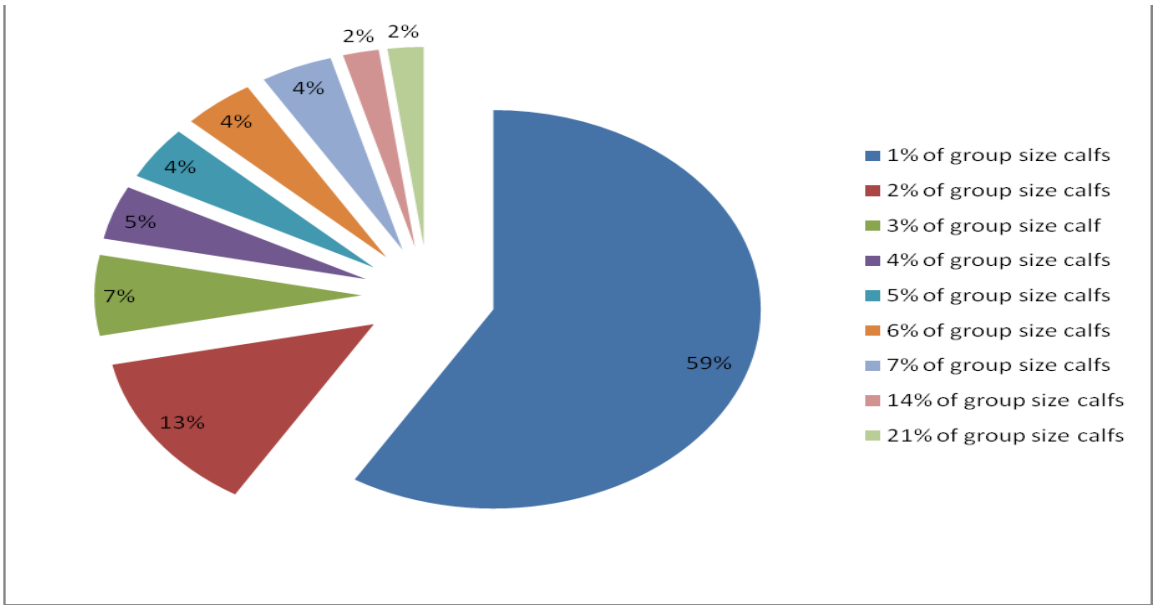


Figure 5: 59% of PTD sightings with calves representing 1% of total group 2003 - 2010

Pantropical dolphins on average have been seen frequently on the leeward size of the island and there are no records that can quantify that they are seen on the windward side.

The travel of Pan tropical dolphins are not represented by maps in this report as there is a substantial amount of data that is very complex. It can clearly identified that Pan tropical spotted dolphins are found just outside of Lemon Valley through to Breakneck Valley most of the time from 9 – 12noon of any day.

4.2.2 Bottlenose Dolphins *(Tursiops truncates)*

Although Bottlenose dolphins (*Tursiops truncates)* are generally sighted all year round they are least likely to be sighted from February to May. As there are so few records of Bottlenose dolphins, few conclusions can be drawn to support Bottlenose group sizes or any clear seasonal movement or pattern.

Group sizes range from 1-38. From land the most frequently sighted group sizes are between 9 and 13 individuals. From the boat, where more accurate counts can be ascertained showed group sizes ranging more frequently from 1 to 7 (Figure 6).

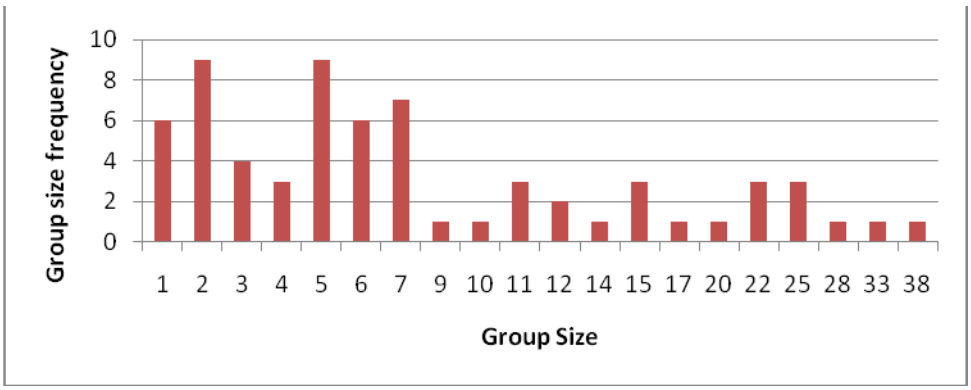


Figure 6: Frequency of Bottlenose dolphin group sizes from boat surveys.

Bottlenose dolphins and Roughtoothed dolphins are generally seen together in groups (42% of all sightings). Combined their group sizes can range from 2 – 105. Although it is difficult to determine what the ratio of Bottlenose Dolphins to Rough Toothed dolphins is in each encounter it can be safely assumed that bottlenose make up a larger percentage.

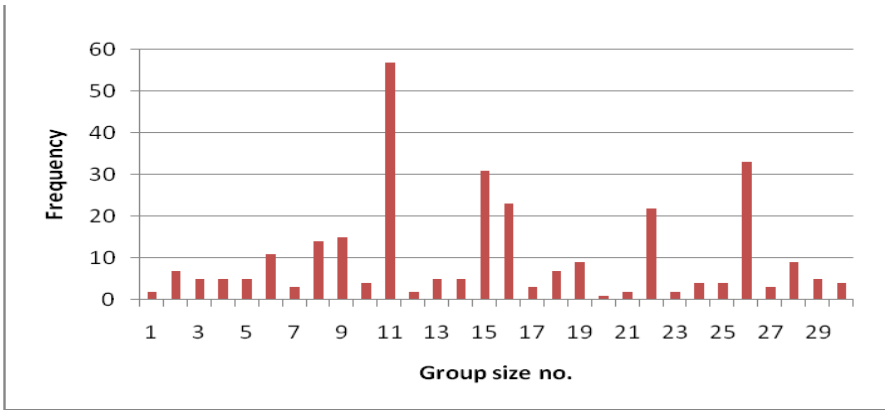


Figure 7: Bottlenose & Roughttoothed dolphin group sizes from combined surveys.

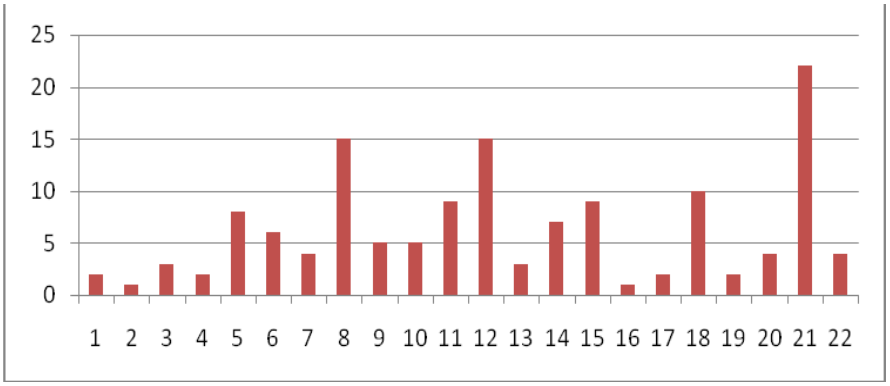


Figure 8: Bottlenose & Roughttoothed dolphin group sizes from boat surveys only.

Bottlenose dolphin calves and juveniles are rarely sighted. Again there is no clear pattern or trend depicting either seasonal presence or number seen that can be derived from our records.

Each year normally from July to September a small group of dolphins (group size ranging from 1 – 10) often frequent James Bay either early mornings or mid evenings. They are known to chase the flying fish into the bay so they are forced to smash into the wharf walls making easy meals (Appendix 5).

There is no clear pattern in relation to Bottlenose dolphin movements. All locations depicted predominantly favour James Bay and along the coast towards Robinsons Valley (Figure 9).

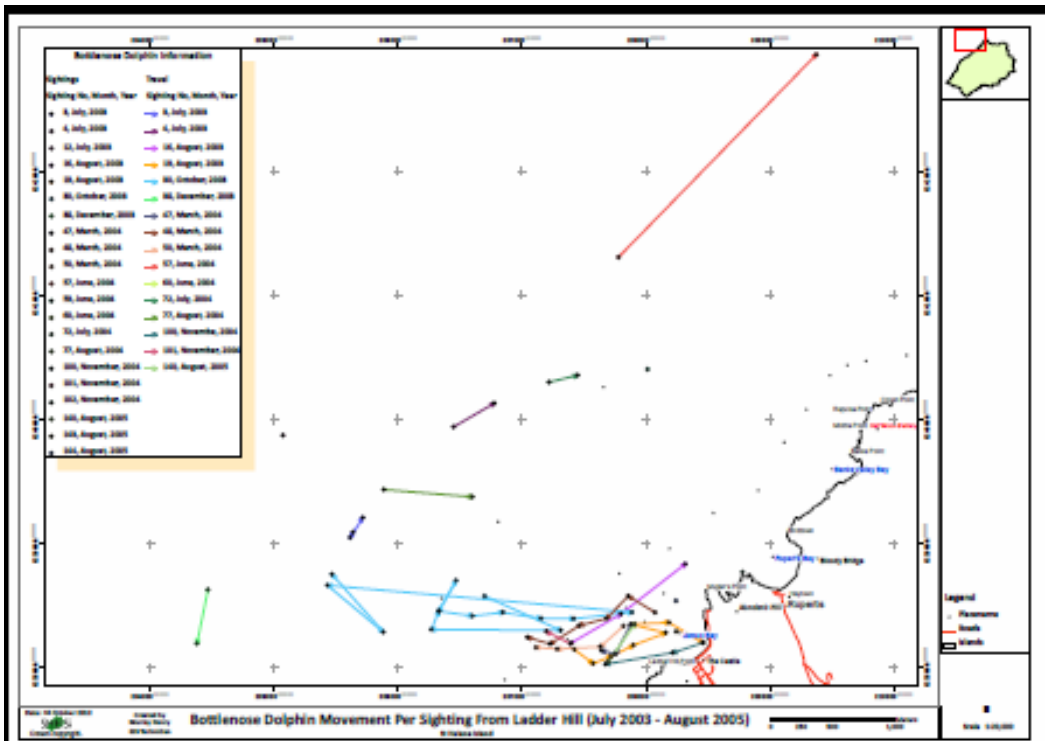


Figure 9: Bottlenose Dolphin movements from land based surveys.

4.2.3 Rough Toothed Dolphins (*Steno bredanensis*)

Rough Toothed dolphins (*Steno bredanensis*) are the least commonly seen dolphins. However they are skittish and once spotted they soon move away from the boat making group size estimates and identification difficult. There have only been 28 records of this species seen travelling alone, however there has been 70 sightings of rough toothed travelling in small numbers with bottlenose dolphins. It is also interesting to note that the presence of these dolphins have only been recorded in 2003, but is very likely that they were always there; previously they were probably misidentified as bottlenose dolphins.

When travelling alone they have been recorded in groups ranging from 5 to 48. On the leeward side of the island there appears to be no pattern to their travel or group size number. It is safe to assume that Rough Toothed dolphins are resident in St. Helena waters

but are species that are not easily or often seen. This species of dolphin is not listed in St. Helena endangered species legislation.

To date there have been no records which depict the presence of calves or juveniles.

Generally very little is known about this particular cetacean species.

4.2.5 Humpback Whales *(Megaptera novaeangliae)*

Humpback whales annually frequent St. Helena's waters from June to December of each year.

In June adult whales are seen alone or in groups of adults only. Later on they are seen generally as one adult with a calf which strongly suggests that they give birth to their young in St. Helena waters and after this tend to travel only as mother and calf. There hasn't been any research undertaken to identify t how long a mother and calf will stay in St. Helena waters before they leave

Humpback whales generally only give birth to one calf as they are often seen travelling with only one, however there has been two records which indicate that one adult has been sighted with two calves (30/09/2005 & 10/11/2008). Individual adults are often seen on their own at first with the highest percentage of calf sightings being reported from July onwards, with the peak season for calf sighting being in October of each year (Figure 10). This would suggest that soon after the whales arrive in St. Helena waters they give birth. There has been one record that suggests that someone has seen a Humpback Whale giving birth.

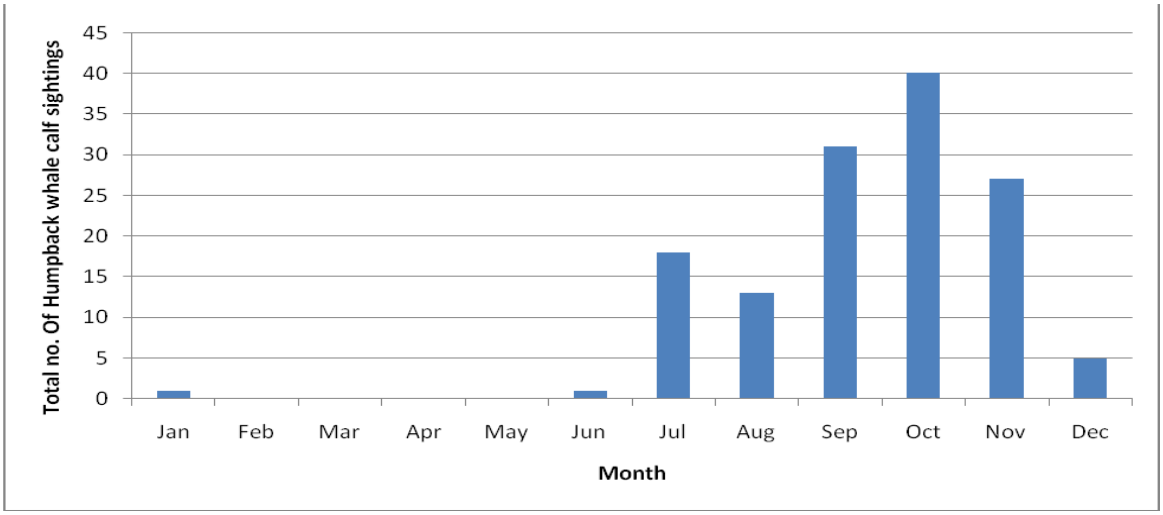


Figure 10: Marine sightings of Humpback whale calves from 1998 - 2012.

Eexactly how many individual whales frequent our waters each season cannot be concluded. Fisherman generally indicate that individual adults at any one time range from 8 – 10 (based on their comments from where they see the whales during their fishing trips –

although this cannot be quantified). To quantify this considerable effort would be required and specialist skill, this is potentially a new area of work.

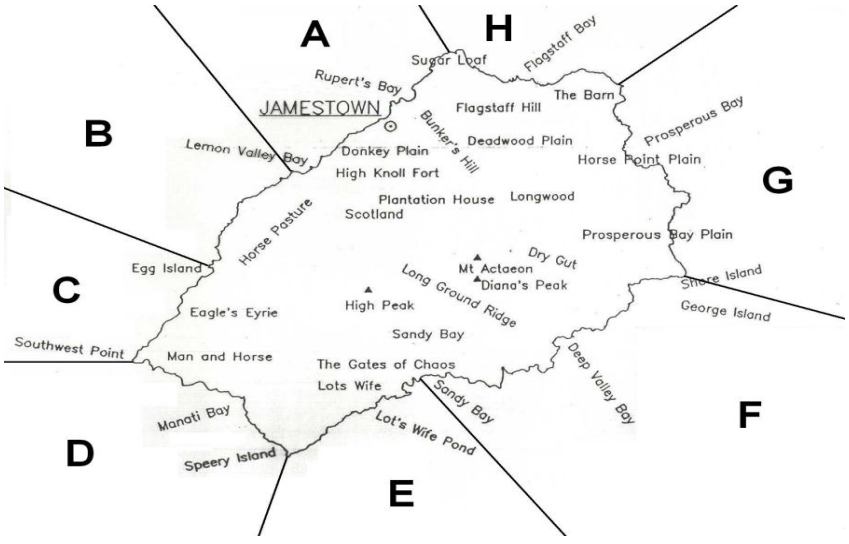
There are two known breeding grounds of humpback whales, one off Brazil and the other off the West Coast of Africa. Here we provide evidence of a third previously unknown breeding ground in the South Atlantic Ocean off the Island of St. Helena.

Humpback whale sightings have predominantly been recorded on the leeward side of the island although there are records of their presence on the windward side. There is no evidence to support that Humpback whales have a preference for any specific area or side of the island.

The marine sighting scheme has greatly supported the trends of Humpback whale sightings. Largely due to the fact that these are the easiest cetacean that can be identified by the general public and generate the most interesting (Table 1).

Table 1: Zones that Humpback whale sightings were reported through marine sightings scheme (zone map explained in Appendix 3)

Zone	A	B	C	D	E	F	G	H
Number of sightings recorded	243	26	108	43	33	25	8	11
%	49	5	22	9	7	5	2	2



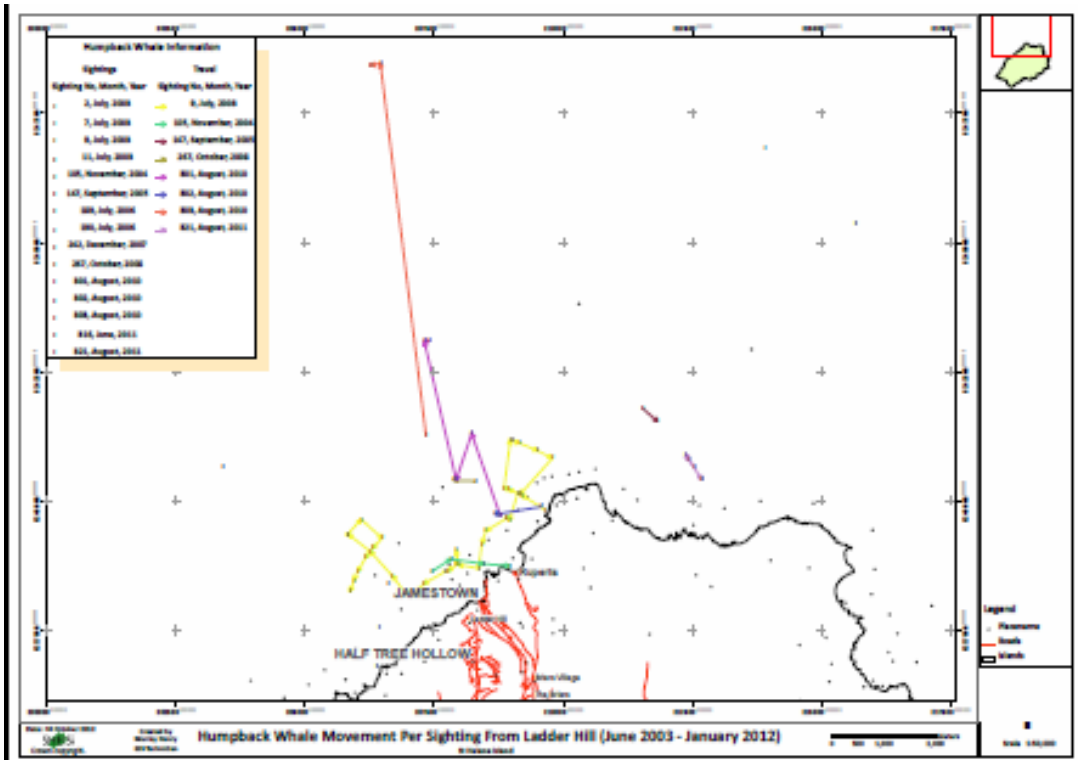


Figure 11: Humpback whale movements from land based survey 2003 – 2012.

4.2.6 Occasional cetacean sightings

Below are records of cetaceans that have been positively identified either through photographic evidence or adequate descriptions recorded in St. Helena waters.

Blainville beaked whales (Mesoplodon densirostris)

Species recorded only once in November 2007 from dedicated boat surveys seen at quite a distance out from Sugarloaf point. A picture was taken which was identified by Dr. Colin McCloud of Aberdeen University in 2011. The marine sightings database also holds three records which suggest presence of Beaked Whales, all of which were reported from the local deepwater fishing ground. Descriptions given are too vague to support positive identification.

Pigmy Sperm Whales/Dwarf Pigmy Sperm Whales (Kogia Brevicep/sima)

From dedicated cetacean surveys on three occasions in 2004 (August, September and October), a record is made of Pigmy or Dwarf Sperm whale. These species require specialist knowledge for positive identification.

Sperm Whales

There are only two records of this species recorded.

1) Reported by fisherman Dorian Caswell in July 2009 where he stated that he saw "20 Sperm whales all different sizes coming up with their mouths open. He stayed with them for around 2 hours. Pictures also taken (covered by local media at the time). These cetaceans where seen 6miles out of James Bay.
2) Reported by visiting yacht nearing St. Helena – only reported one individual. (30°08.75'S 14°20.35'E)

Other

Marine sighting databases reports the presence of Sei whales (2-4 individuals seen April 2011 three miles off Egg Island), Killer whales, False Killer whales and Southern Right whales – each only recorded once.

Unknown

There are records from the dedicated cetacean surveys and marine sightings which indicate cetacean species as being unknown. In many of the cases "unknown" means uncertain as to species at it is too far away to make a positive identification. In addition other records describe cetaceans not common to St. Helena but insufficiently described to make a positive identification. Such records would require specialist knowledge for positive identification.

5. Discussion

The data collected from this monitoring scheme is an invaluable source of information about St. Helena's cetacean fauna. We have also been able to establish a baseline for future monitoring

From this data the Environmental Management Division will be able to provide clear evidence based advice in relation to any proposed development for the island where cetaceans will be affected. In addition the SHG GIS office stores the location datasets of all land based cetacean sighting which will allow for subject specific analysis to be conducted as and when required.

This monitoring project has succeeded in raising general public awareness of cetacean fauna on the island. Literature has been produced and presentations given to both adult and school audiences. Data has also been used for production of scientific literature and in 2006 a paper was published by the Marine Biological Association in the UK entitled: Pantropical Spotted Dolphin (*Stenella attenuata*) and other cetaceans around St. Helena in the Tropical South-Eastern Atlantic; Colin D McCloud and Emma Bennett (Appendix 3).

The completion of this monitoring means that work effort can now be concentrated towards putting in place the necessary legislation, guidelines and policy requirements for the protection of St. Helena cetaceans. We have established a comprehensive picture of

cetacean fauna in St. Helena waters. In the long-term much of the data can be utilised in the formulation of marine management plans.

This is an ideal time to undertake this stage of work in St. Helena's history as the completion of St. Helena's airport is looming. For a long-time St. Helena has been protected by its isolation and small population size but St. Helena is now gearing towards providing unique tourist attractions. In order to keep St. Helena's uniqueness and environmental status protection is vital.

It is proposed that dedicated cetacean monitoring cease but that the relaunch of the marine sightings scheme be utilised to continue to facilitate our knowledge of St. Helena cetaceans. This is a further opportunity to engage with the public and facilitate ownership and protection of St. Helena marine environment to those that live and enjoy it.

6. Recommendations

- Dedicated cetacean surveys from land or boat are discontinued annually but are repeated every 3 to 5 years.
- The marine sighting scheme as it is becomes the focal point in collecting cetacean data.
- Further promotion of the marine sighting scheme is required as a priority area in the Environmental Management Directorate (EMD) communication strategy. A paper should be prepared for publication in a journal on the records of Humpback whales from St. Helena and the evidence that it is a breeding area so that international audiences are made aware of this.
- Specialists should be encouraged to undertake target studies of St. Helena's cetacean fauna.
- Effort is put into identifying all threats posed on cetacean presence and the necessary management plans policies, procedure and law be enacted as soon as possible.
- The Endangered Species and Protection Ordinance Schedule is updated to reflect Roughtoothed dolphins and Humpback whales.

Additional recommendations based on identified threats:

Threat/Threaten Activity	Recommended Actions

Underwater blasting	A procedure be drafted to protect cetacean fauna if underwater blasting work is carried out
Cetacean boat tours	Daily tour limits be enacted. Cetacean watching procedures be put in place. Boats require special licences to do cetacean survey tours.

Acknowledgements

I would like to thank the Foreign Commonwealth Office for funding the initial cetacean monitoring project. Thanks also to the Agriculture and Natural Resources Directorate Management who supported the continuation of the monitoring post project and special thanks to Mr Gerald Benjamin of the Fisheries Division at ANRD for this unwavering support throughout. Also thanks to the Environmental Management Directorate for supporting the reporting stage of this project.

I would further like to thank Dr. Colin McCloud (Aberdeen University) for initially setting up the cetacean monitoring scheme on the island; it should be noted that this was a voluntary contribution of his time and I would also like to acknowledge the support that he has provided to this project and monitoring scheme throughout.

Special thanks should also be extended to Emma Bennett previous Marine Scientific Officer for her impeccable organisational skills, transfer of monitoring skills and support to date.

Also thanks to Emma Fowler, Leeann Henry and Annalea Beard for conducting much of the field based monitoring and data entry. In particular I would like to thank Leeann Henry and Annalea Beard for the support with the formulation of this final report.

I would also like to acknowledge the support provided by Mr Graham Sim and Mr Johnny Herne.

And to all persons since 2003 who have in anyway contributed marine sightings.

References

Perrin, W.F. 1985. The Former Dolphin Fishery at St Helena. International Whaling Commission.

European Commission. 1931. International Convention on the Regulation of Whaling. Official Journal of the European Communities

Colin D. MacLeod and Emma Bennett. 2006. Pan-tropical spotted dolphins (*Stenella attenuata*) and other cetaceans around St Helena in the tropical south-eastern Atlantic. Journal of Marine Biology

St Helena Government (SHG). 1931. Whale Fisheries Ordinance (CAP 127). St Helena Government (SHG)

Alasdair Edwards. 1990. Fish and Fisheries of Saint Helena Island. NB Print & Design

St Helena Government (SHG).2003. Endangered Species Protection Ordinance 2003. St Helena Government (SHG)

Appendices

Appendix 1: Data

Inventory of cetacean datasets:

There are a number of different cetacean sightings datasets pertaining to St. Helena waters:

1. Dedicated Land-based watches recorded on excel – data collected and managed by the Marine Section
2. Dedicated Boat based watches recorded on excel – data collected and managed by the Marine Section
3. Marine Sightings database – information reported by the general public and fisherman and submitted to Marine Section (Marine sighting zoning location – Appendix 4)
4. Photographic Data- A significant amount of photographic data exists from surveys of cetacean, including Bottlenose Dolphins, Fin and Humpback Whales. Proposal was written.
5. GIS datasets - Marine sightings _2012 – mdb.

Data reliability

Trends and calculations only reflect Land and Boat survey data collected through dedicated surveys. Marine sightings scheme data have been viewed separately and aids narration only.

The original unedited version of the cetacean survey data has been kept, copies where made of these two datasets. On the copies in the first instance data entry records required "tidying up" the process included the following actions:

Note: Throughout this "tidying up" regular spot checks of records were made to ensure that the data has not been compromised or incorrectly edited.

- Correction of inconsistent data entry (i.e. in species names column: Sten/Bran, Sten+Bran, Bran/Sten, Bran+Sten, Bran and Sten *corrected to:* Sten/Bran
- Each field required formatting and uniforming (i.e. field to be time not text time to be 12:00 and not 12.00 etc)
- Initially working out of the correct trigonometry formula was introduced in order to correctly plot cetacean locations at sea into UTM coordinates (land survey data only)
- Potential error entry data was indentified and was checked against paper copies of field data sheets either for correction or to establish that the data was void due to human error

Reasons for data inaccuracies and error:

- It should also be noted that in some cases the indentified incorrect location data entry could have been as a result of inaccuracy of the equipment that has been used to collect data (this was mostly the case in sightings close to land)
- In all cases data collected in relation to groups sizes etc has been utilized for trend in group size calculations but not reflected on maps as bearing or angles incorrectly plot
- All data collected from 2003 – November 2005 would be deemed as most accurate data collected as this was the actual dedicated project duration timeframe

Note: All data has been collected when sea states where 3 or under which means that cetacean sighting are well within accuracy ranges and that maximum, estimated counts were derived from observations.

Land data records reflect sightings within a much smaller concentrated area and for a longer period–of time. Although there are limitations from land, more factors are regulated as opposed to boat surveys and therefore provide more accurate trends.

Appendix 2 : Journal article

J. Mar. Biol. Ass. U.K. (2006), **86**, 5250/1–6
Printed in the United Kingdom

Pan-tropical spotted dolphins (*Stenella attenuata*) and other cetaceans around St Helena in the tropical south-eastern Atlantic

Colin D. MacLeod*‡ and Emma Bennett†

*School of Biological Sciences (Zoology), University of Aberdeen, Tillydrone Avenue, Aberdeen, AB24 2TZ, UK.
†Fisheries Section, Agriculture and Natural Resources Department, Scotland, St Helena, South Atlantic Ocean.
‡Corresponding author, e-mail: c.d.macleod@abdn.ac.uk

The occurrence, distribution and structure of cetacean communities in the tropical south Atlantic beyond the shelf edge are poorly known with little dedicated research occurring within this region. At 15°58′S 005°43′W, the island of St Helena is one of the few areas of land within this region and the only one that lies in the tropical south-eastern Atlantic. As a result, St Helena offers an unique opportunity to study cetaceans within this area using small boats and land-based observations. This paper describes the results of a preliminary, short-term survey of the cetacean community around St Helena in the austral winter of 2003. Pan-tropical spotted dolphins (*Stenella attenuata* Gray, 1846) were the most numerous species recorded, followed by bottlenose dolphins (*Tursiops truncatus*) and rough-toothed dolphins (*Steno bredanensis*), a species not previously reported from St Helena before. This last species was only recorded occurring in mixed groups with bottlenose dolphins. Pan-tropical spotted and bottlenose dolphins differed in their spatial distribution around St Helena. While pan-tropical spotted dolphins were primarily recorded in resting in large groups in the lea of the island during daylight hours, bottlenose dolphins and rough-toothed dolphins were recorded closer to shore and on both the windward and lea sides. Humpback whales (*Megaptera novaeangliae*) were also recorded once during the survey, but interviews with local fishermen suggest that this species regularly occurs in the waters around St Helena in small numbers during the austral winter. The results of this preliminary survey suggest that the cetacean community around St Helena during this survey was relatively simple, consisting of up to three species that are present year round and one seasonally occurring species in the nearshore waters, with a small number of additional species occurring occasionally in deeper offshore areas.

INTRODUCTION

The oceanic cetacean community in the tropical south-eastern Atlantic beyond the West African shelf edge is poorly known and there has been little dedicated research into cetaceans in this area. At 15°58′S 005°43′W, the island of St Helena (an Overseas Territory of the United Kingdom) lies in the middle of this region and, as the only land mass within it, St Helena offers a unique opportunity to study oceanic cetaceans in the tropical south-east Atlantic using small boats and land-based observations. Such methods allow research to be undertaken relatively cheaply and with few of the logistical difficulties often associated with research into oceanic cetacean communities, such as the requirement of a large vessel capable of spending prolonged periods of time at sea.

St Helena is a relatively small island, being approximately 17 km long by 10 km wide, with an area of around 122 km^2. The highest point is 820 m above sea level. The island is of volcanic origin and represents the tip of a complex of extinct volcanoes which rise some 5000 m above the surrounding abyssal plane. The base of the volcanic complex is approximately 130 km across (Ashmole & Ashmole, 2000). The waters around St Helena can be divided into three zones (Figure 1). The first zone is the deeper offshore waters (exclusively beyond the 2001m depth contour) which cover the steep sides of the volcanic complex and the surrounding abyssal plane at depths of around 5000 m. The remaining two zones are coastal and are situated almost entirely over the narrow volcanic platform which surrounds St Helena. This area has been created by the erosion of the volcanic complex which formed St Helena and mostly consists of waters less than 200 m deep with relatively gentle seabed gradient, usually within 2 km of the shore. The two zones are the Windward Coastal Zone (WCZ), consisting of the south-east facing windward side where waters are relatively rough for most of the year, and the Lea Coastal Zone (LCZ), consisting of the north-west facing coasts in the wind shadow created by the mass of St Helena interacting with the south-east trade winds and where waters are usually relatively calm. In total, the coastal zones represent an area of approximately 150 km^2, with the WCZ being the larger of the two (Figure 1). The waters of St Helena are relatively cool considering their latitude (sea surface temperatures range from 22°C in winter to about 26°C in summer) due to the influences of the Benguela current bringing cooler water up the western coast of Africa. The prevailing winds are the south-east trade winds which blow almost continuously around the island

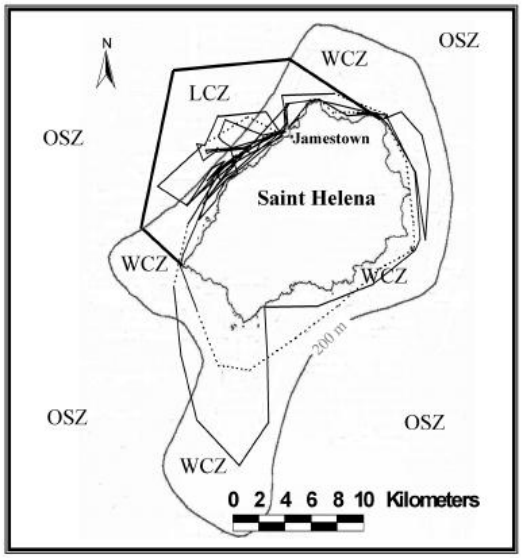


Figure 1. The maritime zones around St Helena, with routes of surveys conducted between 13 and 29 June 2003. LCZ, Lea Coastal Zone; WCZ, Windward Coastal Zone (landward of 200 m contour line); and OSZ, Offshore Zone. Solid lines, on effort 15 min survey sections (sea states three or less); and dashed lines, off effort 15 min sections of surveys (sea state Beaufort 4 or more).

at a speed of around 15 to 25 km/h (Ashmole & Ashmole, 2000). As a result of the interaction of the surface currents and prevailing winds with the mass of St Helena, an apparent island wake forms around the island. From coastal cliffs, current patterns caused by this island wake effect can be observed forming at the point where the two coastal zones meet, dividing the lea waters from those affected by the trade winds.

Knowledge of the cetacean community around St Helena can best be described as sketchy (Edwards, 1990). Whales and dolphins were reported around the island as early as 1634 (Peter Mundy quoted in Edwards, 1990). However, details of the exact species involved are unclear. Perrin (1985) undertook observations on the small cetaceans in the areas between April and June 1983. He reported the presence of pan-tropical spotted dolphins (*Stenella attenuata* Gray, 1846) in the LCZ, as well as bottlenose dolphins (*Tursiops truncatus* Montague, 1821), from sightings during his visit. The only other small cetacean confirmed to occur in St Helena is the spinner dolphin (*Stenella longirostris* Gray, 1828), although records of this species are limited to a single skull collected from the island in 1926 (Perrin, 1985). Perrin (1985) also received reports from local fishermen of other possible species including 'whale killers', 'blackfish', a small delphinid known locally as the 'white-bellied porpoise' and 'black porpoise'. However, none of the species to which these terms applied were identified with certainty. In addition, Perrin (1985) reported small cetaceans described by local people which he tentatively identified as rough-toothed dolphins (*Steno bredanensis* G. Cuvier in Lesson, 1828).

The humpback whale (*Megaptera novaeangliae*) is the only large cetacean species known from the near-shore waters around St Helena with adults, sometimes with calves, being recorded from July to September (Edwards, 1990). Humpback whales have been recorded around St Helena as far back as the early 19th century (Edwards, 1990) and the descriptions of whales seen during a visit in 1634 by an English Naturalist, Peter Mundy, are consistent with

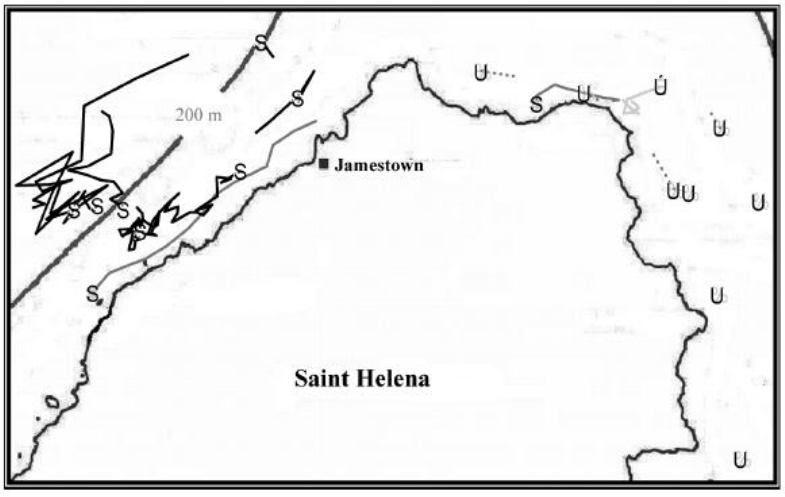


Figure 2. Positions and tracks of individual cetacean groups encountered. The start position for each encounter is indicated by a symbol (white circles, pan-tropical spotted dolphins; white circle with numeral in centre, mixed group of pan-tropical spotted dolphins and bottlenose dolphins; grey circle, mixed group of bottlenose and rough-toothed dolphins; grey square, bottlenose dolphins; and star, humpback whales). The line associated with each symbol represents the subsequent position of the group recorded at five min intervals.

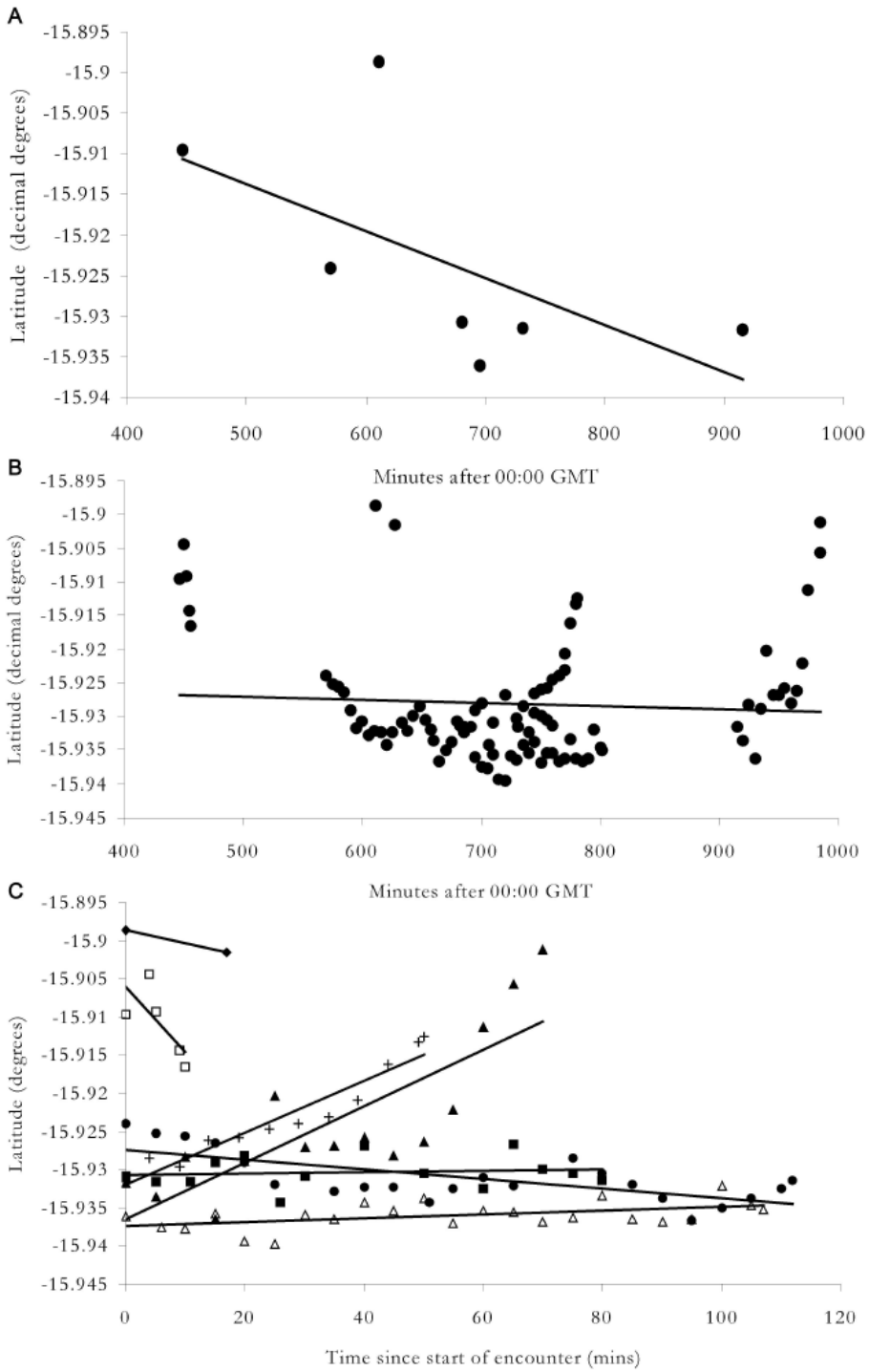


Figure 3. An analysis of trends in the location of pan-tropical spotted dolphins (*Stenella attenuata*) groups with time of day. (A) Latitude where each group was first sighted against minutes after 00:00 Greenwich mean time (GMT), with linear trend line; (B) the relationship between all recorded latitudes of pan-tropical spotted dolphin groups and the number of minutes after 00:00 GMT, with linear trend line; and (C) time since start of encounter and latitude of a group, with linear trend lines fitted individually for each encounter.

humpback whales ('. . . wee sawe a couple of whales, said to bee in heate or katte, for they went wallowinge, puffinge and spoutinge, sometimes side by side, then their tailes, then their heads aloft;'—cited in Edwards, 1990). Further offshore, sperm whales (*Physeter macrocephalus* Linnaeus, 1758) may occur and at one point St Helena was a major rendezvous point for American whalers targeting this species (Edwards, 1990). Other large whales known to locals include 'blue' and 'right whales', although the exact species these refer to is unknown (Edwards, 1990).

Until 1979 when it was banned and all local cetaceans received official protection, both pan-tropical spotted dolphins and bottlenose dolphins were hunted by the islanders, with up to several hundred pan-tropical spotted dolphins and about five to 15 bottlenose dolphins being taken each year (Perrin, 1985). Since 1979, few or no dolphins have been hunted directly. Humpback whales were also hunted close to St Helena in the 19th century, with locally-based fisheries primarily targeting humpback whales being set up in 1833 and 1875. A final, unsuccessful, attempt was made to set up an island-based whaling industry as late as 1910 (Edwards, 1990). All these whale fisheries appear to have failed, although the reasons for the failures are unclear.

In June 2003, we conducted a pilot study to assess the feasibility of setting up a long-term research project on the occurrence, abundance and ecology of the cetacean community around St Helena. While this pilot study was of relatively short duration, it allowed a preliminary assessment of what species of cetaceans regularly occur around St Helena and on differences in the distribution of the most commonly encountered species. It also allowed a comparison to be made with observations collected at a similar time of year in the early 1980s (Perrin, 1985) regarding the daily occurrence of pan-tropical spotted dolphins in the LCZ, revealing how this has changed, possibly in response to changes in local human hunting pressures.

METHODOLOGY

Between the 13 and 29 June 2003, data were gathered from dedicated boat surveys and incidental sighting reported by local people. Nine boat surveys covering 272.56 km (218.64 km 'on effort' when sea state was Beaufort three or less and 53.92 km 'off effort' when seas state was over Beaufort three—Figure 1) were conducted using locally available boats ranging in length from eight to 10 m. At least two observers and one crewman were onboard during each boat survey. The surveys could be divided into two types: 1, short surveys of the inshore waters of the LCZ; and 2, long surveys that circumnavigated the island, passing through both the LCZ and the WCZ. The occurrence of either type of survey was strongly weather dependent, particularly for the second type, and were conducted whenever the sea conditions were suitable.

For the duration of each survey, the position of the boat was recorded using a hand-held Garmin global positioning system receiver along with the direction of travel, speed and environmental conditions such as sea state, wind strength and direction, visibility and type of precipitation. During 'on effort' periods, at least one observer was stationed on each side of the boat and scanned an area from directly ahead of the vessel to approximately 135° from the bow of the vessel. Due to the low eye height above sea level (generally between 1.5 and 2.5 m) and the stability of the vessels being used, scans were primarily conducted with the naked eye to detect cetaceans. During 'off effort' periods scans were conducted on a more opportunistic basis with at least one observer scanning the 270° arc ahead and to the sides of the vessel. Whenever a group of cetaceans were encountered, a position was recorded within 100 m of the group and the group was subsequently followed until either the group was lost or it was determined that the survey would have to be continued in order to be able to complete it in the available time. When with a group, the number of animals, composition and behaviour was recorded every 15 min along with an updated position. Between these 15 min periods, opportunistic recordings of behaviour were recorded along with photographs (using a Nikon F90x fitted with a 100–300 mm lens) and video footage (using a JVC digital video camera). Behavioural recordings consisted of noting the timing of specific behavioural events of individuals or small groups of animals close to the vessel using a microcassette recorder.

On return to shore all data were entered into a geographical information system (GIS) constructed using ESRI Arcview 3.2 software. The total level of effort was calculated by plotting the 15 min positions and calculating the surveyed distance between them. The positions and tracks of individual cetacean groups were also plotted within the GIS and compared between species. Finally, the temporal trends in the position of groups of pan-tropical spotted dolphins within the LCZ were investigated. Three separate comparisons were undertaken: (1) a comparison of the latitude of first sighting of each group of dolphins and time of day; (2) a comparison of all positions recorded for all dolphin groups and time of day; and (3) a comparison of the latitude of each group with the time since the start of the encounter.

RESULTS AND DISCUSSION

Four species of cetaceans were sighted. These were pan-tropical spotted dolphins, bottlenose dolphins, rough-toothed dolphins and humpback whales. Reports were also received from local fishermen of pilot whales (*Globicephala* spp.) and beaked whales (of undetermined species) in offshore waters.

Pan-tropical spotted dolphins were sighted seven times (Figure 2). On each occasion the sighting consisted of a large group of animals (mean: 143, range: 70–300) dispersed into smaller sub-groups of about 20–30 individuals over an area of up to approximately one square kilometre. There was some evidence of age/sex segregation with some sub-groups being primarily made up of juveniles, others adults and small calves, and others of larger individuals with higher levels of white pigmentation on the tip of the beak and on the 'lips', presumably representing adult animals. All encounters with pan-tropical spotted dolphins occurred in the calm waters of the LCZ, and they were sighted on seven out of eight days when the LCZ was surveyed. During each survey when

pan-tropical spotted dolphins were encountered, only a single group was seen, with no evidence of additional separate groups occurring in the LCZ at the time.

Pan-tropical spotted dolphins were observed for a total of 446 min (mean duration of an encounter: 63.7 min, range: 10–112 min). Throughout each encounter behaviours such as logging, milling, bow-riding, breaching and other surface activities were frequently observed. Most aerial behaviours, such as jumping and breaching, were undertaken by calves or juvenile animals and often consisted of multiple sequences of up to seven or more breaches by the same individual, with each breach being lower than the preceding one. No evidence of any foraging or feeding was observed and there were no seabirds associated with the dolphins during any encounter. As a result, we conclude that pan-tropical spotted dolphins were primarily using the LCZ to rest and that although the number of animals which use this area may vary between days, all individuals using this area at any one time form a single large, dispersed group. Reports from local fishermen indicate that pan-tropical spotted dolphins also occur in deeper, offshore waters to the windward of the island (including the outer limits of the WCZ) and this may represent the primary foraging area for the dolphins which come into LCZ to rest. This is consistent with the findings of Perrin (1985) from his visit in 1983.

However, a very different pattern of utilization of the LCZ by pan-tropical spotted dolphins was observed in 2003 from that observed in 1983. Perrin (1985) reported that in 1983 pan-tropical spotted dolphins consistently moved inshore at the southern end of the LCZ in the early morning and moved slowly north before leaving the LCZ at the northern end before noon. During this study, dolphins where recorded in the LCZ from as early as 07:26 Greenwich mean time (GMT) until as late as 16:25 GMT, and most groups moved a relatively short distance between when they were first sighted and when the survey boat moved on (average distance between first and last position of an encounter: 1.85 km, range: 0.30–4.32 km). For the first position in each encounter, there was an apparent relationship between position and time of day, however, this was the opposite to that observed by Perrin (1985) with the first position of groups seen later in the day occurring further south than those seen earlier in the day (Figure 3A). When all positions for each encounter (taken at five minute intervals) were taken into account, the relationship with latitude all but disappeared (Figure 3B). For the majority of encounters there was no clear relationship between time since the start of the encounter and latitude, and, although some groups moved northward during an encounter, there was little consistency in the direction of movements between groups (Figure 3C). This contrasts sharply with time of day the LCZ was used and trends in direction of movement observed by Perrin (1985).

This difference between observations in 1983 and 2003 may represent a change in habitat utilization over time, with animals now making greater use of the LCZ to rest in daylight hours than in 1983. Perrin (1985) undertook his observations shortly after hunting for small cetaceans was banned in St Helena. Therefore, we suggest that the change in utilization of the LCZ area between 1983 and 2003 could reflect a long-term 'adaptation' of the local dolphin population to this cessation of a direct hunting due to official protection, with utilization of the LCZ increasing in response to a drop in the 'predation' by fishermen while the dolphins are in this area. In a similar vein, Perrin (1985) noted that while bow-riding, animals did not surface directly under the bow of the boat, from where they were traditionally harpooned, instead they moved away from the boat by several metres to surface before returning to the boat's bow. Although this pattern of surfacing was observed during this study, animals also surfaced directly under the bow while bow-riding. Again this may reflect a change in behaviour over time since hunting ceased.

Bottlenose dolphins were encountered on nine occasions in groups ranging from two to between 15 to 20 animals. On three occasions they were sighted in mixed species groups, once with pan-tropical spotted dolphins and twice with rough-toothed dolphins. Bottlenose dolphins were consistently sighted closer to the coast than pan-tropical spotted dolphins and were most frequently seen close to shore in the WCZ (seven out of nine sightings), where pan-tropical dolphins were never sighted during this study (Figure 2). While no surveys were conducted in the offshore zone during this study, Perrin (1985) reported a group of bottlenose dolphins five to seven kilometres to the north-east of St Helena, suggesting they may also utilize deeper, offshore waters on occasions.

Rough-toothed dolphins were sighted on two occasions, in both cases as a small number of animals (five to 10 on one occasion and 12 to 15 on another) encountered in a mixed group with bottlenose dolphins close to the shore (Figure 2). These dolphins remained elusive throughout both encounters and species identification had to be confirmed through photographs on both occasions. These are the first confirmed records of rough-toothed dolphins for St Helena, although, as noted above, Perrin (1985) tentatively identified this species as occurring in St Helenian waters.

Humpback whales were also sighted on a single occasion in the WCZ (Figure 2). The group consisted of three animals, two of adult size and one calf. Local fishermen reported humpback whales in waters further offshore in the WCZ throughout the period of this study. Anecdotal reports we received suggest that humpback whales occur seasonally in small numbers in St Helenian waters throughout the late austral winter from the end of June until around October both in the WCZ and the LCZ. Most reported sightings are of single animals or adults with calves. The historical presence of humpback whales in St Helenian waters and the current anecdotal reports suggest that humpback whales regularly use these waters, possibly as winter breeding/calving grounds. The only other known breeding/calving grounds for this species in the south Atlantic are off the African coast 1800 km to the east at the nearest point and off eastern South America 3260 kilometres to the west (Walsh et al., 2000; Martins et al., 2002). Currently, it is unclear whether the humpback whales which visit St Helena are isolated from these other breeding groups or whether there is interchange with any of these areas. However, due to the distances from other breeding grounds, it is possible that the current small number of whales reported annually from St Helena are the remnants of a relatively

isolated breeding population depleted by past whaling in the local area (and/or other parts of their range) and, as such, represent an additional genetic reservoir for humpback whales in the South Atlantic. The relationship between humpback whales around St Helena and those in other areas will be investigated during future research using genetic and photo-identification techniques.

In summary, the coastal waters of St Helena are utilized year-round by at least two cetacean species (pan-tropical spotted dolphins and bottlenose dolphins) and seasonally by at least one more (humpback whales). Currently, too little is known about rough-toothed dolphins around St Helena to know whether they are present year-round, seasonally or whether they only occur occasionally around St Helena. The two species known to be present year-round species appear to occupy different ecological niches within the local marine ecosystem and use coastal waters for different purposes. Pan-tropical spotted dolphins primarily use the LCZ to rest during daylight hours and forage in other areas, such as the offshore waters and the outer WCZ. In contrast, the bottlenose dolphins use the coastal waters of both the LCZ and WCZ in daylight and anecdotal reports suggest they also use these areas at night. In addition, bottlenose dolphins utilize the areas closest to shore and the inner WCZ where pan-tropical spotted dolphins were not seen.

We would like to thank the people of St Helena for their help with this research particularly Johnny Herne, Donny O'Bey, Michael Francis and Gerald Benjamin. This research was funded by a grant from the Environment Fund of the Foreign and Commonwealth Office of the United Kingdom.

REFERENCES

Ashmole, P. & Ashmole, M., 2000. *St Helena and Ascension Island: a natural history*. Shropshire, UK: Anthony Nelson.

Edwards, A., 1990. Fish and Fisheries of Saint Helena Island. Saint Helena Government and University of Newcastle upon Tyne, Newcastle, UK.

Martins, C.C.A., Morete, M.E., Engel, M.H., Frietas, A.C., Secchie, E.R. & Kinas, P.G., 2002. Aspects of habitat use patterns of humpback whales in the Abrolhos Bank, Brazil, breeding ground. *Memoirs of the Queensland Museum*, **47**, 563–570.

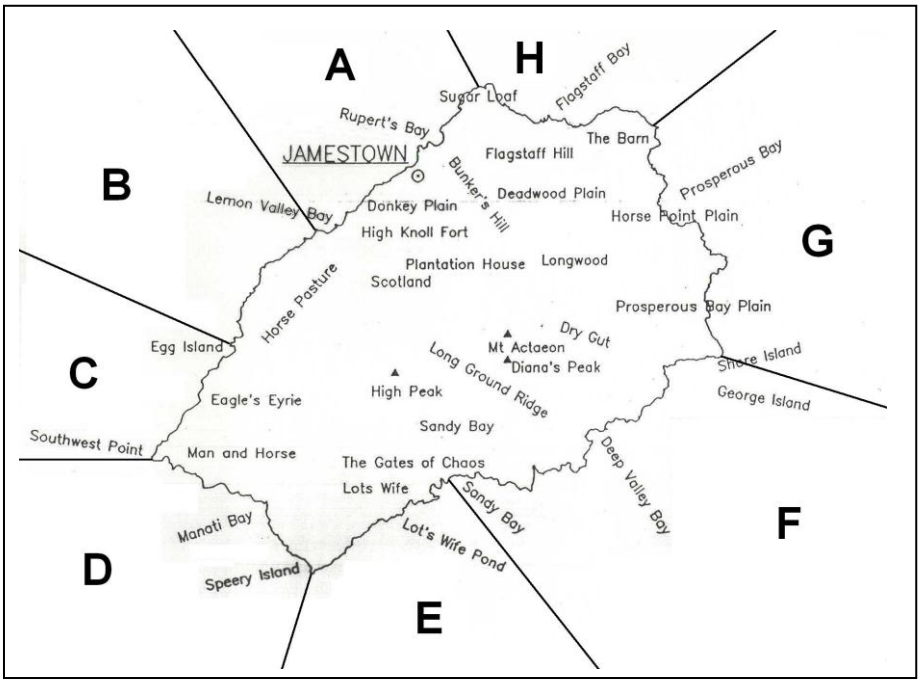
Perrin, W.F., 1985. The former dolphin fishery at St Helena. *Report to the International Whaling Commission*, **35**, 423–428.

Walsh, P.D., Fay, J.M., Gulick, S. & Sounguest, G.P. 2000. Humpback whale activity near Cap Lopez, Gabon. *Journal of Cetacean Research and Management*, **2**, 63–67.

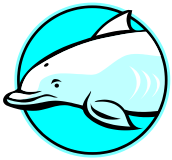
Submitted ●●●. *Accepted* ●●●.

Appendix 3: Marine sighting scheme location zoning details

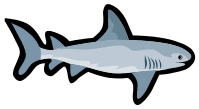
Zone	Description
A	From the Half Moon Battery it includes Lemon Valley Bay, Donkey Plain, Ladder Hill Point, James Bay, Rupert's Bay, Bank's Point, Buttermilk Point up to Sugar Loaf.
B	It Includes Swanley Valley, Ladies Chair, Dry Gut Bay, Lighter Rock, Horse Pasture Point, Long Ledge and up to the Half Moon Battery.
C	From South West Point it includes Tripe Bay, Black Rock, Thompsons Bay, Thompsons Valley Island, Egg Island, Peaked Island, past Old Womans Valley and before Swanley Valley to an area called "The Monkey".
D	From Castle Rock Point it includes Manati Bay, Bird Island, Speery Island, Flat Rock, Salt Rock up to South West Point.
E	From Potato Bay it includes Sandy Bay, Lot's Wife Ponds, Frightus Rock, Robert Rock up to Castle Rock Point.
F	From Gill Point it includes Stone Top Bay, Rough Rock, Deep Valley, Powell's Bay and up to Potato Bay.
G	From Barn Long Point it includes Prosperous Bay, King and Queen Rocks, Prosperous Bay Plain and up to Gill Point.
H	From Sugar Loaf it includes Sugar Loaf Crack, Sugar Loaf Point, Dockyards, Flagstaff Bay up to just before Barn Long Point.



Appendix 4: Marine sighting record sheet



Marine Sightings Record Sheet



Date:……

Time - please record exact time (24hr clock) if known or circle the approximate time of day. Exact time: …… AM PM

Type/Species - please circle below

Turtle	Hawksbill/Green/Other
Whale	Humpback/Other
Dolphin	"porpoise"/"cow porpoise"/Other
Seabirds	Cape Hen/Masked Booby/Red-billed Tropic Bird/Other
Shark	Whale/Hammerhead/Mackerel/Other
Fish	Flying fish/Bait/other

If other, or not mentioned above please name species……

Number Seen - please tick (or record exact number if known)

1		5-10		16-20		31-50		101-200	
2-4		11-15		21-30		51-100		200+	

Recorded By:……

Location Seen - Name of place/fishing ground/area

(Mark the place where you saw sighting on the map and record GPS position if available).

……

……

……

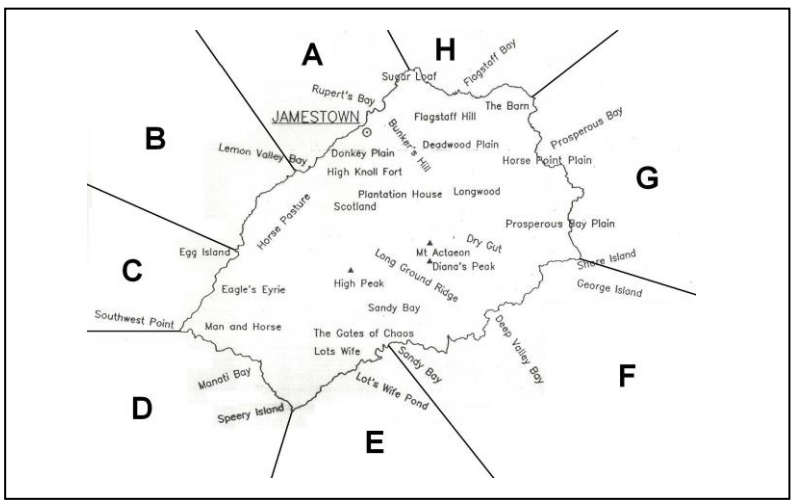
Any Other Comments/Notes:

……

……

……

……



Please record each sighting on a different sheet.

Thank you!

Please return to the Marine Section, Environmental Management Directorate

Appendix 5: Record of all Bottlenose dolphins seen chasing flying fish into steps at Wharf landing steps

Date	Species Common Name	Geolocation	Notes	Range of Individuals Seen	Zone	Location Description	Time
01/07/2003	Bottlenose Dolphin	Front Steps	Seen sometime during the week beginning this date. Coming in to feed on flying fish; were 4 of them; seen around 4am + rough toothed as below	2-4	A	Front Steps, James Bay	04:00
26/07/2003	Bottlenose Dolphin	James Bay	About 12 bottlenose present. Were feeding on flying fish. ~ 4am seen.	11-15	A	Wharf area	04:00
23/04/2004	Bottlenose Dolphin	Front Steps	~ 12 midnight. Saw 2 bottlenose dolphins in steps area, chasing flying fish. RMS was in & lights on, on wharf.	2-4	A	Front Steps, James Bay	00:00
26/06/2004	Bottlenose Dolphin	Front Steps	Bottlenose & flying fish seen ~ 9pm. NB: US Navy Ship in harbour	5-10	A	Front Steps, James Bay	21:00
27/06/2004	Bottlenose Dolphin	Front Steps	Bottlenose & flying fish seen ~ 9pm. NB: US Navy Ship in harbour	5-10	A	Front Steps, James Bay	21:00
28/06/2004	Bottlenose Dolphin	Front Steps	For the last few mornings ~4am, bottlenose and flying fish seen in harbour	31-50	A	Front Steps, James Bay	04:00
29/06/2004	Bottlenose Dolphin	Front Steps	For the last few mornings ~4am, bottlenose and flying fish seen in harbour	21-30	A	Front Steps, James Bay	04:00

30/06/2004	Bottlenose Dolphin	Front Steps	For the last few mornings ~4am, bottlenose and flying fish seen in harbour	31-50	A	Front Steps, James Bay	04:00
10/07/2004	Bottlenose Dolphin	Front Steps	Bottlenose dolphins (~4-6) seen chasing flying fish into the steps area. Many flyingfish being forced to fly ashore, hit steps & die. NB: Throughout the week 5th - 12th July '04, on certain nights this scene was observed. Some nights were different times	5-10	A	Front Steps, James Bay	
12/07/2004	Bottlenose Dolphin	Front Steps	Bottlenose dolphins (~4-6) seen chasing flying fish into the steps area. Many flyingfish being forced to fly ashore, hit steps & die. NB: Throughout the week 5th - 12th July '04, on certain nights this scene was observed. Some nights were different times	5-10	A	Front Steps, James Bay	
12/07/2004	Bottlenose Dolphin	James Bay	~6 bottlenose followed ferry boat from steps to RMS (out & in) at nite ~8-10 pm.	5-10	A	From Front Steps to anchored RMS	21:00
17/07/2004	Bottlenose Dolphin	James Bay	Saw ~3 Bottlenose dolphins & 1 flying fish(ff). The bottlenose(b) were scanning the area; only 1 ff present near tied up ferry boat;(b)came swimming through really fast & then went out. ~ 8/8:30pm. Didn't come back in	2-4	A	Off Front Steps, James Bay	20:00

			1½hrs that we stayed there.				
28/07/2004	Bottlenose Dolphin	Front Steps	4 bottlenose seen, were close in to steps near ferry. Went away when ferry started up. ~4am	2-4	A	Front Steps, James Bay	04:00
04/08/2004	Bottlenose Dolphin	James Bay	Were out sailing; flying fish started flying out water & then saw bottlenose dolphins chasing them. ~20-30 bottlenose. Almost 99% confident that saw 1-2 rough toothed dolphin - had many circular markings (not from cookie cutter shark) white mouth; pink u	21-30	A	Out off Darkdale, James Bay	
06/08/2004	Bottlenose Dolphin	Front Steps	Between midnite-1am saw 4 bottlenose chasing flying fish.	2-4	A	Front Steps, James Bay	00:00
13/08/2004	Bottlenose Dolphin	Off Munden's Point	Saw 1 humpback whale. Many (presumed) bottlenose dolphins swimming with it (~20-25) ~1 pm encountered.	1	A	15°54.637'S 005°43.220'W (~½mile out off Mundens Point)	13:00
23/08/2004	Bottlenose Dolphin	James Bay	~15-20 of them. Heading down (to Breakneck). ~4.30pm. Were moving very fast.	16-20	A	James Bay Moorings	16:30
30/08/2004	Bottlenose Dolphin	Front Steps	Bottlenose dolphins were chasing flying fish. ~4am.	51-100	A	Front Steps, James Bay	04:00
31/08/2004	Bottlenose Dolphin	Ruperts Bay	Saw around 10 bottlenose dolphins chasing a school of flying	5-10	A	Ruperts Bay	00:00

			fish. Around 11am! Stayed around for a bit and then went out				
04/09/2004	Bottlenose Dolphin	Front Steps	~11-11.30pm. Saw 2 dolphins chasing flying fish	2-4	A	Front Steps, James Bay	23:30
24/09/2004	Bottlenose Dolphin	James Bay	Saw ~6 bottlenose chasing mackerel fry into the steps. ~6am	5-10	A	James Bay	06:00
26/09/2004	Bottlenose Dolphin	James Bay	Saw ~8 dolphins chasing flying fish. Presume these to be bottlenose	5-10	A	James Bay	05:00
05/10/2004	Bottlenose Dolphin	James Bay	Were round behind the Eye. Were chasing Mackerel fry. Were right up inside rocks; a lot of jumping and splashing.	2-4	A	The Eye, James Bay	08:30
12/10/2004	Bottlenose Dolphin	Front Steps	~1/2 11- 1am. Saw 3 bottlenose chasing flying fish	2-4	A	Front Steps, James Bay	11:03
31/10/2004	Bottlenose Dolphin	Front Steps	3 bottlenose chasing Mackerel in steps	2-4	A	Front Steps, James Bay	04:00
31/05/2005	Bottlenose Dolphin	James Bay		5-10	A	Needles Eye, James Bay	06:00
07/06/2005	Bottlenose Dolphin	Lemon Valley Bay		5-10	A	Nr Lemon Valley	
25/06/2005	Bottlenose Dolphin	Front Steps	Bottlenose dolphins were chasing flying fish into the steps area	1	A	Front Steps, James Bay	20:00
26/06/2005	Bottlenose Dolphin	Front Steps	Bottlenose dolphins were chasing flying fish.	5-10	A	Front Steps, James Bay	19:30
05/07/2005	Bottlenose Dolphin	Front Steps	Bottlenose dolphins were chasing flying fish into the steps area	2-4	A	Front Steps, James Bay	22:00
05/07/2005	Bottlenose Dolphin	Ruperts Bay	Presumed bottlenose, as they were with a humpback whale.	5-10	A	Ruperts Bay	15:00

06/07/2005	Bottlenose Dolphin	Front Steps	Bottlenose dolphins were chasing flying fish into the steps area	2-4	A	Front Steps, James Bay	22:00
07/07/2005	Bottlenose Dolphin	Front Steps	Bottlenose dolphins were chasing flying fish into the steps area	1	A	Front Steps, James Bay	22:00
23/07/2005	Bottlenose Dolphin	Front Steps	Saw them chasing flyingfish into the steps; actually saw a dolphin catch a flyingfish. ~8pm	2-4	A	Front Steps, James Bay	20:00
25/07/2005	Bottlenose Dolphin	Front Steps	Saw ~2 bottlenose dolphins chasing flyingfish into the Steps from midnight onwards. Came in very close to the Steps.	2-4	A	Front Steps, James Bay	00:00
26/07/2005	Bottlenose Dolphin	Front Steps	Saw ~2 bottlenose dolphins chasing flyingfish into the Steps from midnight onwards. Came in very close to the Steps.	2-4	A	Front Steps, James Bay	00:00
27/07/2005	Bottlenose Dolphin	Front Steps	Saw ~2 bottlenose dolphins chasing flyingfish into the Steps from midnight onwards. Came in very close to the Steps.	2-4	A	Front Steps, James Bay	00:00
28/07/2005	Bottlenose Dolphin	Front Steps	Saw ~2 bottlenose dolphins chasing flyingfish into the Steps from midnight onwards. Came in very close to the Steps.	2-4	A	Front Steps, James Bay	00:00
29/07/2005	Bottlenose Dolphin	Front Steps	Saw ~2 bottlenose dolphins chasing flyingfish into the Steps from midnight onwards. Came in very close to the Steps.	2-4	A	Front Steps, James Bay	00:00
03/08/2005	Bottlenose Dolphin	Front Steps	Saw the bottlenose chasing the flyingfish into the Steps. While	5-10	A	Front Steps, James Bay	01:15

			they were watching them, they swam off in the direction of Needles Eye after a while.				
08/08/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps.	5-10	A	Front Steps, James Bay	04:00
09/08/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps.	5-10	A	Front Steps, James Bay	04:00
10/08/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps.	5-10	A	Front Steps, James Bay	04:00
11/08/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps.	5-10	A	Front Steps, James Bay	04:00
12/08/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps.	5-10	A	Front Steps, James Bay	04:00
16/08/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps.	5-10	A	Front Steps, James Bay	05:00
27/08/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps. Came in really close, ~10-15cm from the Front Steps!	5-10	A	Front Steps, James Bay	20:30
28/08/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps.	2-4	A	Front Steps, James Bay	20:00
29/08/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps. Note: once flyingfish hit the Steps and got knocked unconscious, the bottlenose dolphins did not eat it.	2-4	A	Front Steps, James Bay	20:30
29/08/2005	Bottlenose Dolphin	Lemon Valley Bay	Were heading up towards James Bay. Only saw ~5 fins every now and then, therefore assume they were the bottlenose or rough-	11-15	A	Lemon Valley	15:00

			toothed dolphins.				
01/09/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps.	1	A	Front Steps, James Bay	20:00
02/09/2005	Bottlenose Dolphin	Front Steps	2-3 were seen at 8.50pm and ~6 were seen at 10-10.20pm. Were chasing flyingfish into the Steps area. At 10pm the dolphins came in really close - within centimetres of the edge of the Front Steps. 1 juvenile seen - about a third of the size of the adults.	5-10	A	Front Steps, James Bay	20:50
03/09/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish into the Steps. Stayed around for about half and hour.	2-4	A	Front Steps, James Bay	22:00
05/09/2005	Bottlenose Dolphin	Front Steps	Saw them chase a flyingfish. Stayed around for about 10-15 minutes.	2-4	A	Front Steps, James Bay	20:20
06/09/2005	Bottlenose Dolphin	Front Steps	Saw them chasing flyingfish PM.	2-4	A	Front Steps, James Bay	
07/09/2005	Bottlenose Dolphin	Front Steps	Saw 2 dead flyingfish. Note - link to Nigel Bagley of same night, different time.	1	A	Front Steps, James Bay	20:50
07/09/2005	Bottlenose Dolphin	Front Steps	Said they saw bottlenose chase a flyingfish in a circle (as flyingfish did a turn, bottlenose followed it). Note: link to Darrin Henry of same night, different time.	2-4	A	Front Steps, James Bay	22:00

08/09/2005	Bottlenose Dolphin	Off Lemon Valley Bay	A few dolphins seen with a humpback whale - (presumably bottlenose and/or rough-toothed).	2-4	A	Off Lemon Valley	17:30
09/09/2005	Bottlenose Dolphin	Front Steps	Did not see any flyingfish. Dolphins came in to look around and then went back out.	1	A	Front Steps, James Bay	23:30
16/09/2005	Bottlenose Dolphin	Front Steps	The 2 dolphins were very close together, as if up to something! Also to note is that a few flyingfish came in, but no dolphins followed.	2-4	A	Front Steps, James Bay	02:00
25/09/2005	Bottlenose Dolphin	Front Steps	Were chasing flyingfish in.	2-4	A	Front Steps, James Bay	19:30
26/09/2005	Bottlenose Dolphin	Front Steps	Saw one calf. Perhaps more than 6 present.	5-10	A	Front Steps, James Bay	01:30
25/10/2005	Bottlenose Dolphin	Front Steps	Were chasing flying fish into the Steps. Came in really close.	5-10	A	Front Steps, James Bay	22:00
06/08/2006	Bottlenose Dolphin	Front Steps	At dusk between Eye and 1st moorings, were chasing flyingfish.	11-15	A	Nr Front Steps	18:30
17/08/2006	Bottlenose Dolphin	Front Steps	Were chasing flyingfish.	5-10	A	Front Steps, James Bay	09:00
21/08/2006	Bottlenose Dolphin	Front Steps	Chasing flyingfish at night. Through to the 31/08/06	5-10	A	Front Steps, James Bay	
23/08/2006	Bottlenose Dolphin	Front Steps	5--6 flyingfish seen and dolphins chasing them.	5-10	A	Front Steps, James Bay	10:20
11/09/2006	Bottlenose Dolphin	Front Steps	Were chasing Flyingfish.	5-10	A	Front Steps, James Bay	07:30
12/09/2006	Bottlenose Dolphin	Front Steps	Were chasing Flyingfish.	5-10	A	Front Steps, James Bay	08:30
19/09/2006	Bottlenose	Front Steps	Chasing flyingfish. Through to the	5-10	A	Front Steps,	18:30

	Dolphin		21/09/2006			James Bay	
14/06/2007	Bottlenose Dolphin	Front Steps	Saw bottlenose dolphins chasing flyingfish into the Steps at night.	2-4	A	Front Steps, James Bay	
04/07/2007	Bottlenose Dolphin	Front Steps	Came in really close and were circling around. 1-2 flyingfish seen aswell. Stayed for ~1/2 hour.	5-10	A	Front Steps, James Bay	20:30
17/07/2007	Bottlenose Dolphin	Front Steps	Dolphins have been in the steps almost every morning since last week.	1	A	Landing Steps	04:45
21/07/2007	Bottlenose Dolphin	Front Steps	Seen chasing flyingfish.	5-10	A	Front Steps, James Bay	21:00
05/08/2007	Bottlenose Dolphin	Front Steps	These dolphins were chasing flying fish.	5-10	A	Wharf, James Bay	04:45
06/08/2007	Bottlenose Dolphin	Front Steps	Seen chasing flyingfish.	5-10	A	Front Steps, James Bay	23:30
07/08/2007	Bottlenose Dolphin	Front Steps	Seen chasing flyingfish.	5-10	A	Front Steps, James Bay	23:45
09/08/2007	Bottlenose Dolphin	Front Steps	Seen chasing flyingfish.	5-10	A	Front Steps, James Bay	21:00
13/08/2007	Bottlenose Dolphin	Front Steps	Seen chasing flyingfish.	5-10	A	Front Steps, James Bay	20:00
27/08/2008	Bottlenose Dolphin	Front Steps	Time: at night. They were chasing flying fish into the front steps.	2-4	A	Front Steps	
19/09/2008	Bottlenose Dolphin	Front Steps	(After dark). There were quite a few of them they came into the front steps and were swimming around and around.	11-15	A	Front Steps	

09/03/2009	Bottlenose Dolphin	Ruperts Bay	Came down from Buttermilk Point area. Swimming slowly came in quite close to the yellow bouy and then went out to sea.	21-30	A	Ruperts Bay	11:00
04/08/2009	Bottlenose Dolphin	Buttermilk Point		16-20	A	Butter Milk Point	10:00
05/08/2010	Bottlenose Dolphin	Front Steps	Dolphins seen chasing flying fish fromt the Front Steps to Thompsons Crane.	5-10	A	Front Steps	01:00
10/08/2010	Bottlenose Dolphin	James Bay	Seen chasing flyingfish.	16-20	A	James Bay	04:30
09/10/2010	Bottlenose Dolphin	Ruperts Bay	2 dolphins chasing flying fish. Did not stay in the area for long.	2-4	A	Ruperts Bay	20:05
01/11/2010	Bottlenose Dolphin	Front Steps	Chasing flying fish early in the morning.	11-15	A		
27/07/2011	Bottlenose Dolphin	The Wharf	Seen chaising flying fish.	5-10	A	off the steps	
17/08/2011	Bottlenose Dolphin	James Bay	Bottlenose dolphins seen chasing flying fish into the steps.	5-10	A	Jamestown landing steps and span area	19:30