

2014

# ENVIRONMENTAL STATISTICS COMPENDIUM



GOVERNMENT OF BERMUDA  
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**Department of Statistics**

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# FOREWORD

The Department of Statistics is pleased to release its fifth issue of the Environmental Statistics Compendium. In alignment with the Department's mission to collect, process and analyze relevant statistical information, and in keeping with its mandate to collaborate with Government Ministries and Departments for the collation and distribution of statistics to the general public, this publication is produced annually. It reflects the collation of existing data sourced from the activities of both Government and non-governmental entities that are involved in either monitoring, controlling or promoting awareness about issues affecting Bermuda's environment.

Additionally, the delivery of this report supports the combined efforts of the United Nations Statistics Division (UNSD) and the Caribbean Community (CARICOM) to strengthen capacity and harmonize the compilation of social, gender and environmental statistics and indicators in the CARICOM Region for the achievement of the UN Millennium Development Goals by 2015.

The Environmental Statistics Compendium is structured into 13 sections which include:

1. Population and Households
2. Tourism
3. Environmental Health and Weather
4. Natural and Environmental Disasters
5. Energy, Minerals and Transport
6. Agriculture
7. Land Use
8. Coastal and Marine Resources
9. Biodiversity
10. Forestry
11. Air
12. Waste
13. Water

The figures in the Environmental Statistics Compendium are mainly annual totals and totals for calendar months representing the period 2009 to 2013.

The Department gratefully acknowledges the continued support of all subject area experts and stakeholders who committed to providing the statistical data and information needed to compile and publish this report.

**Melinda Williams**  
Acting Director  
**Department of Statistics**

April 2015



## Data Notes

...	not applicable	ha	hectares
..	not available	km	kilometre
r	revised data	km <sup>2</sup>	square kilometre
-	less than half of the unit specified or nil	kWh	kilowatt-hour
'000	thousands	mio m <sup>3</sup> /y	million cubic meters per year
°	degrees	mT	metric tons
%	percent	No.	number
\$	Bermuda dollar		
°F	Fahrenheit		
r	revised		

\*Percentages may not sum to totals due to rounding.

## Measuring Units Conversion Table

METRIC	IMPERIAL	IMPERIAL	METRIC
<b>LENGTH</b>			
1 millimetre (mm)	0.03937 inch (in)	1 inch (in)	2.54 centimetre (cm)
1 centimetre (cm)	10 mm	1 yard (yd)	0.9144 metre (m)
1 metre (m)	100 cm	1 mile	1.6093 kilometre (km)
1 kilometre (km)	1,000 m	0.6214 mile	
<b>AREA</b>			
1 square meter (m <sup>2</sup> )	10,000 cm <sup>2</sup>	1 acre	4,046.9 square meter (m <sup>2</sup> )
1 hectare (ha)	10,000 m <sup>2</sup>	1 acre	0.4047 hectare (ha)
1 square kilometer (km <sup>2</sup> )	100 ha	1 square mile (mile <sup>2</sup> )	640 acres
		0.3861 square mile (mile <sup>2</sup> )	2.59 square kilometer(km <sup>2</sup> )
<b>MASS</b>			
1 kilogram (kg)	1,000 grams (g)	2.2046 pounds (lbs)	1 pound (lb)
1 metric tonne (mT)	1,000 kg	0.9842 ton	16 ounces (oz)
		1 ton	2,240 lbs
			1.016 metric tonne (mT)
<b>TEMPERATURE</b>			
°C = [5/9 x (°F-32)]		1 degree Celsius (°C)	33.8 degrees Fahrenheit (°F)
°F = [(9/5 x °C) + 32]			

## Contributors

Bermuda Electric Light Company (BELCO) Ltd. • Bermuda Fire and Rescue Services  
 Department of Conservation Services Department of Environmental Protection • Department of Health  
 Department of Planning • Department of Statistics • Department of Tourism • Bermuda Tourism Authority  
 The Bermuda Weather Service • Transport Control Department  
 Department of Works and Engineering — Waste and Enforcement Section



# POPULATION AND HOUSEHOLDS



# Section 1: Population and Households

## Population

Bermuda's civilian non-institutionalized population (which excludes non-sheltered persons) is projected to decrease over time. This is a result of net emigration (emigration greater than immigration) exceeding natural increase every year.

According to the Population Projections for 2013, Bermuda's civilian population was estimated to be 61,954 persons. This represents a 0.73 percent decrease from the 62,408 persons estimated to be living in Bermuda in 2012. It is estimated that the population density of Bermuda for 2013 was 1,140 persons per square kilometer; a decrease of 8 persons per square kilometer from 2012 (see Table 1.1).

## Households

The 2010 Census reported 26,923 households (see Table 1.2) in Bermuda which represented a 7.06% increase in the number of households since 2000. This rise can be attributed to Bermuda's growing population during the decade. The growing number of households may lead to environmental concerns such as waste disposal and water supply.

**Table 1.1**

**Population and Population Density**

Year	Population	Population Density (per km <sup>2</sup> )
2010	64,237 <sup>1</sup>	1,182
2011	63,193 <sup>2</sup>	1,163
2012	62,408 <sup>2</sup>	1,148
2013	61,954 <sup>2</sup>	1,140

Source: Department of Statistics

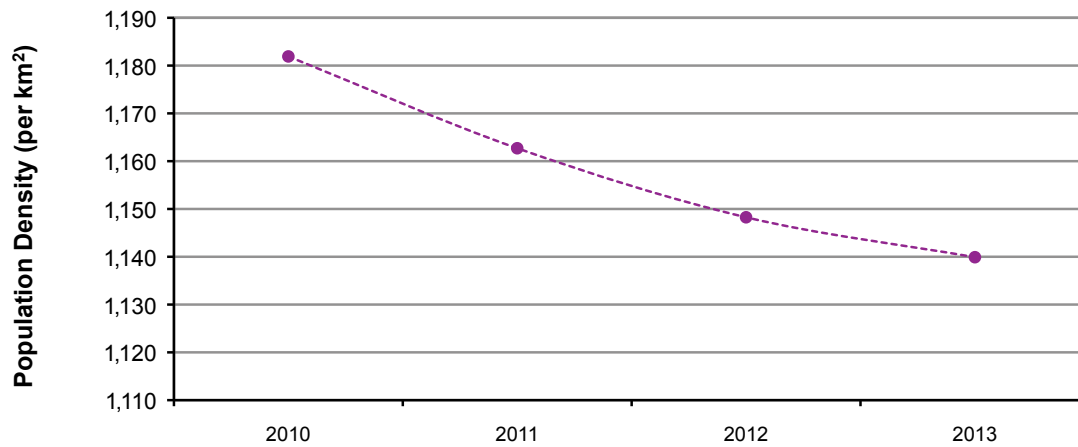
According to the Department of Planning (2008), Bermuda is 54.34 km<sup>2</sup>.

<sup>1</sup>The 2010 Census year population totals excludes the non-sheltered and institutionalized population.

<sup>2</sup>Based on the Bermuda Population Projections 2010-2020.

**Chart 1.1**

**Population Density**



**Table 1.2****Number of Households by Type of Dwelling**

Type of Dwelling	2000		2010	
	No.	%	No.	%
Undivided private house (cottage)	6,717	26.71	6,280	24.33
Two apartments	8,679	34.51	8,870	34.36
Three apartments	4,396	17.48	4,639	17.97
Four or more apartments	4,580	18.21	5,024	19.46
Residential/commercial premises	306	1.22	281	1.09
Group dwellings <sup>1</sup>	385	1.53	696	2.71
Other/not stated	85	0.34	27	0.10
<b>Total</b>	<b>25,148</b>	<b>100.00</b>	<b>26,923<sup>2</sup></b>	<b>100.00<sup>3</sup></b>

Source: 2000 and 2010 Census Population and Housing

<sup>1</sup> Group dwellings include hotel staff quarters, nurses' hostels and police barracks.

<sup>2</sup> Includes 1,106 households for which there is no data by type of dwelling.

<sup>3</sup> The denominator for percentage distribution is 25,817 (26,923 - 1,106). Percentages may not sum to totals due to rounding.

**Table 1.3****Number of Households by Type of Tenure**

Type of Tenure	2000		2010	
	No.	%	No.	%
Own	10,863	43.20	12,238	47.40
Rent	12,854	51.11	11,719	45.39
Rent-Free	1,006	4.00	1,004	3.89
Other/Not Stated	425 <sup>1</sup>	1.69	856 <sup>2</sup>	3.32
<b>Total</b>	<b>25,148</b>	<b>100.00</b>	<b>26,923<sup>3</sup></b>	<b>100.00<sup>4</sup></b>

Source: 2000 and 2010 Census Population and Housing

<sup>1</sup> Includes 385 group dwellings

<sup>2</sup> Includes 696 group dwellings and 27 boats.

<sup>3</sup> Includes 1,106 households for which there is no data by type of tenure.

<sup>4</sup> The denominator for percentage distribution is 25,817 (26,923 - 1,106). Percentages may not sum to totals due to rounding.

**Table 1.4****Number of Households by Number of Bedrooms**

<b>Number of Bedrooms</b>	<b>2000</b>		<b>2010</b>	
	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>
Studio dwelling (zero bedrooms)	1,188	4.79	790	3.15
Households with one bedroom	6,385	25.78	6,101	24.31
Households with two bedrooms	8,964	36.20	8,944	35.64
Households with three bedrooms	6,866	27.73	7,473	29.78
Households with more than three bedrooms	1,319	5.33	1,645	6.56
Not stated	41	0.17	141	0.56
<b>Total number of households</b>	<b>24,763</b>	<b>100.00</b>	<b>26,923<sup>1</sup></b>	<b>100.00<sup>5</sup></b>
<b>Average number of bedrooms per household</b>	<b>2.03</b>		<b>2.15<sup>2</sup></b>	
<b>Average size of the household</b>	<b>2.47</b>		<b>2.42<sup>3</sup></b>	
<b>Average number of persons per bedroom</b>	<b>1.23</b>		<b>1.13<sup>4</sup></b>	

Source: 2000 and 2010 Census Population and Housing

<sup>1</sup> Includes 696 group dwellings, 27 boats and 1,106 households for which there is no data by type of dwelling.

<sup>2</sup> Excludes 696 group dwellings and 27 boats, since the number of bedrooms is not collected for these types of dwellings, 141 households which were Not Stated and 1,106 households for which there is no data on the number of bedrooms.

<sup>3</sup> In calculating the average size of household, the population of 875 persons from the group dwellings and boats, the population of 308 persons from the Not Stated households and the population 2,551 from the 1,106 households for which there is no data by type of dwelling, was subtracted from the total population.

<sup>4</sup> In calculating the average size of household, the population of 875 persons from the group dwellings and boats, the population of 308 persons from the number of persons per bedroom, the population of 875 persons from the group dwellings and boats was subtracted from the total population.

<sup>5</sup> The denominator for percentage distribution is 25,094 (26,923 - 696, 27 and 1,106). Percentages may not sum to totals due to rounding.

**Table 1.5****Number of Households by Size of Household**

Size of Household	2000		2010	
	No.	%	No.	%
One person	7,358	29.26	7,341	29.25
Two persons	7,539	29.98	7,902	31.49
Three persons	4,489	17.85	4,498	17.92
Four persons	3,683	14.65	3,536	14.09
Five persons	1,436	5.71	1,234	4.92
Six persons	408	1.62	385	1.53
Seven persons	151	0.60	112	0.45
Eight persons	47	0.19	52	0.21
More than eight persons	37	0.15	34	0.14
<b>Total number of households</b>	<b>25,148</b>	<b>100.00</b>	<b>26,923<sup>1</sup></b>	<b>100.00<sup>3</sup></b>
<b>Average size of household</b>	<b>2.47</b>		<b>2.42<sup>2</sup></b>	

Source: 2000 and 2010 Census Population and Housing

<sup>1</sup> Includes 696 group dwellings, 27 boats and 1,106 households for which there is no data by size of households.

<sup>2</sup> In calculating the average size of household, the population of 875 persons from the group dwellings and boats, the population of 308 persons from the Not Stated households and the population 2,551 from the 1,106 households for which there is no data by type of dwelling, was subtracted from the total population.

<sup>3</sup> The denominator for percentage distribution is 25,094 (26,923 - 696, 27 and 1,106). Percentages may not sum to totals due to rounding.

## Millennium Development Goal 7

### Indicator 32

Proportion of households with access to secure tenure

100%

The percentage of the population that do not live in slums. A slum household is a group of individuals living under the same roof who lack one or more of the following conditions: security of tenure, structural quality and durability of dwellings, access to safe water, access to sanitation facilities, and sufficient living area.

Secure tenure refers to household persons who own or are purchasing their homes, renting privately or are in social housing or sub-tenancy. Households without secure tenure are defined as squatters (whether or not they pay rent), homeless and households with no formal agreement.

# TOURISM





## Section 2: Tourism

Bermuda's tourism industry is the largest source of revenue to the economy after international business. The recurrent global economic crisis has had a negative impact on Bermuda's tourism industry.

### **Tourist Arrivals**

The total number of visitors coming to Bermuda in 2013 decreased by 5.56 percent since 2012. This decrease was attributed mainly to a 10.11% reduction in cruise ship passengers due to 32 less cruise ships arriving in Bermuda (see Table 2.1). Overall, Bermuda has seen an increase in air arrivals of 1.84 percent over the previous year.

### **Visitor Expenditure**

Visitor expenditure has fluctuated during the past five years. Aggregate expenditure peaked at \$435 million in 2011; however, it dropped to \$391 million in 2013 (see Table 2.2).

### **Tourist Properties**

In 2013, there were 2,538 rooms with a total of 5,265 beds, located on 47 properties around Bermuda. The occupancy rate of 57.00 percent in 2013 was a 1.30 percent increase from the previous year (see Table 2.3).

### **Visitor Accommodation**

In 2013, 70.89 percent of all tourists chose accommodations at one of Bermuda's hotels (see Table 2.4). There were 28.40 percent staying in other types of accommodations, while 0.71 percent stayed at a guest house. The average length of stay on the island for a tourist was 5.30 days for 2013. Estimated electricity consumption by tourists was 4,611 kWh in 2013 (see Table 2.6), an increase of 6.93 percent over the electricity consumption by tourists in 2012.

### **Origin of Tourists**

Visitors from the United States, Bermuda's largest tourism market (72.44%), totaled 171,215 in 2013. This represented an increase of 1.81 percent over the 168,178 visitors from the United States in 2012 (see Table 2.5).

#### **NOTE TO READER**

**Average Length of Stay:** intended length of stay or number of nights spent, unless otherwise stated.

**Estimated Electricity Consumption by Tourists:** a more direct tourism pressure indicator. It is estimated as the national daily per capita electricity consumption times the number of tourist arrivals by the average length of stay, per one million population.

**Index of Social Pressure or Ratio of Tourists (or Visitors) to the Local Population:** measures the number of tourists (or visitors) to one resident of the country at any given point in time.

**Number of Hotel Rooms per km<sup>2</sup>:** commonly accessible indirect proxy to measure tourism's imprint on the physical environment. It is the number of hotel rooms available divided by the total land area (53.35 km<sup>2</sup>).

**Occupancy Rate:** it is calculated by dividing the monthly or yearly sum of room nights used by the number of room nights available for use, then multiplying the quotient by 100 to express as a percentage.

**Tourism:** the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business, and other purposes.

**Tourist:** a person travelling to and staying in places outside his or her usual environment for not more than one consecutive year but who stays for more than 24 hours in a destination for leisure, business, and other purposes.

**Tourist Arrivals:** all stay-over visitors, not cruise passenger arrivals, given most cruise ships stop at multiple destinations, the total number of arrivals at all destinations is considerably larger than the number of cruise passengers visiting the region.

**Tourism Expenditure:** the total expenditure made by a visitor or on behalf of a visitor for and during his/her trip and stay at a destination.

**Tourism Intensity/Density Ratio:** measures the average daily tourist density per km<sup>2</sup>. It is the number of tourists per unit of land area at any given point in time. That is, number of tourists times average stay divided by land area (53.35 km<sup>2</sup>) times 365. It shows how tourists are spread on the territory on average, and gives a general indication of pressures on land use due to tourism, with regard to a reference period (e.g. year) or in peak season.

**Tourism Penetration Ratio:** measures the average daily tourist density per 1,000 population. It is number of tourists per 1,000 inhabitants of the country at any given point in time. That is, the number of tourists multiplied by the average length of stay divided by the population times 365.

**Visitor:** any person traveling to a place other than his/her usual environment for less than 12 months and whose main purpose of the visit is other than the exercise of an activity remunerated from within the place visited.

Source: CARICOM Environment Programme

**Table 2.1****Air Arrivals, Cruise Ship Arrivals, Tourist Nights Spent, Tourism Intensity and Penetration Ratios**

Indicator	2009	2010	2011	2012	2013
<b>Total visitors<sup>1</sup></b>	<b>554,394</b>	<b>580,193</b>	<b>651,749</b>	<b>610,325</b>	<b>576,373</b>
Growth rate (%)	0.80	4.65	12.33	-6.36	-5.56
<b>Tourists</b>	<b>235,866</b>	<b>232,262</b>	<b>236,038</b>	<b>232,063</b>	<b>236,343</b>
Growth rate (%)	-10.53	-1.53	1.63	-1.68	1.84
Tourist arrival index	60.40	59.48	60.44	59.43	60.52
<b>Cruise ship passengers</b>	<b>318,528</b>	<b>347,931</b>	<b>415,711</b>	<b>378,262</b>	<b>340,030</b>
Growth rate (%)	11.21	9.23	19.48	-9.01	-10.11
<b>Cruise ship arrivals</b>	<b>135</b>	<b>149</b>	<b>177</b>	<b>157</b>	<b>125</b>
Growth rate (%)	0.75	10.37	18.79	-11.30	-20.38
<b>Average length of stay</b>	<b>6.09<sup>2</sup></b>	<b>6.21<sup>2</sup></b>	<b>6.06<sup>2</sup></b>	<b>6.09<sup>3</sup></b>	<b>5.30<sup>3</sup></b>
<b>Population</b>	<b>65,811<sup>4</sup></b>	<b>64,237<sup>4</sup></b>	<b>63,193<sup>4</sup></b>	<b>62,408<sup>4</sup></b>	<b>61,954<sup>4</sup></b>
<b>Tourists to residents ratio</b>	<b>3.58</b>	<b>3.61</b>	<b>3.65</b>	<b>3.58</b>	<b>3.81</b>
<b>Cruise passengers to residents ratio</b>	<b>4.84</b>	<b>5.41</b>	<b>6.42</b>	<b>5.83</b>	<b>5.49</b>
<b>Visitors to residents ratio</b>	<b>8.42</b>	<b>9.02</b>	<b>10.07</b>	<b>9.41</b>	<b>9.30</b>
<b>Tourism intensity ratio</b>	<b>72.41</b>	<b>72.71</b>	<b>72.10</b>	<b>71.24</b>	<b>63.14</b>
<b>Tourism penetration ratio</b>	<b>59.80</b>	<b>61.44</b>	<b>60.55</b>	<b>59.69</b>	<b>55.39</b>

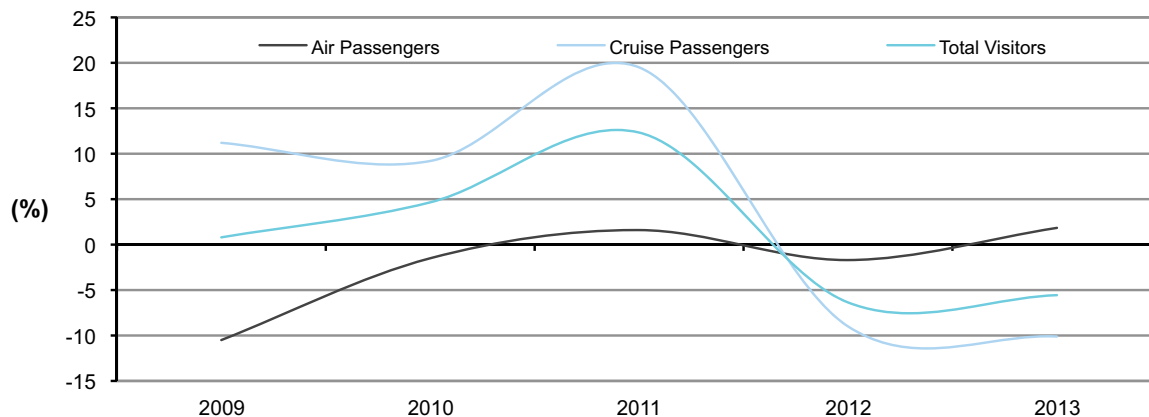
Source: Department of Tourism, Bermuda Tourism Authority and Bermuda Population Projections 2010 - 2020

<sup>1</sup> Does not include yacht passengers.

<sup>2</sup> Source: Department of Tourism

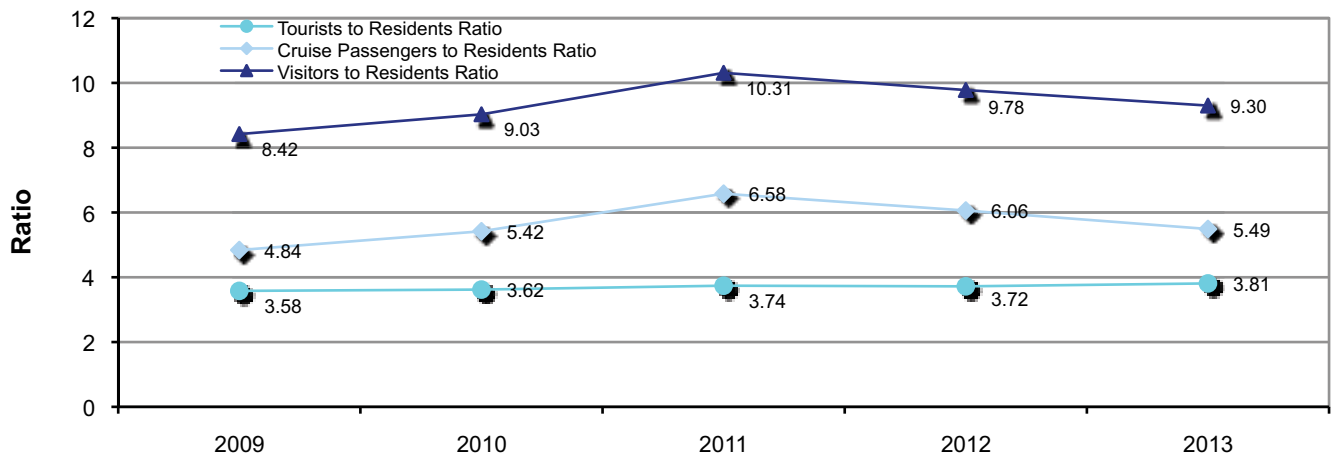
<sup>3</sup> Source: Bermuda Tourism Authority

<sup>4</sup> Source: Bermuda Population Projections 2010-2020

**Chart 2.1****Growth in Air Passengers, Cruise Passengers and Total Visitors**

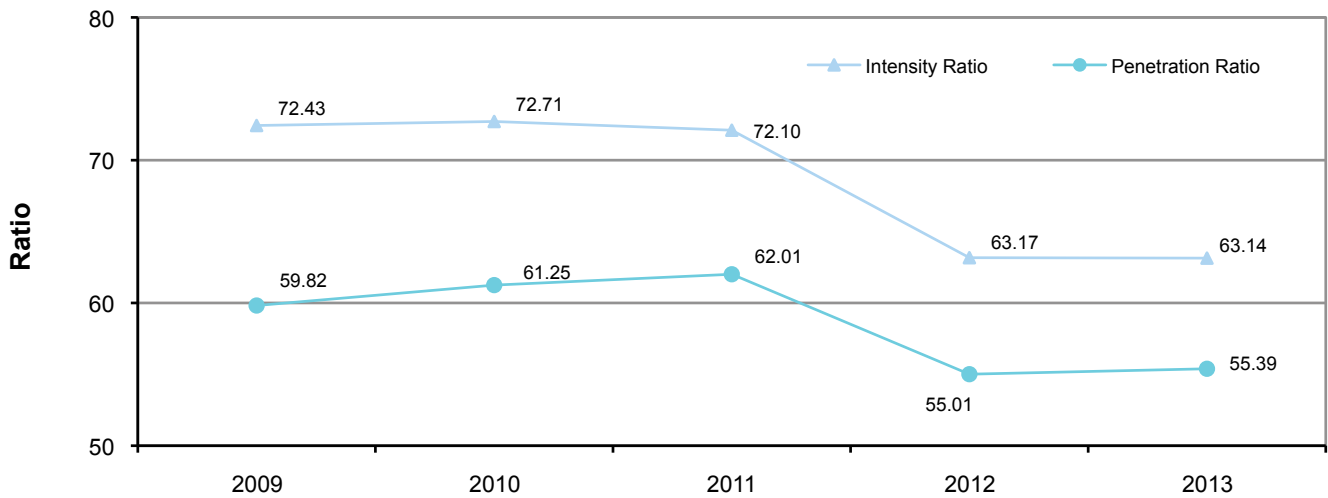
**Chart 2.2**

**Tourist to Residents, Cruise Passengers to Residents and Visitors to Residents Ratios**



**Chart 2.3**

**Tourist Intensity and Penetration Ratios**



**Table 2.2****Visitor Expenditure and Number Employed in Tourism**

Item	2009 <sup>2</sup>	2010 <sup>2</sup>	2011 <sup>2</sup>	2012 <sup>3</sup>	2013 <sup>3</sup>
<b>Visitor expenditure (in US\$'000)</b>	<b>321,200</b>	<b>385,500</b>	<b>434,900</b>	<b>392,100</b>	<b>391,000</b>
Expenditure on same-day visits	54,800	62,600	86,400	80,100	72,800
Expenditure on accommodation, meals and drinks, shopping, entertainment etc.	266,400	322,900	348,500	312,000	318,200
<b>Total directly employed in tourism<sup>1</sup></b>					
Women	1,838	1,759	1,872	1,823	1,723
Men	2,836	2,590	2,661	2,562	2,494
<b>Total</b>	<b>4,674</b>	<b>4,349</b>	<b>4,533</b>	<b>4,385</b>	<b>4,217</b>

<sup>1</sup>Source: Department of Statistics

<sup>2</sup>Source: Department of Tourism

<sup>3</sup>Source: Bermuda Tourism Authority

**Table 2.3****Number of Properties, Number of Rooms per km<sup>2</sup> and Occupancy Rate**

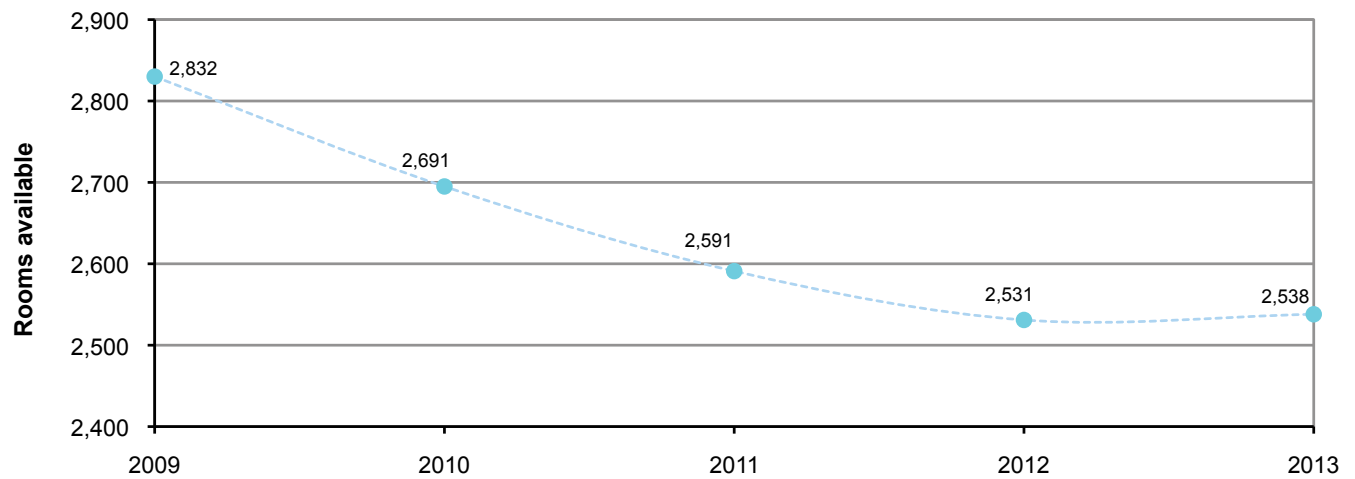
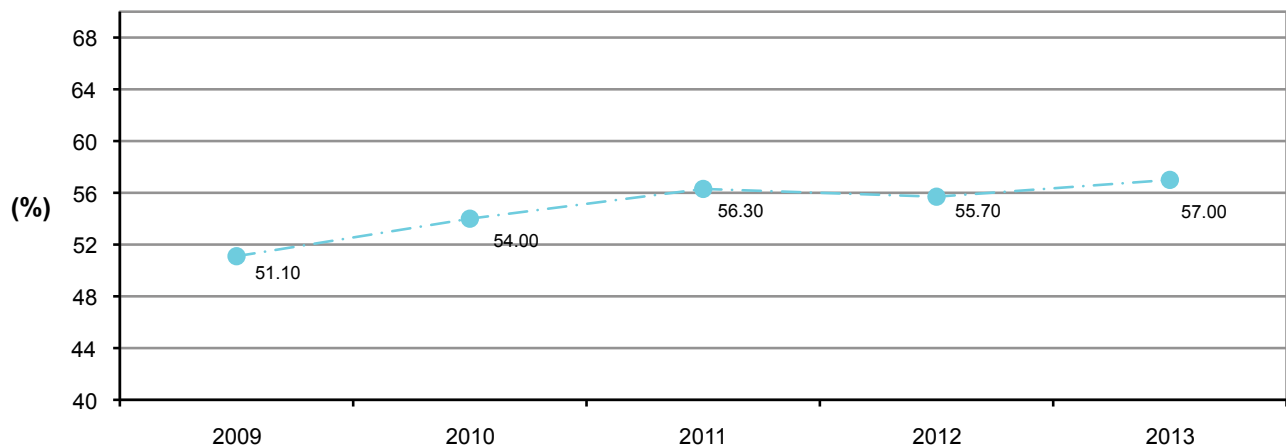
Item	2009 <sup>2</sup>	2010 <sup>2</sup>	2011 <sup>2</sup>	2012 <sup>3</sup>	2013 <sup>3</sup>
Number of properties	52	50	48	48	47
Total number of rooms available	2,832r	2,691r	2,591	2,531	2,538
<b>Number of rooms per km<sup>2</sup></b>	<b>52.12r</b>	<b>49.52r</b>	<b>47.68</b>	<b>46.58</b>	<b>46.71</b>
Total number of beds	5,820r	5,693r	5,401	5,243	5,265
<b>Occupancy rate (%)<sup>1</sup></b>	<b>51.10</b>	<b>54.00</b>	<b>56.30</b>	<b>55.70</b>	<b>57.00</b>

<sup>2</sup>Source: Department of Tourism

<sup>3</sup>Source: Bermuda Tourism Authority

According to the Department of Planning (2008), Bermuda is 54.34 km<sup>2</sup>

<sup>1</sup> Occupancy rate is only reported by the Bermuda Hotel Association which accounts for approximately 50% of the total properties and 80% of the total number of rooms and beds available. This figure is sourced from the Visitor Profile Report produced by the Department of Tourism.

**Chart 2.4****Number of Hotel Rooms Available****Chart 2.5****Occupancy Rate****Table 2.4****Tourist Arrivals by Type of Accommodation**

Type of Accommodation	2009 <sup>1</sup>	2010 <sup>1</sup>	2011 <sup>1</sup>	2012 <sup>2</sup>	2013 <sup>2</sup>
Hotels	159,739	162,011	168,502	166,425	167,538
Guest Houses	1,894	2,067	1,996	1,548	1,683
Other	74,233	68,184	65,540	64,090	67,122
<b>Total</b>	<b>235,866</b>	<b>232,262</b>	<b>236,038</b>	<b>232,063</b>	<b>236,343</b>

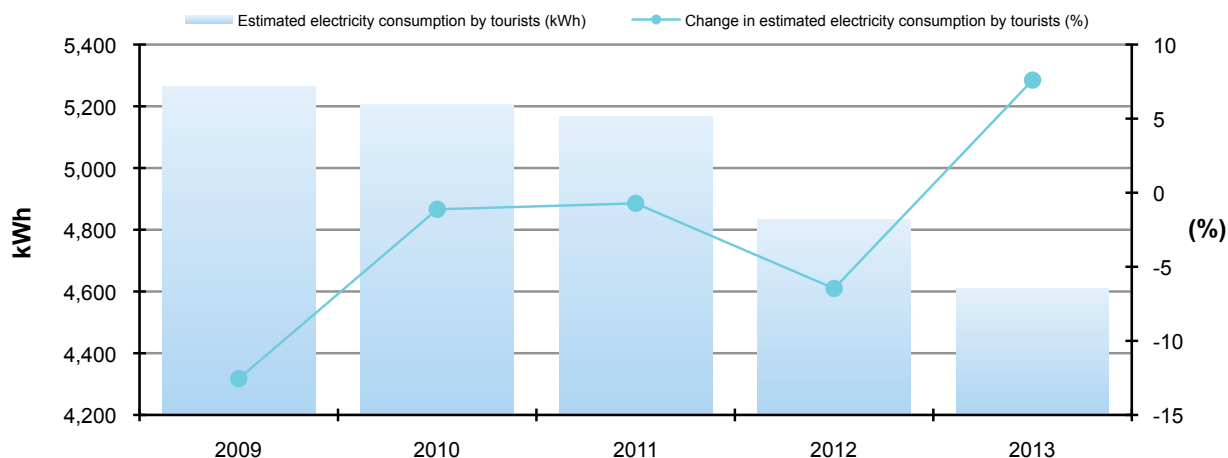
<sup>1</sup>Source: Department of Tourism<sup>2</sup>Source: Bermuda Tourism Authority

**Table 2.5****Tourist Arrivals by Country of Origin**

Country of Origin	2009 <sup>1</sup>	2010 <sup>1</sup>	2011 <sup>1</sup>	2012 <sup>2</sup>	2013 <sup>2</sup>
United States	172,651	166,016	172,890	168,178	171,215
Canada	24,866	30,402	29,217	30,565	27,613
United Kingdom	23,906	23,240	21,524	21,029	23,610
Other	14,443	12,604	12,407	12,291	13,905
<b>Total</b>	<b>235,866</b>	<b>232,262</b>	<b>236,038</b>	<b>232,063</b>	<b>236,343</b>

<sup>1</sup> Source: Department of Tourism<sup>2</sup> Source: Bermuda Tourism Authority**Table 2.6****Estimated Electricity Consumption by Tourists**

Type of Accommodation	2009	2010	2011	2012	2013
Tourists	235,866	232,262	236,038	232,063	236,343
Average length of stay	6.09 <sup>1</sup>	6.21 <sup>1</sup>	6.06 <sup>1</sup>	5.40 <sup>2</sup>	5.30 <sup>2</sup>
Electricity consumption (kWh)	656,083	650,571	636,517	606,345	654,190
Daily per capita electricity consumption (kWh)	3,658	3,608	3,612	3,441	3,681
<b>Estimated electricity consumption by tourists (kWh)</b>	<b>5,255</b>	<b>5,204</b>	<b>5,167</b>	<b>4,312</b>	<b>4,611</b>
<b>Change in estimated electricity consumption by tourists (%)</b>	<b>-12.69</b>	<b>-0.96</b>	<b>-0.72</b>	<b>-16.54</b>	<b>6.93</b>

<sup>1</sup> Source: Department of Tourism<sup>2</sup> Source: Bermuda Tourism Authority**Chart 2.6****Tourists' Estimated Electricity Consumption and Growth**



# ENVIRONMENTAL HEALTH AND WEATHER



## Section 3: Environmental Health and Weather

### Environmental Health

Environmental health refers to all aspects of human health and disease that are determined by factors in the environment. It refers to the theory and practice of assessing and controlling factors in the environment that can potentially affect a person's health (World Health Organization, 2009).

Bermuda's subtropical weather and high humidity contribute to the occurrence of human health conditions on the island such as asthma and bronchitis. In 2013, there were 6,383 reported cases of environmentally-related diseases in Bermuda. A total of 5,630 or 88.20% of these cases were classified as respiratory diseases. Females had the greatest distribution of environmentally-related diseases at 55.26% while males accounted for 44.74% (see Table 3.1).

Gastroenteritis is defined as a "condition that causes irritation and inflammation of the stomach and intestines. Viral infection is the most common cause of gastroenteritis, but bacteria, parasites, and food-borne illness (such as shellfish) can be the offending agent. Viruses and bacteria are very contagious and can spread through contaminated food or water." (Emedicinehealth, 2009). In 2013, gastroenteritis accounted for 9.10% or 581 cases of the environmentally-related diseases in Bermuda.

### Weather

The amount of rain that fell on Bermuda increased by 25.27% during the period 2012-2013. The Bermuda Weather Service reported that Bermuda collected 61.72 inches of rainfall from 177 rain days during 2013. The most rain days was recorded in September while June had the least (see Table 3.2).

July was the hottest month in Bermuda during 2013 with an average daily temperature of 81.40°F. The coolest month was March (62.60°F). Over the last five years, the annual average air temperature in Bermuda has remained around 71.62°F. During that period, the average daily maximum temperature was 75.41°F while the average daily minimum temperature was 67.67°F (see Table 3.3).

Over the past five years, 2009 to 2013, the average humidity was 73.40%. In 2013, April, June, September and October were the months with the highest humidity (77.00%) and the lowest was November (68.00%) (see Table 3.4).

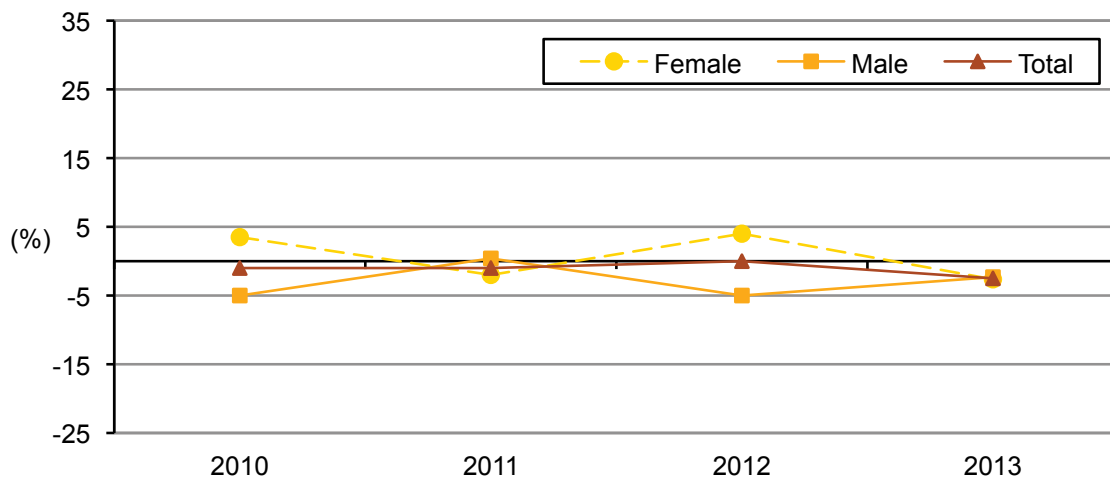
**Table 3.1****Reported Cases of Environmentally-Related Diseases by Sex**

<b>Cause</b>	<b>Sex</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Gastroenteritis	Female	477	349	359	337
	Male	357	287	299	244
	Total	834	636	658	581
Malaria (imported)	Female	0	1	0	0
	Male	0	2	0	1
	Total	0	3	0	1
Dengue (imported)	Female	1	1	0	0
	Male	1	0	0	0
	Total	2	1	0	0
Accidental pesticide	Female	2	2	0	0
	Male	3	2	1	0
	Total	5	4	1	0
Poisoning	Female	66	48	49	37
	Male	49	44	32	26
	Total	115	92	81	63
Diarrhoea	Female	56	58	55	63
	Male	53	45	55	45
	Total	109	103	110	108
Respiratory diseases (all)	Female	2,944	3,026	3,160	3,090
	Male	2,588	2,682	2,537r	2,540
	Total	5,532	5,708	5,697r	5,630
Acute bronchitis	Female	258r	274r	309r	231
	Male	207r	205r	186r	195
	Total	465r	479r	495r	426
Chronic sinusitis	Female	112	115	91	106
	Male	45	45	51	50
	Total	157	160	142	156
Other	Female	2,574r	2,637r	2,760r	2,753
	Male	2,336r	2,432r	2,300r	2,295
	Total	4,910r	5,069r	5,060r	5,048
<b>TOTAL CASES, all causes</b>	<b>Female</b>	<b>3,546</b>	<b>3,485</b>	<b>3,623</b>	<b>3,527</b>
	<b>Male</b>	<b>3,051</b>	<b>3,062</b>	<b>2,924</b>	<b>2,856</b>
	<b>Total</b>	<b>6,597</b>	<b>6,547</b>	<b>6,547</b>	<b>6,383</b>
<b>Growth rate (%)</b>	<b>Female</b>	<b>3.50</b>	<b>-2.00</b>	<b>4.00</b>	<b>-2.64</b>
	<b>Male</b>	<b>-5.00</b>	<b>0.40</b>	<b>-5.00</b>	<b>-2.32</b>
	<b>Total</b>	<b>-1.00</b>	<b>-1.00</b>	<b>0.00</b>	<b>-2.50</b>

Source: Department of Health/BHB  
2010-2013 includes inpatient discharges and emergency encounters.

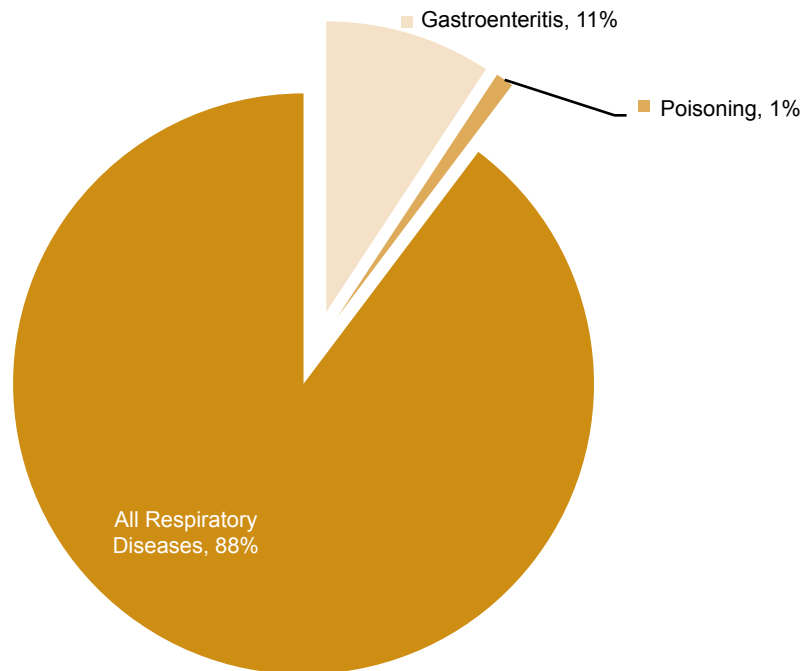
**Chart 3.1**

**Growth in Reported Cases of Environmentally-Related Diseases by Sex and Total**



**Chart 3.2**

**Reported Cases of Environmentally-Related Diseases by Cause**



**Table 3.2****Rainfall in Inches and Days by Month of Year and Total**

<b>Year</b>	<b>Jan.</b>	<b>Feb.</b>	<b>Mar.</b>	<b>Apr.</b>	<b>May</b>	<b>Jun.</b>	<b>Jul.</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Dec.</b>	<b>Total</b>
<b>2009</b>	Inches 4.02	Inches 4.72	Inches 2.74	Inches 2.54	Inches 1.31	Inches 12.70	Inches 3.10	Inches 3.32	Inches 6.54	Inches 8.84	Inches 3.41	Inches 2.60	Inches 55.90
	Rain 18	Rain 15	Rain 15	Rain 10	Rain 9	Rain 25	Rain 12	Rain 10	Rain 18	Rain 17	Rain 15	Rain 15	Rain 179
	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days
<b>2010</b>	Inches 6.00	Inches 3.60	Inches 5.13	Inches 1.11	Inches 1.21	Inches 0.70	Inches 5.30	Inches 4.10	Inches 9.21	Inches 4.00	Inches 1.40	Inches 4.00	Inches 46.20
	Rain 23	Rain 20	Rain 17	Rain 11	Rain 8	Rain 5	Rain 12	Rain 17	Rain 15	Rain 10	Rain 16	Rain 26	Rain 180
	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days
<b>2011</b>	Inches 5.19	Inches 1.87	Inches 2.51	Inches 2.13	Inches 0.62	Inches 0.97	Inches 5.02	Inches 7.16	Inches 3.22	Inches 5.94	Inches 3.36	Inches 2.58	Inches 40.57
	Rain 20	Rain 12	Rain 16	Rain 6	Rain 16	Rain 8	Rain 15	Rain 24	Rain 14	Rain 17	Rain 19	Rain 15	Rain 182
	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days
<b>2012</b>	Inches 3.88	Inches 2.13	Inches 0.79	Inches 1.87	Inches 4.36	Inches 5.50	Inches 2.89	Inches 4.50	Inches 9.28	Inches 5.12	Inches 6.16	Inches 2.79	Inches 49.27
	Rain 18	Rain 13	Rain 8	Rain 13	Rain 10	Rain 14	Rain 11	Rain 17	Rain 16	Rain 16	Rain 23	Rain 15	Rain 174
	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days
<b>2013</b>	Inches 2.07	Inches 6.48	Inches 5.47	Inches 3.58	Inches 1.95	Inches 4.58	Inches 3.11	Inches 10.43	Inches 9.76	Inches 6.21	Inches 3.37	Inches 4.71	Inches 61.72
	Rain 16	Rain 18	Rain 19	Rain 13	Rain 10	Rain 8	Rain 9	Rain 15	Rain 22	Rain 17	Rain 14	Rain 16	Rain 177
	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days

Source: The Bermuda Weather Service

Table 3.3

## Mean Air Temperature

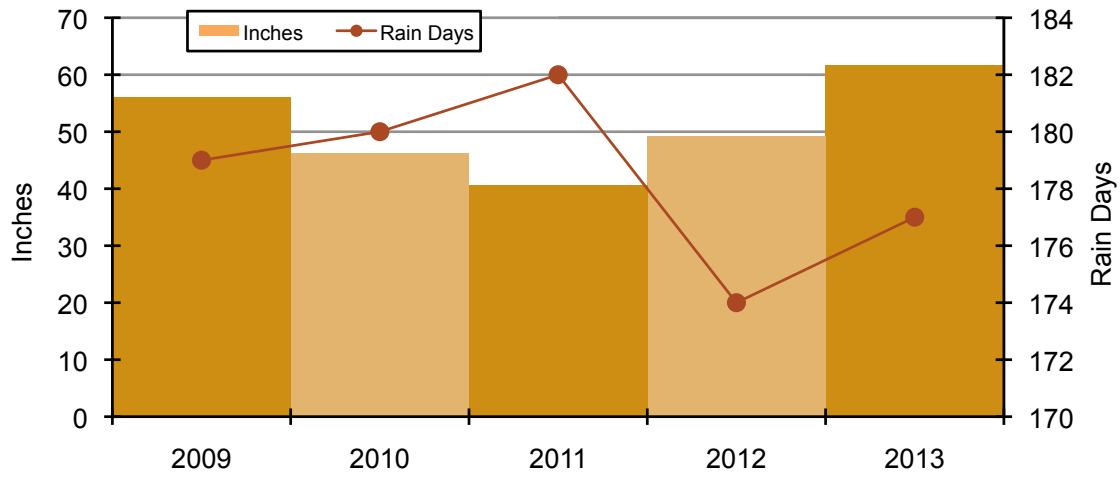
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Yearly Average
<b>2009</b>	Mean Daily Max.	69.10	66.30	67.60	70.60	75.90	84.40	86.10	84.00	79.70	75.20	69.60	75.80
	Mean Daily Min.	60.20	57.70	60.00	62.60	68.70	77.20	78.70	76.30	72.10	68.00	62.30	68.00
	Mean Daily	65.00	62.30	63.70	66.70	71.80	80.70	82.30	80.10	76.10	71.70	66.30	72.00
<b>2010</b>	Mean Daily Max.	65.90	64.70	67.20	69.80	74.50	84.50	85.60	82.70	79.30	73.30	66.50	74.60
	Mean Daily Min.	57.60	56.30	59.70	62.70	67.00	76.90	78.20	75.10	72.40	66.30	57.80	66.90
	Mean Daily	62.10	60.90	63.40	65.90	70.20	80.40	81.90	79.00	75.70	69.70	63.10	70.80
<b>2011</b>	Mean Daily Max.	66.70	67.30	67.80	71.30	74.70	85.00	84.90	84.10	79.60	75.20	71.20	75.68
	Mean Daily Min.	58.70	58.80	59.60	64.30	67.10	76.70	77.20	77.10	72.10	68.80	63.80	68.06
	Mean Daily	62.90	63.20	63.70	67.40	70.50	80.70	81.50	80.70	76.00	71.90	67.80	71.86
<b>2012</b>	Mean Daily Max.	69.10	68.50	69.90	71.20	74.00	84.50	85.90	82.90	80.30	74.70	71.30	75.85
	Mean Daily Min.	60.10	60.20	61.20	62.80	67.20	77.00	78.40	75.20	73.80	67.00	62.50	68.01
	Mean Daily	65.10	64.70	65.50	66.90	70.50	80.40	82.10	79.30	77.10	71.10	67.40	72.04
<b>2013</b>	Mean Daily Max.	68.00	67.20	66.30	69.90	73.00	85.60	84.80	82.30	79.60	73.00	71.30	75.12
	Mean Daily Min.	60.00	59.60	58.70	62.30	65.50	77.20	75.90	74.40	72.50	65.40	63.70	67.37
	Mean Daily	64.40	63.50	62.60	66.20	69.20	76.70	81.40	78.50	76.00	69.50	67.80	71.38

Source: The Bermuda Weather Service



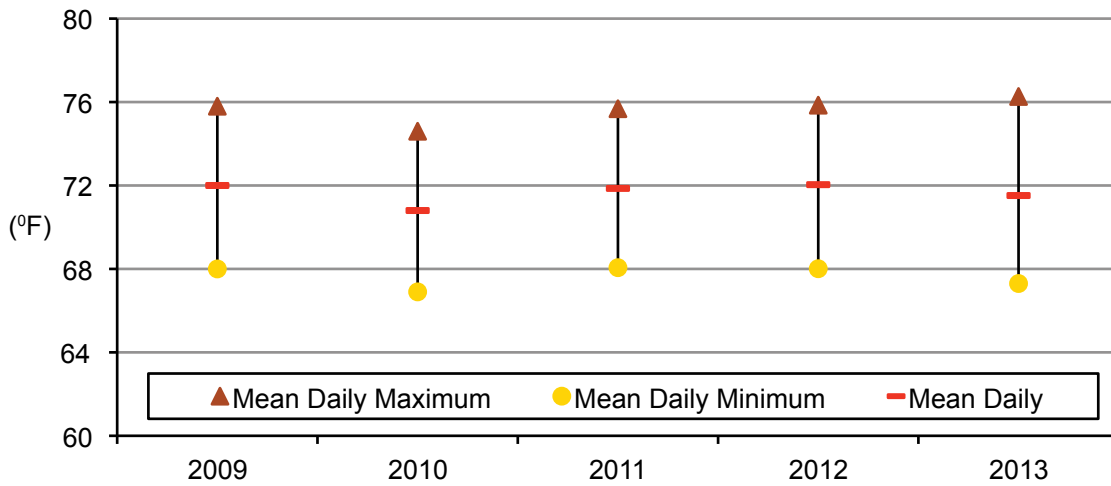
**Chart 3.3**

**Total Number of Inches of Rainfall and Rain Days**



**Chart 3.4**

**Mean Daily Maximum, Minimum and Mean Daily Air Temperature**





**Table 3.4**

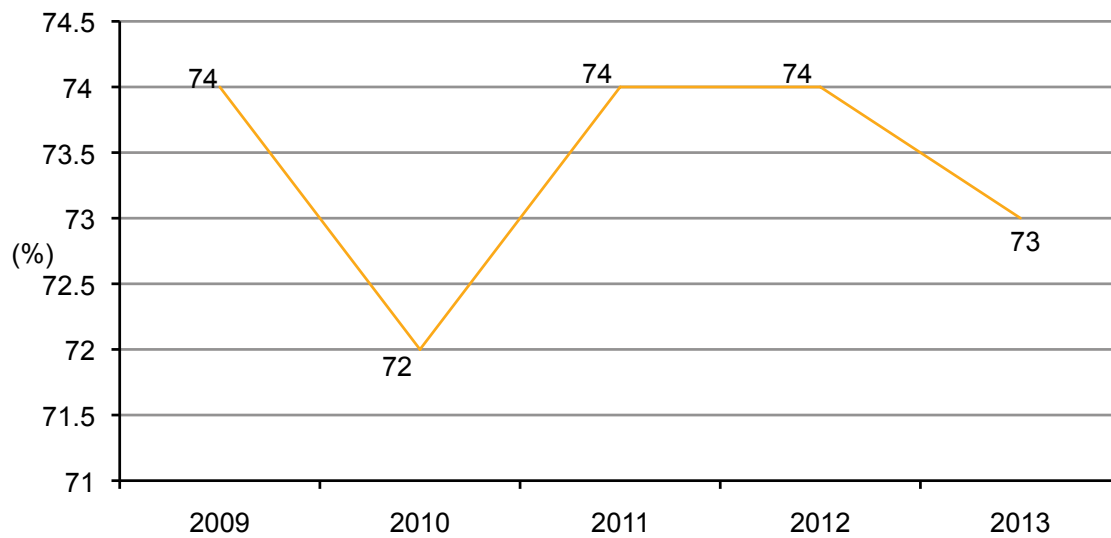
**Mean Relative Humidity**

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	(%)
													Yearly Average
<b>2009</b>	75	67	70	70	75	82	79	74	76	73	75	68	74
<b>2010</b>	70	66	72	71	78	78	75	76	75	70	68	67	72
<b>2011</b>	71	72	74	77	74	75	76	79	78	72	70	69	74
<b>2012</b>	72	70	71	72	77	79	78	74	73	75	72	71	74
<b>2013</b>	71	70	70	77	72	77	72	75	77	77	68	75	73

Source: The Bermuda Weather Service

**Chart 3.5**

**Mean Relative Humidity**



## **Millennium Development Goal 7**

### **Indicator 30**

Proportion of population with sustainable access to an improved water source

100 %

The percentage of the population who use any of the following types of water supply for drinking: piped water, public tap, borehole or pump, protected well, protected spring or rainwater to the total population, expressed as a percentage. Improved water sources do not include vendor-provided water, bottled water, tanker trucks or unprotected wells and springs.

Access to safe water refers to the percentage of the population with reasonable access to an adequate supply of safe water in their dwelling or within a convenient distance of their dwelling.

## **Millennium Development Goal 7**

### **Indicator 31**

Proportion of population with access to improved sanitation

100 %

The percentage of the population with access to improved excreta disposal. Facilities such as sewers or septic tanks, pour-flush latrines and simple pit latrines are assumed to be adequate, provided that they are not public. To be effective, facilities must be correctly constructed and properly maintained.

# **NATURAL AND ENVIRONMENTAL DISASTERS**



## **Section 4: Natural and Environmental Disasters**

### **Hurricanes**

Natural and environmental disasters are very rare in Bermuda. The last natural disaster was Hurricane Fabian, a category 3 hurricane, which made landfall on September 5th, 2003. The hurricane resulted in four deaths and an estimated \$300 million in damages across the Island (see Table 4.1).

### **Fires**

The number of fires reported in 2013 increased to 1,830 (see Table 4.2). This represents an increase of 2.98% over total fires in 2012. The majority of fires were classified in the “other” category.

**Table 4.1****Natural Disaster**

<b>Item</b>	<b>2003</b>
Type of disaster	Hurricane
Date started <sup>1</sup>	September 5th 2003
Total casualties:	4
of which: dead	4
Total population affected <sup>2</sup>	50,000
Damage (\$ million) <sup>3</sup>	300

Source: Department of Statistics

<sup>1</sup> Date of the first call for national assistance.

<sup>2</sup> Persons in households who lost electricity.

<sup>3</sup> Estimated value of all damages and economic losses directly related to the occurrence of the hurricane

**NOTE TO READER**

**Natural Disaster:** a natural event which overwhelms local capacity, necessitating a request for national or international assistance, or is recognized as such by a multilateral agency, or by at least two sources, such as national, regional or international assistance groups and the media. There are two types: sudden-impact disasters e.g. earthquakes; or those that develop gradually, e.g. drought.

**Type of disaster:** Avalanches, floods, earthquakes, cyclones, torrential rains, volcanic eruptions, typhoons, droughts, landslides, mudslides, fires, blizzards, tsunamis, etc.

Source: CARICOM Environment Programme

**Table 4.2**

**Incidences of Fires by Type**

Year	Total	Other <sup>1</sup>	Minor Incidents <sup>2</sup>	Structure <sup>3</sup>	Island Fires	Vehicle	Boat Fires
2009	1,771	521	381	825	4	35	5
2010	1,788	542	485	729	1	28	3
2011	1,841	786	372	655	0	26	2
2012	1,777	751	412	597	..	17	..
2013	1,830	950	372	495	..	13	..

Source: Bermuda Fire and Rescue Services

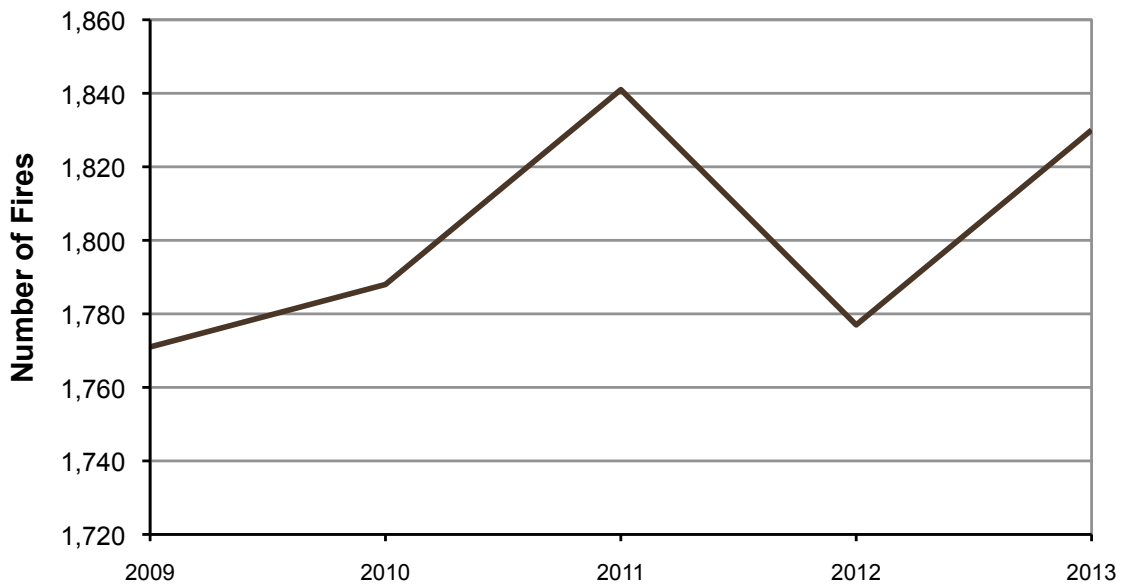
<sup>1</sup> Reflects the activities of the Crash and Fire Rescue Services in other emergency duties such as Airport Operations Division incidents, foreign object debris checks, hot refuel, aircraft standby, etc.

<sup>2</sup> From 2006 there was a different reporting system by the Bermuda Fire Service which now categorizes brush, trash, gas cylinder leaks, etc. as "minor incidents".

<sup>3</sup> Includes false alarms.

**Chart 4.1**

**Total Incidences of Fire**



# ENERGY, MINERALS AND TRANSPORT





## Section 5: Energy, Minerals and Transport

The section on Energy, Minerals and Transport comprises of information on the types of fuels imported to Bermuda such as gasoline, diesel and propane. It also contains data on electricity consumption by type of consumer and the types of vehicles operating on Bermuda's roads.

### Fuels

In 2013, the value of petroleum oils and oils from bituminous mineral, other than crude imported into Bermuda was \$154 million, an increase of 59.30 percent from the total value imported in 2012 (see Table 5.1).

### Mineral Fuels

Of the types of mineral fuels and oils imported to Bermuda, petroleum oils and gases were the most consumed with a combined import value of \$158 million in 2013 (see Table 5.2).

### Electricity

The volume of electricity consumption in 2013 was nearly 587 million kilowatt-hours (kWh), 3.24% lower than the 606 million kWh consumed in 2012. The commercial sector accounted for over half (295 million kWh) of all electricity consumed in Bermuda (see Table 5.3).

### Transport

Bermuda's unique traffic laws permit drivers to have only one car per dwelling unit. In 2013, there were 46,947 registered road vehicles on Bermuda's roads, with private cars accounting for almost half (45.93%) of this total. In 2013, nearly one-third (31.97%) of all vehicles registered in Bermuda were motorcycles (see Table 5.6).

**Table 5.1****Value of Imported Fuel<sup>1</sup> by Type**

<b>Type</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
	<b>Value (\$)</b>	<b>Value (\$)</b>	<b>Value (\$)</b>	<b>Value (\$)</b>
Light oils & preparations (i.e. motor spirits)	19,085,734	19,064,278	11,703,867	32,608,135
Gas oils (diesel)	12,975,113	8,400,691	6,307,623	17,208,412
Gas oils (heavy atmospheric)	18,558,234	25,483,946	8,170,259	20,237,831
Kerosene & other medium oils (not including gas oils)	712,494	6,398,003	6,485,207	17,546,376
Fuel oils not elsewhere specified	37,862,445	22,288,504	60,161,139	61,480,353
Other lubricating oils & greases, etc.	3,931,518	3,893,602	3,676,570	4,826,875
Other waste oils	503,130	110,435	130,544	29,677
<b>Total</b>	<b>93,628,668</b>	<b>85,639,459</b>	<b>96,635,208</b>	<b>153,937,660</b>

Source: Department of Statistics

<sup>1</sup> Petroleum oils and oils obtained from bituminous minerals, other than crude.

**Table 5.2****Value of Imported Mineral Fuels, Mineral Oils and Related Products Consumed by Type**

Type	2009	2010	2011	2012	2013
	(\$)	(\$)	(\$)	(\$)	(\$)
Coal, briquettes	22,938	31,638	20,949	9,552	10,833
Lignite	70.56	203.17	1,648	540	-
Peat	100,961	102,642	70,076	63,675	76,793
Coke and semi coke	107,963	108,648	107,284	72,643	93,740
Coal gas, water gas	614.68	222.48	589	750	-
Tar distilled	8,343	3,608	4,198	1,032	644
Oils and other products	27,202	8,037	10,401	323	5,632
Pitch and pitch coke	19,775	1,151	3,578	-	-
Petroleum oils	11.36	323.59	193	-	-
Petroleum oils other than crude	109,479,394	93,628,668	85,639,459	96,635,208	153,937,660
Petroleum gases and other gaseous hydrocarbons	2,305,416	3,140,447	2,932,380	1,614,583	3,040,172
Petroleum jelly	178,059	129,000	43,886	37,887	38,266
Petroleum coke	47,773	3,846	15,105	1,588	98,307
Other bitumen and asphalt	18,886	2,868	25,923	1,061	5,167
Bituminous mixtures	654,786	607,499	524,230	612,298	469,124
Electrical energy	2,201	0	2,212	42,705	-
<b>Total</b>	<b>112,974,394</b>	<b>97,768,800</b>	<b>89,402,111</b>	<b>99,093,845</b>	<b>157,776,338</b>

Source: Department of Statistics

**Table 5.3****Electricity Consumption by Type of Consumer**

Year	Per Capita Electricity Consumption (kWh)	Total ('000 kWh)	Type		
			Residential ('000 kWh)	Commercial ('000 kWh)	Other <sup>1</sup> ('000 kWh)
<b>2009</b>	10,188	656,082	271,682	326,727	57,673
<b>2010</b>	10,128	650,571	276,824	320,527	53,220
<b>2011</b>	10,073	636,517	265,243	316,356	54,918
<b>2012</b>	9,716	606,346	249,749	307,269	49,328
<b>2013</b>	9,470	586,704	244,421	295,043	47,240

Source: Bermuda Electric Light Company Ltd.

<sup>1</sup> Includes street lighting paid by Parish Councils and sales to Government for offices, distillation plant, etc.

**Table 5.4****Growth in Electricity Consumption by Type of Consumer**

Year	Growth Total Electricity Consumption	Type		
		Residential %	Commercial %	Other %
2009	1.73	1.20	2.40	0.50
2010	-0.84	1.80	-1.80	-7.70
2011	-2.16	-4.20	-1.30	3.20
2012	-4.74	-5.80	-2.90	-10.10
2013	-3.24	-2.13	-3.98	-4.23

**Chart 5.1****Growth in Electricity Consumption by Type of Consumer and Total Consumption****Table 5.5****Percent of Total Electricity Consumption by Type of Consumer**

Year	Total	Type		
		Residential %	Commercial %	Other %
2009	100	41.40	49.70	8.70
2010	100	42.50	49.20	8.10
2011	100	41.70	49.70	8.60
2012	100	41.20	50.70	8.10
2013	100	41.66	50.29	8.05

Source: Bermuda Electric Light Company Ltd.  
 Percentages may not sum to totals due to rounding.

**Table 5.6****Registered Road Vehicles<sup>1,2</sup>**

Type	2009	2010	2011	2012	2013
Private Cars	22,626	22,315	21,991	21,707	21,564
Buses, Minibuses & Limousines	178	178	179	185	187
Taxis	598	595	588	579	581
Trucks	4,026	3,967	3,870	3,746	3,655
Trailers	318	320	313	321	288
Farm Tractors	26	23	22	26	25
Ambulances & Fire Engines	48	48	46	41	44
Military Vehicles	34	33	33	36	32
Tractors & Tractor Trailers	451	429	418	393	376
Light Private Cars	129	119	107	94	81
Auxiliary Cycles <sup>3</sup>	6,190	5,586	5,232	4,754	4,458
Motor Cycles & Scooters	15,514	15,317	15,163	14,887	15,009
Construction Vehicles <sup>4</sup>	82	78	71	72	60
Government Private (GP) Vehicles <sup>5</sup>	250	254	247	257	252
Other <sup>6</sup>	401 <sup>7</sup>	400	381	361	335
<b>Total</b>	<b>50,871</b>	<b>49,662</b>	<b>48,661</b>	<b>47,459</b>	<b>46,947</b>

Source: Transport Control Department

<sup>1</sup> Number of vehicles for which a valid license was in effect as of December 31st .

<sup>2</sup> This table format was revised in 2014.

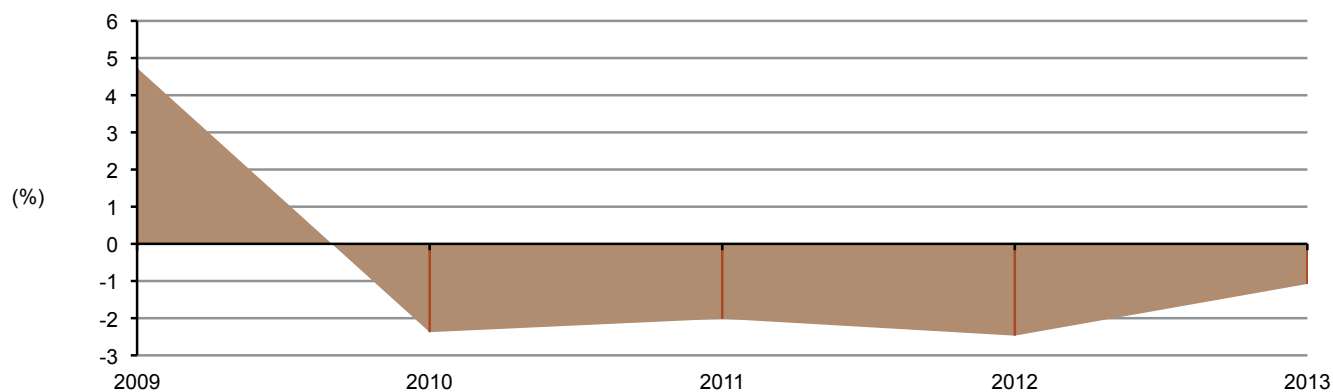
<sup>3</sup> Includes livery cycles

<sup>4</sup> Includes cement mixers

<sup>5</sup> Includes cars, classes A-H and minibuses.

<sup>6</sup> Includes classic cars, community service vehicles, doctors' cars, garbage trucks, hearses, instructional vehicles, loaner vehicles, locomotives, police utility vehicles, public carriages and sporting associations.

<sup>7</sup> Includes amphibious vehicles

**Chart 5.2****Growth in Registered Road Vehicles**

# AGRICULTURE



## Section 6: Agriculture

The Agriculture section includes tables, charts and information on the imported fertilizers and pesticides in Bermuda.

### **Fertilizers and Pesticides**

In 2013, the aggregate value of fertilizers imported into Bermuda totaled \$659,713 representing a decrease of 7.92% from the previous year (see Table 6.1). The total value of pesticides imported in 2013 climbed to \$2 million representing an increase of 10.61% since 2012 (see Table 6.2). In 2013, insecticides accounted for 42.51% of the total value of imported pesticides.

**Table 6.1****Imported Fertilizers by Type**

<b>Category</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Animal/Vegetable fertilizers	237,853	231,180	284,041	267,024	165,631
Nitrogenous fertilizers	99,614	119,543	182,686	105,071	131,917
Phosphate fertilizers	13,169	63,854	249	29	17
Potash fertilizers	13,778	4,128	3,516	116	360
Other fertilizers	488,135	389,117	353,556	344,253	361,788
<b>Total</b>	<b>852,549</b>	<b>807,822</b>	<b>824,048</b>	<b>716,493</b>	<b>659,713</b>
<b>Growth rate (%)</b>	<b>-13.67</b>	<b>-5.25</b>	<b>2.01</b>	<b>-13.05</b>	<b>-7.92</b>

Source: Department of Statistics  
Data on quantities imported are not available.

**Table 6.2****Imported Pesticides by Type**

<b>Category</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Insecticides <sup>A</sup>	612,986	744,680	815,541	801,569	854,812
Herbicides <sup>B</sup>	227,217	148,754	146,616	238,032	311,135
Fungicides, bactericides and seed treatments <sup>C</sup>	78,906	126,015	163,484	111,941	134,383
Disinfectants	187,463	262,917	228,717	431,708	478,639
Others (including mineral oils)	529,456	382,246	148,722	234,952	232,110
<b>Total</b>	<b>1,636,028</b>	<b>1,664,612</b>	<b>1,503,080</b>	<b>1,818,202</b>	<b>2,011,079</b>
<b>Growth rate (%)</b>	<b>8.80</b>	<b>1.75</b>	<b>-9.70</b>	<b>20.96</b>	<b>10.61</b>

Source: Department of Statistics  
Data on quantities imported are not available.

According to Food and Agriculture Organization (FAO), the following should be included in the above:

A: Include chlorinated hydrocarbons, organo-phosphates, carbonates-insecticides, pyrethroids, botanical products and biological, and others.

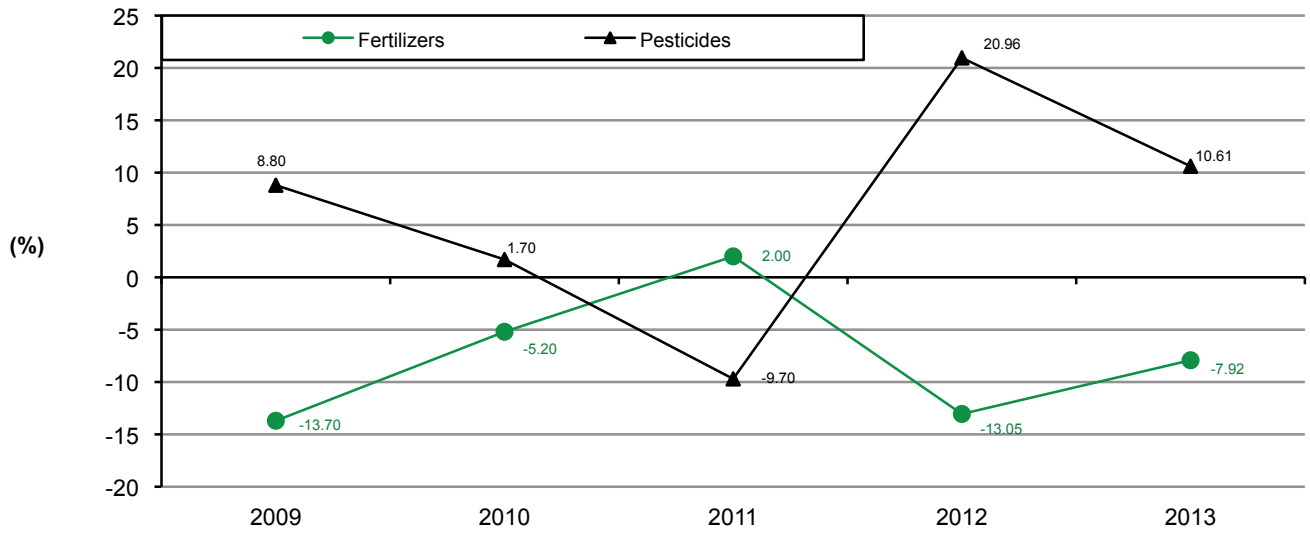
B: Include phenoxy hormone products, triazines, amides, carbonates-herbicides, dinitroanilines, urea derivatives, sulfonyl urea, bipiridils, uracil, and others.

C: Include inorganic, dithiocarbamates, benzimidazoles, triazoles, diazoles, diazines, morpholines, and others.



Chart 6.1

Growth in Imported Fertilizers and Pesticides



# LAND USE



## Section 7: Land Use

The Land Use section includes tables and charts pertaining to land usage in Bermuda. The data in this section was collected in 2001 by the Department of Planning and has not been updated.

### Land Use

In 2001, residential properties occupied 45.10 percent of all land in Bermuda, covering roughly 5,984 acres of land. Nearly 4,417 acres were dedicated to open space land use, which comprises of golf courses, nature reserves, other recreation and rural areas. This represented about one-third of Bermuda's land. Land used for commercial purposes (such as retail and office space) accounted for nearly 1.70 percent of all occupied land space in Bermuda (see Table 7.1).

A comparison of land use by parish showed that St. George's holds the largest share of land with 2,162.70 acres. Of this total, one-third covered open space. The parish of St. George is known for its golf courses, nature reserves, recreational and other rural open spaces. In contrast, the City of Hamilton occupies the least amount of land in Bermuda (176.34 acres), with less than 4.49 percent deemed open space (see Table 7.2.2). This is reflected by the large concentration of commercial, institutional and utility activity located within the city limits (see Table 7.2.1) Map 7.1 displays the land usage by category in Bermuda.

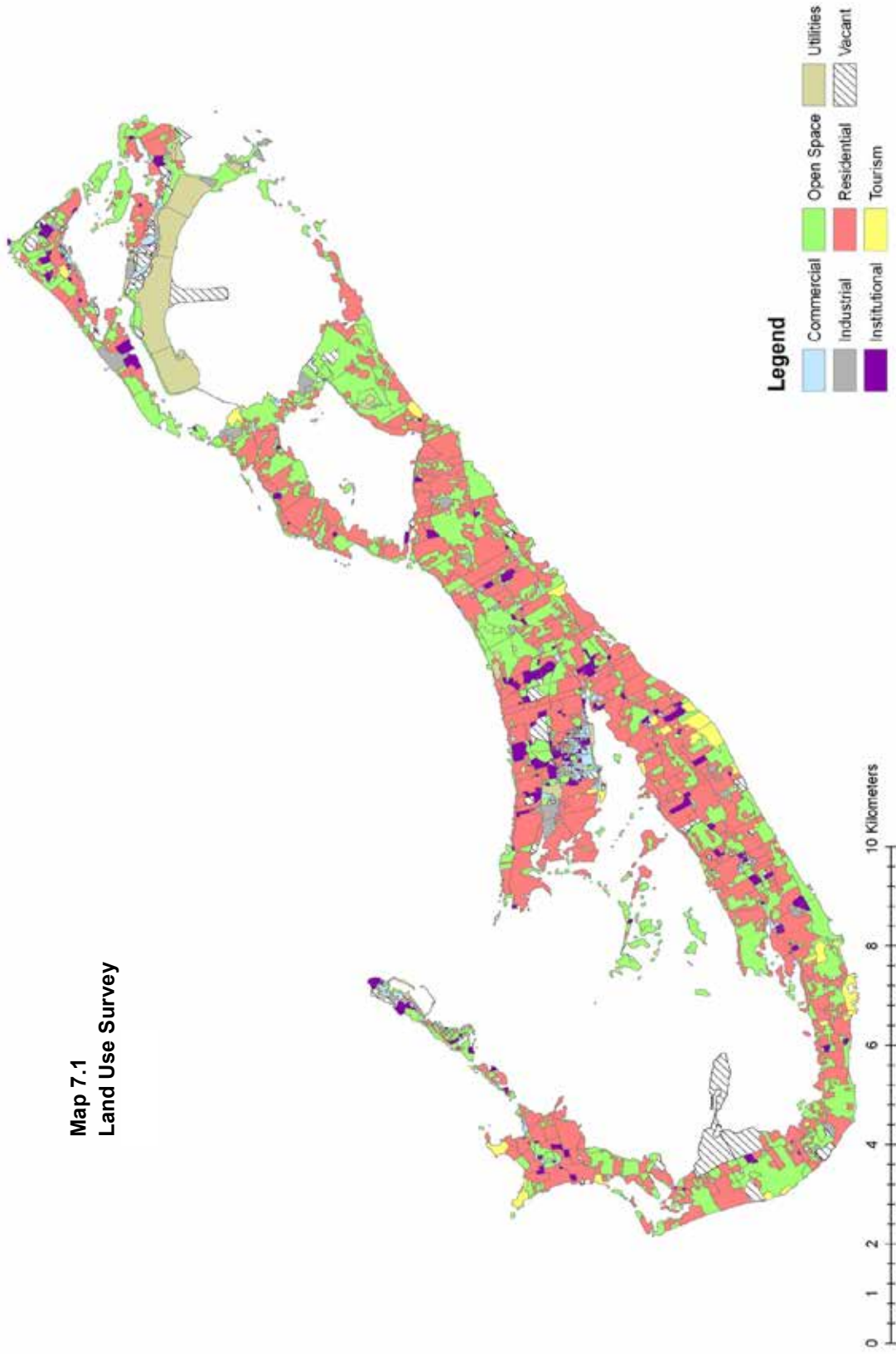
**Table 7.1****Land Use as of 2001**

<b>Main Use</b>	<b>Sub-Category</b>	<b>Total Area (Acres)</b>	<b>Percentage Distribution</b>
Commercial	Mixed-use	36.45	0.27
	Office	63.03	0.48
	Retail	126.16	0.95
	<b>Total</b>	<b>225.64</b>	<b>1.70</b>
Industrial	General	200.42	1.51
	Light industrial	64.37	0.49
	Quarry	56.81	0.43
	<b>Total</b>	<b>321.61</b>	<b>2.42</b>
Institutional	Education	254.20	1.92
	Government	63.97	0.48
	Hospital	30.32	0.23
	Police	59.07	0.45
	Prison	16.76	0.13
	Religious	87.48	0.66
	Social	12.24	0.09
	<b>Total</b>	<b>524.04</b>	<b>3.95</b>
Open space	Golf courses	808.77	6.10
	Nature reserve	1,258.08	9.48
	Other	946.23	7.13
	Recreation	240.92	1.82
	Rural	1,162.82	8.76
	<b>Total</b>	<b>4,416.82</b>	<b>33.29</b>
Residential	Condos	162.25	1.22
	Housing	5,799.45	43.71
	Institutional	22.18	0.17
	<b>Total</b>	<b>5,983.89</b>	<b>45.10</b>
Tourism	Cottage colonies	204.68	1.54
	Hotels	127.61	0.96
	<b>Total</b>	<b>332.29</b>	<b>2.50</b>
Utilities	Airport	548.42	4.13
	Docks	36.82	0.28
	BELCO	37.95	0.29
	Transport	44.04	0.33
	Waste	67.07	0.51
	<b>Total</b>	<b>734.29</b>	<b>5.53</b>
Vacant	Vacant buildings	119.9	0.90
	Vacant land	610.27	4.60
	<b>Total</b>	<b>730.17</b>	<b>5.50</b>
<b>Total</b>		<b>13,268.74</b>	<b>100.00</b>

Source: Department of Planning, Land Use Survey 2001

The 2001 Land Use Survey was based on the 1997 digital survey of the islands, whose coastline was probably taken at the high water mark hence the discrepancy in total area which now stands at 13,430.39 acres (low tide mark) in 2007 as a result of the more accurate 2003 Topographic Mapping Database.

**Map 7.1**  
**Land Use Survey**



**Table 7.2.1**  
**Land Use by Parish, City and Town in Acres, as of 2001**

Main Use / Sub-Category	The City of Hamilton	Devon-shire	Hamilton	Paget	Pembroke	Sandy's	St. George's	Smith's	Southampton	The Town of St. George	Warwick
<b>Commercial</b>	<b>66.79</b>	<b>10.82</b>	<b>11.01</b>	<b>16.39</b>	<b>27.16</b>	<b>26.95</b>	<b>32.50</b>	<b>2.92</b>	<b>10.16</b>	<b>11.05</b>	<b>9.89</b>
Mixed-use	32.18	-	-	-	-	-	-	-	-	4.27	-
Office	16.93	4.19	-	6.57	15.11	-	18.96	-	-	0.45	0.83
Retail	17.68	6.63	11.01	9.82	12.05	26.95	13.54	2.92	10.16	6.33	9.06
<b>Industrial</b>	<b>12.34</b>	<b>18.85</b>	<b>47.45</b>	<b>4.12</b>	<b>55.59</b>	<b>13.91</b>	<b>99.55</b>	<b>21.10</b>	<b>21.79</b>	<b>8.91</b>	<b>18.00</b>
General	5.96	11.34	11.49	0.74	52.94	13.91	66.59	9.46	18.91	1.30	7.78
Light industrial	6.38	7.51	-	3.38	2.65	-	32.96	-	2.88	7.62	1.00
Quarry	-	-	35.96	-	-	-	-	11.63	-	-	9.22
<b>Institutional</b>	<b>30.65</b>	<b>72.62</b>	<b>12.95</b>	<b>66.43</b>	<b>96.85</b>	<b>60.58</b>	<b>48.08</b>	<b>15.81</b>	<b>30.66</b>	<b>34.29</b>	<b>55.10</b>
Education	4.35	35.96	8.89	27.93	47.78	25.28	27.30	11.29	16.96	20.42	28.04
Government	12.54	11.03	-	8.87	25.49	1.15	1.48	-	-	2.94	0.47
Hospital	0.51	11.26	-	14.74	0.62	3.18	-	-	-	-	-
Police	1.14	9.33	-	-	1.30	15.43	15.47	-	6.83	0.54	9.02
Prison	5.25	-	-	4.59	2.81	-	1.53	-	-	-	2.57
Religious	6.58	5.04	4.06	10.30	15.67	11.85	2.31	4.52	6.87	10.00	10.28
Social	0.28	-	-	-	3.18	3.68	-	-	-	0.39	4.71
<b>Utilities</b>	<b>26.88</b>	<b>23.83</b>	<b>11.43</b>	<b>-</b>	<b>23.77</b>	<b>20.35</b>	<b>606.21</b>	<b>6.71</b>	<b>5.07</b>	<b>9.81</b>	<b>0.22</b>
Airport	-	-	-	-	-	-	548.42	-	-	-	-
Docks	10.28	0.36	-	-	0.29	15.08	6.54	-	0.33	3.70	0.22
BELCO	0.46	4.37	-	-	20.32	0.12	4.10	6.71	1.43	0.44	-
Transport	16.14	4.97	0.58	-	3.16	2.48	10.18	-	3.31	3.22	-
Waste	-	14.13	10.84	-	-	2.67	36.98	-	-	2.44	-

Source: Department of Planning, Land Use Survey 2001.

The 2001 Land Use Survey was based on the 1997 digital survey of the islands, whose coastline was probably taken at the high water mark hence the discrepancy in total area which now stands at 13,430.39 acres (low tide mark) in 2007 as a result of the more accurate 2003 Topographic Mapping Database.

**Table 7.2.2**

**Land Use by Parish, City and Town in Acres, as of 2001**

Main Use / Sub-Category	The City of Hamilton	Devon-shire	Hamilton	Paget	Pembroke	Sandy's	St. George's	Smiths	Southampton	The Town of St. George	Warwick
<b>Residential</b>	<b>27.40</b>	<b>562.37</b>	<b>585.43</b>	<b>803.56</b>	<b>758.13</b>	<b>669.53</b>	<b>450.30</b>	<b>709.70</b>	<b>610.69</b>	<b>98.99</b>	<b>707.79</b>
Condos	-	27.99	15.34	21.81	11.86	20.39	6.12	10.58	24.64	2.70	20.81
Housing	25.73	527.16	570.09	779.98	742.79	645.42	444.18	696.02	586.05	95.89	686.15
Institutional	1.67	7.22	-	1.76	3.47	3.72	-	3.10	-	0.41	0.83
<b>Tourism</b>	<b>-</b>	<b>14.17</b>	<b>18.68</b>	<b>112.14</b>	<b>15.72</b>	<b>44.70</b>	<b>3.95</b>	<b>15.29</b>	<b>88.74</b>	<b>10.16</b>	<b>8.74</b>
Cottage colonies	-	14.17	18.68	62.36	3.03	44.70	3.95	15.29	23.59	10.16	8.74
Hotels	-	-	-	49.78	12.68	-	-	-	65.15	0.00	-
<b>Open space</b>	<b>7.91</b>	<b>499.31</b>	<b>611.26</b>	<b>296.83</b>	<b>132.29</b>	<b>383.01</b>	<b>715.60</b>	<b>432.66</b>	<b>614.39</b>	<b>138.74</b>	<b>584.83</b>
Golf courses	-	76.64	127.69	10.82	-	5.35	139.50	-	198.05	79.72	171.01
Nature reserve	6.44	163.71	156.15	70.33	73.99	107.83	296.43	106.00	104.32	8.39	164.50
Other	1.48	56.96	167.89	59.25	25.38	123.99	218.85	75.27	121.68	30.21	65.29
Recreation	-	35.37	9.11	4.23	27.27	33.92	35.97	24.83	16.85	-	53.37
Rural	-	166.63	150.42	152.20	5.65	111.93	24.86	226.56	173.49	20.43	130.66
<b>Vacant</b>	<b>4.36</b>	<b>19.46</b>	<b>13.98</b>	<b>3.48</b>	<b>60.75</b>	<b>219.39</b>	<b>206.52</b>	<b>12.15</b>	<b>130.19</b>	<b>29.05</b>	<b>30.84</b>
Vacant buildings	0.74	-	13.98	3.11	0.27	22.31	51.16	-	-	18.79	9.54
Vacant land	3.62	19.46	-	0.37	60.47	197.09	155.36	12.15	130.19	10.26	21.30
<b>Total</b>	<b>176.34</b>	<b>1,221.43</b>	<b>1,312.18</b>	<b>1,302.95</b>	<b>1,170.24</b>	<b>1,438.43</b>	<b>2,162.70</b>	<b>1,216.35</b>	<b>1,511.69</b>	<b>341.00</b>	<b>1,415.42</b>

Source: Department of Planning, Land Use Survey 2001

The 2001 Land Use Survey was based on the 1997 digital survey of the islands, whose coastline was probably taken at the high water mark hence the discrepancy in total area which now stands at 13,430.39 acres (low tide mark) in 2007 as a result of the more accurate 2003 Topographic Mapping Database.



# COASTAL AND MARINE RESOURCES





## Section 8: Coastal and Marine Resources

Bermuda's coastal and marine resources are valued entities to its inhabitants. This is primarily because the entire population lives on coastal land and a large percentage use Bermuda's waterways for transportation or commercial fishing.

This section includes information on various marine areas by name, locations, activities permitted in these areas and the date they were established in Bermuda. It also provides information about Bermuda's fishing industry.

### Marine Protected Areas by Category and Area

In 2013, the total marine area of Bermuda was 4,236.11 km<sup>2</sup>, of which 6.96% or 294.74 km<sup>2</sup> was classified as protected area (see Table 8.1 and Chart 8.1). There are 29 protected dive sites located in Bermuda covering an area of 13.70 km<sup>2</sup>. A total of twelve marine parks have been established in Bermuda covering an area of 1.858 km<sup>2</sup>, two seasonal fisheries protected areas that measure 153.36 km<sup>2</sup> and two coral reef preserves, (one each on the north and south shores) which occupy a total of 131.07 km<sup>2</sup> (see Table 8.2).

Tables 8.3.1 and 8.3.2 list the various marine protected areas around Bermuda by the year they were established, whether anchoring or scuba diving is permitted and limitations with respect to fishing and extraction of plants and animal species.

Map 8.1 displays the outline of Bermuda's terrestrial area and identifies the protected seasonal fisheries areas, protected coral reefs and protected dive sites.

### Fisheries

The total quantity of fish landings by species from the years 2009 to 2013 are shown in Table 8.4. In 2013, the total catch was 497.26 metric tons (mT), a decrease of 2.48% from the 509.88 (mT) caught in 2012. The tuna and pelagic species is the most popular catch at 140.97mT or 28.35% of fish landings. In 2013, a total of 315 registered fishermen in Bermuda spent 84,106 hours at sea (see Table 8.5). The 11.52% decrease in registered fishermen accounted for 1,623 less hours (-1.90%) at sea over the previous year.

**Table 8.1**

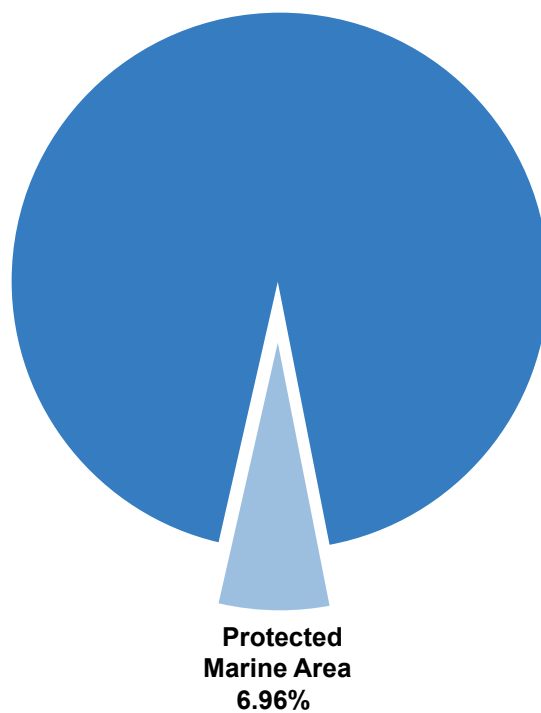
**Total and Protected Marine Area**

<b>Indicator</b>	<b>2013</b>
Total area (km <sup>2</sup> )	4,290.46
Total marine area (km <sup>2</sup> )	4,236.11
Protected marine area (km <sup>2</sup> )	294.74
Protected marine area as a % of total marine area	6.96
Protected marine area as a % of total area	6.87

Source: Department of Planning

**Chart 8.1**

**Protected Marine Area as a Percentage of Total Marine Area**



**Table 8.2**

**Marine Protected Areas By Category And Area**

<b>Marine Protected Areas</b>	<b>Area (km<sup>2</sup>)</b>	<b>Marine Protected Areas</b>	<b>Area (km<sup>2</sup>)</b>
<b>Coral Reef Preserves</b>		<b>Protected Dive Sites</b>	
North Shore Coral Reef Preserve	126.25	North Rock	3.14
South Shore Coral Reef Preserve	4.82	SW Breaker	1.13
<b>Subtotal</b>	<b>131.07</b>	Eastern Blue Cut	1.13
		Pelinaion	0.79
<b>Fisheries Seasonal Protected Areas</b>		Hermes	0.79
North Eastern Area	38.67	Constellation	0.79
South Western Area	114.69	Cristobal Colon	0.28
<b>Subtotal</b>	<b>153.36</b>	NE Breaker	0.28
		Taunton	0.28
<b>Marine Parks</b>		Aristo	0.28
Somerset Long Bay Marine Park	0.008	Mills Breaker	0.28
Church Bay Marine Park	0.034	Cathedral	0.28
John's Smiths Bay Marine Park	0.079	Kate	0.28
Shelly Bay Marine Park	0.016	Tarpon Hole	0.28
South Shore Marine Park	0.368	Marie Celeste	0.28
Castle Island Marine Park	0.688	North Carolina	0.28
Astwood Bay Marine Park	0.023	Airplane	0.28
Walsingham Marine Park	0.216	Blanche King	0.28
Daniel's Head Marine Park	0.011	Darlington	0.28
Cooper's Island Marine Park	0.279	L'Herminie	0.28
Tobacco Bay Marine Park	0.076	Lartington	0.28
Spittal Pond Marine Park	0.062	Montana	0.28
<b>Subtotal</b>	<b>1.858</b>	Snake Pit	0.28
		Hog Breaker	0.28
		Caraquet	0.28
		Madiana	0.28
		Commissioner's Point	0.13
		Xing Da	0.13
		Vixen	0.03
		<b>Subtotal</b>	<b>13.70</b>

<b>Marine Protected Areas</b>	<b>Area (km<sup>2</sup>)</b>
Merged marine protected areas (no overlaps) <sup>1</sup>	294.74
Territorial area (net) <sup>2</sup>	4,236.11

Source: Department of Planning

<sup>1</sup> Total marine protected area does not equal to the sum of the sub-totals as it excludes any overlapping areas (5.26 km<sup>2</sup>) to avoid double counting.

<sup>2</sup> Territorial area (net) means total water area and does not include the land area of 54.35 km<sup>2</sup>.

**Table 8.3.1**

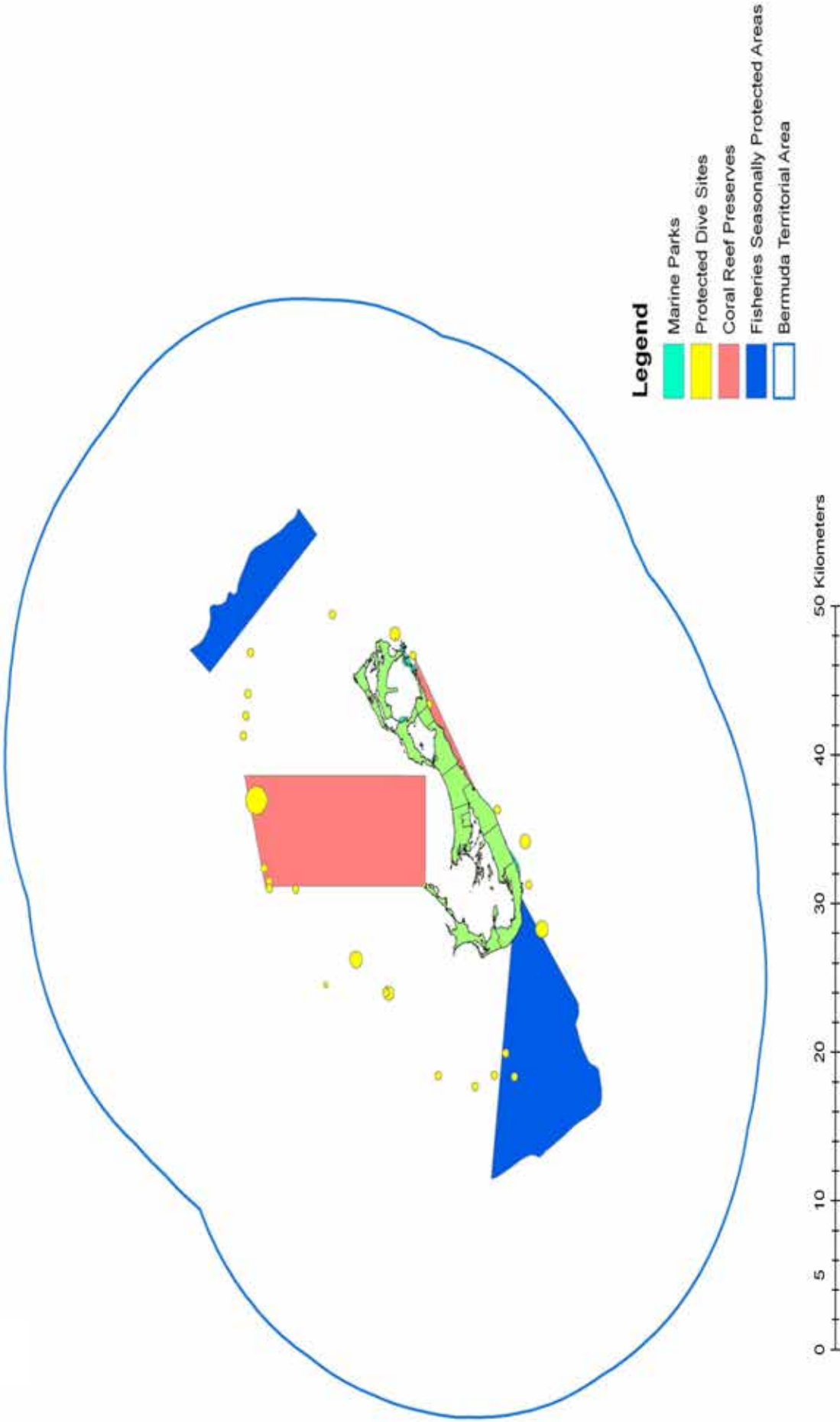
**Marine Protected Areas Around Bermuda**

<b>Marine Protected Area/ No-Take Reserve</b>	<b>Year Established</b>	<b>Anchoring Permitted?</b>	<b>Scuba Diving Permitted?</b>	<b>No-Take Reserve?</b>
North Shore Coral Reef Preserve	1966	Yes	Yes	Line fishing is permitted throughout this Preserve, as is lobster diving and spear fishing provided they are within the limits of the prevailing fisheries regulations. It is an offence to remove, damage or be in possession of plants or animals, whether dead or alive, which are attached to the coast, the seabed or any reef in this preserve.
South Shore Coral Reef Preserve	1966	Yes	Yes	Line fishing is permitted throughout this Preserve, as is lobster diving and spear fishing provided they are within the limits of the prevailing fisheries regulations. It is an offence to remove, damage or be in possession of plants or animals, whether dead or alive, which are attached to the coast, the seabed or any reef in this preserve.
Vixen (Wreck)	1973	No	Yes	Yes
The Eastern Area	Established in 1974 but in 1990 the area was expanded to the current size.	Yes	Yes	Seasonally protected area, no fishing from 1 May to 31 August. First act (1974) stated no fishing between 1 May and 15 August. This was amended in 1975 to 24 May and 15 August, in 1976 it was amended to 1 May-15 August, in 1990 it was amended to 1 May and 30 September and finally in 1993 it was amended to 1 May and 31 August. Trolling for pelagic species is permitted seaward of the 30 fathom depth contour and shore fishing is also permitted.
The South Western Area	Established in 1974 but in 1990 the area was expanded to the current size.	Yes	Yes	Seasonally protected area, no fishing from 1 May to 31 August. First act (1974) stated no fishing between 1 May and 15 August. This was amended in 1975 to 24 May and 15 August, in 1976 it was amended to 1 May and 15 August, in 1990 it was amended to 1 May and 30 September and finally in 1993 it was amended to 1 May and 31 August. Trolling for pelagic species is permitted seaward of the 30 fathom depth contour and shore fishing is also permitted.

**Table 8.3.2****Marine Protected Areas Around Bermuda**

<b>Marine Protected Area/ No-Take Reserve</b>	<b>Year Established</b>	<b>Anchoring Permitted?</b>	<b>Scuba Diving Permitted?</b>	<b>No-Take Reserve?</b>
Constellation (Wreck)	1988	No	Yes	Yes
South West Breaker Area	1988	No	Yes	Yes
Eastern Blue Cut	1989	No	Yes	Yes
Pelinaion and Rita Zovetta (Wrecks)	1989	No	Yes	Yes
Kate (Wreck)	1989	No	Yes	Yes
Hermes and Minnie Bressleur (Wrecks)	1989	No	Yes	Yes
North Rock	1990	No	Yes	Yes
	1990			
The North Eastern Area	It was merged in 2005 with the Eastern Area and redesigned.	Yes	Yes	Seasonally protected area, no fishing from 1 May to 31 August. Initially there was no fishing between 1 May and 30 September, but in 1993 this was amended to 1 May and 31 August. Trolling for pelagic species is permitted seaward of the 30 fathom depth contour and shore fishing is also permitted.
Walsingham Marine Reserve	1991	No	Yes	Yes
Commissioner's Pt. Area	1996	No	Yes	Yes
Xing Da (Wreck)	1997	No	Yes	Yes
Cristobal Colon (Wreck)	2000	No	Yes	Yes
North East Breaker	2000	No	Yes	Yes
Taunton (Wreck)	2000	No	Yes	Yes
Aristo (Wreck)	2000	No	Yes	Yes
Mills Breaker	2000	No	Yes	Yes
The Cathedral	2000	No	Yes	Yes
Tarpon Hole	2000	No	Yes	Yes
Marie Celeste (Wreck)	2000	No	Yes	Yes
North Carolina (Wreck)	2000	No	Yes	Yes
Airplane (Wreck)	2000	No	Yes	Yes
Blanche King (Wreck)	2000	No	Yes	Yes
Darlington (Wreck)	2000	No	Yes	Yes
L'Herminie (Wreck)	2000	No	Yes	Yes
Lartington (Wreck)	2000	No	Yes	Yes
Montana (Wreck)	2000	No	Yes	Yes
Snake Pit	2000	No	Yes	Yes
Hog Breaker	2000	No	Yes	Yes
Caraquet (Wreck)	2000	No	Yes	Yes
Madiana (Wreck)	2000	No	Yes	Yes

**Map 8.1**  
**Marine Protected Area**



**Table 8.4****Quantity of Fish Landings by Type**

Species Group	(mT)				
	2009	2010	2011	2012	2013
Groupers	48.45	44.64	44.47	74.09	75.65
Jacks and related species	49.93	55.70	49.28	77.04	71.76
Snappers	32.46	30.55	33.52	39.13	46.23
Tuna and pelagics	178.36	158.38	239.73	187.89	140.97
Sharks	5.44	4.58	5.71	6.40	5.00
Miscellaneous	30.50	30.19	28.63	36.91	44.20
<b>Total</b>	<b>345.14</b>	<b>324.04</b>	<b>401.34</b>	<b>421.46</b>	<b>423.65</b>
Bait	36.72	25.78	35.97	41.84	39.96
<b>Total including bait</b>	<b>381.86</b>	<b>349.82</b>	<b>437.31</b>	<b>463.30</b>	<b>463.61</b>
Shellfish <sup>1</sup>	42.31	41.55	45.26	46.58	33.65
<b>Including bait &amp; lobsters</b>	<b>424.17</b>	<b>391.37</b>	<b>482.57</b>	<b>509.88</b>	<b>497.26</b>
<b>Growth rate (%)</b>	<b>5.80</b>	<b>-7.70</b>	<b>24.05</b>	<b>5.70</b>	<b>-2.48</b>

Source: Department of Environmental Protection, Marine Resources Division

<sup>1</sup> Shellfish includes spiny lobster. Size of fish is not measured.

Totals may not sum due to rounding.

**Table 8.5****Total Catch by Hours at Sea, Average Catch of Fishing Area and Number of Registered Fishermen**

Indicators	2009	2010	2011	2012	2013
<b>Total catch<sup>1</sup> (mT)</b>	<b>424.17</b>	<b>391.37</b>	<b>482.57r</b>	<b>509.88r</b>	<b>497.26</b>
Average catch of fishing area <sup>2</sup> (mT per km <sup>2</sup> )	0.10	0.09	0.11r	0.12r	0.12
<b>Total hours at sea</b>	<b>70,546</b>	<b>68,528</b>	<b>83,616</b>	<b>85,729</b>	<b>84,106</b>
Growth rate (%)	3.70	-2.20	22.02	2.53	-1.90
Hours at sea per vessel	446	387	475	429	438
Registered fishermen	306	305	305	356	315
Growth rate (%)	..	-0.30	..	16.70	-11.52

Source: Department of Environmental Protection, Marine Resources Division

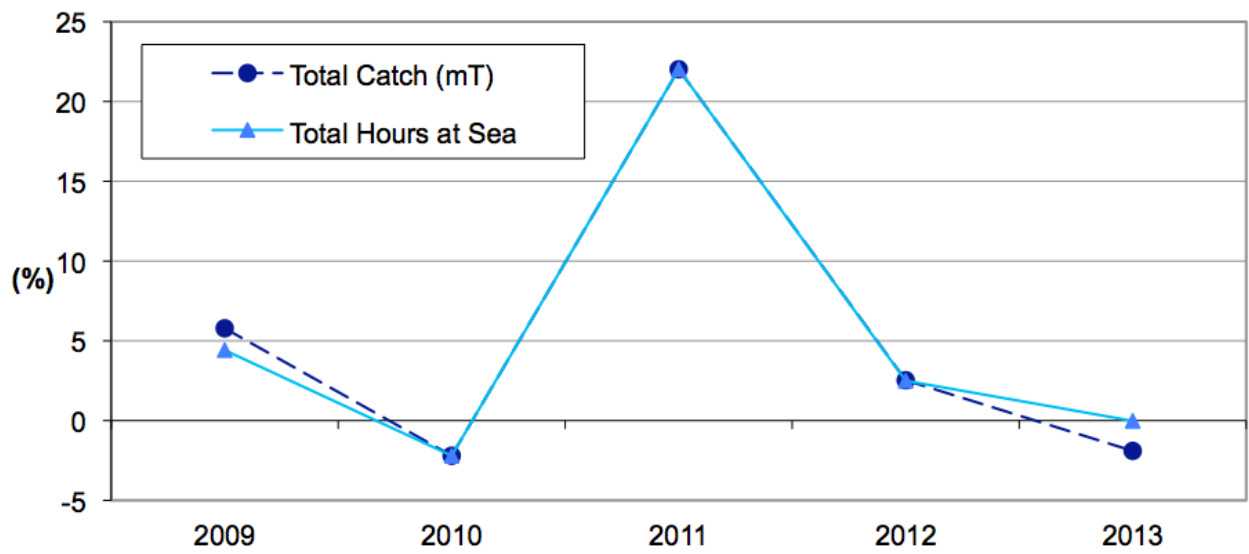
<sup>1</sup> Total catch include fish landings in addition to bait and lobster catches.

<sup>2</sup> Total fishing area is estimated as 4,236.11 km<sup>2</sup> (Department of Planning, see 8.1). Fishing area includes the fisheries seasonal protected areas (153.36 km<sup>2</sup>) which are closed between May 1st and August 31st.

Computation: Average catch of fishing area = Total catch (mT) / Total estimated fishing area of 4,236.11 km<sup>2</sup>

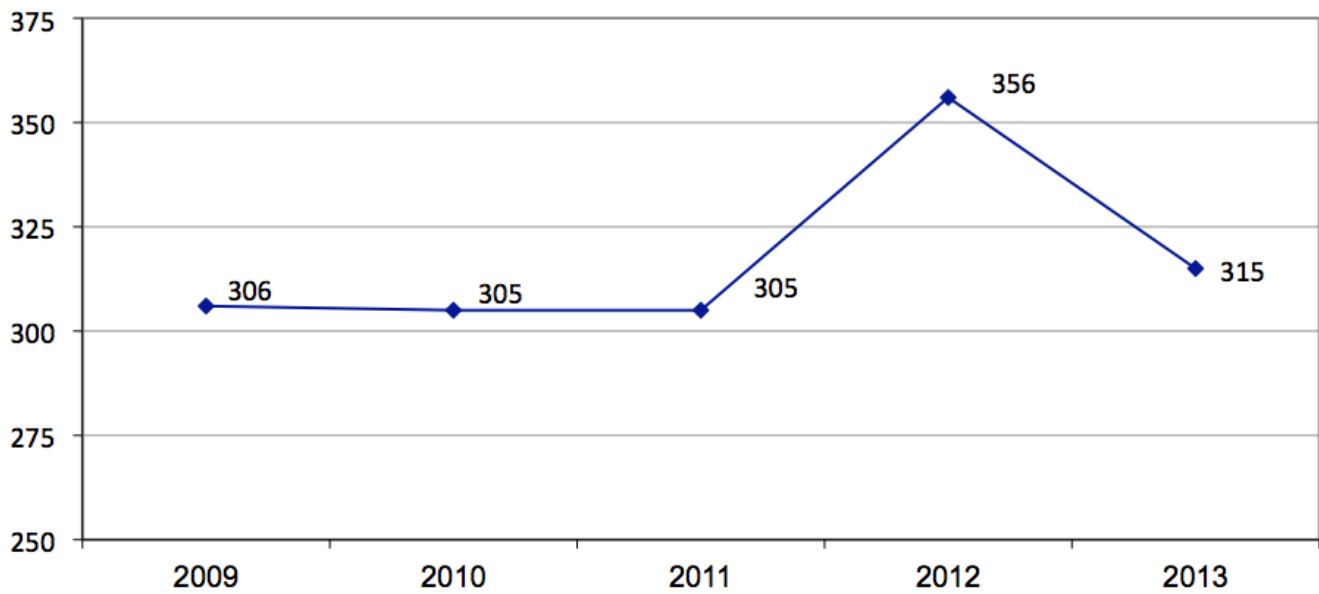
**Chart 8.2**

**Growth in Total Catch and Total Hours at Sea**



**Chart 8.3**

**Number of Registered Fishermen**



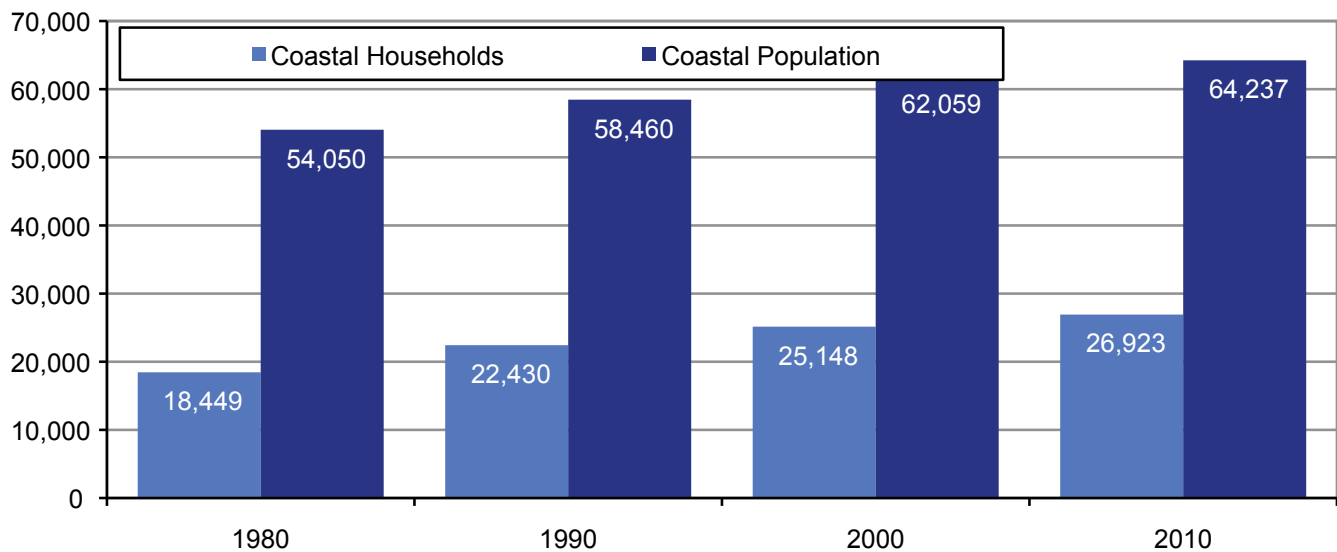


**Table 8.6****Number of Households and Population of Coastal Areas**

Indicators	Census Years			
	1980	1990	2000	2010
Number of households in coastal areas	18,449	22,430	25,148	26,923
Ten-year growth rate (%)	..	21.60	12.10	7.10
Population in coastal areas	54,050	58,460	62,059	64,237 <sup>1</sup>
Ten-year growth rate (%)	..	8.20	6.20	3.50

Source: 1980 - 2010 Census of Population and Housing  
 Bermuda measures 1 mile at its widest point. Based on the standard definition of coastal area, the entire island will be considered coastal.

<sup>1</sup> Does not include the non-sheltered and institutionalized populations

**Chart 8.4****Number of Households and Population of Coastal Areas (Census Years)**

# BIODIVERSITY



## Section 9: Biodiversity

Biodiversity refers to the number and variety of species of plant and animal life within a particular ecosystem. It also encompasses variation in the genetic makeup of each species and the different ecosystems that they form. Biodiversity has direct consumptive value in food, agriculture, medicine and industry and has aesthetic and recreational value. (CARICOM Environment Programme)

This section contains information on the protected land areas in Bermuda such as protected coastal reserves, protected open space, historical cave areas and parks.

### **Protected Area: Land and Water**

In 2013, Bermuda's total protected area inclusive of land and water was 319.66 square kilometers (km<sup>2</sup>). This represented almost 7.45 percent of the total area (6.87% water and 0.58% land) (see Table 9.1).

As a proportion of the total land area (54.35 km<sup>2</sup>), protected land area represented 45.84 percent or 24.92 km<sup>2</sup> while protected water areas represented 6.96 percent or 294.74 km<sup>2</sup> of total water area (see Table 9.1).

A breakdown of protected land area shows that conservation base zones (open space, waste reserves, nature reserves and parks) totaled 19.28 km<sup>2</sup>. Conservation areas (agriculture and woodland reserves) accounted for 7.19 km<sup>2</sup>, cave protection areas occupied 4.48 km<sup>2</sup> and historical protected areas less than 1.00 km<sup>2</sup> (see Table 9.2).

Map 9.1 displays the terrestrial protected areas including marine parks by category across Bermuda.

**Table 9.1****Protected Area**

<b>Category</b>	<b>2013</b>
Total area (km <sup>2</sup> )	4,290.46
Total land area (low tide mark) (km <sup>2</sup> )	54.35
Total water area (km <sup>2</sup> )	4,236.11
Protected land area (km <sup>2</sup> )	24.92
Protected land area as a % of total land area	45.84
Protected land area as a % of total area	0.58
Protected water area (km <sup>2</sup> )	294.74
Protected water area as a % of total water area	6.96
Protected water area as a % of total area	6.87
Total protected area (land and water)	319.66
Total protected area as a % of total area	7.45

Source: Department of Planning

**NOTE TO READER**

**Biodiversity:** the range of genetic differences, species differences, and ecosystem differences in a given area.

**Protected Area:** legally established land or water area under either public or private ownership that is regulated and managed to achieve specific conservation objectives. A protected area, as adopted by the International Union for Conservation of Nature (IUCN), is defined as an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means. It includes six categories which are:

- Category Ia: Strict Nature Reserve
- Category Ib: Wilderness Area
- Category II: National Park
- Category III: Natural Monument
- Category IV: Habitat/Species Management Area
- Category V: Protected Landscape/Seascape
- Category VI: Managed Resource Protected Area

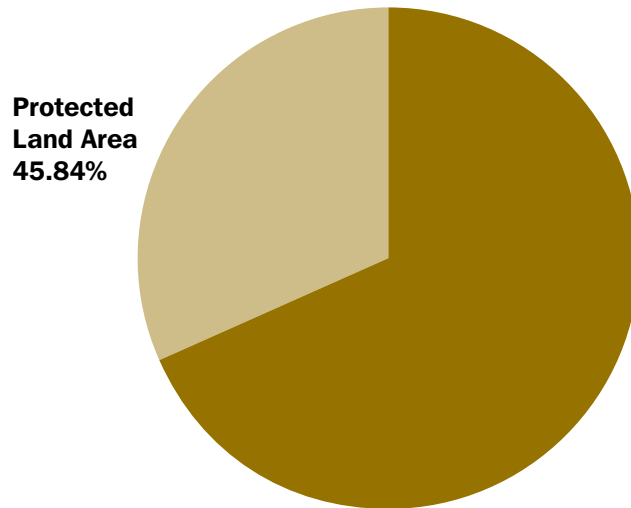
**Total Area:** Total area (of country) including area under inland water bodies, but excluding offshore territorial waters (= total land area + water).

**Land Area:** is the total surface area of the country less that area covered by inland waters.

Source: CARICOM Environment Programme

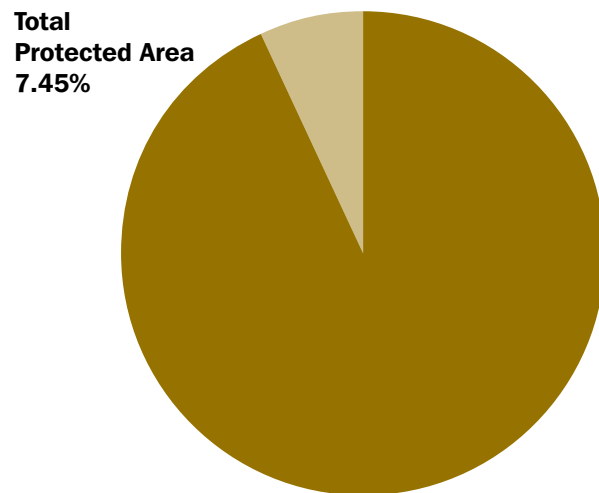
**Chart 9.1**

**Protected Land Area as a Percentage of Total Land Area**



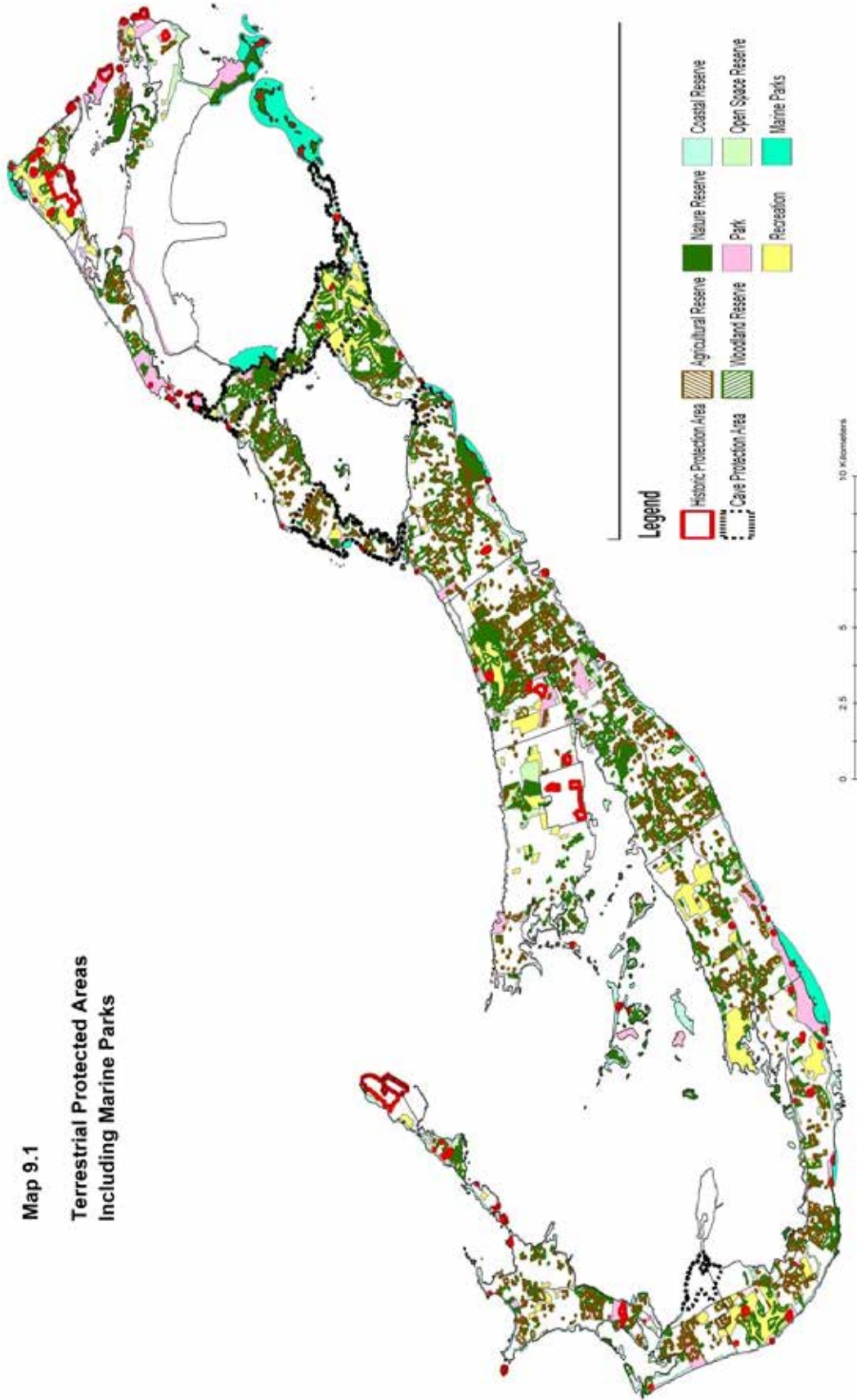
**Chart 9.2**

**Total Protected Area as a Percentage of Total Area**



Map 9.1

**Terrestrial Protected Areas  
Including Marine Parks**



**Table 9.2****Protected Areas by Category and Area**

	Area	
	Acres	km <sup>2</sup>
<b>Conservation base zones</b>		
Open space reserve	1,298.10	5.35
Coastal reserve	823.29	3.57
Nature reserve	770.09	3.05
Park	884.57	3.33
Recreation	963.92	4.00
<b>Sub-total</b>	<b>4,739.97</b>	<b>19.28</b>
<b>Conservation areas</b>		
Agricultural reserve	731.59	3.03
Woodland reserve	983.94	4.16
<b>Sub-total</b>	<b>1,715.53</b>	<b>7.19</b>
<b>Cave protection area</b>	<b>1,107.20</b>	<b>4.48</b>
<b>Historic protection area</b>	<b>201.05</b>	<b>0.74</b>
<b>Conservation base zone and conservation areas (no overlap)<sup>1</sup></b>	<b>6,156.79</b>	<b>24.92</b>
<b>Overlapping area</b>	<b>1,670.11</b>	<b>6.77</b>
<b>Total terrestrial area (low tide mark) Total land area</b>	<b>13,430.39</b>	<b>54.35</b>
<b>Water resources protection area<sup>2</sup></b>	<b>4,000.61</b>	<b>16.19</b>

Source: Bermuda Plan 2008, Department of Planning, Bermuda

<sup>1</sup> Total protected area does not equal to the sum of the sub-totals as it excludes any overlapping areas (6.77 km<sup>2</sup>) to avoid double counting.

<sup>2</sup> The Water Resources Protection Area is not considered as a "protected area" and hence has not been included in the 24.92 km<sup>2</sup> of protected area but is contained in the total terrestrial area of 54.35 km<sup>2</sup>.

## Millennium Development Goal 7

### Indicator 26

Ratio of area protected to maintain biological diversity to surface area

7.45%

Nationally protected areas, both terrestrial and marine, are totalled and expressed as a percentage of the total surface area of the country. The total surface area of the country includes terrestrial area plus any territorial sea area (up to 12 nautical miles).



# FORESTRY





## Section 10: Forestry

The forestry section of the Environmental Statistics Compendium includes a table with information on forest area in Bermuda.

### Forestry

In 2013, Bermuda's total forest area was 4.16 square kilometers (km<sup>2</sup>). This represented 7.65% of Bermuda's total land area.

#### **NOTE TO READER**

**Forest:** Land under forestry or no land use, spanning more than 0.005 km<sup>2</sup> (0.5 hectares); with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. This section includes mangroves and forests on wetlands according to the above height and canopy coverage.

**Protected Area:** A protected area, as adopted by the International Union for Conservation of Nature (IUCN), is defined as an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

**Total Area:** Total area (of country) including area under inland water bodies, but excluding offshore territorial waters (= total land area + water).

**Land Area:** is the land area excluding area under inland or tidal water bodies.

Source: CARICOM Environment Programme

**Table 10.1**

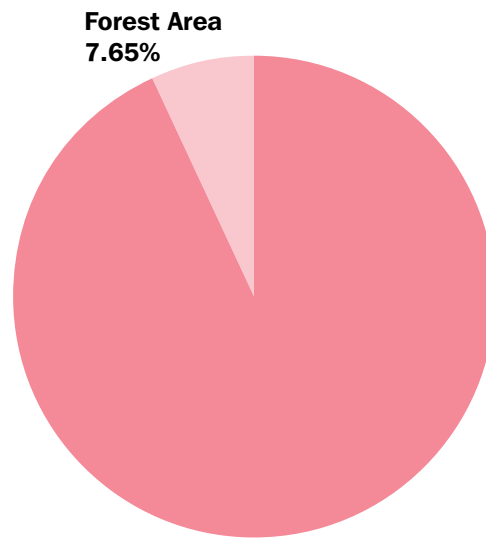
**Protected Forest Area as a Percentage of Total Land Area**

<b>Protected Area Category</b>	<b>Area km<sup>2</sup></b>
Total forest area	4.16 <sup>1</sup>
Total land area	54.35
Protected forest area as a % of total forest area	100
Protected forest area as a % of total land area	7.65

Source: Department of Planning  
<sup>1</sup>This includes woodland reserves.

**Chart 10.1**

**Protected Forest Area as a Percentage of Total Land Area**



# AIR



## Section 11: Air

The air quality in Bermuda is a valued part of its natural resources. Six ambient air monitoring sites have been set up island-wide to monitor air quality and keep levels of pollutants within the Bermuda limit (Clean Air Regulations 1993) (Map 11.1).

This section includes information on air emissions by pollutants from the various ambient air monitoring sites. Table 11.2 provides the average annual, hourly and daily concentrations of the various pollutants from the different monitoring sites.

Table 11.3 illustrates the maximum concentration for pollutants at the various collection sites. In 2013, the Langton Hill monitoring site recorded a daily maximum concentration of sulfur dioxide (SO<sub>2</sub>) of 127.00 µg/m<sup>3</sup>. This recording was the highest among all six monitoring sites; however, the recording fell below the Bermuda limit of 150.00 µg/m<sup>3</sup> set by the Clean Air Regulations 1993.

Figures 11.1 and 11.2 highlight the average fine Particulate Matter (PM<sub>10</sub>) concentration for 2013 on a daily basis. Note that exceedances of PM<sub>10</sub> (i.e. particular matter <sup>10</sup>µm diameter) can arise from natural sources (i.e. pollen, sea aerosols, dust) as well as from combustion of petroleum and other combustibles. Bermuda is currently determining what PM<sub>2.5</sub> limit shall be introduced. The data in Figure 11.1 shows that between April and May the busy road at East Broadway was very close to reaching the 24 hour mean limit of average PM<sub>10</sub> concentration in comparison to the other listed sites.

Map 11.3 highlights the locations of the six ambient air monitoring sites in Bermuda.

Unit	Unit Measure
µg/m <sup>3</sup>	Micrograms
NO <sub>2</sub>	Nitrogen Dioxide
SO <sub>2</sub>	Sulfur Dioxide
ppb	parts per billion
TSP	Total Suspended Particles
PM <sub>10</sub> /PM <sub>2.5</sub>	Fine Particulate Matter

**Table 11.1****Air Emissions from Tynes Bay Waste to Energy Incinerator**

<b>Pollutant</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
VOCs (mg/Nm <sup>3</sup> )	1.32	0.08	0.26	2.35	2.32
NO <sub>2</sub> (mg/Nm <sup>3</sup> )	284.00	317.40	316.20	299.50	253.20
SO <sub>2</sub> (mg/Nm <sup>3</sup> )	20.10	155.70	28.10	36.80	38.50
Lead (mg/Nm <sup>3</sup> )	0.44	0.13	0.01	0.02	0.02
Particulate Matter (mg/Nm <sup>3</sup> )	35.70	5.00	1.30	1.98	1.88

Source: Department of Environmental Protection

**Table 11.2**  
**Average Concentrations for Government (BIOS) and BELCO-Operated Ambient Air Monitoring Sites**

		2011					2012					2013												
		Prospect	East Broadway	Belco Site (Government)	Cemetry Lane (BDA#1)	(Belco-Operated ISO14001)	Langton Hill (BDA#2)	(Belco-Operated ISO14001)	Prospect	East Broadway	Belco Site (Government)	Cemetry Lane (BDA#1)	(Belco-Operated ISO14001)	Langton Hill (BDA#2)	(Belco-Operated ISO14001)	Prospect	East Broadway	Belco Site (Government)	Cemetry Lane (BDA#1)	(Belco-Operated ISO14001)	Langton Hill (BDA#2)	(Belco-Operated ISO14001)	BIOS	
		<b>Bermuda Limit (Clean Air Regulations 1993)</b>																						
Units																								
Hourly	NO <sub>2</sub>	4.37	-	-	-	?	?	-	4.51	-	-	?	?	-	-	3.20	-	-	-	-	-	-	?	-
	SO <sub>2</sub>	1.09	-	-	-	?	?	-	9.66	-	-	?	?	-	-	1.20	-	-	-	-	-	-	?	-
	PM <sub>10</sub>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PM <sub>2.5</sub>	5.94	-	-	-	-	-	-	4.96	-	-	-	-	-	10.30	-	-	-	-	-	-	-	-	-
	TSP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-Hour	NO <sub>2</sub>	4.40	-	-	-	16.02	6.88	-	44.00	-	-	17.19	5.81	-	3.10	-	-	-	-	-	-	14.30	6.20	-
	SO <sub>2</sub>	1.10	-	-	-	7.71	4.62	-	9.10	-	-	4.35	4.61	-	1.10	-	-	-	-	-	-	2.10	8.30	-
	PM <sub>10</sub>	19.90	28.00	-	-	14.95	14.57	17.30	30.10	45.20	-	17.77	14.17	32.60	13.90	23.90	-	-	-	-	-	15.10	13.10	15.40
	PM <sub>2.5</sub>	8.20	-	-	-	-	-	-	9.10	-	-	-	-	-	10.20	-	-	-	-	-	-	-	-	-
	TSP	24.10	47.70	44.50	24.03	21.60	29.20	44.00	54.20	54.20	54.50	26.39	21.24	42.50	22.40	36.90	42.10	22.50	21.40	22.50	21.40	32.80	-	-
1-year	NO <sub>2</sub>	2.50	-	-	-	16.00	6.76	-	0.40	-	-	16.16	5.65	-	3.10	-	-	-	-	-	-	14.30	6.20	-
	SO <sub>2</sub>	0.90	-	-	-	7.69	4.59	-	0.20	-	-	4.93	4.88	-	1.40	-	-	-	-	-	-	2.10	8.30	-
	PM <sub>10</sub>	17.78	27.20	-	-	14.91	14.57	15.88	23.70	39.80	-	16.66	14.22	24.00	11.30	22.50	-	-	-	-	-	15.10	13.10	13.50
	PM <sub>2.5</sub>	7.70	-	-	-	-	-	-	9.06	-	-	-	-	-	10.30	-	-	-	-	-	-	-	-	-
TSP	21.81	44.40	40.54	24.04	22.24	25.40	29.20	48.10	48.10	45.80	26.18	20.88	30.00	18.60	35.10	37.20	22.50	21.40	22.50	21.40	31.60	-	-	

Source: Department of Environmental Protection

- Not Required or Not determined as part of the current protocols

? - Hourly data is collected but data acquisition software averages up the hourly data in batches to provide 24-hour data. Hourly averaged data will therefore be similar to the 24-hourly data.

Note:

Amount in red shows that the limit according to the 1993 Clean Air Regulation was exceeded.

**Table 11.3**

**Maximum Concentrations for Ambient Air Monitoring Sites**

		2011					2012					2013				
		Prospect	East Broadway	Belco Site (Government)	Cemetry Lane (BDA#1)	(Belco-Operated ISO14001)	Langton Hill (BDA#2)	(Belco-Operated ISO14001)	Prospect	East Broadway	Belco Site (Government)	Cemetry Lane (BDA#1)	(Belco-Operated ISO14001)	Langton Hill (BDA#2)	(Belco-Operated ISO14001)	BIOS
		(Clean Air Regulations 1993)														
		Bermuda Limit														
		Units														
Hourly	NO <sub>2</sub>	58.40	-	-	223.00	131.00	-	63.00	-	-	295.00	165.00	-	33.50	-	-
	SO <sub>2</sub>	40.70	-	-	125.00	280.00	-	325.60	-	-	233.00	314.00	-	34.90	-	-
	PM <sub>10</sub>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PM <sub>2.5</sub>	61.80	-	-	-	-	76.40	-	-	-	-	-	-	91.50	-	-
	TSP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-Hour	NO <sub>2</sub>	42.80	-	-	120.00	61.00	-	18.40	-	-	126.00	60.00	-	12.60	-	-
	SO <sub>2</sub>	9.00	-	-	87.00	102.00	-	3.10	-	-	76.00	79.00	-	9.10	-	-
	PM <sub>10</sub>	47.40	47.30	-	45.00	<b>103.00</b>	39.00	<b>86.30<sup>†</sup></b>	<b>73.70</b>	-	<b>110.00</b>	47.00	<b>82.70</b>	33.00	47.30	42.80
	PM <sub>2.5</sub>	30.90	-	-	-	-	-	37.30	-	-	-	-	-	27.10	-	-
	TSP	61.50	<b>102.70</b>	88.20	49.00	53.00	74.70	<b>132.80</b>	<b>113.20</b>	147.20	74.00	67.00	<b>119.50</b>	68.50	79.60	70.30
Total number of exceedances of the limits set in the Clean Air Regulations 1993 over each year		0	1	0	0	1	0	4	6	1	1	0	2	0	0	0

Source: Department of Environmental Protection

- Not determined as part of the current protocols

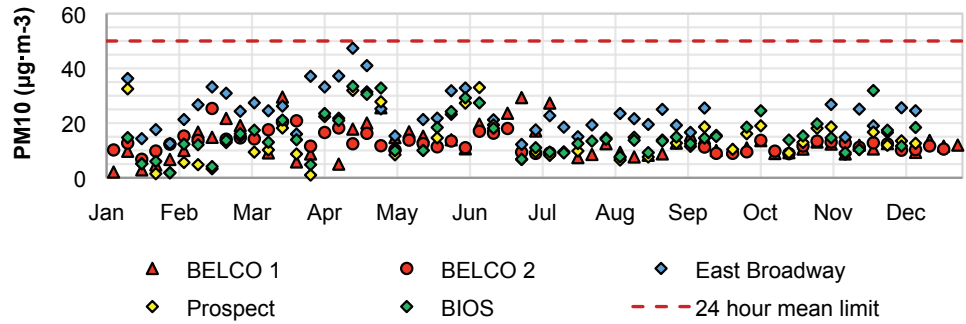
<sup>†</sup> Marsh Folly Fire (29-30 June 2012)

Note:

Amounts in red show that the limit according to the 1993 Clean Air Regulation was exceeded.

**Figure 11.1**

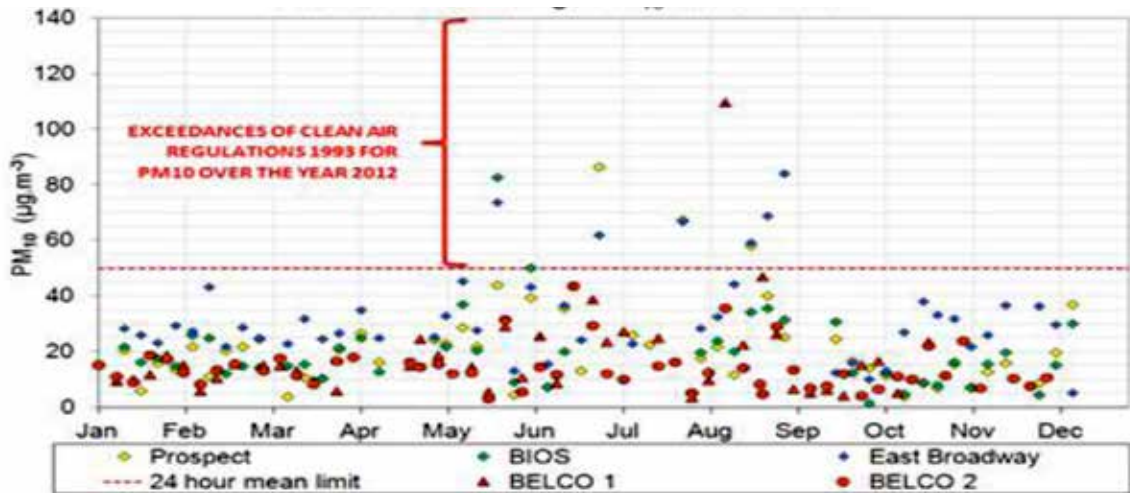
**24-hour Average PM<sub>10</sub> Concentration 2013**



Source: Department of Environmental Protection

**Figure 11.2**

**24-hour Average PM<sub>10</sub> Concentration 2012**



Source: Department of Environmental Protection



## Map 11.1

### Bermuda Ambient Air Monitoring Sites



**Prospect Site:** Located between Tynes Bay Incinerator and Belco/The City of Hamilton. Tynes Bay Incinerator is located 850 metres north of the Prospect site on the North Shore coast.

**East Broadway:** A busy road with commuter traffic to/from The City of Hamilton.

**BELCO:** Bermuda Electric Light Corporation (BELCO), Electricity generator for Bermuda.

**BIOS:** Bermuda Institute of Ocean Sciences, St George's Control Site.

**Dockyard:** West end of the island monitoring ambient air adjacent to cruise ship terminal. Monitoring started in 2011.

# WASTE



## Section 12: Waste

The section on waste comprises information regarding the generation and disposal of solid waste in Bermuda. The 2013 numbers are estimates except for those related to incineration.

### Generation

The total waste collected in 2013 was 84,600 tonnes, an increase of 2,600 tonnes from 2012. Household waste accounted for 28,300 tonnes for 2013 while waste from other sources accounted for 56,300 tonnes (Table 12.1).

### Management

The Waste Management Section of the Ministry of Public Works follows a Comprehensive Waste Management Strategy (CWMS) to divide waste handling into:

1. Waste reduction
2. Recycling
3. Composting
4. Energy from waste (Incineration)
5. Land creation (Land-filling)
6. Special disposal of hazardous waste

In 2013, 1,600 tonnes of waste was recycled, 15,000 tonnes of horticultural waste was composted, 58,000 tonnes of waste was incinerated to generate electricity and 10,000 tonnes of waste was land-filled (Table 12.2).

### Waste Reduction

Waste reduction aims to limit the amount of garbage produced thereby reducing environmental and economic costs associated with collection, processing and disposal.

The Waste Management Section continues to educate and conduct waste audits with schools and businesses. Data generated from these waste audits is being applied as a means to minimize waste and divert resources. Waste reduction results in a lessening of the environmental impact of doing business, costs of waste removal and wasteful consumption patterns which can affect bottom line results.

### Recycling

Recycling was estimated to be unchanged at 127 container loads of materials either exported for the US recycling market or reused on island in 2013 (Chart 12.1).

Recycling or the reprocessing of materials helps to reduce the burden on the Tynes Bay Waste to Energy incinerator by removing non-combustible items from the waste-stream, reduces dependence on land-filling and is an environmentally sound choice whenever possible.

### Composting

Approximately 15,000 tonnes of horticultural waste was composted in 2013 using the windrow composting technique. The end product is a soil amendment that is available to the public for horticultural practices.

### Special Waste

Special wastes are items requiring specific handling and disposal due to their potentially hazardous nature. These

materials are consolidated and packaged in Bermuda according to the United States Environmental Protection Agency (US EPA) standards and exported to the United States where they are processed for the reuse or recycling markets whenever possible (see starred items, Chart 12.1). Where recycling or reuse is not possible Special Waste is disposed of at US EPA certified controlled land-fill disposal sites. The respective amounts are shown in Table 12.3.

In 2013, Bermuda exported 501 tonnes of Special Waste for either the recyclables market or safe disposal.

#### ***Note to Reader***

**Waste:** This is any article or substance (including scrap metal or other surplus arising from the application of a process) which is not liquid and either requires to be disposed of as being unwanted, broken, worn out, contaminated or otherwise spoilt or useless, or in relation to a particular person, has been discarded by.

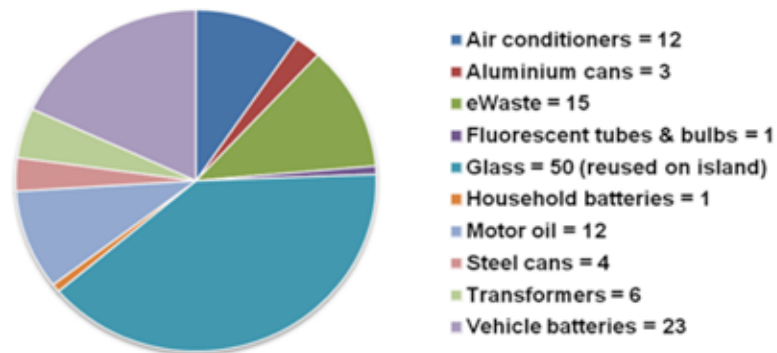
**Household Waste:** This is waste that comes from a private dwelling, being a dwelling that is not considered as commercial premises; or waste from premises operated by a charity registered under the Charities Act 1978.

Source: The Waste and Litter Control Act, 1987

**Table 12.1****Generation of Waste by Source**

Indicator	(1,000t)				
	2009	2010	2011	2012	2013 <sup>1</sup>
Municipal waste collected from households	30.16	30.19	27.00	27.00	28.30
Municipal waste collected from other origins	60.33	60.39	54.00	55.00	56.30
<b>Total amount of municipal waste collected</b>	<b>90.49</b>	<b>90.58</b>	<b>81.00</b>	<b>82.00</b>	<b>84.60</b>

Source: Public Works  
<sup>1</sup>2013 is estimated data.

**Chart 12.1****Recyclables Exported to the United States by Bermuda  
(20' Container loads)**

**Total = 127 Shipping Container Loads**



**Table 12.2****Management of Municipal Waste**

<b>Indicator</b>	<b>(1,000t)</b>				
	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013<sup>1</sup></b>
Amounts going to:					
Recycling	1.58	1.58	1.60	1.60	1.60
Composting	15.00	15.00	15.00	15.00	15.00
Incineration	63.91	64.00	54.40	55.40	58.00
Landfilling	10.00	10.00	10.00	10.00	10.00

Source: Public Works  
<sup>1</sup>2013 is estimated data.

**Table 12.3****Management of Special Waste**

<b>Indicator</b>	<b>(1,000t)</b>				
	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013<sup>1</sup></b>
Stock of hazardous waste at the beginning of the year	87	112	109	98	122
Hazardous waste generated during the year	623	582	590	525	525
Hazardous waste exported during the year	598	585	601	501	501
Amounts going to:					
Recycling	370	365	352	362	362
Incineration	6	5	7	5	5
Landfilling	222	215	242	209	209
Stock of hazardous waste at the end of the year	112	109	98	122	146

Source: Public Works  
<sup>1</sup>2013 is estimated data.

**Table 12.4****Management of Municipal Waste by Type**

<b>Indicator</b>	<b>2008</b>	<b>2010</b>	<b>2012*</b>
Paper, paperboard	29	29	..
Textiles	6	17	..
Plastics	17	13	..
Glass	11	9	..
Metals	5	6	..
Other inorganic material	9	9	..
Organic material	23	17	..
<b>Total (%)</b>	<b>100</b>	<b>100</b>	<b>..</b>

Source: Public Works

Beginning in 2006 the Waste Management Section of the Ministry of Public Works began conducting a municipal waste audit every two years.

\* A waste audit has not been conducted.

# WATER





## Section 13: Water

Water is an essential ingredient for all life and is used in the production of almost all goods. It is therefore vital to monitor the state of water resources and to ensure sustainable use of this important commodity.

In 2012, the total volume of atmospheric wet precipitation (rain, dew, etc.) falling on the island was 67.92 mio m<sup>3</sup>/y (See Table 13.1). The total fresh water made available for use was 3.52 mio m<sup>3</sup>/y (See Table 13.2).

Map 13.1 shows water resource protection areas in Bermuda as of 2007.

**\* Note: At the time of publishing, data for 2010 to 2013 were not available for some tables.**

**Table 13.1****Renewable Freshwater Resources**

Category	mio m <sup>3</sup> /y			
	2010	2011	2012	2013
Precipitation	63.78	56.05	67.92	..
Actual evapotranspiration	..	..	..	..
Internal flow	..	..	..	..
Renewable freshwater resources	..	..	..	..
Regular freshwater resources 95% of the time	..	..	..	..

Source: Department of Environmental Protection

**NOTE TO READER**

**Precipitation:** total volume of atmospheric wet precipitation (rain, dew, etc.) falling on the territory of the country over one year.

**Actual evapotranspiration:** total actual volume of evaporation from the ground, wetlands, and natural water bodies and transpiration of plants.

**Internal flow:** total volume of river run-off and groundwater generated over the period of a year, in natural conditions, exclusively by precipitation into a territory. It is equal to the precipitation less actual evapotranspiration.

**Renewable freshwater resources:** equal internal flow plus any inflow of surface and groundwaters.

**Regular freshwater resources 95% of the time:** portion of the total freshwater resource that can be depended on for annual water development during 19 out of 20 consecutive years, or at least 95% of the years included in longer consecutive periods. This item yields information about the average annual long-term availability of freshwater for use in human activities.

Source: United Nations Statistics Division (UNSD) and United Nations Environment Programme (UNEP)

**Table 13.2****Water Use Balance**

Category	mio m <sup>3</sup> /y			
	2010	2011	2012	2013
<b>Net freshwater abstracted</b>	..	..	1.74	..
Desalinated water	..	..	1.54	..
<b>Total freshwater made available for use</b>	..	..	3.52	..
Wastewater generated	..	..	..	..
of which: Discharged to marine water bodies	..	..	..	..
<b>Consumptive water use</b>	..	..	..	..
<b>Water consumption</b>	..	..	..	..

Source: Department of Environmental Protection

**NOTE TO READER**

**Net freshwater abstracted:** water removed from any source either permanently or temporarily less any water returned without use.

**Desalinated water:** total volume of water obtained from desalination of (that is, removal of salt from) seawater and brackish water.

**Total freshwater made available for use:** net freshwater abstraction plus desalinated water plus any reused water or import

**Wastewater:** water which is of no further value to the purpose for which it was used because of its quality, quantity or time of occurrence. However, wastewater from one user can be a potential supply to a user elsewhere. Cooling water is included.

**Wastewater generated:** the quantity of wastewater generated including wastewater that is delivered to another use for reuse, and wastewater that is discharged after use to inland water bodies or to the sea.

**Consumptive water use:** water that was abstracted but is no longer available for use because it has evaporated, transpired, been incorporated into products and crops, or consumed by man or livestock. Water losses due to leakages during the transport of water between the point(s) of abstraction and the point(s) of use are not considered a consumptive use and are excluded.

**Water consumption:** water that was abstracted but is no longer available for use because it has evaporated, been transpired, incorporated into products and crops, consumed by man or livestock, ejected directly to the sea, or otherwise removed from freshwater resources. Water losses due to leakages during the transport of water between the point(s) of abstraction and the point(s) of use are excluded. Total water consumption equals consumptive water use plus discharges to the sea. Water consumption should not be confused with water use which is a different concept in water statistics.

Source: United Nations Statistics Division (UNSD) and United Nations Environment Programme (UNEP)

**Table 13.3****Freshwater Abstraction**

Category	mio m <sup>3</sup> /y			
	2010	2011	2012	2013
Water abstracted				
<b>Gross <u>freshwater</u> abstracted</b>	..	..	1.74	..
Water abstraction by water supply industry (ISIC 36)	..	..	..	..
Self abstraction for own use by:				
Households	..	..	..	..
Other economic activities	..	..	..	..
Surface water abstracted				
<b>Gross <u>fresh surface water</u> abstracted</b>	..	..	..	..
Self abstraction for own use by:				
Households	..	..	..	..
Other economic activities	..	..	..	..
Groundwater abstracted				
<b>Gross <u>fresh groundwater</u> abstracted</b>	..	..	..	..
Groundwater abstraction by water supply industry (ISIC 36)	..	..	..	..
Self abstraction for own use by:				
Households	..	..	..	..
Other economic activities	..	..	0.00	0.00

Source: Department of Environmental Protection

**NOTE TO READER**

**Fresh surface water:** freshwater which flows over, or rests on, the surface of a land mass; natural watercourses such as lakes, streams, etc., as well as artificial watercourses such as irrigation, industrial and navigation canals, drainage systems, and artificial reservoirs. Water obtained through bank filtration and includes as fresh surface water but sea-water, and transitional waters, such as brackish swamps, lagoons, and estuarine areas are not considered fresh surface water.

**Fresh groundwater:** freshwater which is being held in, and can usually be recovered from, or via, an underground formation. All permanent and temporary deposits of water, both artificially charged and naturally, in the subsoil, or sufficient quality for at least seasonal use. It includes springs, both concentrated and diffused, which may be subaqueous.

**Gross fresh groundwater abstracted:** fresh groundwater removed from the ground, either permanently or temporarily. It includes abstraction by the water supply industry (Industrial Standard Industrial Classification (ISIC) 36) and direct abstraction by other activities, and water abstracted but returned without use, such as mine water and drainage water. Artificial recharge is not deducted.

**Water abstraction by water supply industry:** water abstraction by economic units engaged in collection, purification and distribution of water (including desalting of sea water to produce water as the principal product of interest, and excluding system operation for agricultural purposes and treatment of wastewater solely in order to prevent pollution).

Source: United Nations Statistics Division (UNSD) and United Nations Environment Programme (UNEP)

**Table 13.4****Water Supply Industry (ISIC 36)**

Category	mio m <sup>3</sup> /y			
	2010	2011	2012	2013
<b>Net freshwater delivered by water supply industry (ISIC 36)</b>	1.01	..	..	..
<i>of which delivered to:</i>				
Households	0.75	..	..	..
Other economic activities	0.25	..	..	..
<b>Percentage of population supplied by water supply industry (ISIC 36) (%)</b>	10.00	..	..	..

Source: Department of Environmental Protection

**NOTE TO READER**

**Net freshwater delivered by water supply industry:** water delivered by public water supply industry to the user minus freshwater losses during transport.

**Population supplied by water supply industry (ISIC 36):** the percentage of the resident population connected to the water supply.

Source: United Nations Statistics Division (UNSD) and United Nations Environment Programme (UNEP)

**Table 13.5****Total Water Use**

Category	mio m <sup>3</sup> /y			
	2010	2011	2012	2013
<b>Freshwater use, total</b>	..	..	..	..
<i>of which used by:</i>				
Households	..	..	..	..
Other economic activities	..	..	..	..

Source: Department of Environmental Protection

**NOTE TO READER**

**Freshwater use:** the quantity of freshwater that is actually used in a year by end users including water delivered by the water supply industry (ISIC 36), water directly abstracted for own use and water received from other parties. It excludes freshwater returned without use.

Source: United Nations Statistics Division (UNSD) and United Nations Environment Programme (UNEP)

**Table 13.6****Percentage of Population Connected to Wastewater Treatment**

<b>Category</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Population connected to wastewater collecting system	..	..	..	..
Population connected to wastewater treatment	..	..	..	..
of which at least secondary treatment	..	..	..	..
Population with independent wastewater treatment (e.g. septic tanks)	..	..	..	..

Source: Department of Environmental Protection  
There are 4 wastewater treatment plants

**NOTE TO READER**

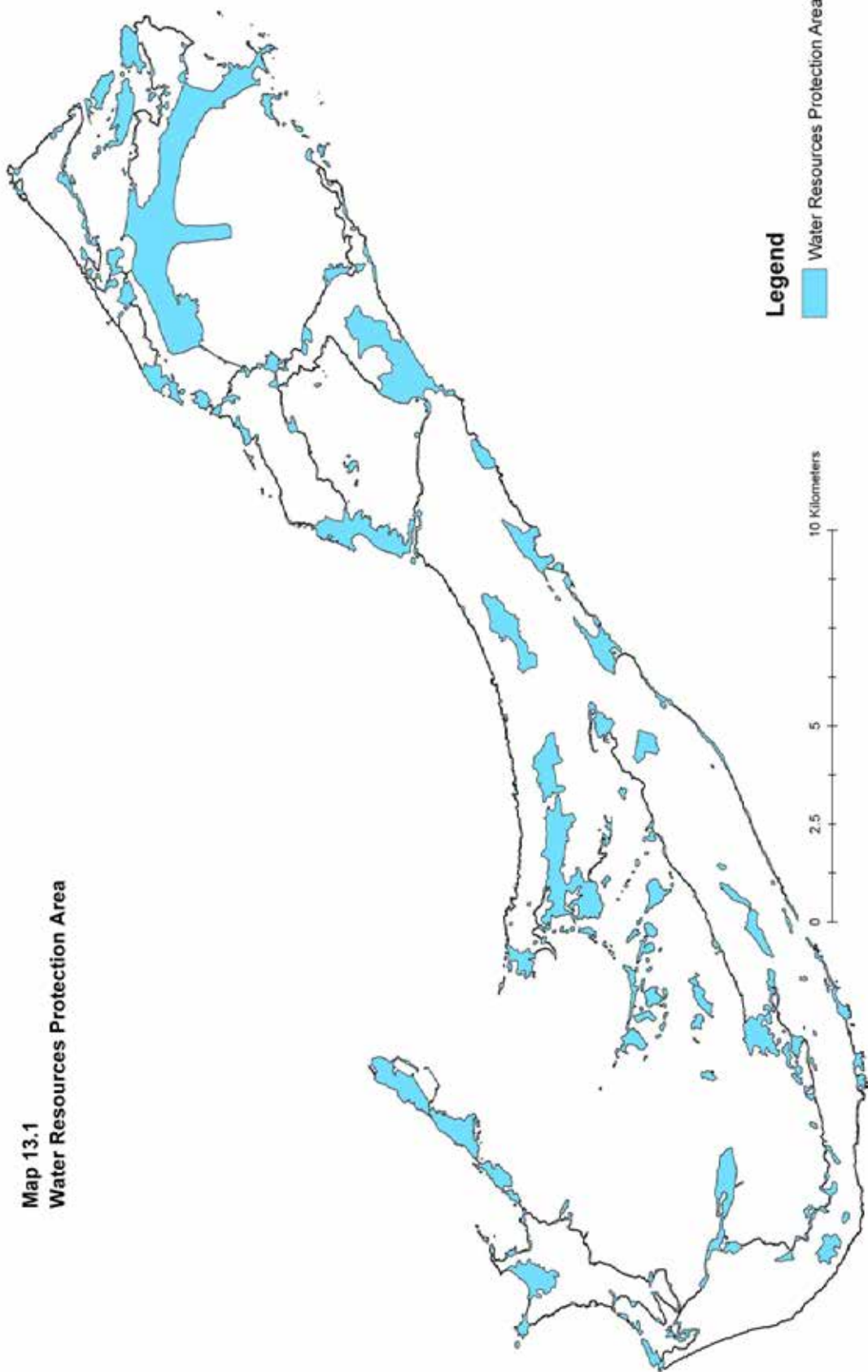
**Population connected to wastewater collecting system:** the percentage of resident population connected to the wastewater collecting system (sewerage). Wastewater collecting systems may deliver wastewater plants or may discharge it without treatment to the environment.

**Population connected to wastewater treatment:** the percentage of the resident population whose wastewater is treated at wastewater treatment plants.

**Population with independent wastewater treatment (e.g. septic tanks):** the percentage of resident population whose wastewater is treated in individual, often private facilities such as septic tanks.

Source: United Nations Statistics Division (UNSD) and United Nations Environment Programme (UNEP)

**Map 13.1**  
**Water Resources Protection Area**

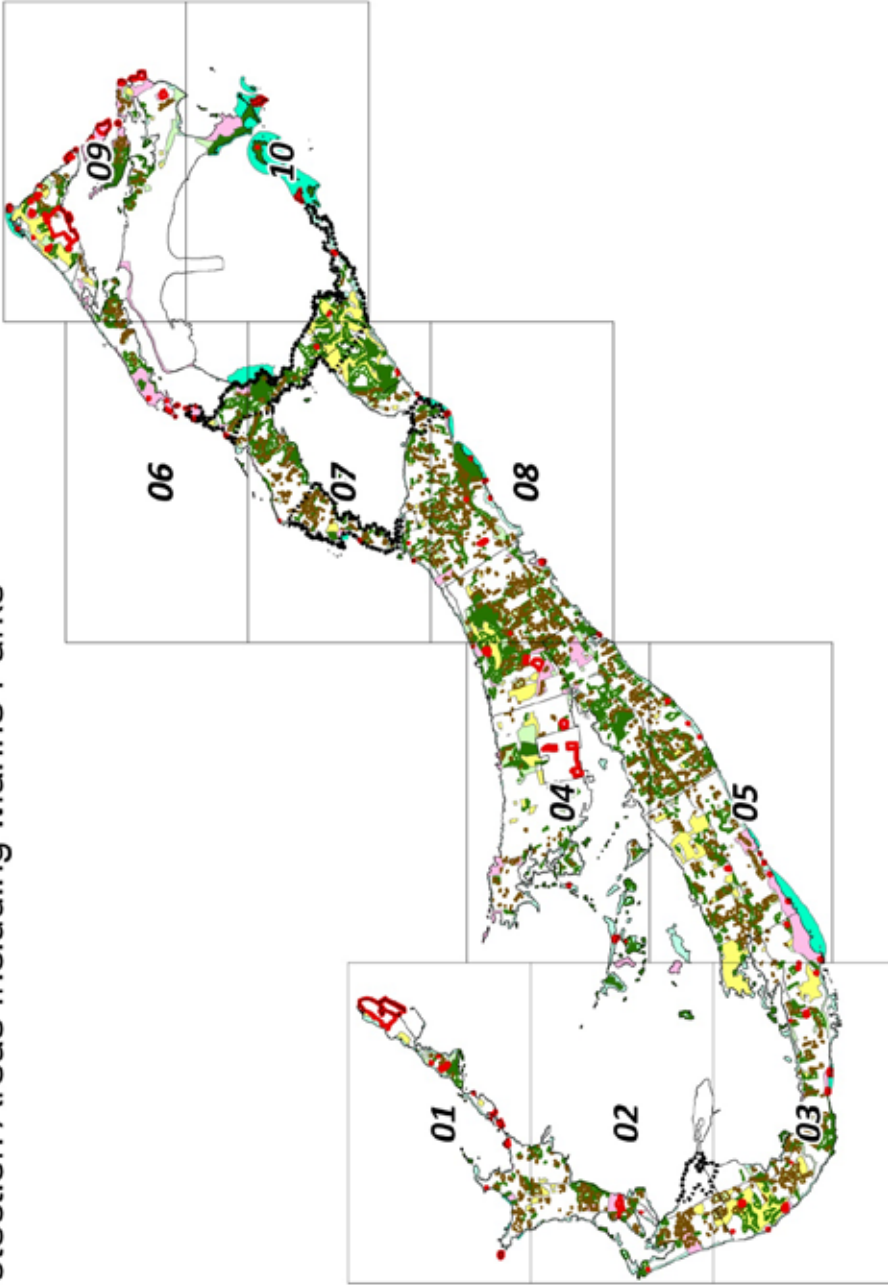


# ANNEX

The background features a light blue gradient at the top, transitioning into a series of wavy, overlapping bands in various shades of blue and a vibrant yellow-green at the bottom.



# Terrestrial Protection Areas Including Marine Parks



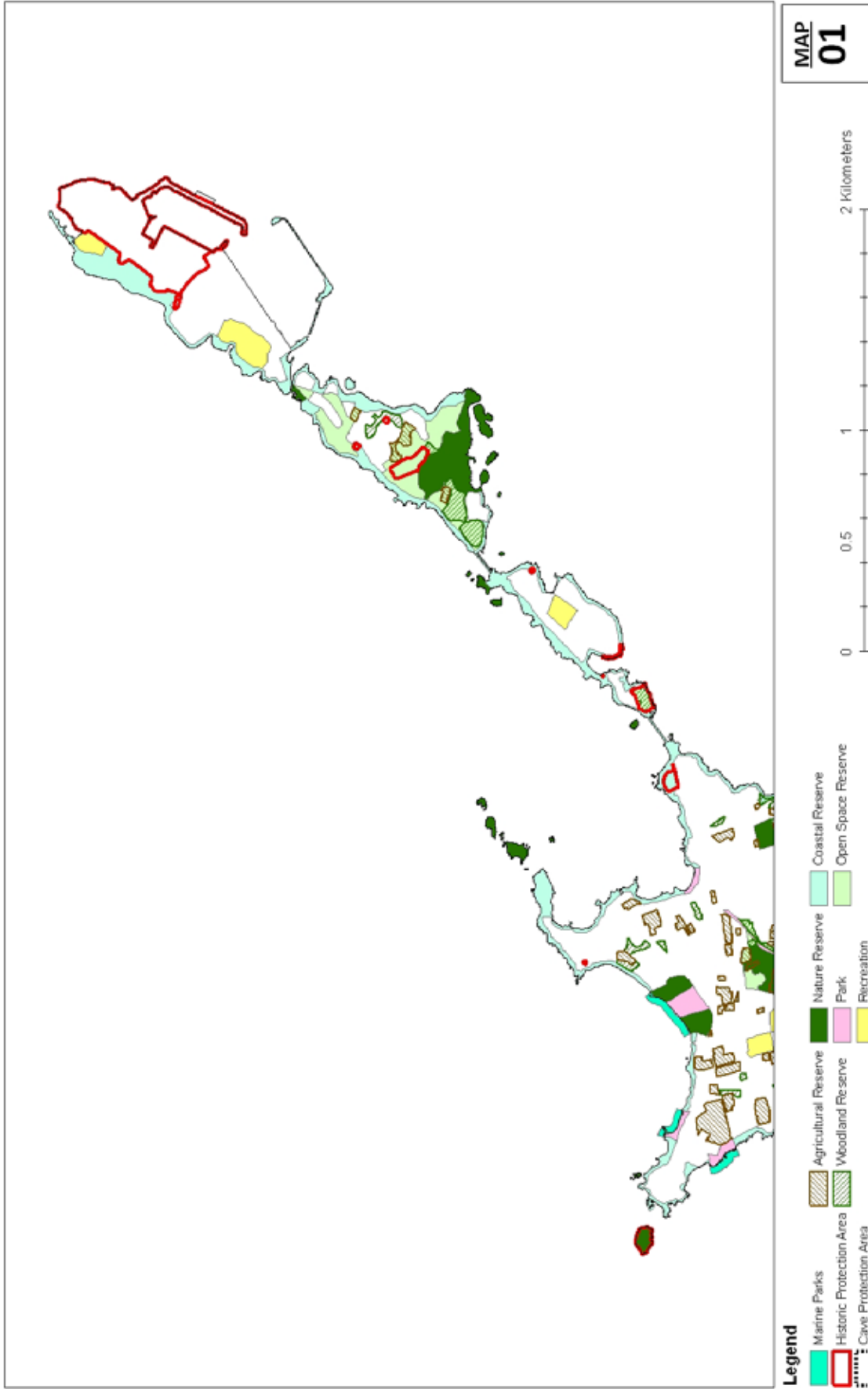
## Legend

- Historic Protection Area
- Cave Protection Area
- Agricultural Reserve
- Woodland Reserve
- Nature Reserve
- Park
- Recreation
- Coastal Reserve
- Open Space Reserve
- Marine Parks

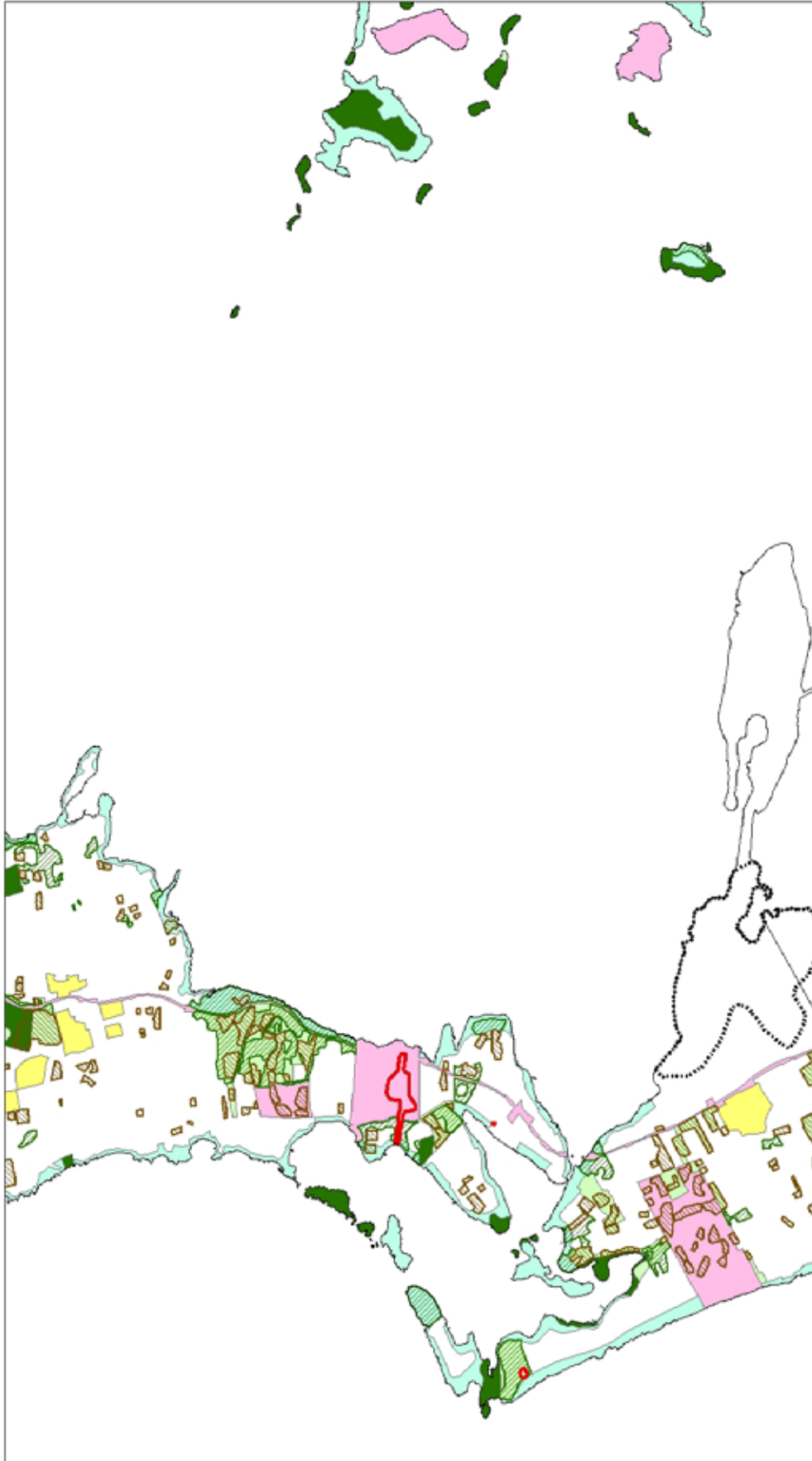
## MAP Key



Source: Department of Planning



Source: Department of Planning



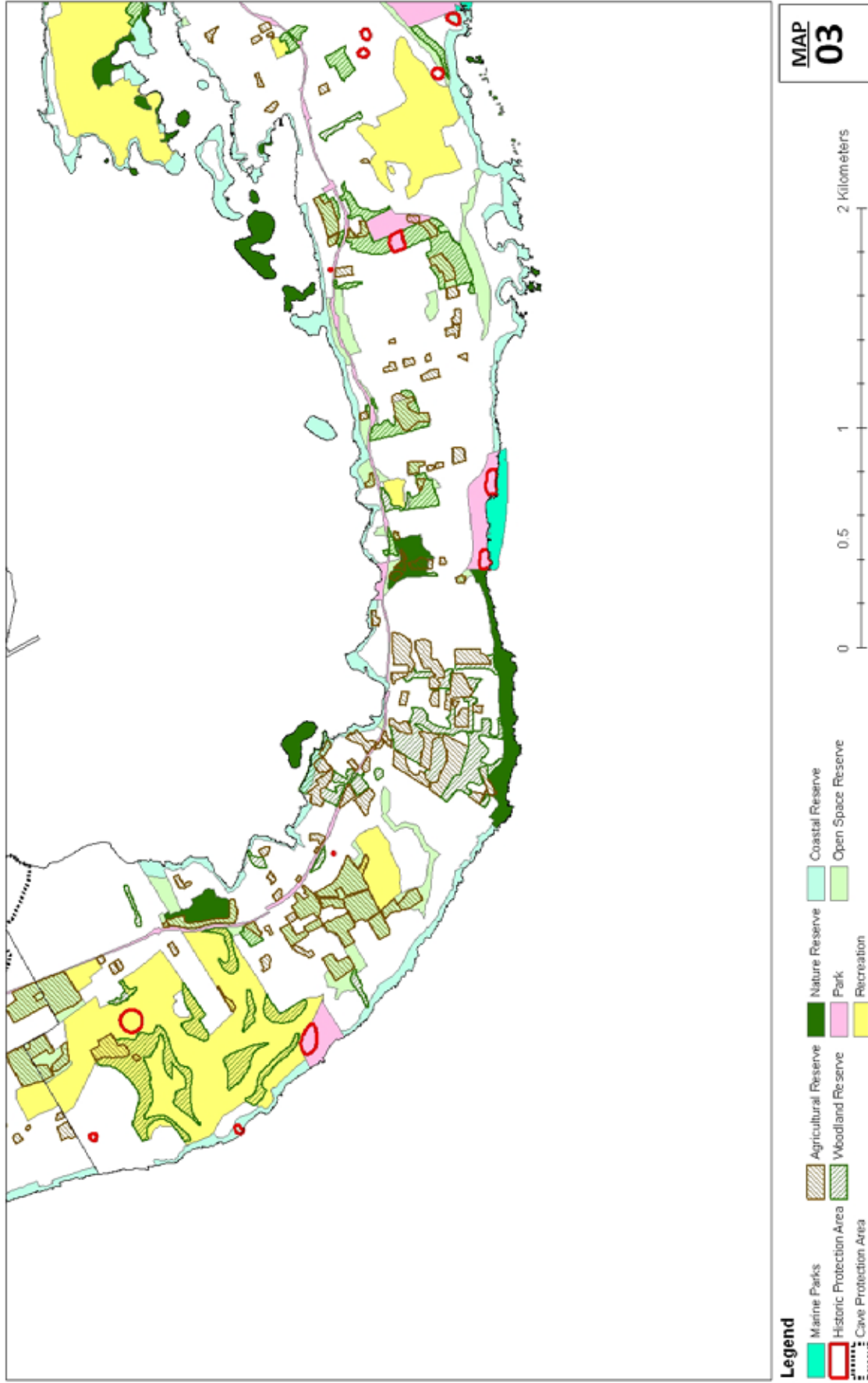
**MAP**  
**02**

**Legend**

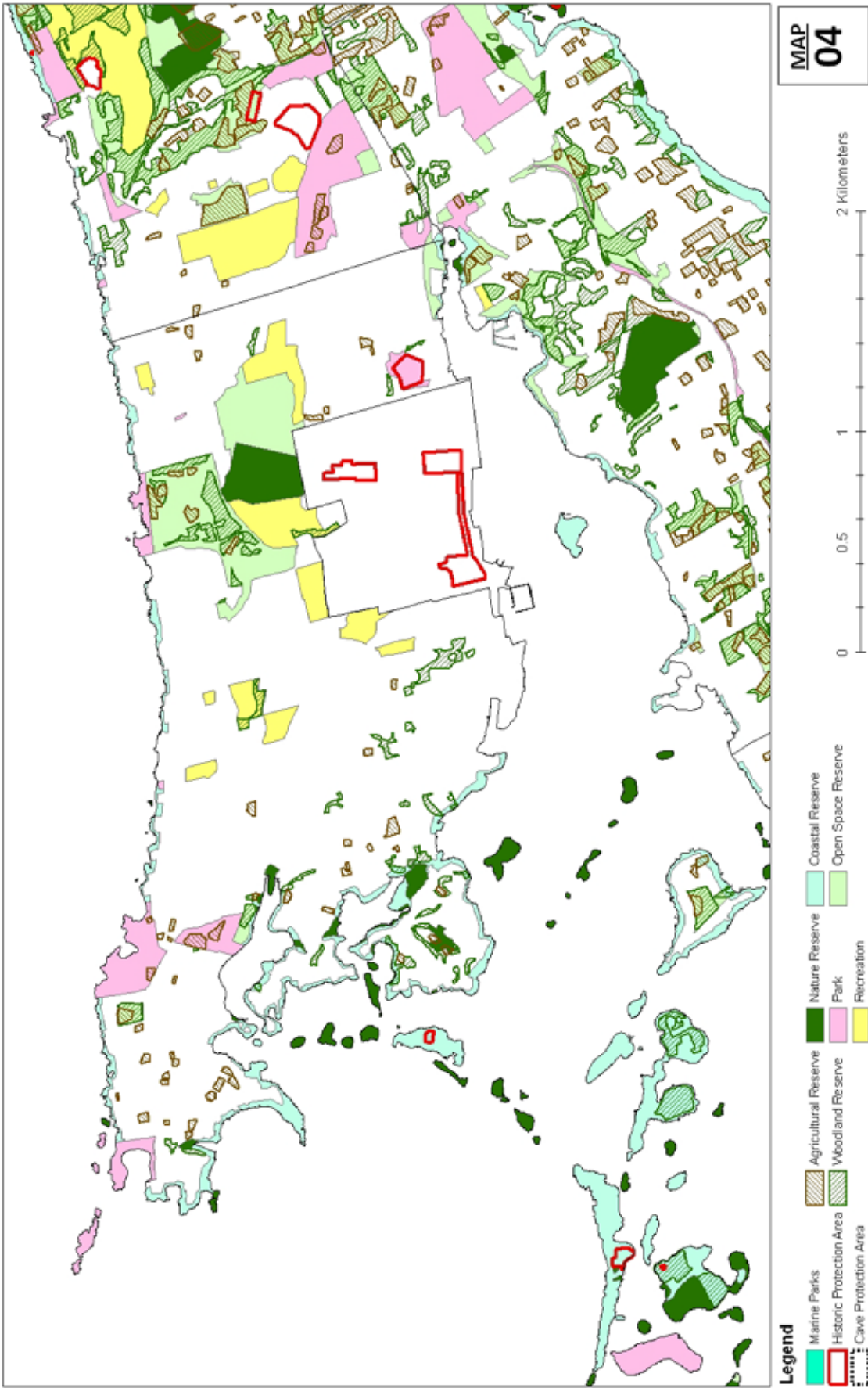
- Marine Parks
- Historic Protection Area
- Cave Protection Area
- Agricultural Reserve
- Woodland Reserve
- Nature Reserve
- Park
- Recreation
- Coastal Reserve
- Open Space Reserve



Source: Department of Planning



Source: Department of Planning

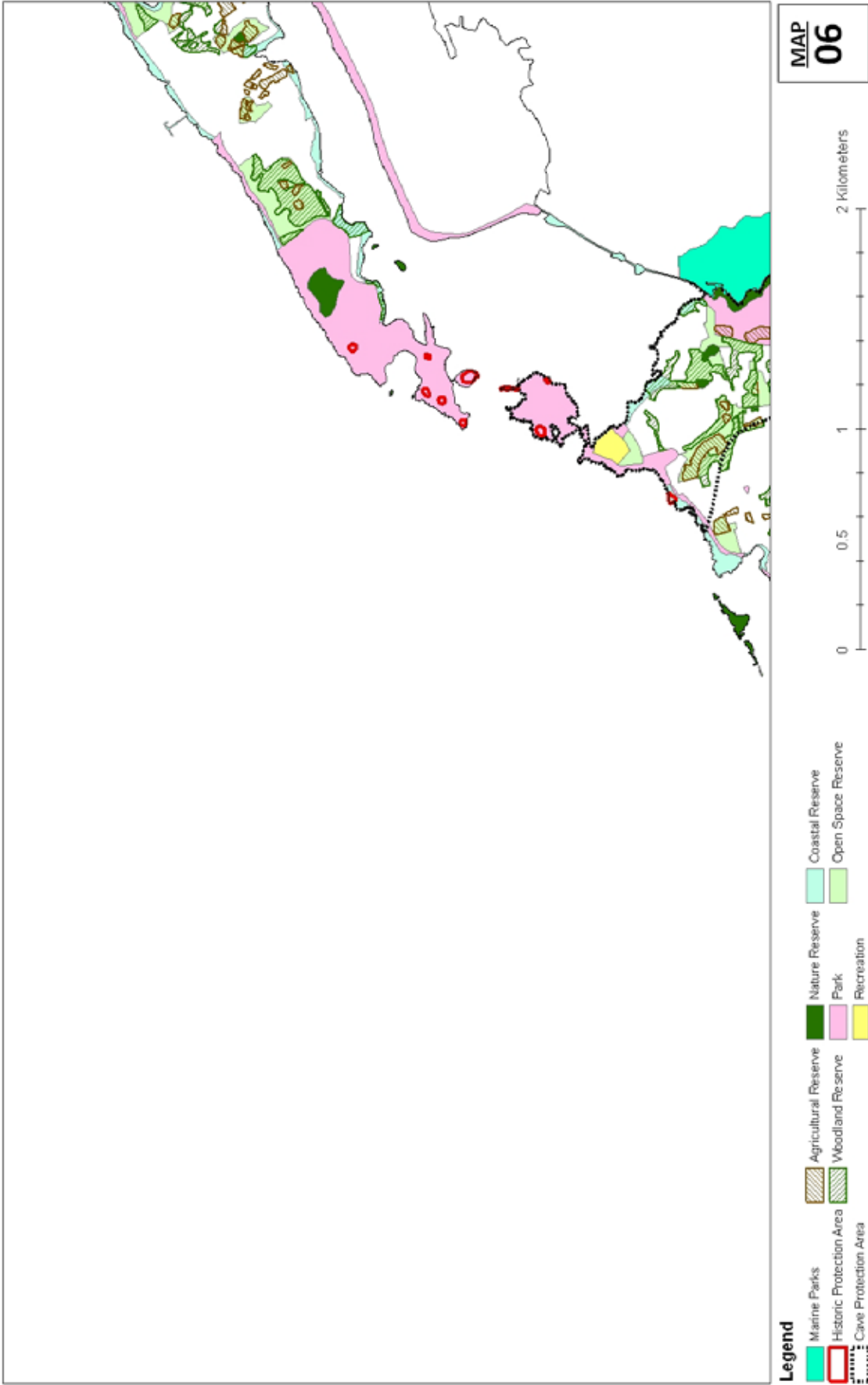


Source: Department of Planning

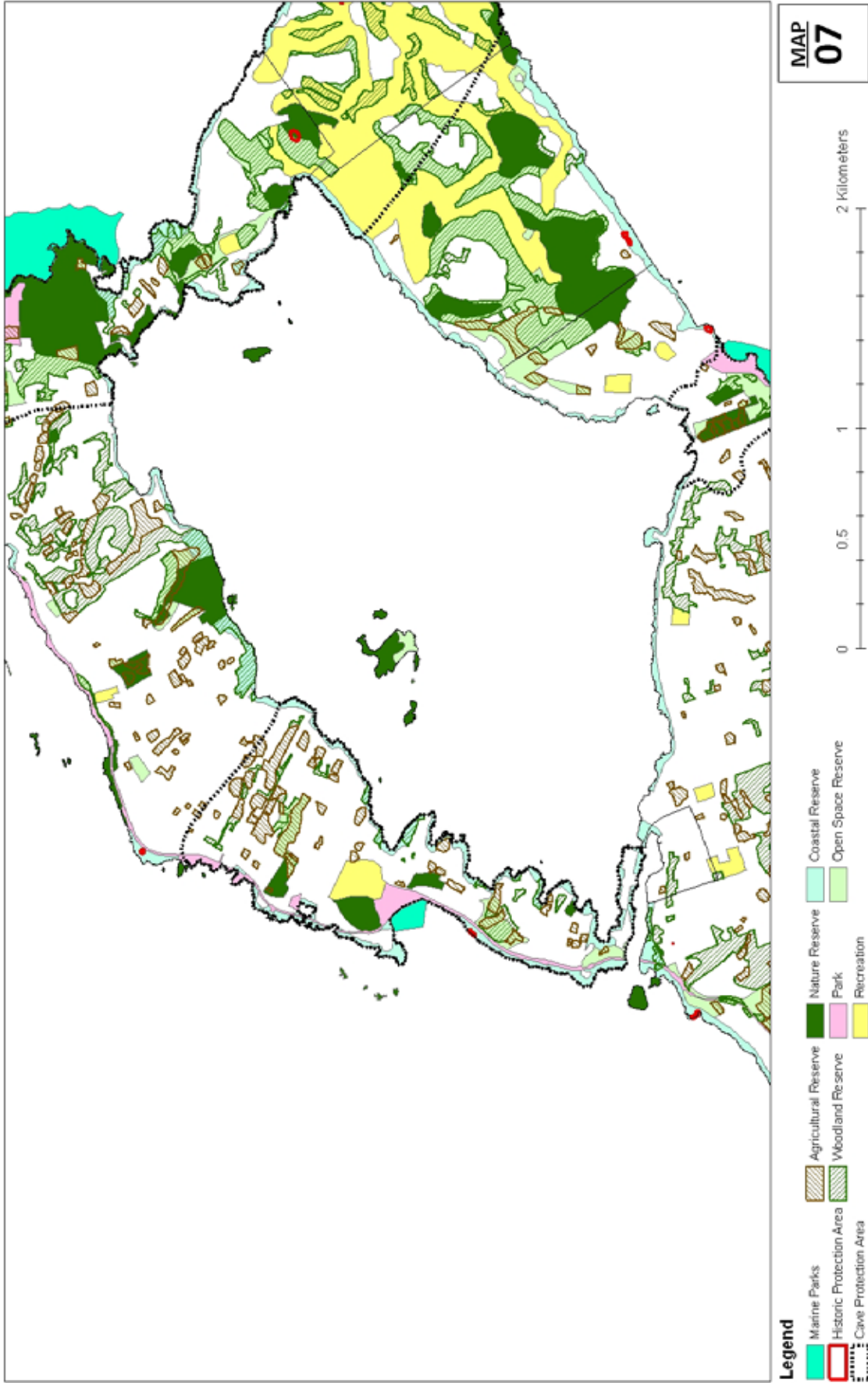


Source: Department of Planning



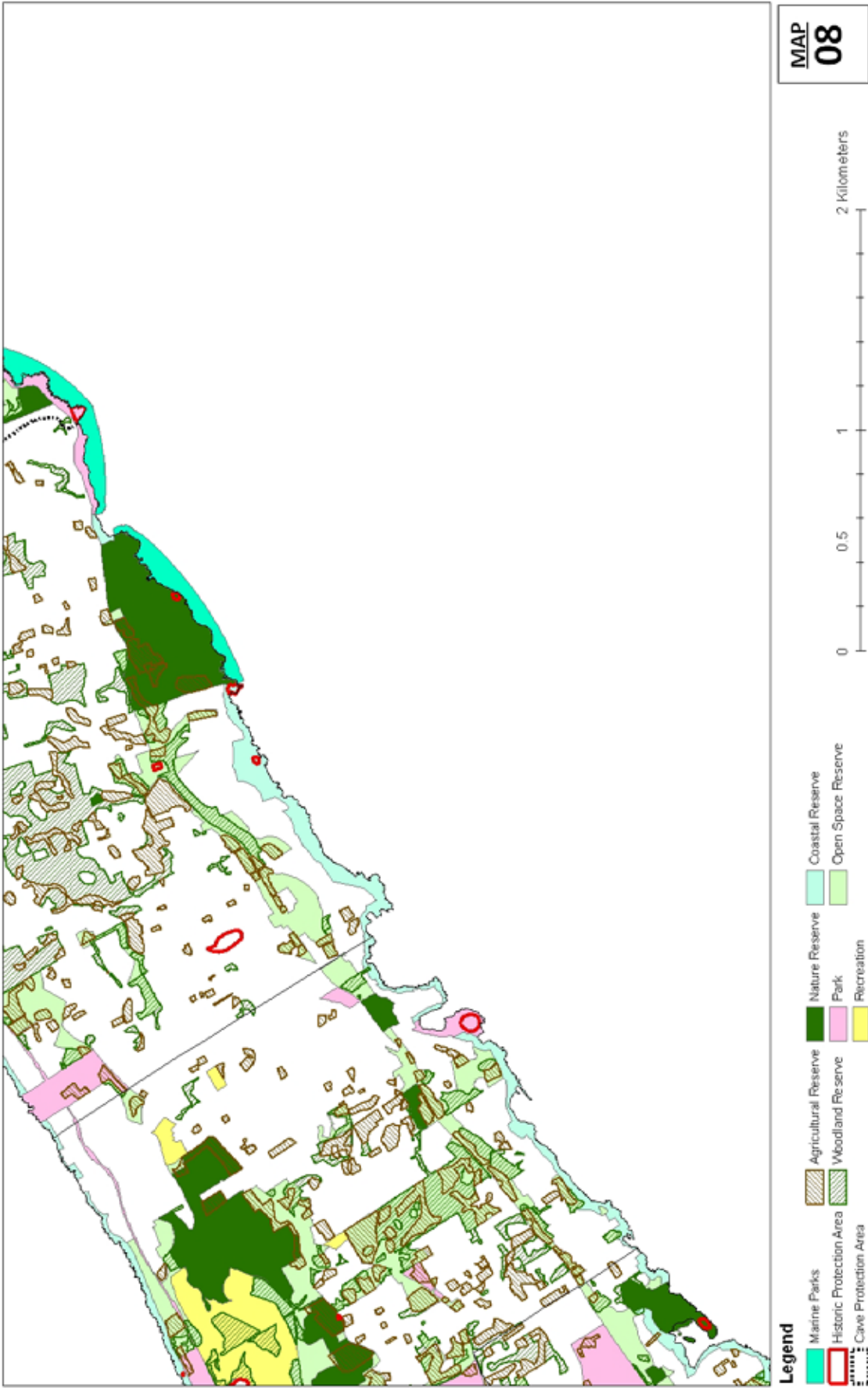


Source: Department of Planning

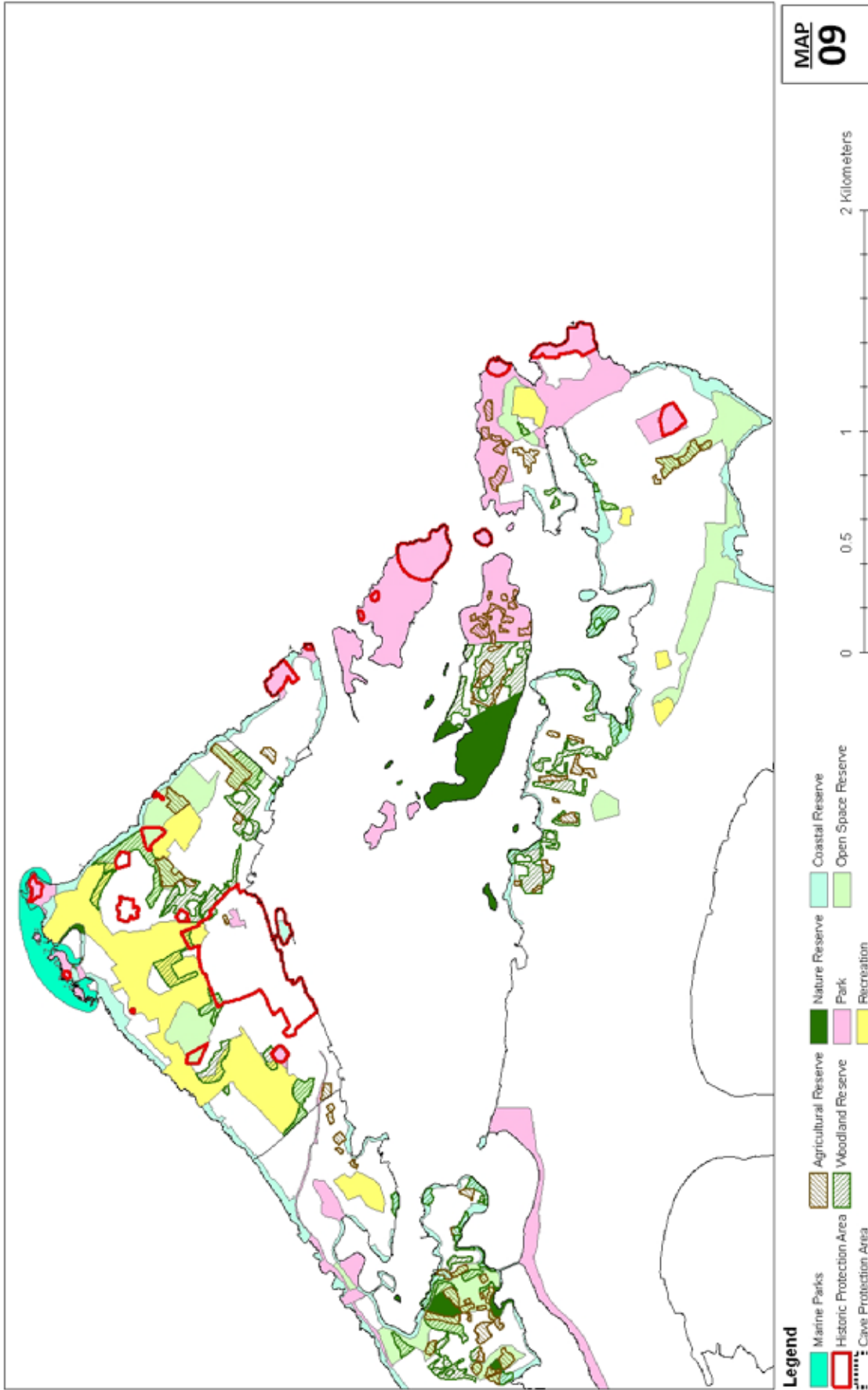


Source: Department of Planning

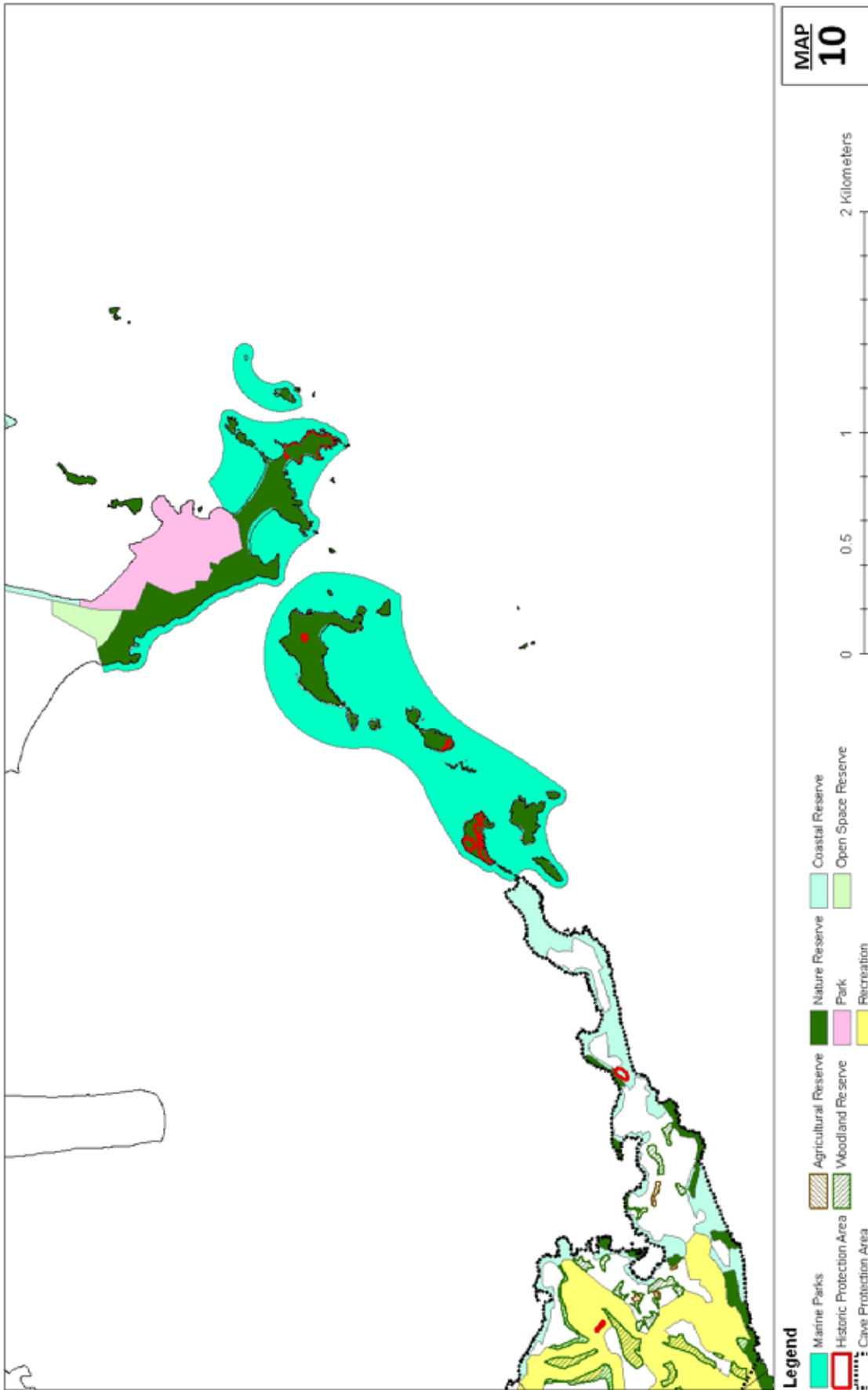




Source: Department of Planning



Source: Department of Planning



Source: Department of Planning



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