

2012 ENVIRONMENTAL STATISTICS COMPENDIUM



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FOREWORD

The Department of Statistics is pleased to release its third issue of the “*Environment 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 and 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 Compendium is structured in thirteen (13) sections which include:

1. Population and Households
2. Tourism
3. Environmental Health/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 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.

Valerie Robinson-James

Director

Department of Statistics

March, 2013

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DATA NOTES

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

MEASURING UNITS CONVERSION TABLE

METRIC		IMPERIAL	IMPERIAL	METRIC	
LENGTH					
1 millimetre (mm)		0.03937 inch (in)	1 inch (in)		2.54 centimetre (cm)
1 centimetre (cm)	10 mm	0.3937 inch	1 yard (yd)	3 feet (ft)	0.9144 metre (m)
1 metre (m)	100 cm	1.0936 yards (yds)	1 mile	1,760 yds	1.6093 kilometre (km)
1 kilometre (km)	1,000 m	0.6214 mile			
AREA					
1 square meter (m ²)	10,000 cm ²		1 acre	4,840 yd ²	4,046.9 square meter (m ²)
1 hectare (ha)	10,000 m ²	2.4712 acres	1 acre		0.4047 hectare (ha)
1 square kilometer (km ²)	100 ha	0.3861 square mile (mile ²)	1 square mile (mile ²)	640 acres	2.59 square kilometer(km ²)
MASS					
1 kilogram (kg)	1,000 grams (g)	2.2046 pounds (lbs)	1 pound (lb)	16 ounces (oz)	0.4536 kg
1 metric tonne (mT)	1,000 kg	0.9842 ton	1 ton	2,240 lbs	1.016 metric tonne (mT)
TEMPERATURE					
°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 Services

Department of Conservation Services

Department of Environmental Protection

Department of Health

Department of Planning

Department of Statistics

Department of Tourism

The Bermuda Weather Service

Transport Control Department

Department of Works and Engineering- Water Section

Department of Works and Engineering- Waste & Enforcement Section

POPULATION & HOUSEHOLDS



Section 1: Population and Households

Population

Bermuda's population has continued to grow over time. This is attributed in part to natural increase, that is, when the number of births exceeds the number of deaths. According to the Population Projections for 2011, Bermuda's civilian population was estimated to be 64,722 persons. It is estimated that the population density of Bermuda for 2011 was 1,191 persons per square kilometer. The civilian population does not include persons in institutions or who were non-sheltered. The population density has gradually increased year on year (see Table 1.1).

Households

The 2010 Census reported 26,923 households in Bermuda (see Table 1.2). The 7.06% increase in the number of households since 2000 can be attributed to Bermuda's growing population. However, the high cost of housing may lead to environmental concerns such as, overcrowding and homelessness.

Table 1.1

Population and Population Density

Year	Population	Population Density (per km ²)
2000	62,059 ¹	1,142
2006	63,797 ²	1,174
2007	64,009 ²	1,178
2008	64,209 ²	1,181
2009	64,395 ²	1,185
2010	64,237 ¹	1,182
2011	64,722 ²	1,191

Source: Department of Statistics

According to the Department of Planning (2008), Bermuda is 54.34 km²

¹ The 2000 and 2010 Census year population totals excludes the non-sheltered and institutionalized population.

² Based on the 2000 Population Projections.

Chart 1.1

Population Density

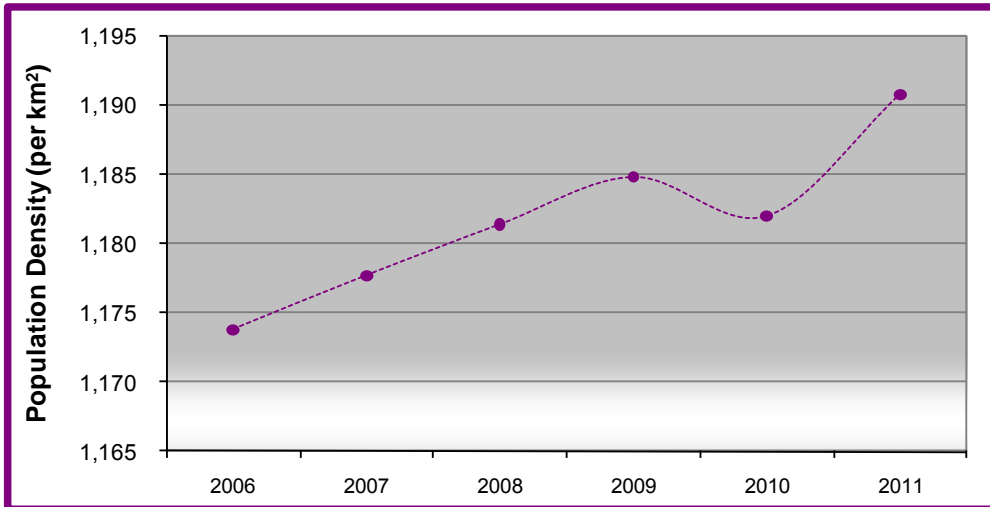


Table 1.2

Number of Households by Type of Dwelling

Type of Dwelling	2000		2010	
	No.	%	No.	%
Undivided private house (cottage)	6,717	26.71	6,280	23.33
Two apartments	8,679	34.51	8,870	32.95
Three apartments	4,396	17.48	4,639	17.23
Four or more apartments	4,580	18.21	5,024	18.66
Residential/commercial premises	306	1.22	281	1.04
Group dwellings	385	1.53	696	2.29
Other/not stated	85	0.34	27	0.10
Total	25,148	100*	26,923¹	100*

Source: 2000 and 2010 Population and Housing Census

Group dwellings include hotel staff quarters, nurses' hostels, and police barracks.

¹ Includes 1,106 households for which there is no data by type of dwelling.

*Percentages may not add up to 100% due to rounding.

Table 1.3

Number of Households by Type of Tenure

Type of Tenure	2000		2010	
	No.	%	No.	%
Own	10,863	43.00	12,238	45.46
Rent	12,854	51.00	11,719	43.53
Rent-Free	1,006	4.00	1,004	3.73
Other/Not Stated	425 ¹	2.00	856 ²	3.18
Total	25,148	100*	26,923 ³	100*

Source: 2000 and 2010 Population and Housing Census

¹Includes 385 group dwellings

²Includes 696 group dwellings and 27 boats.

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

* Percentages may not add up to 100% due to rounding.

Table 1.4

Number of Households by Number of Bedrooms

Number of Bedrooms	2000		2010	
	No.	%	No.	%
Studio dwelling (0 bedrooms)	1,188	4.80	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 3 bedrooms	1,319	5.33	1,645	6.56
Not stated	41	0.17	144	0.57
Total number of households	24,763	100*	25,094¹	100*
Average number of bedrooms per household²	2.03		2.12	
Average size of the household³	2.47		2.42	
Average number of persons per bedroom⁴	1.23		1.14	

¹ Excludes 696 group dwellings and 27 boats since the number of bedrooms is not collected for these types of dwellings.

Source: 2000 & 2010 Population and Housing Census

² Excludes 1,106 households for which there is no data on the number of bedrooms.

³ In calculating the average size of household, the population of 875 persons from the group dwellings and boats was subtracted from the total population.

⁴ In calculating the average number of persons per bedroom, the population of 875 persons from the group dwellings and boats was subtracted from the total population.

* Percentages may not add up to 100% 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
Total number of households	25,148	100*	25,094¹	100*
Average size of household	2.47		2.42	

¹ Excludes 696 go up dwellings and 27 boats since the number of bedrooms is not collected for these types of dwellings.

Source: 2000 and 2010 Population and Housing Census

* Percentages may not add up to 100% 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 serves as one of the largest sources 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

Tourist arrivals in 2011 saw a huge increase of 12.33 per cent over 2010.

After a 16.60 percent decrease in 2008, the number of visitors to the island gradually increased over the following three year period. This increase was mainly attributed to the rise in cruise ship passengers (see Table 2.1).

Visitor Expenditure

Visitor expenditure fluctuated during the past 6 years. Aggregate expenditure peaked to \$513.2 million in 2007 but fell to \$434.9 million in 2011 (see Table 2.2).

Tourist Properties

In 2011, there were 2,591 rooms with a total of 5,401 beds, located on 48 properties around Bermuda. The occupancy rate of fifty-six point three zero percent in 2011 was a 2.30 percent increase from the previous year (see Table 2.3).

Visitor Accommodation

In 2011, 71.39 percent of all tourists chose accommodations at one of Bermuda's larger hotels (see Table 2.4). Twenty seven point seven six percent stayed in other types of accommodations, while 0.85% percent stayed at a guest house. Estimated electricity consumption in 2011 was 5,096 kWh (see table 2.6).

Origin of Tourists

Visitors from the United States, Bermuda's largest tourism market, totaled 172,890 in 2011 representing an increase of 4.14 percent over 166,016 visitors in 2010 (see Table 2.5). Overall, Bermuda has seen an increase in air arrivals of 1.63 percent over the previous year. The number of cruise ship passengers increased 19.48 percent in 2011. (see Table 2.1).

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 1 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 km²: 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 km²).

Occupancy Rate: it is calculated by dividing the monthly or yearly sum of room nights utilized 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 traveling 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 traveling 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 km². 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 km²) 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 twelve months and whose main purpose of visit is other than the exercise of an activity remunerated from within the place visited.

Table 2.1

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

Indicator	2006	2007	2008	2009	2010	2011
Total visitors¹	635,272	659,572	550,021	554,394	580,193	651,749
Growth rate (%)	22.90	3.80	-16.60	0.80	4.65	12.33
Tourists	298,973	305,548	263,613	235,866	232,262	236,038
Growth rate (%)	10.90	2.20	-13.70	-10.53	-1.53	1.63
Tourist arrival index	76.60	78.30	67.50	60.40	59.48	60.44
Cruise passengers	336,299	354,024	286,408	318,528	347,931	415,711
Growth rate (%)	36.00	5.30	-19.10	11.21	9.23	19.48
Cruise arrivals	185	195	134	135	149	177
Growth rate (%)	14.90	5.40	-31.30	0.75	10.37	18.79
No. of tourists nights spent	6.50	6.20	6.40	6.09	6.21	6.06
Population	64,693	65,084	65,462	65,811	64,319	64,722
Tourists to residents ratio	4.62	4.69	4.03	3.58	3.61	3.65
Cruise passengers to residents	5.20	5.44	4.38	4.84	5.41	6.42
Visitors to residents ratio	9.82	10.13	8.40	8.42	9.02	10.07
Tourism intensity ratio	97.96	95.49	85.05	72.41	72.71	72.10
Tourism penetration ratio	82.30	79.75	70.61	59.80	61.44	60.55

¹ Does not include yacht passengers.

Source: Department of Statistics and Department of Tourism

Chart 2.1

Growth in Air Passengers, Cruise Passengers and Total Visitors

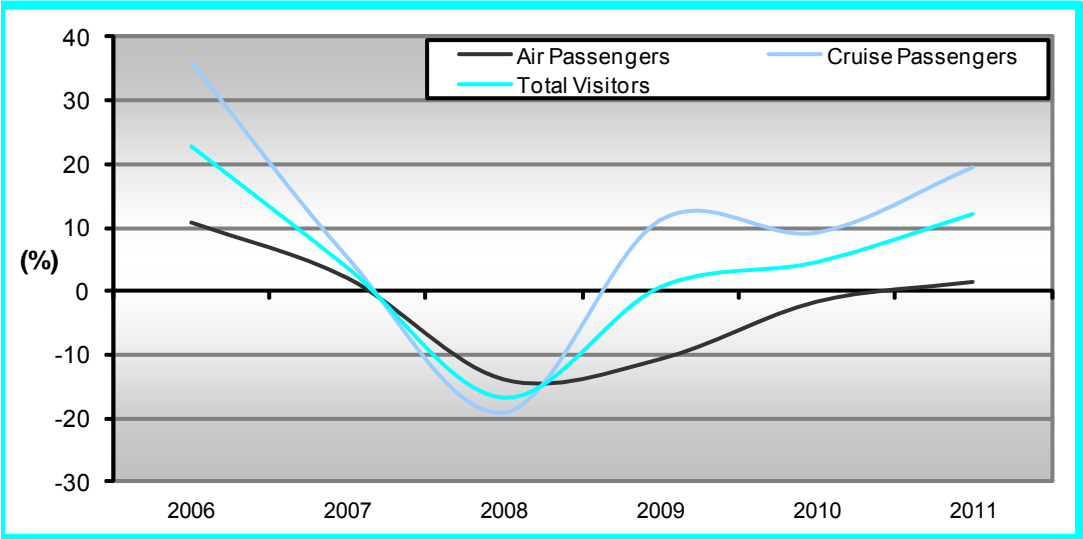


Chart 2.2

Tourists to Residents, Cruise Passengers to Residents
And Visitors to Residents Ratios

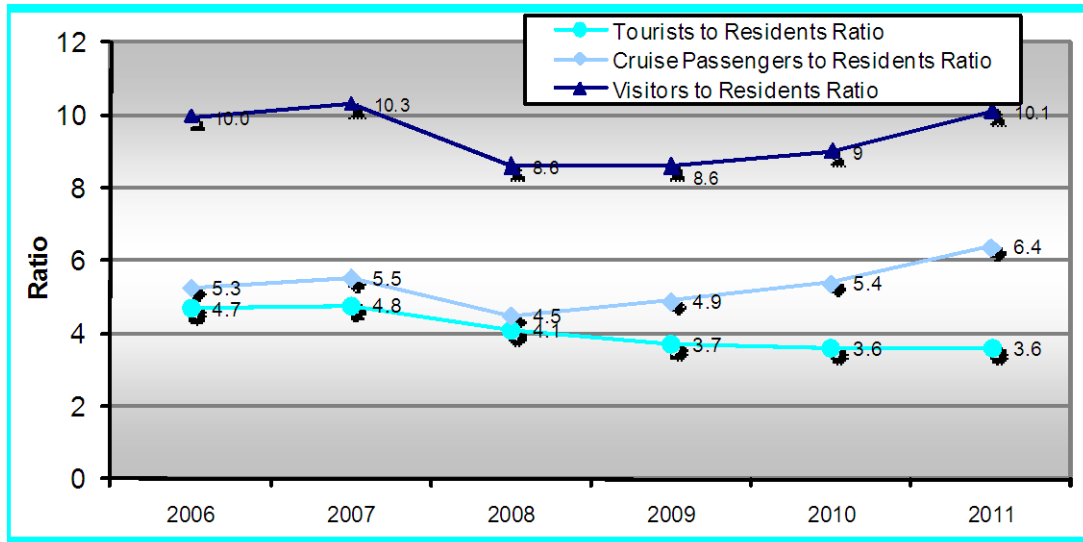


Chart 2.3

Tourist Intensity and Penetration Ratios

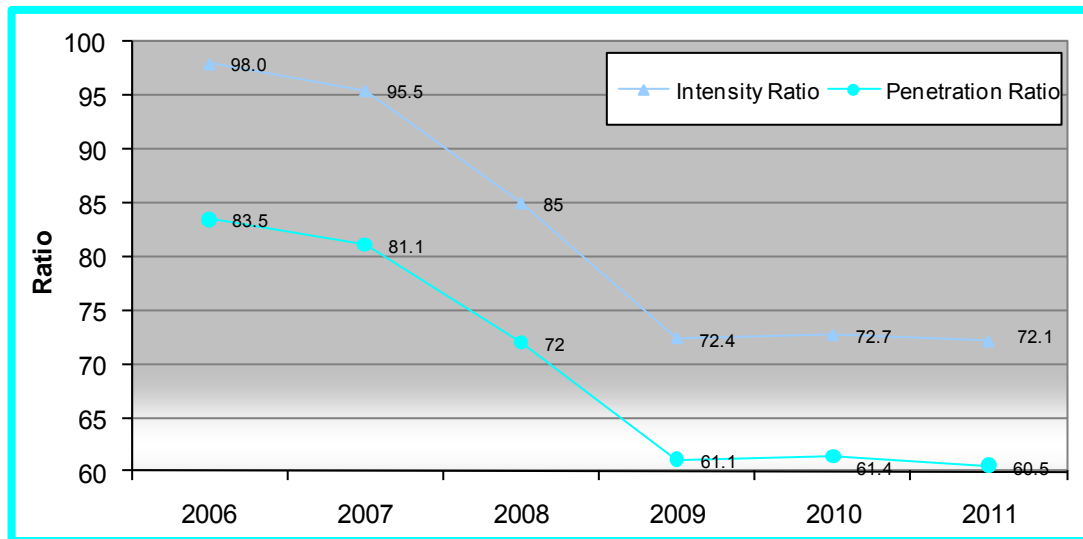


Table 2.2

Visitor Expenditure and Number Employed in Tourism

Item	2006	2007	2008	2009	2010	2011
Visitor expenditure (in US\$'000) ^a	454,200	513,200	401,800	321,200	385,500	434,900
Expenditure on same-day visits	65,300	70,500	57,700	54,800	62,600	86,400
Expenditure on accommodation, meals and drinks, shopping, entertainment etc.	388,900	442,700	344,100	266,400	322,900	348,500
Total directly employed in tourism						
Women	2,080	2,042	1,966	1,838	1,759	1,872
Men	2,821	2,768	2,903	2,836	2,590	2,661
Total	4,901	4,810	4,869	4,674	4,349	4,533

Source: Department of Statistics and Department of Tourism

Table 2.3

Number of Properties, Number of Rooms, Per km², and Occupancy Rate

Item	2006	2007	2008	2009	2010	2011
Number of properties	57	55	54	52	50	48
Total number of rooms available	3,011	2,766	2,736	2,830	2,695	2,591
Number of rooms per km ²	55.40	50.90	50.30	52.10	49.60	47.68
Total number of beds	6,065	5,590	5,538	5,814	5,722	5,401
Occupancy rate (%) ¹	63.80	67.10	59.10	51.10	54.00	56.30

According to the Department of Planning (2008), Bermuda is 54.34 km²

Source: Department of Statistics and Department of Tourism

¹ 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

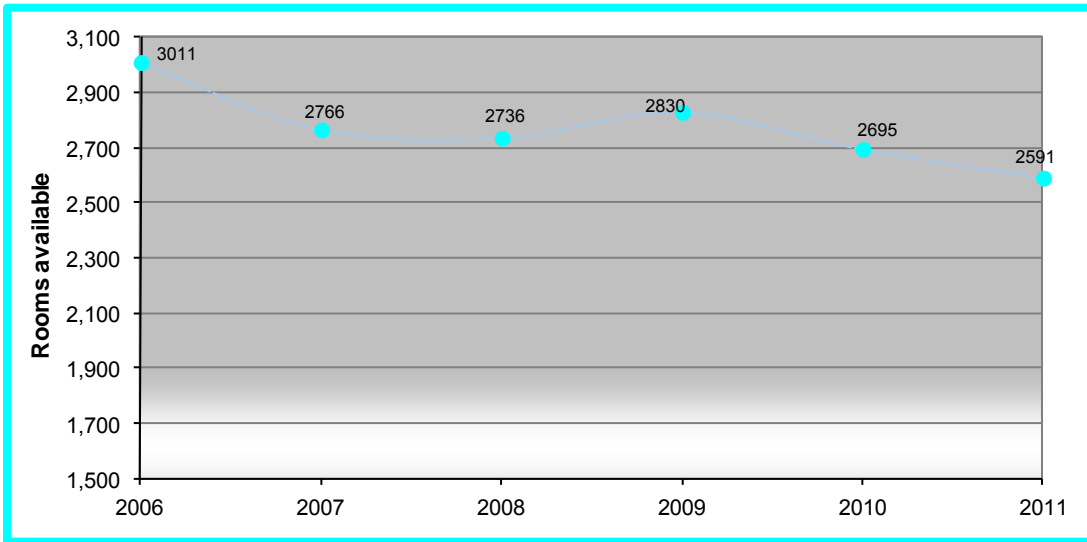


Chart 2.5

Occupancy Rate

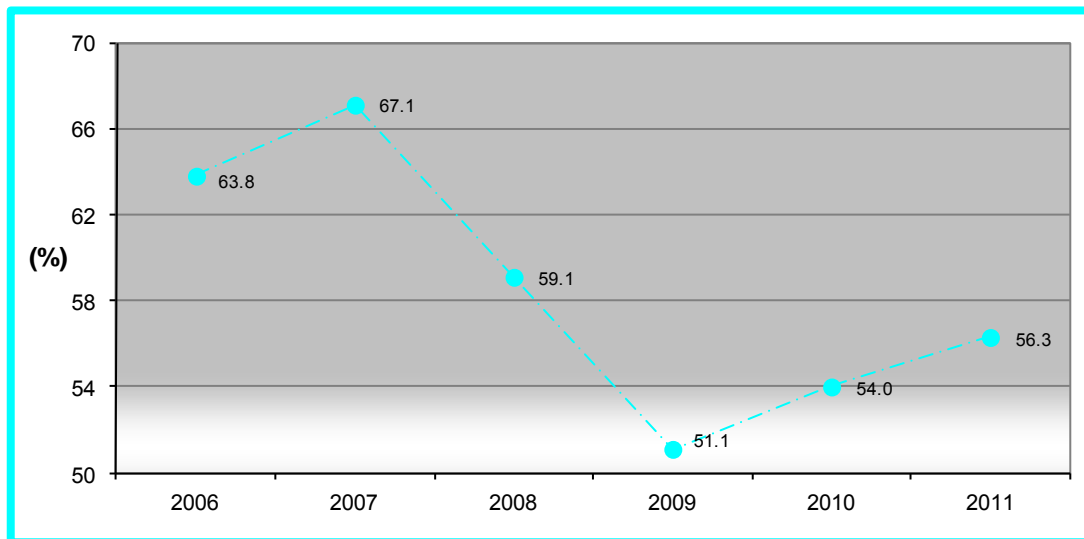


Table 2.4

Tourist Arrivals by Type of Accommodation

Type of Accommodation	2006	2007	2008	2009	2010	2011
Hotels	207,486	207,401	171,203	159,739	162,011	168,502
Guest Houses	2,345	2,722	2,291	1,894	2,067	1,996
Other	89,142	95,425	90,119	74,233	68,184	65,540
Total	298,973	305,548	263,613	235,866	232,262	236,038

Source: Department of Statistics and Department of Tourism

Table 2.5

Tourist Arrivals by Country of Origin

Country of Origin	2006	2007	2008	2009	2010	2011
United States	227,725	229,498	189,388	172,651	166,016	172,890
Canada	27,675	27,844	27,207	24,866	30,402	29,217
United Kingdom	27,008	30,386	29,255	23,906	23,240	21,524
Other	16,565	17,820	17,763	14,443	12,604	12,407
Total	298,973	305,548	263,613	235,866	232,262	236,038

Source: Department of Statistics and Department of Tourism

Table 2.6

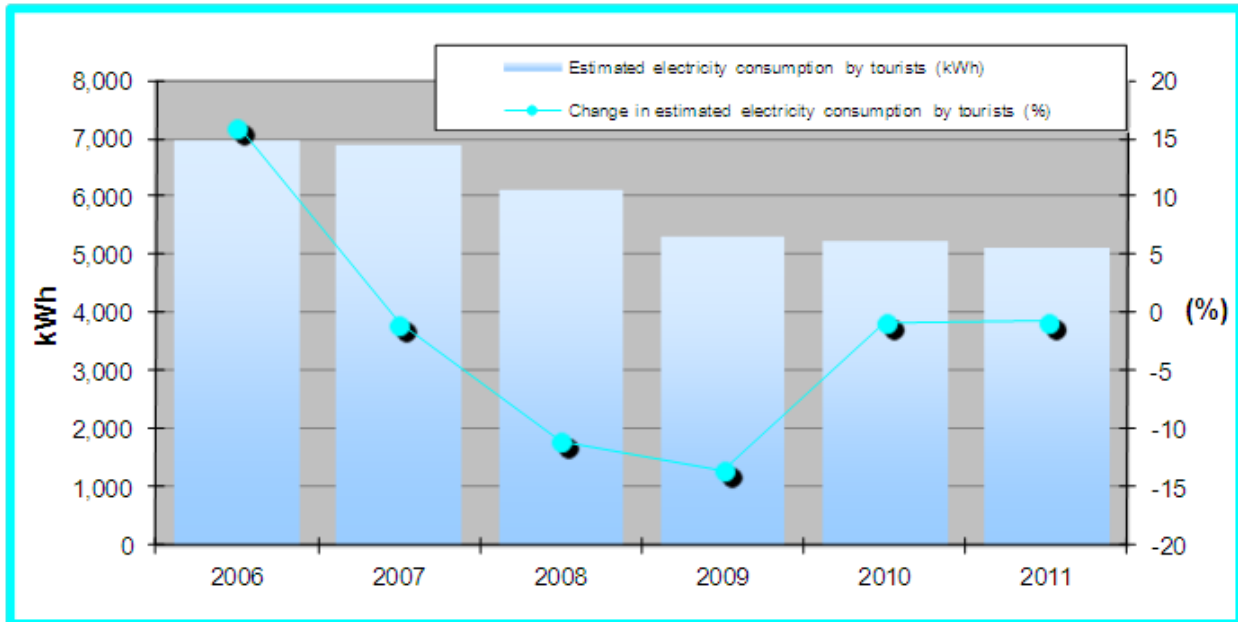
Estimated Electricity Consumption by Tourists

Type of Accommodation	2006	2007	2008	2009	2010	2011
Tourists	298,973	305,548	263,613	235,866	232,262	236,038
Average length of stay	6.50	6.20	6.40	6.10	6.21	6.06
Electricity consumption (kWh)	631,366	643,821	644,954	656,083	650,571	636,517
Daily per capita electricity consumption (kWh)	3,532	3,583	3,567	3,608	3,559	3,563
Estimated electricity consumption by tourists (kWh)	6,864	6,787	6,019	5,191	5,133	5,096
Change in estimated electricity consumption by tourists (%)	14.62	-1.12	-11.32	-13.75	-1.12	-0.72

Source: Department of Statistics and Department of Tourism

Chart 2.6

Tourists' Estimated Electricity Consumption and Growth



ENVIRONMENTAL HEALTH/ 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 2011, there were 644 reported cases of environmentally related diseases in Bermuda. A total of 589 or 91.46% of these cases were classified as respiratory diseases.

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 2011, gastroenteritis accounted for 4.97% or 32 cases of the environmental related diseases in Bermuda.

Environmentally related diseases were almost equally distributed by gender with males accounting for 47.36 percent and females 52.64 percent of reported cases (see Table 3.1).

Weather

The precipitation on Bermuda has decreased by 12.12% since 2011, with 40.6 inches of rainfall in 2011 from 182 rain days. On record, August is the month with the most rain days and the month of April the least rain days (see Table 3.2).

The month of August was the hottest in Bermuda with an average daily temperature of 81.5⁰F and the lowest was January (62.9⁰F). Over the last six years, the annual average air temperature in Bermuda has remained around 71.9 degrees Fahrenheit. During that period the average daily maximum temperature was 75.7 ⁰F, and average daily minimum temperature was 68.1 ⁰F in 2011. (see Table 3.3).

Over the past 6 years, 2006 to 2011, the average humidity was 74%. In 2011, the month with the highest humidity was August (79%) and the lowest was December (69%) (see Table 3.4).

Table 3.1

Number of Reported Cases of Environmentally Related Diseases by Sex

Cause	Sex	2006	2007	2008	2009	2010	2011
Gastroenteritis	Female	43	40	33	22	36	18
	Male	31	33	23	25	16	14
	Total	74	73	56	47	52	32
Malaria (imported)	Female	-	-	-	2	-	1
	Male	-	2	-	1	-	2
	Total	-	2	1	3	-	3
Dengue (imported)	Female	1	-	-	-	1	1
	Male	-	-	-	-	1	-
	Total	1	-	-	-	2	1
Accidental pesticide	Female	-	-	-	-	-	-
	Male	-	2	-	-	-	-
	Total	-	2	-	-	-	-
Poisoning	Female	13	23	14	15	17	8
	Male	13	15	9	9	12	10
	Total	26	38	23	24	29	18
Diarrhoea	Female	5	4	-	1	1	1
	Male	3	4	1	1	-	-
	Total	8	8	1	2	1	1
Respiratory diseases (all)	Female	227	257	245	280	338	310
	Male	263	237	238	281	286	279
	Total	490	494	483	561	624	589
Acute bronchitis	Female	3	6	-	-	2	2
	Male	2	4	1	-	-	-
	Total	5	10	1	-	2	2
Chronic sinusitis	Female	8	4	4	3	4	2
	Male	7	6	4	4	1	-
	Total	15	10	8	7	5	2
Other	Female	216	247	241	277	332	306
	Male	254	227	233	277	285	279
	Total	470	274	474	554	617	585
TOTAL CASES, all causes	Female	289	234	292	320	393	339
	Male	310	293	272	317	315	305
	Total	599	617	564	637	708	644
Growth rate (%)	Female	-14.20	-19.00	24.80	9.60	22.80	-13.70
	Male	-9.90	-5.50	-7.20	16.50	-0.60	-3.20
	Total	-12.00	3.00	-8.60	12.90	11.10	-9.00

Source: Department of Health/BHB

Reported inpatient discharges only based on International Classification of Diseases (ICD) -9 codes.

Chart 3.1

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

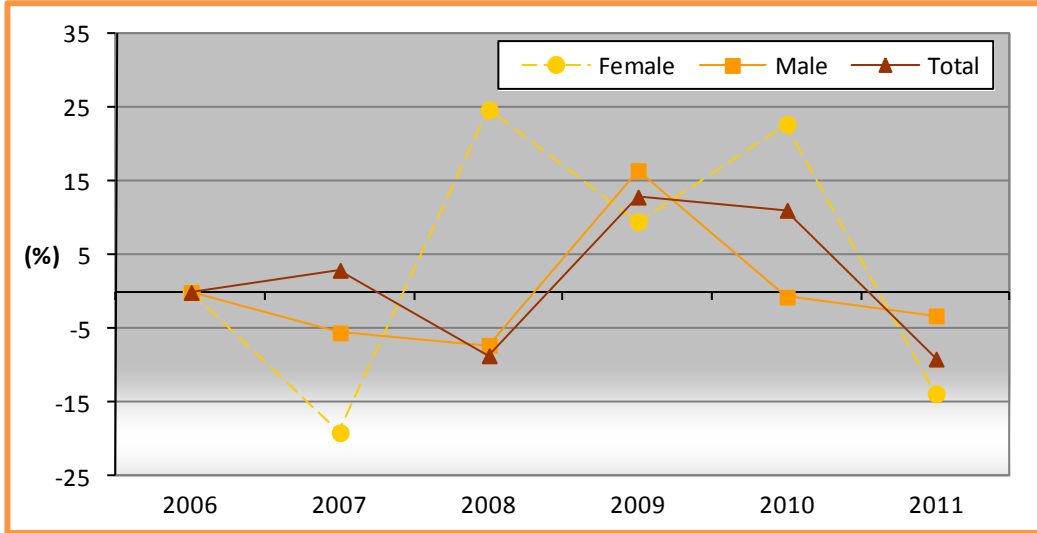


Chart 3.2

Reported Cases of Environmentally Related Diseases by Cause 2011

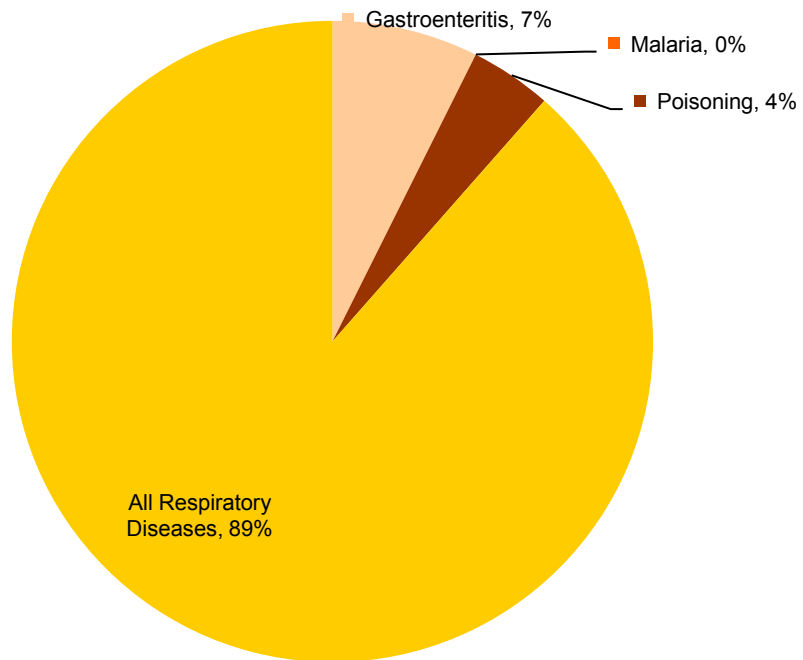


Table 3.2

Rainfall in Inches and Days by Month of Year and Total

Year		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
2006	Inches	5.62	5.83	4.36	3.09	5.30	5.27	9.62	4.28	5.11	5.15	5.50	3.02	62.15
	Rain Days	19	20	21	13	10	17	15	15	8	16	14	15	183
2007	Inches	4.10	5.01	4.03	4.08	7.09	4.30	6.02	8.35	2.00	4.27	4.18	3.11	56.54
	Rain Days	13	20	11	12	11	14	12	17	10	12	18	17	167
2008	Inches	2.85	3.28	5.37	6.45	10.21	1.07	6.76	5.33	3.30	5.73	1.97	3.50	55.82
	Rain Days	21	12	13	15	17	10	11	16	14	15	14	9	167
2009	Inches	4.02	4.72	2.74	2.54	1.31	12.70	3.10	3.32	6.54	8.84	3.41	2.60	55.90
	Rain Days	18	15	15	10	9	25	12	10	18	17	15	15	179
2010	Inches	6.00	3.60	5.13	1.11	1.21	0.70	5.30	4.10	9.21	4.00	1.40	4.00	46.20
	Rain Days	23	20	17	11	8	5	12	17	15	10	16	26	180
2011	Inches	5.19	1.87	2.51	2.13	0.62	0.97	5.02	7.16	3.22	5.94	3.36	2.58	40.60
	Rain Days	20	12	16	6	16	8	15	24	14	17	19	15	182

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
2006	Mean Daily Max.	69.5	67.1	66.9	70.4	75.2	80.6	84.4	85.5	84.0	80.2	75.6	71.7	75.9
	Mean Daily Min.	60.4	58.1	56.7	62.0	66.4	72.9	76.1	76.5	75.2	71.4	68.5	63.5	67.3
	Mean Daily	64.9	62.5	61.7	65.8	70.3	76.2	80.0	80.6	78.9	75.5	71.6	67.4	71.3
2007	Mean Daily Max.	68.6	66.3	67.7	69.8	72.8	77.7	82.2	84.2	82.7	79.5	73.8	71.6	74.7
	Mean Daily Min.	59.8	56.8	58.3	61.0	65.9	70.3	75.1	76.4	75.5	72.0	65.8	63.9	66.7
	Mean Daily	64.2	62.0	63.0	65.5	69.1	74.0	78.7	80.5	78.9	75.7	70.0	67.7	70.8
2008	Mean Daily Max.	68.3	70.5	68.2	71.9	73.1	79.8	83.4	84.6	83.9	77.7	72.7	70.5	75.4
	Mean Daily Min.	59.6	63.3	60.5	64.2	65.3	72.9	75.9	76.8	77.0	69.8	64.8	64.2	67.9
	Mean Daily	64.1	66.7	64.4	67.7	69.1	75.8	79.8	80.7	80.4	73.9	69.0	67.3	71.6
2009	Mean Daily Max.	69.1	66.3	67.6	70.6	75.9	80.5	84.4	86.1	84.0	79.7	75.2	69.6	75.8
	Mean Daily Min.	60.2	57.7	60.0	62.6	68.7	72.4	77.2	78.7	76.3	72.1	68.0	62.3	68.0
	Mean Daily	65.0	62.3	63.7	66.7	71.8	76.6	80.7	82.3	80.1	76.1	71.7	66.3	72.0
2010	Mean Daily Max.	65.9	64.7	67.2	69.8	74.5	81.3	84.5	85.6	82.7	79.3	73.3	66.5	74.6
	Mean Daily Min.	57.6	56.3	59.7	62.7	67.0	72.8	76.9	78.2	75.1	72.4	66.3	57.8	66.9
	Mean Daily	62.1	60.9	63.4	65.9	70.2	76.7	80.4	81.9	79.0	75.7	69.7	63.1	70.8
2011	Mean Daily Max.	66.7	67.3	67.8	71.3	74.7	80.4	85.0	84.9	84.1	79.6	75.2	71.2	75.7
	Mean Daily Min.	58.7	58.8	59.6	64.3	67.1	72.5	76.7	77.2	77.1	72.1	68.8	63.8	68.1
	Mean Daily	62.9	63.2	63.7	67.4	70.5	76.0	80.7	81.5	80.7	76.0	71.9	67.8	71.9

Source: The Bermuda Weather Service

Chart 3.3

Total Number of Inches of Rainfall and Rain Days

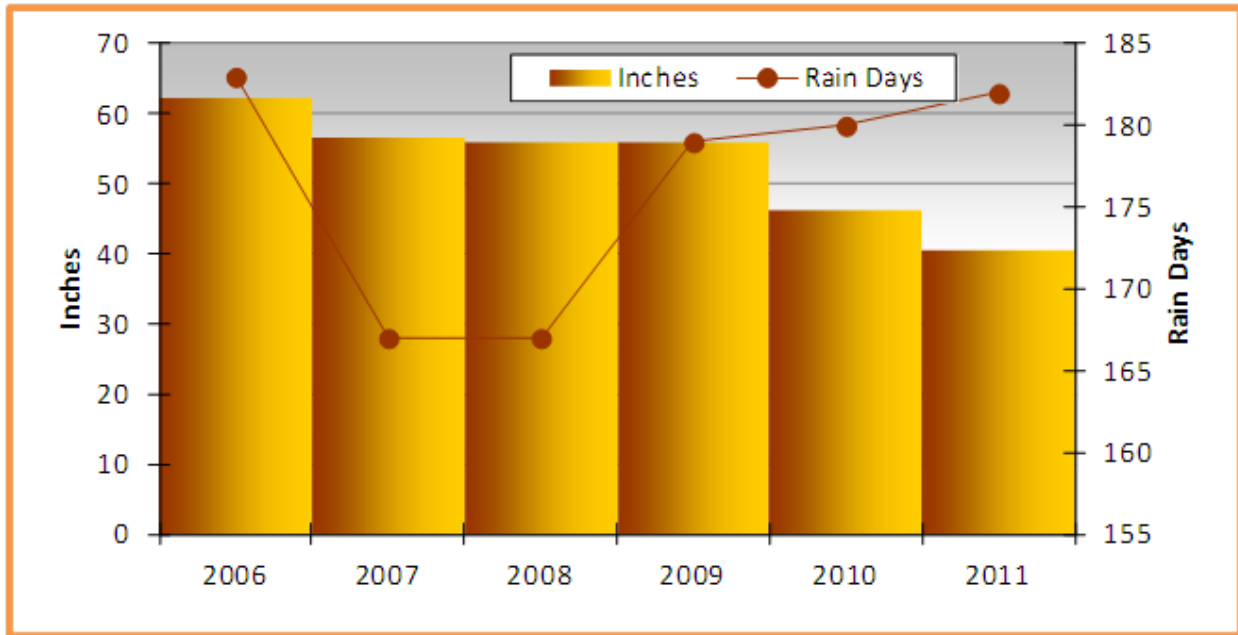


Chart 3.4

Mean Daily Maximum, Minimum and Mean Daily Air Temperature

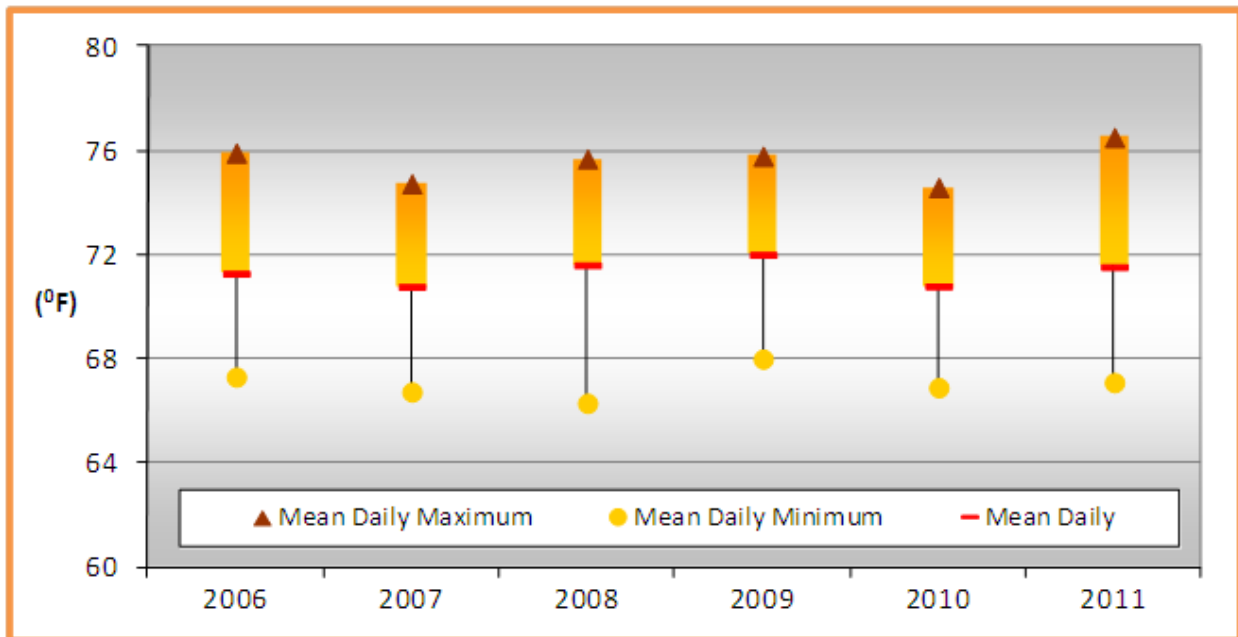


Table 3.4

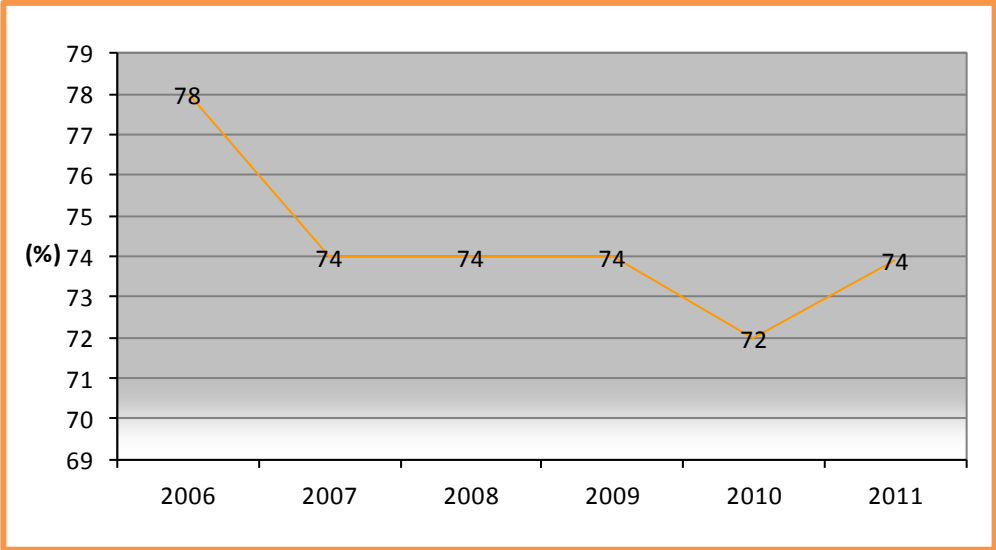
Mean Relative Humidity (%)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Yearly Average
2006	76	74	71	79	80	87	81	79	81	75	77	72	78
2007	71	73	70	75	76	81	79	78	74	71	70	75	74
2008	73	76	69	75	76	80	77	78	76	68	69	70	74
2009	75	67	70	70	75	82	79	74	76	73	75	68	74
2010	70	66	72	71	78	78	75	76	75	70	68	67	72
2011	71	72	74	77	74	75	76	79	78	72	70	69	74

Source: The Bermuda Weather Service

Chart 3.5

Yearly Average 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.

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.



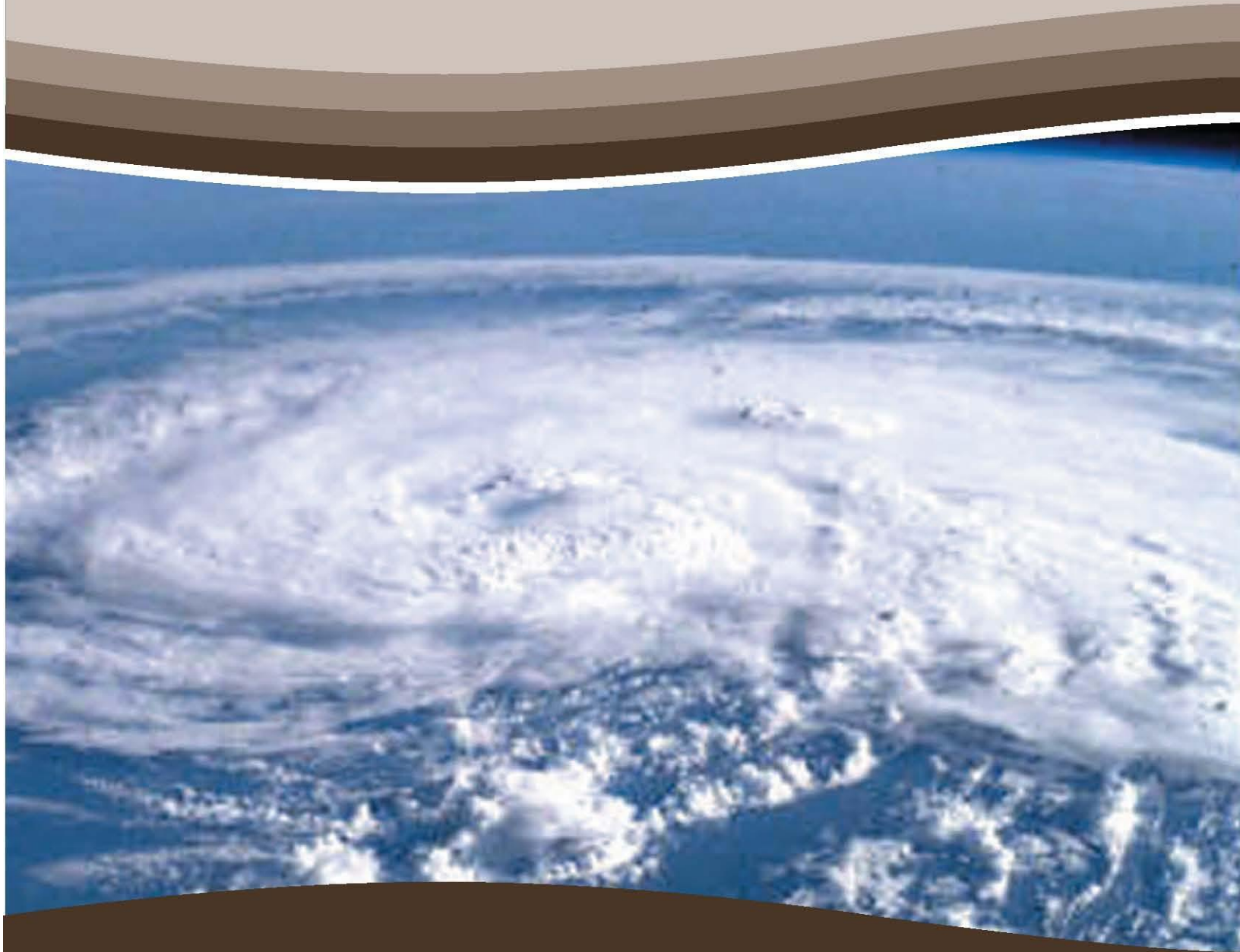
Millennium Development Goal 7

Indicator 31

Proportion of population with access to improved sanitation

100 %

NATURAL & ENVIRONMENTAL DISASTERS



Section 4: Natural and Environmental Disasters

Hurricanes

Natural and Environmental disasters, although they occur, are very rare in Bermuda. The last major 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 has increased during the past six years. Table 4.2 shows that the number of fires reported in 2008 were the lowest (1,340) over the six-year period. In 2011, there were 1,838 fires reported with the majority (790) classified in the “other” category. This represents an increase of 2.79% over total fires in 2010.

Table 4.1

Natural Disaster

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

Source: Department of Statistics

¹ Date of the first call for national assistance.

² Persons in households who lost electricity.

³ 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.

Table 4.2

Incidences of Fires by Type

Year	Total	Other ¹	Minor Incidents ²	Structure ³	Island Fires	Vehicle	Boat Fires
2006	1,559	29	517	976	--	37	--
2007	1,697	506	412	743	--	36	--
2008	1,340	514	--	795	--	31	--
2009	1,771	521	381	825	4	35	5
2010	1,788	542	485	729	1	28	3
2011	1,838	790	370	651	0	25	2

Source: Bermuda Fire Services

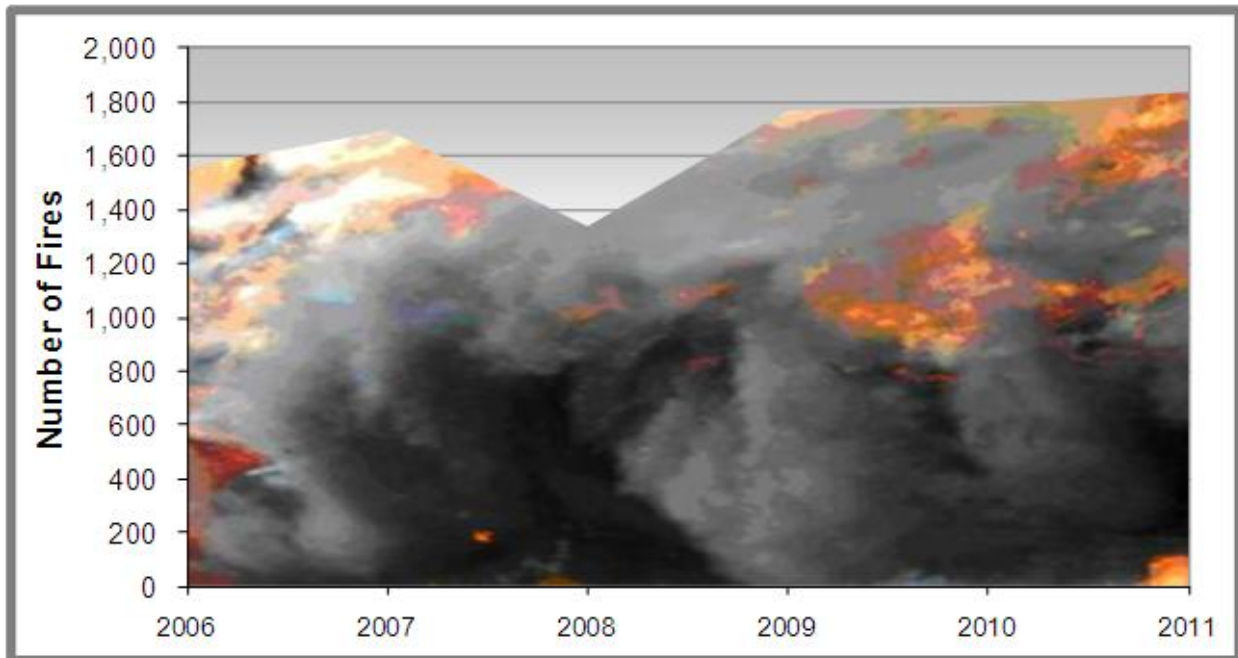
¹Reflects the activities of the Crash and Fire Rescue Services in other emergency duties such as Airport Operations Division incidents, foreign object, debris checks, hot refuel, aircraft standby, etc.

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

³Includes false alarms.

Chart 4.1

Total Incidences of Fire



ENERGY, MINERAL & 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 2011, the value of petroleum oils and oils from bituminous mineral, other than crude imported into Bermuda was \$59.3 million, an increase of 6.37 percent from the total value imported in 2010 (see Table 5.1).

Mineral Fuels

Of the other types of mineral fuels and oils imported to Bermuda, petroleum oils and gases were the most consumed with a combined import value of \$76 million in 2011 (see Table 5.2).

Electricity

The volume of electricity consumption in 2011 was nearly 637 million kilowatt-hours (kWh), 2.16% lower than the 650 million kWh consumed in 2010. The Commercial sector accounted for almost half (316 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 2011, there were 48,581 registered road vehicles on Bermuda's roads, with private cars accounting for almost half (45.27%) of this total. Motorcycles accounted for 31.21 percent or 15,163 vehicles (see Table 5.6).

Table 5.1**Value of Imported Fuel¹ by Type**

Type	2009	2010	2011
	Value (\$)	Value (\$)	Value (\$)
Light oils & preparations (i.e. motor spirits)	18,541,016	19,087,462	18,359,771
Gas oils (diesel)	7,597,750	12,975,103	8,254,424
Gas oils (heavy atmospheric)	32,277,103	18,558,234	25,339,250
Kerosene & other medium oils (not including gas oils)	4,267,739	712,494	3,362,476
Fuel oils not elsew here specified	..	401	495
Other lubricating oils & greases, etc.	3,672,898	3,929,953	3,893,602
Other w aste oils	572,911	503,130	110,435
Total	66,929,417 r	55,766,777 r	59,320,453

Source: Department of Statistics

¹ Petroleum oils and oils obtained from bituminous minerals, other than crude.

r - Revision has been made to previous year.

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

Type	2009 (\$)	2010 (\$)	2011 (\$)
Coal, briquettes	22,938	31,638	20,949
Lignite	71	203	1,648
Peat	100,961	102,642	70,076
Coke and semi coke	107,963	108,648	107,284
Coal gas, w ater gas	615	222	589
Tar distilled	8,343	3,608	4,198
Oils and other products	27,202	8,037	10,401
Pitch and pitch coke	19,775	1,151	3,578
Petroleum oils	11	324	193
Petroleum oils other than crude	109,655,112	93,628,668	73,428,750
Petroleum gases & other gaseous hydrocarbons	2,305,416	3,140,447	2,932,380
Petroleum jelly	178,059	128,999	43,886
Petroleum coke	47,773	3,846	15,105
Other bitumen and asphalt	18,886	2,868	25,923
Bituminous mixtures	654,786	607,499	514,230
Electrical energy	2,201	..	2,212
	113,150,112	97,768,800	77,181,402

Source: Department of Statistics

Table 5.3

Electricity Consumption by Type of Consumer

Year	Electricity Consumption	Total	Type		
	(kWh)	('000 kWh)	Residential	Commercial	Other ¹
			('000 kWh)	('000 kWh)	('000 kWh)
2006	9,896	631,366	271,215	311,408	48,743
2007	10,058	643,821	275,677	319,277	48,867
2008	10,045	644,954	268,563	319,018	57,373
2009	10,188	656,083	271,682	326,728	57,673
2010	10,076	650,571	276,824	320,527	53,220
2011	9,835	636,517	265,243	316,356	54,918

Source: Bermuda Electric Light Company Ltd.

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

² Starting in 1995, commercial and total amount of electricity consumed figures are inclusive of the baselands.

Table 5.4

**Growth in Electricity Consumption by Type of Consumer
Percentage Change at Annual Rate**

Year	Growth	Type		
	Total Electricity Consumption	Residential	Commercial	Other
		%	%	%
2006	2.40	0.90	2.90	8.00
2007	2.00	1.60	2.50	0.30
2008	0.20	-2.60	-0.10	17.40
2009	1.70	1.20	2.40	0.50
2010	-0.80	1.80	-1.80	-7.70
2011	-2.20	-4.20	-1.30	3.20

Chart 5.1

**Growth in Electricity Consumption
by Type of Consumer and Total Consumption**

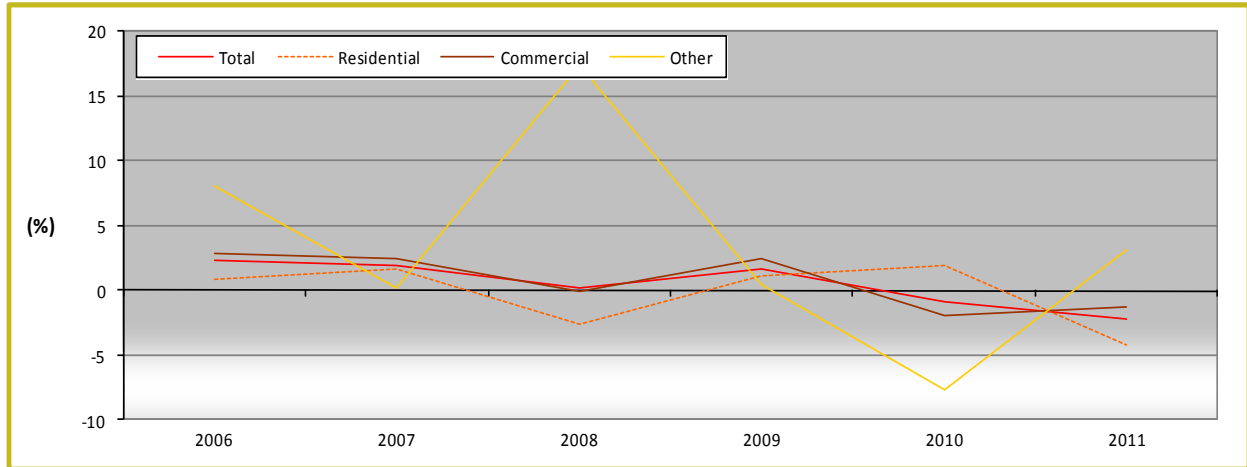


Table 5.5

Percent of Total Electricity Consumption by Type of Consumer

Year	Total	Type		
		Residential %	Commercial %	Other %
2006	100	43.00	49.30	7.70
2007	100	42.80	49.60	7.60
2008	100	41.60	49.50	8.90
2009	100	41.40	49.70	8.70
2010	100	42.50	49.20	8.10
2011	100	41.60	49.70	8.60

Percentages may not sum to totals due to rounding.

Table 5.6

Registered Road Vehicles

Type	2006	2007	2008	2009	2010 ^r	2011
Private cars	22,371	22,617	22,730	22,626	22,315	21,991
Buses, taxis & limousines	789	765	759	776	720	767
Trucks & tank wagons	4,066	4,142	4,196	4,026	4,287	3,870
General haulage	50	51	47	53	43	313
Agriculture	24	25	19	23	23	22
Ambulances & fire engines	40	41	39	48	48	46
Construction vehicles	106	108	103	81	77	52
Forces vehicles	60	69	43	34	36	33
Tractors & trailers	348	716	460	434	334	406
Auxiliary cycles ¹	7,579	4,834	4,611	4,407	5,586	5,232
Motor cycles & scooters	14,078	14,398	15,089	15,514	15,317	15,163
Other ²	119	186	182	207	622	519
Government private (GP) vehicles ³	91	102	105	127	176	167
Total	49,721	48,054	48,571	48,356	49,584	48,581

Source: Transport Control Department

¹ Includes livery cycles

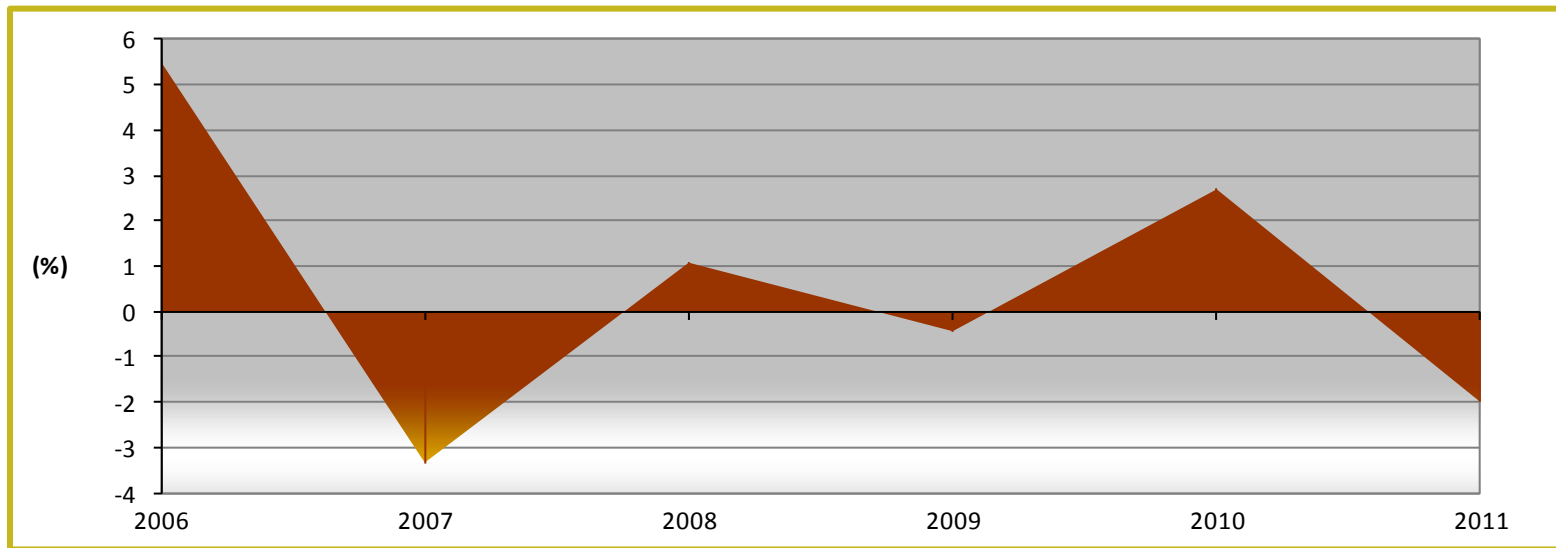
² Increase is due to the inclusion of categories such as, community service vehicles, instructional vehicles, doctor's cars, loaner vehicles, classic cars, garbage trucks, sporting association, etc.

³ Includes cars, classes A-G and minibuses. Excludes class H.

^r Revision has been made to previous year

Chart 5.2

Growth in Registered Road Vehicles



AGRICULTURE



Section 6: Agriculture

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

Fertilizers and Pesticides

In 2011, the aggregate value of fertilizers imported into Bermuda totaled \$824,048 representing an increase of 2.00% from the previous year (see Table 6.1). The total value of pesticides imported in 2011 stood at \$1,503,080 representing a decrease of 9.70% compared to 2010 (see Table 6.2).

Table 6.1

Use of Fertilizer by Type

	(\$)					
Category	2006	2007	2008	2009	2010	2011
Animal/Vegetable fertilizers	213,322	148,861	200,729	237,853	231,180	284,041
Nitrogenous fertilizers	191,699	112,974	140,439	99,614	119,543	182,686
Phosphate fertilizers	55,507	49,206	75,870	13,169	63,854	249
Potash fertilizers	198	7,716	40,551	13,778	4,128	3,516
Other fertilizers	419,858	390,611	529,918	488,135	389,117	353,556
Total	880,584	709,368	987,507	852,549	807,822	824,048
Growth rate (%)	33.40	-19.40	39.20	-13.70	-5.20	2.00

Data on quantities imported are not available.

Source: Department of Statistics

Table 6.2

Use of Pesticides by Type

	(\$)					
Category	2006	2007	2008	2009	2010	2011
Insecticides^a	981,467	463,856	250,914	612,986	744,680	815,541
Herbicides	268,170	117,438	150,772	227,217	148,754	146,616
Fungicides, bactericides and seed treatments^c	78,953	64,969	62,677	78,906	126,015	163,484
Disinfectants	227,054	116,262	40,027	187,463	262,917	228,717
Others (including mineral oils)	68,762	690,529	999,235	529,456	382,246	148,722
Total	1,624,406	1,453,054	1,503,625	1,636,028	1,664,612	1,503,080
Growth rate (%)	26.00	-11.00	4.00	8.80	1.70	-9.70

Source: Department of Statistics

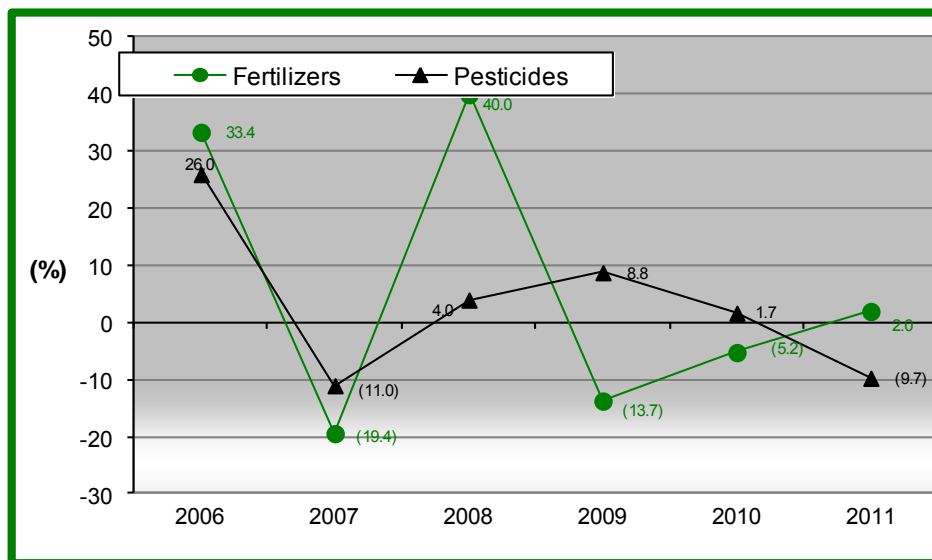
Data on quantities imported are not available.

According to Food and Agriculture Organization (FAQ), 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 Use of 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 since then.

Land Use

In 2001, residential properties occupied 45.1 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 golf courses, nature reserves, other recreation and rural areas. This represented about 33.3 percent of Bermuda's land. Land used for commercial purposes (such as retail and office space) accounted for 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 space. In contrast, the City of Hamilton occupies the least amount of land in Bermuda (176.34 acres), with less than 5 percent deemed open space (see Table 7.2.2). This is reflected by the large concentration of commercial, institution 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

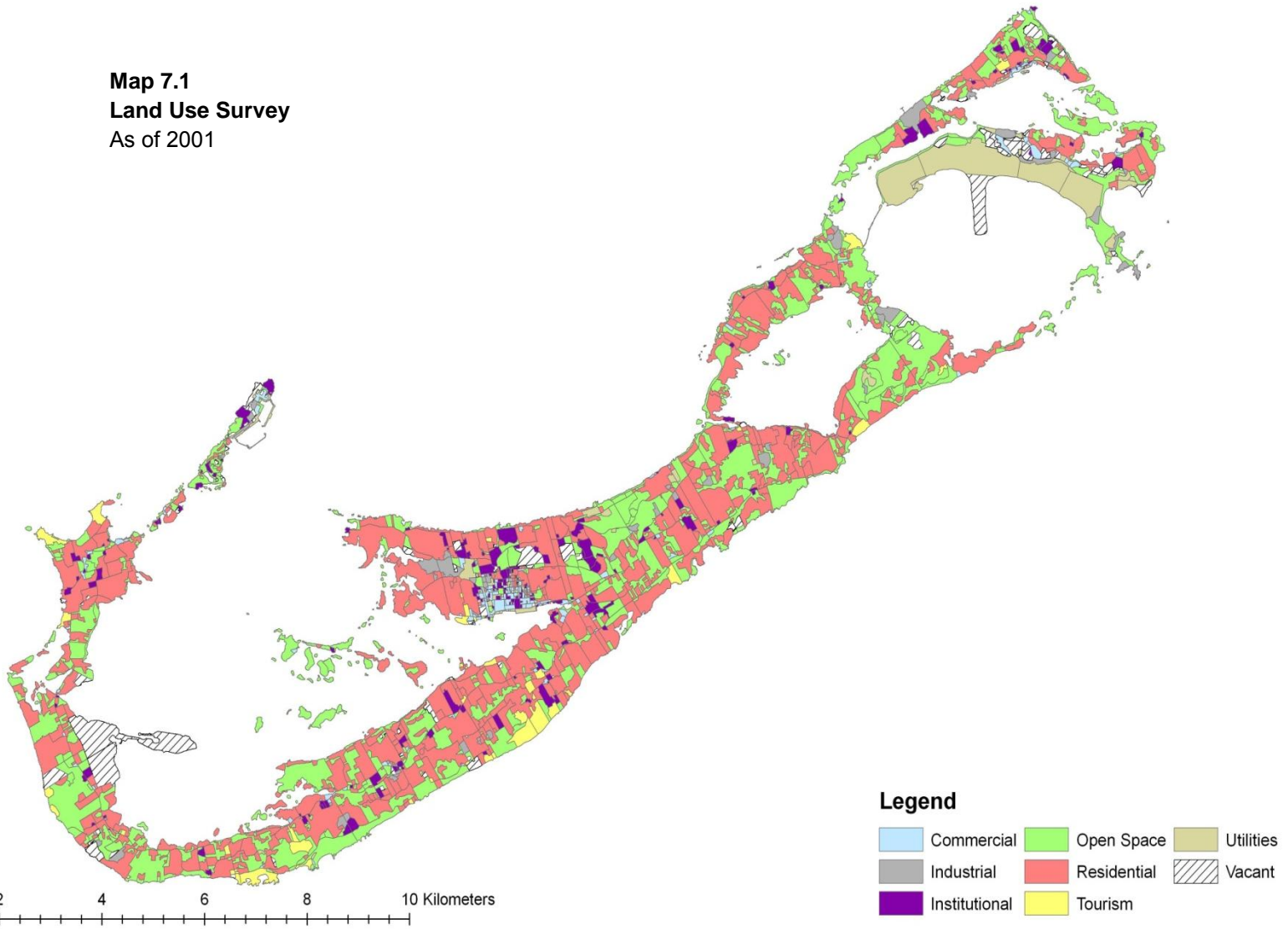
Land Use as of 2001

Main Use	Sub-Category	Total Area (Acres)	Percentage Distribution
Commercial	Mixed-use	36.45	0.3
	Office	63.03	0.5
	Retail	126.16	1
	Total	225.64	1.7
Industrial	General	200.42	1.5
	Light industrial	64.37	0.5
	Quarry	56.81	0.4
	Total	321.61	2.4
Institutional	Education	254.2	1.9
	Government	63.97	0.5
	Hospital	30.32	0.2
	Police	59.07	0.4
	Prison	16.76	0.1
	Religious	87.48	0.7
	Social	12.24	0.1
	Total	524.03	3.9
Open space	Golf courses	808.77	6.1
	Nature reserve	1,258.08	9.5
	Other	946.23	7.1
	Recreation	240.92	1.8
	Rural	1,162.82	8.8
	Total	4,416.82	33.3
Residential	Condos	162.25	1.2
	Housing	5,799.45	43.7
	Institutional	22.18	0.2
	Total	5,983.89	45.1
Tourism	Cottage colonies	204.68	1.5
	Hotels	127.61	1
	Total	332.29	2.5
Utilities	Airport	548.42	4.1
	Docks	36.82	0.3
	BELCO	37.95	0.3
	Transport	44.04	0.3
	Waste	67.07	0.5
	Total	734.29	5.5
Vacant	Vacant buildings	119.9	0.9
	Vacant land	610.27	4.6
	Total	730.17	5.5
Total		13,268.74	100

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
As of 2001



Source: Department of Planning

Table 7.2.1

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

Main Use / Sub-Category	City of Hamilton	Devonshire	Hamilton	Paget	Pembroke	Sandy's	St. George's	Smith's	Southampton	Town of St. George	Warwick
Commercial	66.79	10.82	11.01	16.39	27.16	26.95	32.50	2.92	10.16	11.05	9.89
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
Industrial	12.34	18.85	47.45	4.12	55.59	13.91	99.55	21.10	21.79	8.91	18.00
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
Institutional	30.65	72.62	12.95	66.43	96.85	60.58	48.08	15.81	30.66	34.29	55.10
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
Utilities	26.88	23.83	11.43	-	23.77	20.35	606.21	6.71	5.07	9.81	0.22
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	City of Hamilton	Devonshire	Hamilton	Paget	Pembroke	Sandy's	St. George's	Smiths	Southampton	Town of St. George	Warwick
Residential	27.40	562.37	585.43	803.56	758.13	669.53	450.30	709.70	610.69	98.99	707.79
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
Tourism	-	14.17	18.68	112.14	15.72	44.70	3.95	15.29	88.74	10.16	8.74
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	-
Open space	7.91	499.31	611.26	296.83	132.29	383.01	715.60	432.66	614.39	138.74	584.83
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
Vacant	4.36	19.46	13.98	3.48	60.75	219.39	206.52	12.15	130.19	29.05	30.84
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
Total	176.34	1,221.43	1,312.18	1,302.95	1,170.24	1,438.43	2,162.70	1,216.35	1,511.69	341.00	1,415.42

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 & MARINE RESOURCES



Section 8: Coastal and Marine Resources

Bermuda's coastal and marine resources are valued entities to its inhabitants. This is primarily because a large percentage of the population live on coastal land and use Bermuda's water ways 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 2011, the total marine area of Bermuda was 4,236.11 km², of which 6.96% or 294.74 km² 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 km². A total of twelve marine parks are established in

Bermuda covering an area of 1.86 km², two seasonal fisheries protected areas that measure 153.36 km² and two coral reef preserves, (one each on the north and south shores) which occupy a total of 131.07 km² (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 2006 to 2011 are shown in Table 8.4. In 2011, the total catch was 437.47 metric tons (mT) with the tuna and pelagic species by far the most popular catch at 239.73mT. In 2011, a total of 305 registered fishermen in Bermuda spent 83,616 hours at sea. (see Table 8.5).

Table 8.1

Total and Protected Marine Area

Indicator	2011
Total area (km ²)	4,290.46
Total marine area (km ²)	4,236.11
Protected marine area (km ²)	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
2011**

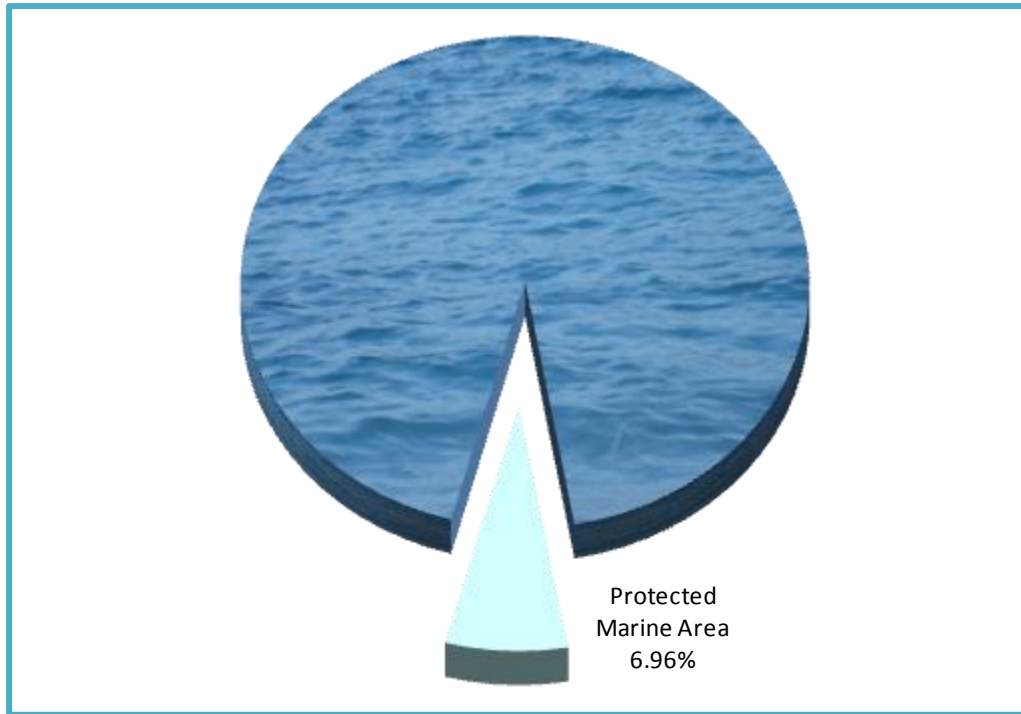


Table 8.2

Marine Protected Areas by Category and Area
2011

Marine Protected Areas	Area (km ²)	Marine Protected Areas	Area (km ²)
Coral Reef Preserves		Protected Dive Sites	
North Shore Coral Reef Preserve	126.25	North Rock	3.14
South Shore Coral Reef Preserve	4.82	SW Breaker	1.13
Subtotal	131.07	Eastern Blue Cut	1.13
		Pelinaion	0.79
Fisheries Seasonal Protected Areas		Hermes	0.79
North Eastern Area	38.67	Constellation	0.79
South Western Area	114.69	Cristobal Colon	0.28
Subtotal	153.36	NE Breaker	0.28
		Taunton	0.28
Marine Parks		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
Subtotal	1.858	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
		Subtotal	13.70

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

Source: Department of Planning

¹ Total marine protected area does not equal to the sum of the sub-totals as it excludes any overlapping areas (5.26 km²) to avoid double counting.

² Territorial area (net) means total water area and does not include the land area of 54.35 km².

Table 8.3.1

**Marine Protected Areas Around Bermuda
2011**

Marine Protected Area/ No-Take Reserve	Year Established	Anchoring Permitted?	Scuba Diving Permitted?	No-Take Reserve?
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.

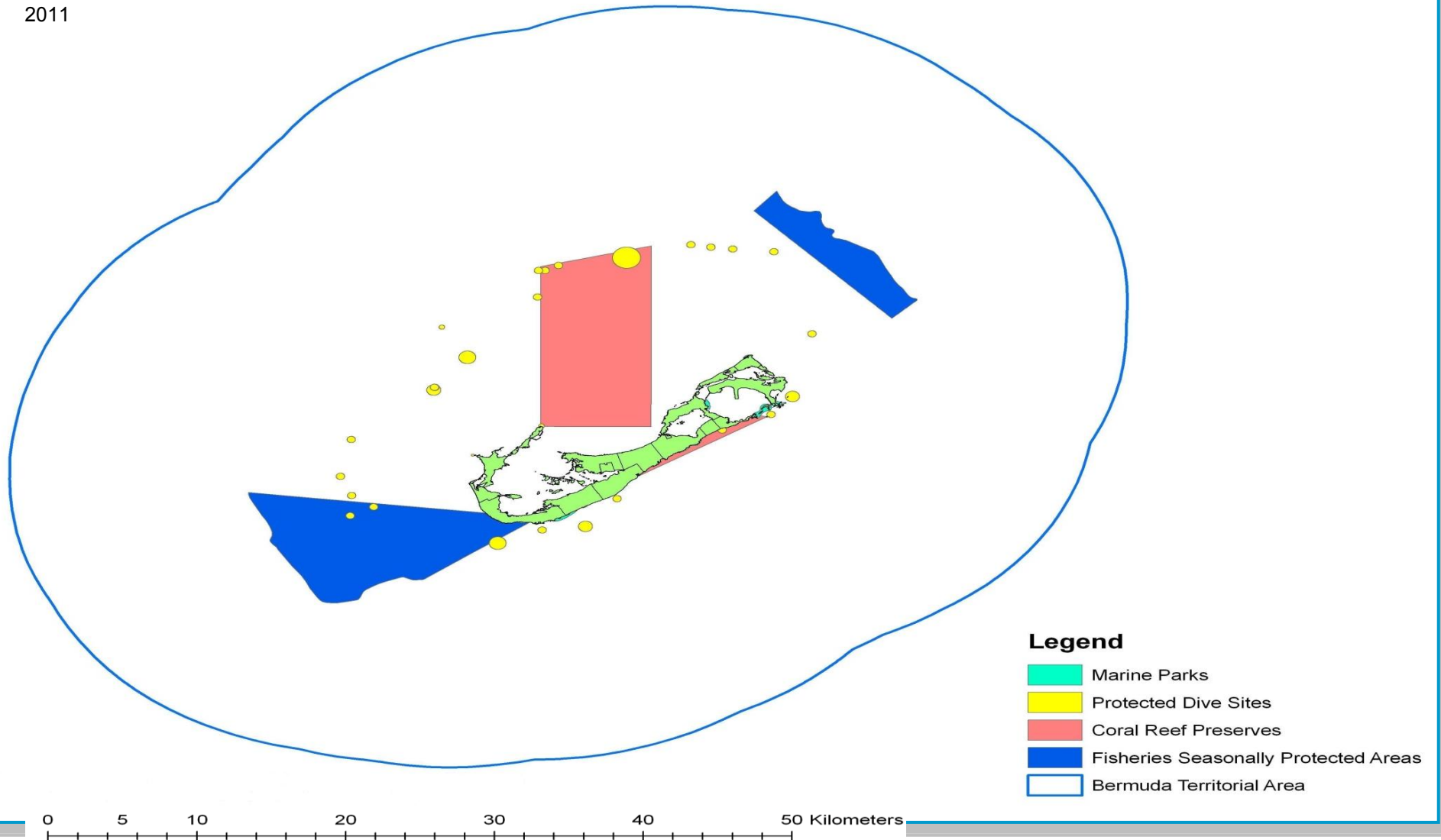
Table 8.3.2

**Marine Protected Areas Around Bermuda
2011**

Marine Protected Area/ No-Take Reserve	Year Established	Anchoring Permitted?	Scuba Diving Permitted?	No-Take Reserve?
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
The North Eastern Area	1990	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.
	It was merged in 2005 with the Eastern Area and redesigned.			
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 Pt	2000	No	Yes	Yes
Hog Breaker	2000	No	Yes	Yes
Caraquet (Wreck)	2000	No	Yes	Yes
Madiana (Wreck)	2000	No	Yes	Yes

Source: Department of Environmental Protection

Map 8.1
Marine Protected Area
2011



Source: Department of Planning

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

Species Group	2006	2007	2008	2009	2010	2011
Groupers	54.12	60.79	53.47	48.45	44.64	44.47
Jacks and related species	52.56	51.05	48.86	49.93	55.70	49.28
Snappers	33.25	30.09	36.69	32.46	30.55	33.52
Tuna and pelagics	146.11	181.35	162.72	178.36	158.38	239.73
Sharks	6.46	18.24	20.05	5.44	4.58	5.71
Miscellaneous	16.74	6.59	6.55	30.50	30.19	28.63
Total	309.24	348.11	328.34	345.14	324.04	401.34
Bait	38.93	38.99	35.75	36.72	25.78	35.97
Total including bait	348.17	387.10	364.09	381.86	349.82	437.31
Shellfish ¹	35.68	34.48	36.89	42.31	41.55	48.19
Including bait & lobsters	383.85	421.58	400.98	424.17	391.37	485.50
Growth rate (%)	-4.70	9.80	-4.90	5.80	-7.70	24.10

Source: Department of Environmental Protection, Marine Resources Division

¹ 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	2006	2007	2008	2009	2010	2011
Total catch¹ (mT)	383.85	418.47	400.98	424.17	391.37	437.47
Average catch of fishing area² (mT per km²)	0.09	0.10	0.09	0.10	0.09	0.10
Total hours at sea	67,783	70,599	67,563	70,546	68,528	83,616
Growth rate (%)	-5.60	4.20	-4.30	3.70	-2.20	22.00
Hours at sea per vessel	510	504	466	446	387	475
Registered fishermen	320	331	306	306	305	305
Growth rate (%)	-4.50	3.40	-7.60	-	-0.30	-

Source: Department of Environmental Protection, Marine Resources Division

¹ Total catch include fish landings in addition to bait and lobster catches.

² Total fishing area is estimated as 4236.11km² (Department of Planning, see 8.1). Fishing area includes the fisheries seasonal protected areas (153.36 km²) which are closed between May 1st and August 31st.

Chart 8.2

Growth in Total Catch and Total Hours at Sea

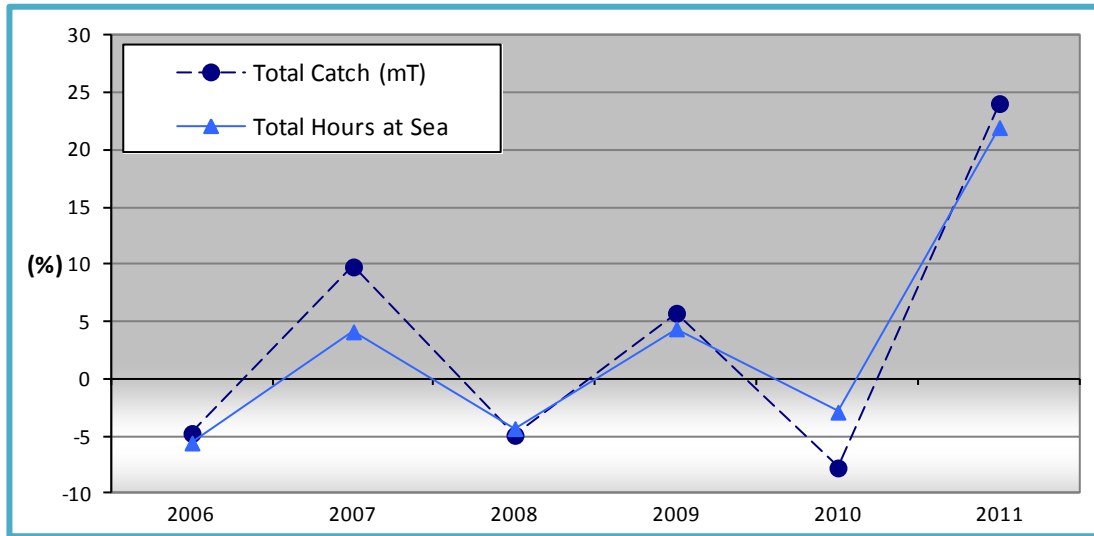


Chart 8.3

Number of Registered Fishermen

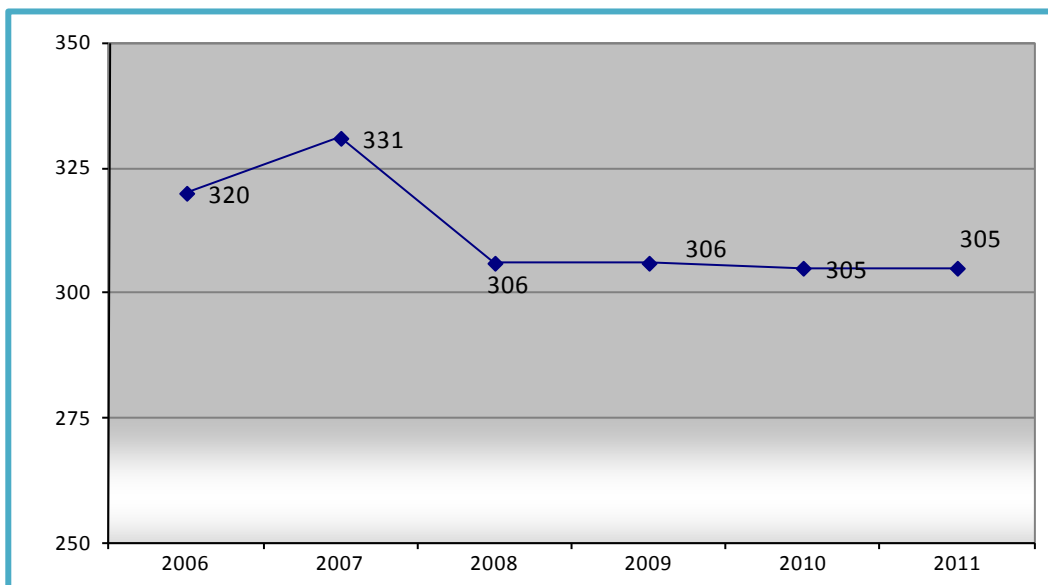


Table 8.6

Number of Households and Population of Coastal Areas

(Census Years)

Indicators	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 ¹
Ten-year growth rate (%)	..	8.20	6.20	3.50

Source: Department of Statistics Population and Housing Census

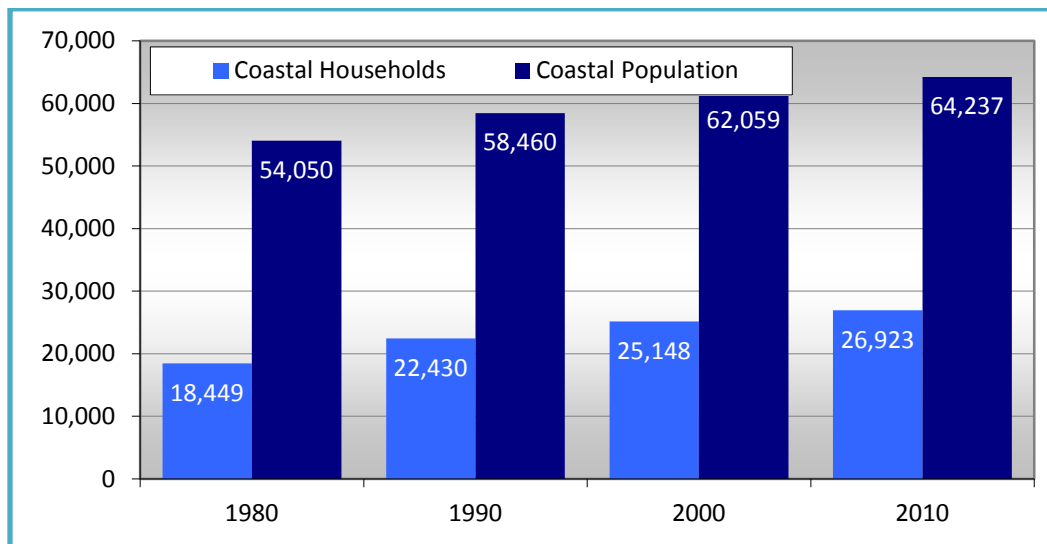
Bermuda measures 1mile at its widest point. Based on the standard definition of coastal area, the entire island will be considered coastal.

¹ 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.

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 2011, Bermuda's total protected area inclusive of land and water was 319.66 square kilometers (km^2). This represented almost 8 percent of the total area (7% water and 1% land) (see Table 9.1).

As a proportion of the total land area (54.35km^2), protected land area represented 45.84 percent or 24.92 km^2 while protected water areas represented 6.96 percent or 294.74 km^2 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^2 . Conservation areas (agriculture and woodland reserves) accounted for 7.19 km^2 , cave protection areas occupied 4.48 km^2 and historical protected areas less than 1 km^2 (see Table 9.2).

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

Table 9.1

Protected Area

Category	2011
Total area (km ²)	4,290.46
Total land area (low tide mark) (km ²)	54.35
Total water area (km ²)	4,236.11
Protected land area (km ²)	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 ²)	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 (6) 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.

Chart 9.1

**Protected Land Area as a Percentage of Total Land Area
2011**

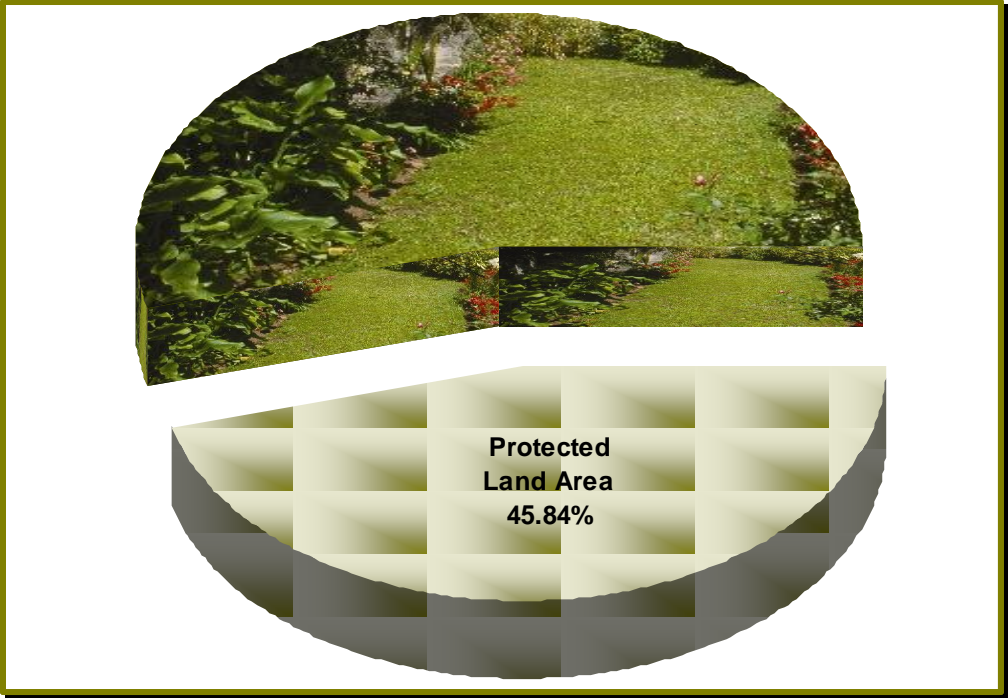
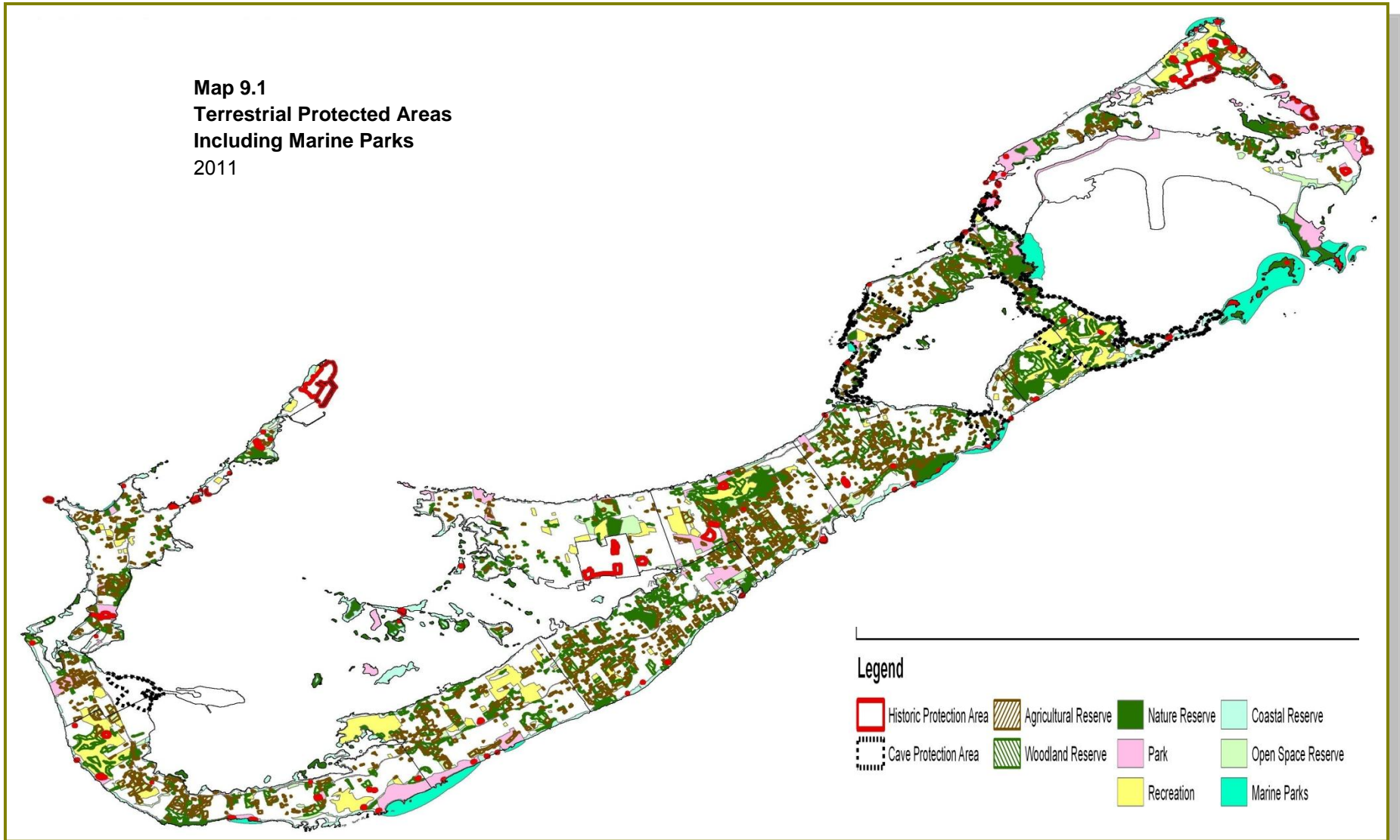


Chart 9.2

**Total Protected Area as a Percentage of Total Area
2011**



Map 9.1
Terrestrial Protected Areas
Including Marine Parks
 2011



Source: Department of Planning

Table 9.2

**Protected Areas by Category and Area
2011**

Protected Area Category	Area	
	Acres	km ²
Conservation base zones		
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
Sub-total	4,739.97	19.28
Conservation areas		
Agricultural reserve	731.59	3.03
Woodland reserve	983.94	4.16
Sub-total	1,715.53	7.19
Cave protection area	1,107.20	4.48
Historic protection area	201.05	0.74
Conservation base zone and conservation areas (no overlap)¹	6,156.79	24.92
Overlapping area	1,670.11	6.77
Total terrestrial area (low tide mark) Total land area	13,430.39	54.35
Water resources protection area²	4,000.61	16.19

Source: Bermuda Plan 2008, Department of Planning, Bermuda

¹ Total protected area does not equal to the sum of the sub-totals as it excludes any overlapping areas (6.77 km²) to avoid double counting.

² The Water Resources Protection Area is not considered as a "protected area" and hence has not been included in the 24.92 km² of protected area but is contained in the total terrestrial area of 54.35 km².

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 totaled and expressed as a percentage of the total surface area of the country. The total surface area if the country includes terrestrial area plus any territorial sea area (up to 12 nautical miles).

FORESTRY



Section 10: Forestry

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

Forest

In 2011, Bermuda's total forest area was 4.16 square kilometers (km²). This represented 7.65% of Bermuda's total land area.

NOTE TO READER

Forest: Land under forestry or no land use, spanning more than 0.005km² (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. Please include 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.

Table 10.1

**Protected Forest Area as a Percentage of Total Land Area
2011**

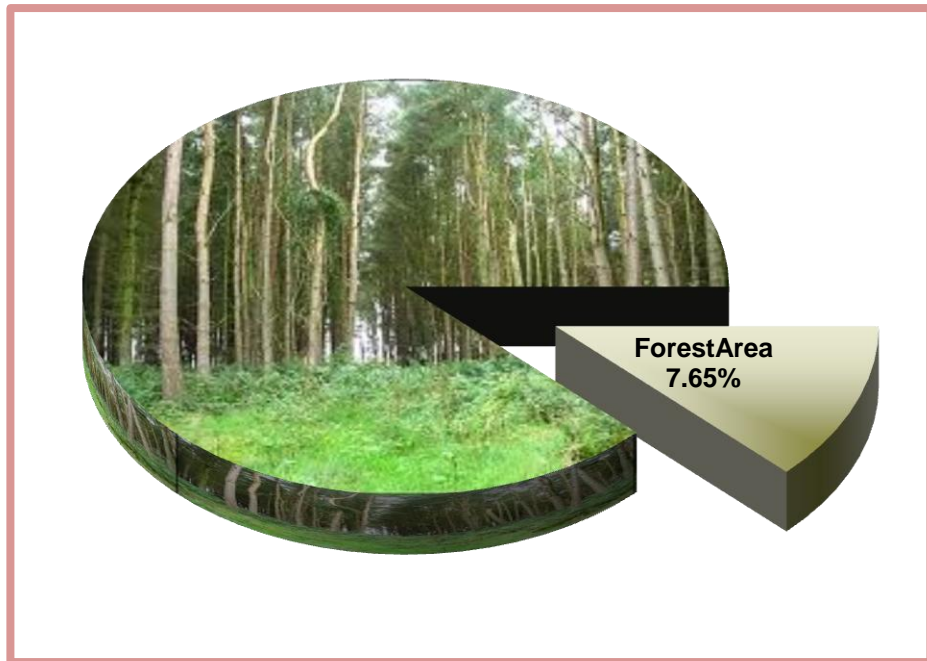
Protected Area Category	Area
	km ²
Total forest area	4.16*
Total land area	54.35
Protected forest area as a % of total forest area	100
Protected forest area as a % of total land area	7.65

Source: Department of Planning

*This includes woodland reserves.

Chart 10.1

**Protected Forest Area as a Percentage of Total Land Area
2011**



AIR



Section 11: Air

The air quality in Bermuda is a valued part of its natural resources. Five 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).

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

The Prospect ambient air monitoring site is the only collector of nitrogen dioxide (NO₂) and sulfur dioxide (SO₂). The amount of nitrogen oxide declined from 5.65 ppb in 2010 to 2.5 ppb in 2011.

Table 11.3 illustrates the maximum concentration for pollutants at the various collection sites. In 2011, East Broadway recorded a daily maximum concentration of total suspended particles (TSP) which was 102.70 µg/m³.

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

Unit	Unit Measure
µg/m ³	Micrograms
NO ₂	Nitrogen dioxide
SO ₂	Sulfur dioxide
ppb	parts per billion
TSP	Total Suspended Particles
PM10/PM2.5	Fine particulate matter

Table 11.1

Air Emissions from Tynes Bay Incinerator

Pollutant	2008	2009	2010	2011
VOCs (mg/Nm ³)	0.04	1.32	0.08	0.26
NOx (mg/Nm ³)	271.00	284.00	317.40	316.20
SO ₂ (mg/Nm ³)	22.00	20.10	155.70	28.10
Lead (mg/Nm ³)	0.19	0.44	0.13	0.01
Particulate Matter (mg/Nm ³)	10.90	35.70	5.00	1.30

Chart 11.1

Air Emissions from Tyne's Bay Incinerator

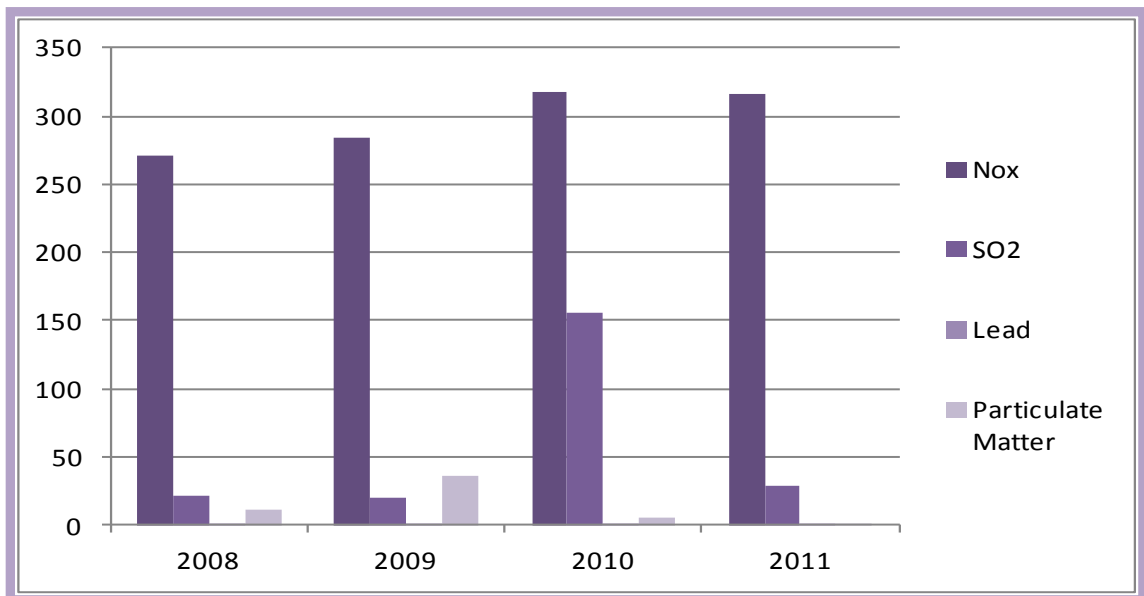


Table 11.2

Average Concentrations for Prospect Ambient Air Monitoring Sites

		Units	Bermuda Limit (Clean Air Regulations 1993)	2008				2009				2010				2011			
				Prospect	East Broadway	Belco *	BIOS	Prospect	East Broadway	Belco *	BIOS	Prospect	East Broadway	Belco *	BIOS	Prospect	East Broadway	Belco *	BIOS
Hourly	NO2	ppb	400	2.86	-	-	-	2.20	-	-	-	3.76	-	-	-	4.37	-	-	-
	SO2	ppb	450	1.74	-	-	-	0.85	-	-	-	1.81	-	-	-	1.09	-	-	-
	PM10	µg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PM2.5	µg/m3	-	5.97	-	-	-	4.74	-	-	-	8.33	-	-	-	7.82	-	-	-
	TSP	µg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-Hour	NO2	ppb	200	2.16	-	-	-	2.10	-	-	-	3.70	-	-	-	4.40	-	-	-
	SO2	ppb	150	0.98	-	-	-	0.81	-	-	-	1.76	-	-	-	1.10	-	-	-
	PM10	µg/m3	50	-	31.40	-	16.60	-	27.70	-	15.20	-	24.70	-	12.10	-	28.00	-	17.30
	PM2.5	µg/m3	-	5.88	-	-	-	4.70	-	-	-	7.80	-	-	-	8.20	-	-	-
	TSP	µg/m3	100	-	50.10	47.10	22.40	-	41.30	37.10	20.10	-	47.20	43.30	21.80	-	47.70	44.50	29.20
1-year	NO2	ppb	60	2.20	-	-	-	2.10	-	-	-	5.65	-	-	-	2.50	-	-	-
	SO2	ppb	30	1.30	-	-	-	0.80	-	-	-	2.25	-	-	-	0.90	-	-	-
	PM10	µg/m3	30	18.90	30.50	-	14.10	14.80	26.00	-	13.70	16.47	24.20	-	11.49	17.78	27.20	-	15.88
	PM2.5	µg/m3	-	6.00	-	-	-	4.70	-	-	-	7.23	-	-	-	7.70	-	-	-
	TSP	µg/m3	60	21.70	38.80	43.60	20.50	18.10	31.10	31.10	17.70	20.00	44.00	39.50	20.10	21.81	44.40	40.54	25.40

Source: Department of Environmental Protection

* Data collected by Belco Ltd. for the Belco Site (i.e. Belco 1) and Langton Hill (Belco 2, down prevailing wind from site) are not shown in this table.

- Not determined as part of the current protocols.

Chart 11.2

Average Concentration for Prospect Ambient Air Monitoring Sites

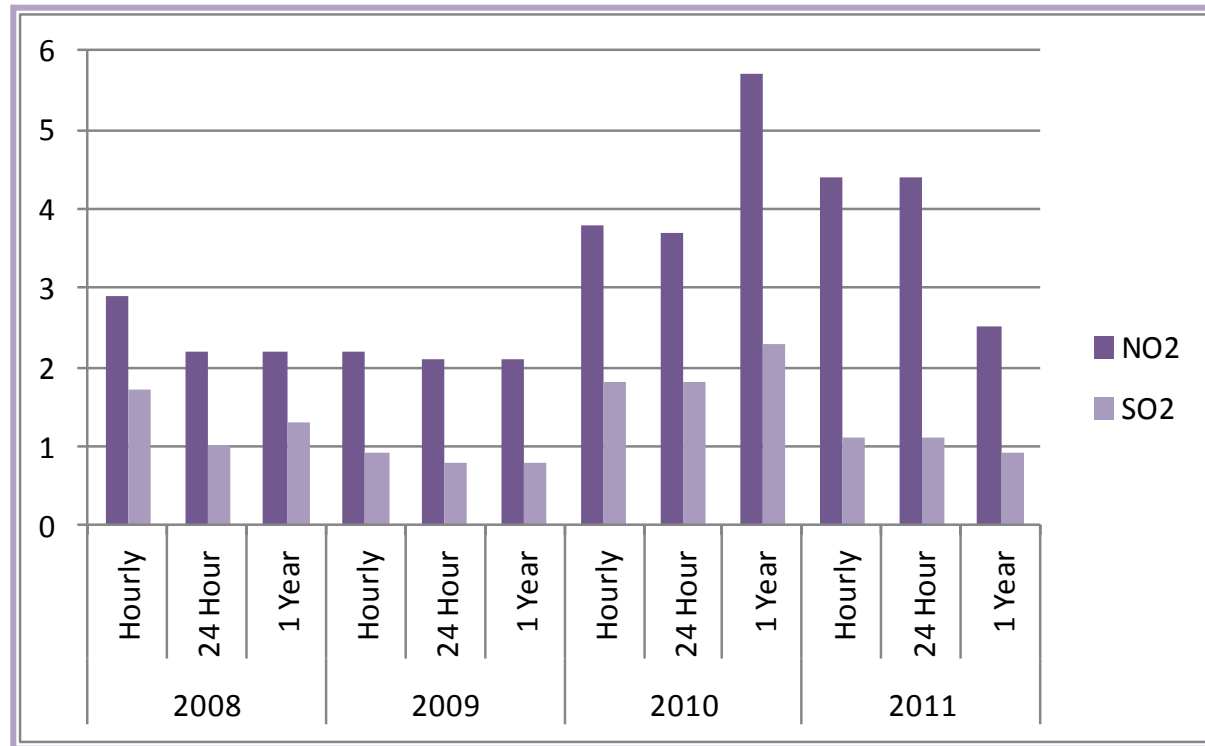


Table 11.3

Maximum Concentrations for Ambient Air Monitoring Sites

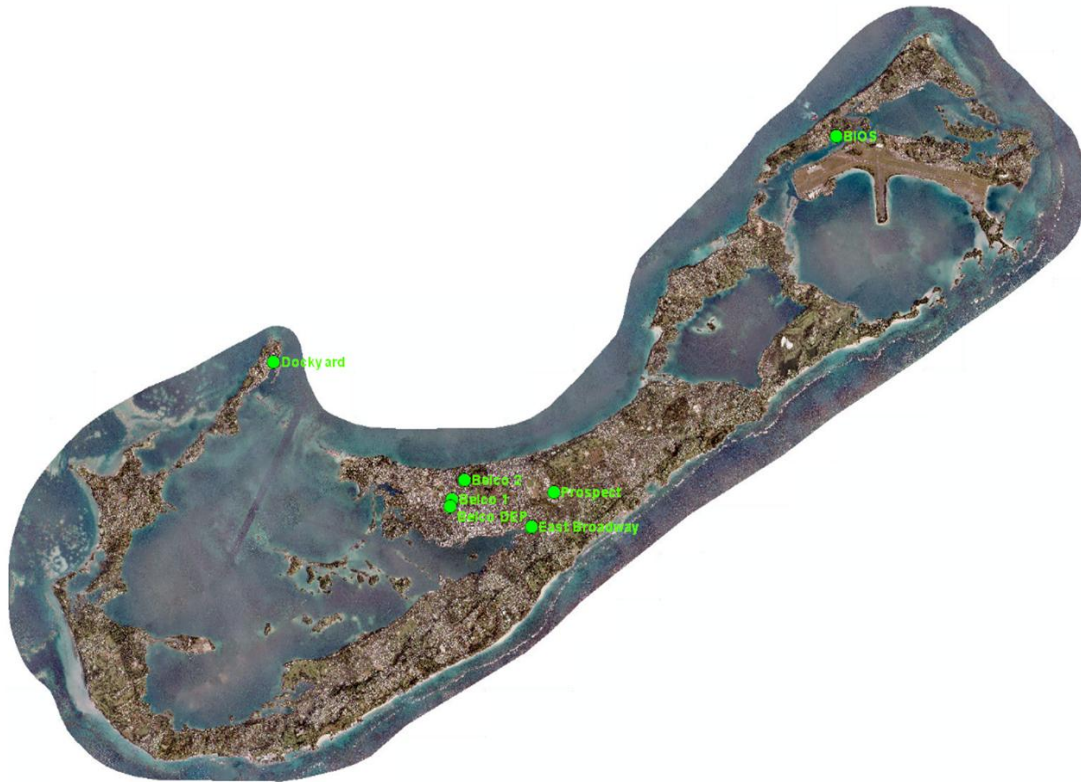
		Units	Bermuda Limit (Clean Air Regulations 1993)	2008				2009				2010				2011			
				Prospect	East Broadway	Belco *	BIOS	Prospect	East Broadway	Belco *	BIOS	Prospect	East Broadway	Belco *	BIOS	Prospect	East Broadway	Belco *	BIOS
Hourly	NO2	ppb	400	47.60	-	-	-	39.30	-	-	-	49.50	-	-	-	58.40	-	-	-
	SO2	ppb	450	34.60	-	-	-	42.70	-	-	-	54.20	-	-	-	40.70	-	-	-
	PM10	µg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PM2.5	µg/m3	-	53.40	-	-	-	45.00	-	-	-	31.10	-	-	-	61.80	-	-	-
	TSP	µg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-Hour	NO2	ppb	200	8.60	-	-	-	33.00	-	-	-	33.20	-	-	-	42.80	-	-	-
	SO2	ppb	150	9.00	-	-	-	15.80	-	-	-	23.50	-	-	-	9.00	-	-	-
	PM10	µg/m3	50	44.20	53.80	-	38.80	41.70	42.30	-	32.00	39.30	40.60	-	28.00	47.40	47.30	-	39.00
	PM2.5	µg/m3	-	28.10	-	-	-	17.70	-	-	-	33.90	-	-	-	30.90	-	-	-
	TSP	µg/m3	100	55.10	105.00	91.10	53.50	49.80	89.50	113.00	46.70	43.70	113.60	125.80	61.20	61.50	102.70	88.20	74.70

Source: Department of Environmental Protection

* Data collected by Belco Ltd. for the Belco Site (i.e. Belco 1) and Langton Hill (Belco 2, down prevailing wind from site) are not shown in this table.

- Not determined as part of the current protocols

Map 11.3
Bermuda Ambient Air Monitoring Sites
2011



Prospect Site: Located between Tynes Bay Incinerator and Belco/Hamilton City.

East Broadway: A busy road-side with commuter traffic into Hamilton City.

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 2011.

Tynes Bay Incinerator is located 850 metres due north of the Prospect site on the North Shore coast.

WASTE



Section 12: Waste

The section on waste comprises information regarding the generation and disposal of waste in Bermuda.

Generation

The total waste collected in 2011 was 81,000 tonnes representing a 10% decrease from 2010. Household waste accounted for 27,000 tonnes of waste for 2011 while waste from other sources accounted for 54,000 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 (Landfilling)
6. Special disposal of hazardous waste

In 2011 1,600 tonnes of waste were recycled, 15,000 tonnes of horticultural waste was composted, 54,400 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 that requires collection, processing and disposal.

Waste audits, a means of quantifying waste produced, are becoming increasingly frequent as more businesses recognize that waste reduction offers cost savings through reduced operating expenses. Many schools have initiated Trash Free Lunch programmes with some reducing waste by up to 50%.

Recycling

Completion of the new Material Recovery Facility or MRF (aka the recycling facility) in 2007, increased capacity and allowed for a broader suite of recyclable materials to be processed for shipment to markets in the United States.

In 2011, the eWaste recycling programme (electronics) saw the biggest increase in materials recovered jumping from 14 to 17 container loads, a 21% increase.

Recycling or the re-processing 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 (see Figure 1).

Bermuda recycles the following items:

Special Waste

Items requiring specialised handling and disposal because of their potentially hazardous nature are referred to as Special Waste. These materials are exported to the United States where they are processed for the reuse or recycling markets whenever possible (Fig 1). Where recycling or reuse is not possible Special Waste is disposed of at US EPA certified controlled landfill disposal sites. The respective amounts are shown in Table 3.

In 2011 Bermuda exported 601 tonnes of Special Waste for either the recyclables market or safe disposal. The stock of Special Waste at the end of 2011 was 98 tonnes, representing a decrease of 11%.

Table 12.1

Generation of Waste by Source

(1,000t)

Indicator	2006	2007	2008	2009	2010	2011
Municipal waste collected from households	31.43	31.80	31.52	30.16	30.19	27.00
Municipal waste collected from other origins	62.87	63.59	63.05	60.33	60.39	54.00
Total amount of municipal waste collected	94.30	95.39	94.57	90.49	90.58	81.00

Source: Public Works

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.

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.

**These definitions are taken from the Waste and Litter Control Act, 1987*

Table 12.2

Management of Municipal Waste

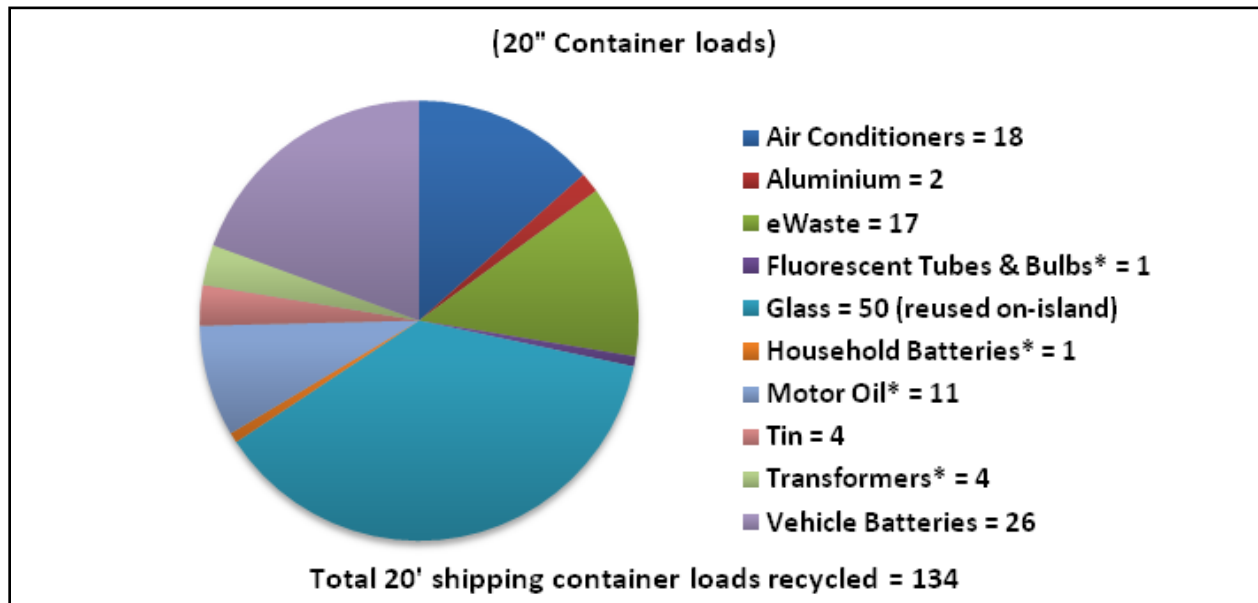
(1,000t)

Indicator	2006	2007	2008	2009	2010	2011
Amounts going to:						
Recycling	1.30	1.20	1.54	1.58	1.58	1.60
Composting	15.00	15.00	15.00	15.00	15.00	15.00
Incineration	68.00	69.19	68.03	63.91	64.00	54.40
Landfilling	10.00	10.00	10.00	10.00	10.00	10.00

Source: Public Works

Figure 12.1

**Recyclables Exported to the United States by Bermuda
2011**



*Items processed through the Special Waste Programme at Sally Port.

Table 12.3

Management of Special Waste

(tonnes)

Indicator	2006	2007	2008	2009	2010	2011
Stock of hazardous waste at the beginning of the year	38	11	35	87	112	109
Hazardous waste generated during the year ¹	872	682	651	623	582	590
Hazardous waste exported during the year	899	658	599	598	585	601
Amounts going to ²:						
Recycling ³	539	373	374	370	365	352
Incineration ⁴	11	20	9	6	5	7
Landfilling ⁵	349	263	216	222	215	242
Stock of hazardous waste at the end of the year	11	35	87	112	109	98

Source: Public Works

¹ Hazardous waste refers to the categories of waste to be controlled according to the Basel Convention on the control of trans-boundary movement of hazardous waste and their disposal (Article 1 and Annex 1).

² Any reprocessing of waste material in a production process that diverts it from the waste stream, except reuse as fuel. Both reprocessing as the same type of product, and for different purposes should be included. Recycling within industrial plants i.e. at the place of generation should be excluded.

³ The controlled combustion of waste with or without energy recovery.

⁴ Final placement of waste into or onto the land in a controlled or uncontrolled way. The definition covers both landfill of waste in internal sites (i.e. where a generation of waste is carrying out its own waste disposal at the place of generation) and in external sites.

⁵ Any final treatment of disposal different from recycling, incineration and landfill. Releasing into water bodies and permanent storage are included here.

Table 12.4

Management of Municipal Waste by Type

Indicator	2006	2008	2010	2011
Paper, paperboard	32.6	29	29	..
Textiles	5.6	6	17	..
Plastics	13.5	17	13	..
Glass	9.9	11	9	..
Metals	5.8	5	6	..
Other inorganic material	10.6	9	9	..
Organic material	22	23	17	..
Total (%)	100	100	100	..

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

Source: Public Works

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 2009, the total volume of atmospheric wet precipitation (rain, dew etc.) falling on the island was 7.74 mio m³/y (See Table 13.1). The total volume of water consumed by natural process, crop production, human consumption or leakage was 9.90 million cubic meters per year (See Table 13.2).

In 2009, 8.66 million cubic meters per year (mio m³/y) of freshwater was used in Bermuda, with 6.20 mio m³/y used by households and 2.46 mio m³/y by other economic activities. (See Table 13.5) About 10 percent of households relied on fresh water to be delivered to their households while ninety-five percent of Bermuda's population has independent waste water treatment facilities (See Table 13.6).

Map 13.1 shows water resource protection areas in Bermuda as of 2011.

Note: At the time of publishing, data for 2010 to 2011 were not available for some tables.

Table 13.1

Renewable Freshwater Resources

Category	mio m3/y					
	2006	2007	2008	2009	2010	2011
Precipitation	8.08	7.61	7.65	7.74	..	..
Actual evapotranspiration	0.32	0.32	0.32	0.32	..	..
Internal flow	7.76	7.31	7.33	7.42	..	..
Renew able freshw ater resources	7.76	7.31	7.33	7.42	..	..
Regular freshw ater resources 95% of the time	7.37	6.94	6.96	7.05	..	..

Source: Department of Works and Engineering

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 m3/y					
	2006	2007	2008	2009	2010	2011
Net freshwater abstracted	8.15	7.70	7.20	7.99	..	..
Desalinated water	1.08	1.08	1.08	1.91	..	..
Total freshwater made available for use	9.23	8.78	8.28	9.90	..	..
Wastewater generated	1.66	1.66	1.66	1.66	..	..
<i>of which:</i> Discharged to marine water bodies	1.66	1.66	1.66	1.66	..	..
Consumptive water use	7.57	7.12	6.62	8.24	..	..
Water consumption	9.23	8.78	8.28	9.90	..	..

Source: Department of Works and Engineering

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 re-used 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 m3/y					
	2006	2007	2008	2009	2010	2011
<i>Water abstracted</i>						
Gross <u>freshwater</u> abstracted	8.15	7.70	7.20	7.99	..	..
Water abstraction by water supply industry (ISIC 36)	2.40	2.40	2.00	1.84	..	..
<i>Self abstraction for own use by:</i>						
Households	4.58	4.23	4.23	5.08	..	..
Other economic activities	1.17	1.07	1.08	1.07	..	..
<i>Surface water abstracted</i>						
Gross <u>fresh surface water</u> abstracted	4.94	4.50	4.50	4.19	..	..
<i>Self abstraction for own use by:</i>						
Households	3.90	3.55	3.55	3.24	..	..
Other economic activities	1.04	0.95	0.95	0.95	..	..
<i>Groundwater abstracted</i>						
Gross <u>fresh groundwater</u> abstracted	3.21	3.21	2.81	2.65	..	..
Groundwater abstraction by water supply industry (ISIC 36)	2.40	2.40	2.00	1.84	..	..
<i>Self abstraction for own use by:</i>						
Households	0.68	0.68	0.68	0.68	..	..
Other economic activities	0.13	0.13	0.13	0.13	..	..

Source: Department of Works and Engineering

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).

Table 13.4

Water Supply Industry (ISIC 36)

Category	mio m3/y					
	2006	2007	2008	2009	2010	2011
Net freshwater delivered by water supply industry (ISIC 36)	3.29	3.29	2.69	1.08	1.01	..
<i>of which delivered to:</i>						
Households	2.05	2.05	1.06	0.75	0.75	..
Other economic activities	1.24	1.24	1.09	0.25	0.25	..
Percentage of population supplied by water supply industry (ISIC 36) (%)	10	10	10	10	10	..

Source: Department of Works and Engineering

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

mio m3/y

Category	2006	2007	2008	2009	2010	2011
Freshwater use, total	9.04	8.59	8.00	8.66	..	..
<i>of which used by:</i>						
Households	6.63	6.28	5.83	6.20	..	..
Other economic activities	2.41	2.31	2.17	2.46	..	..

Source: Department of Works and Engineering

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

Category	2008	2009	2010	2011
Population connected to wastewater collecting system	5	5	5	5
Population connected to wastewater treatment	5	5	5	5
 <i>of which at least secondary treatment</i>	1.50	1.50	1.50	1.50
Population with independent wastewater treatment (e.g. septic tanks)	95	95	95	95

There are 4 wastewater treatment plants

Source: Department of Works and Engineering

NOTE TO READER

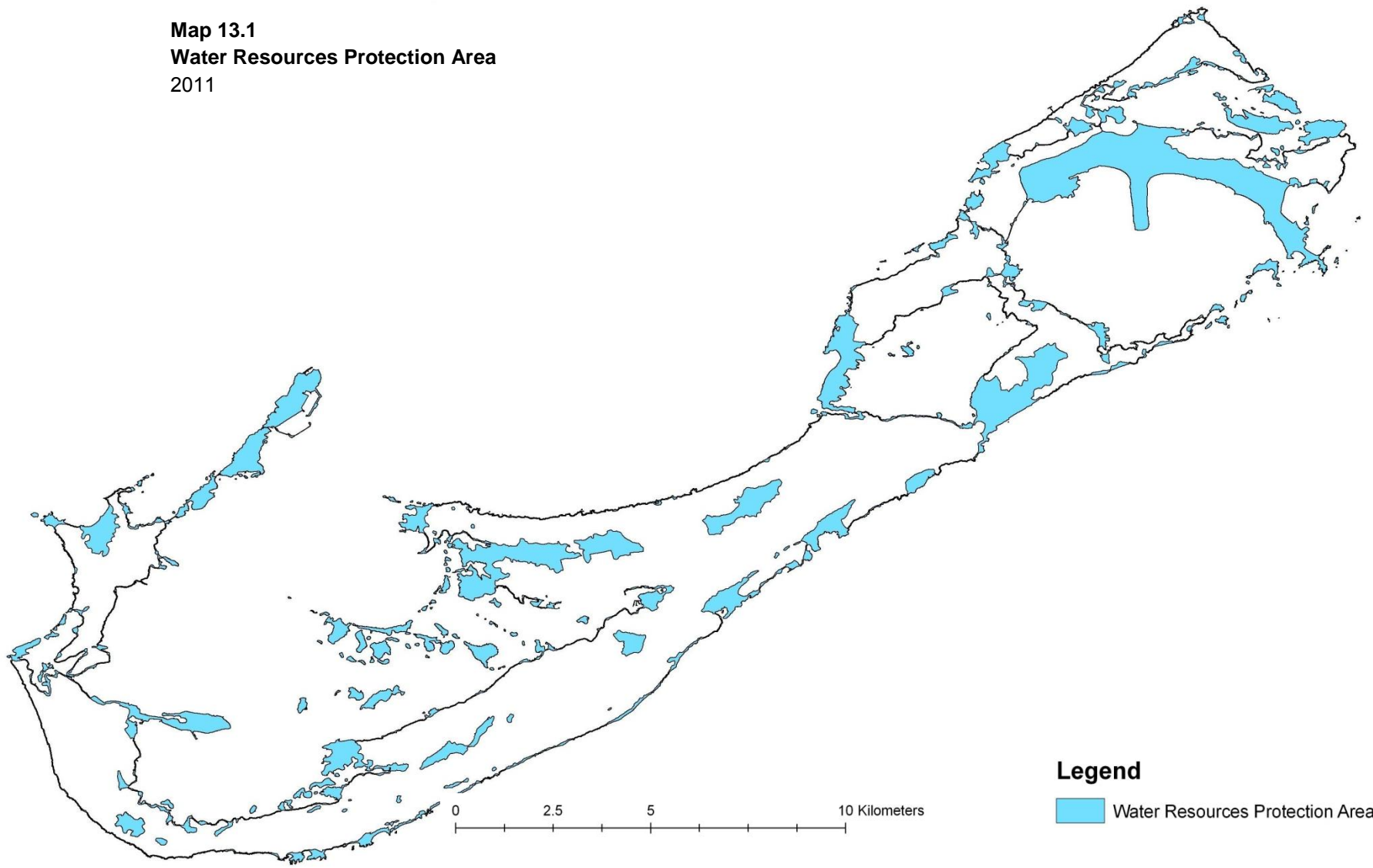
Population connected to wastewater collecting system: the percentage of resident population connected to the wastewater collecting system (sewerage). Wastewater collecting systems may deliver wastewater plants or may discharge it without treatment to the environment.

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)

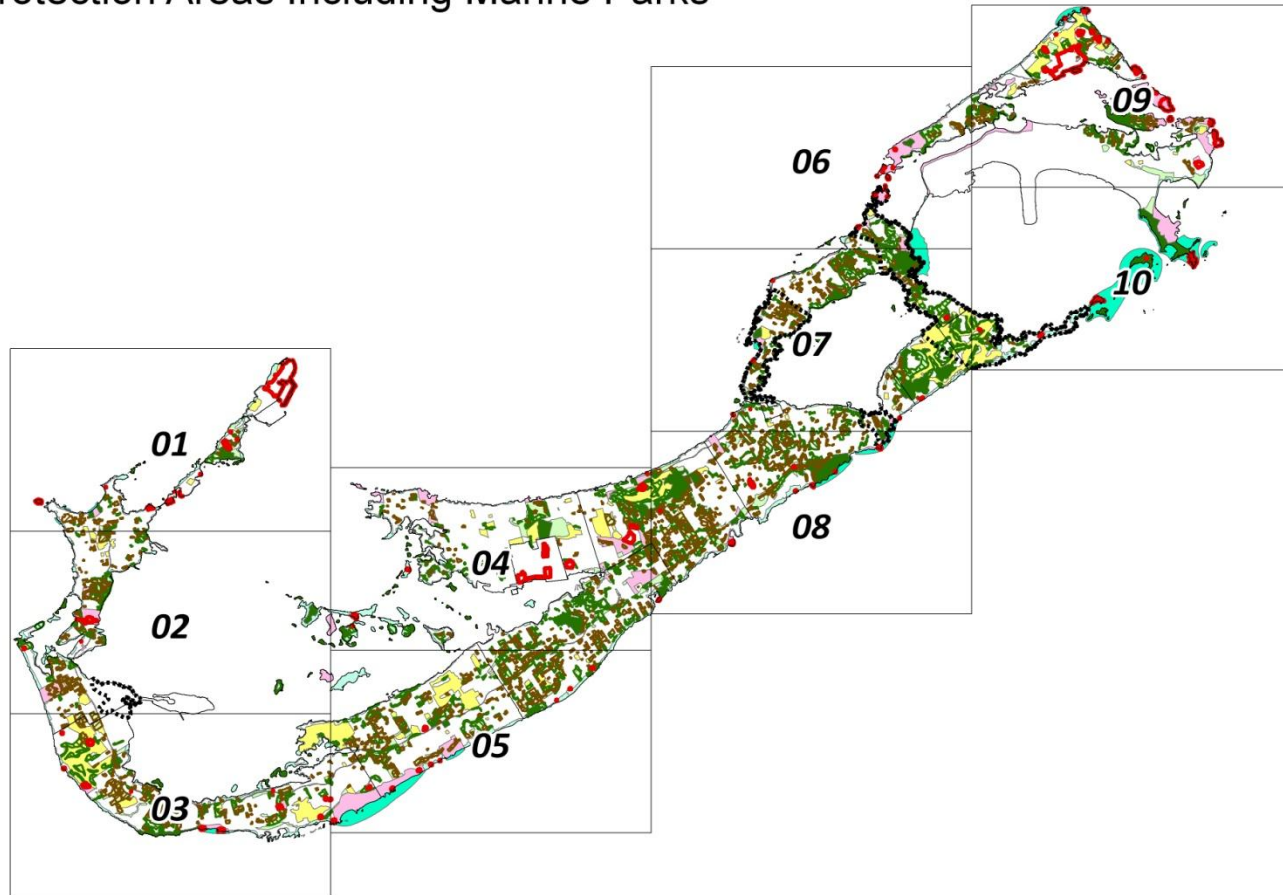
Map 13.1
Water Resources Protection Area
2011



Source: Department of Planning

ANNEX

Terrestrial Protection Areas Including Marine Parks



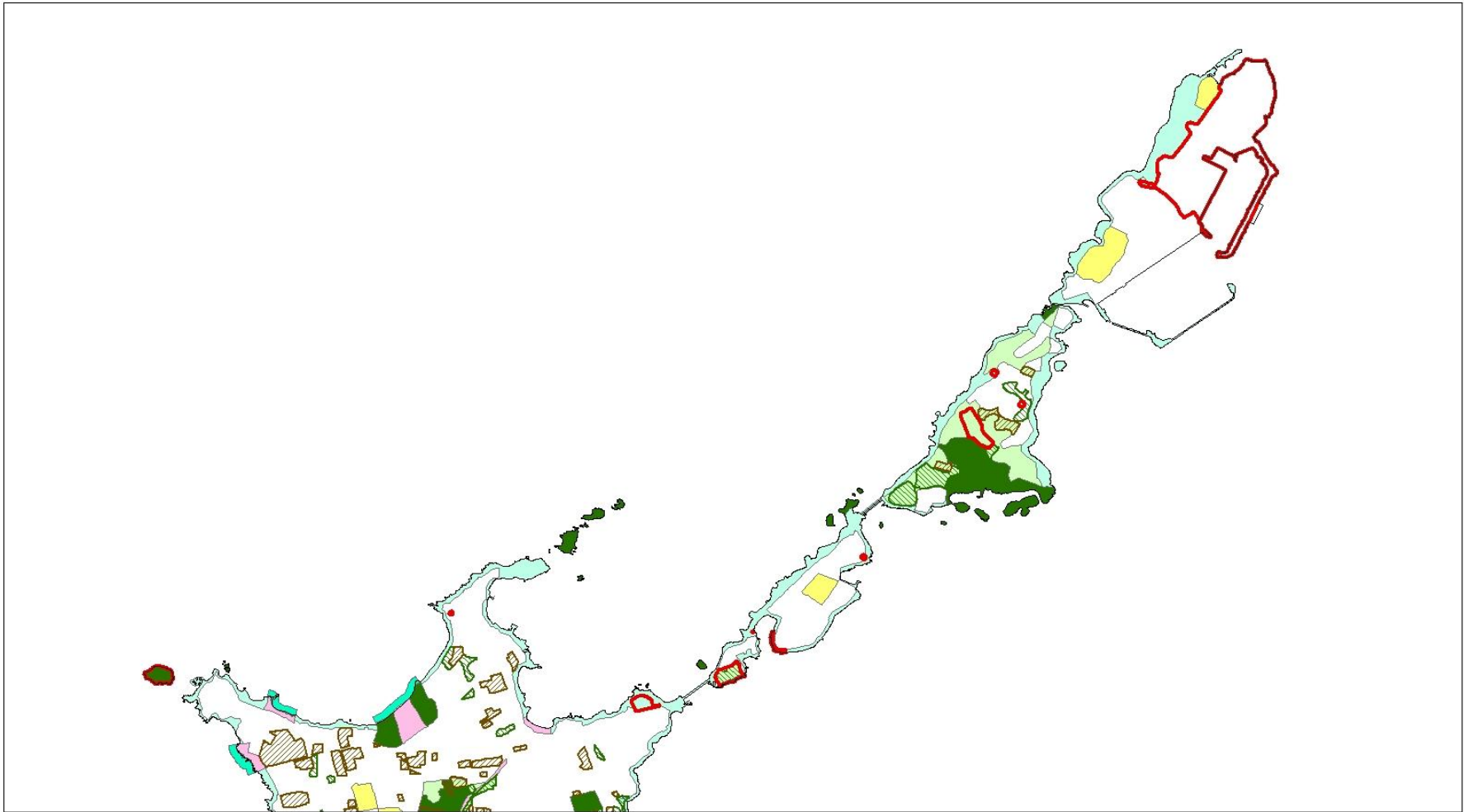
Legend

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



**MAP
Key**

Source: Department of Planning



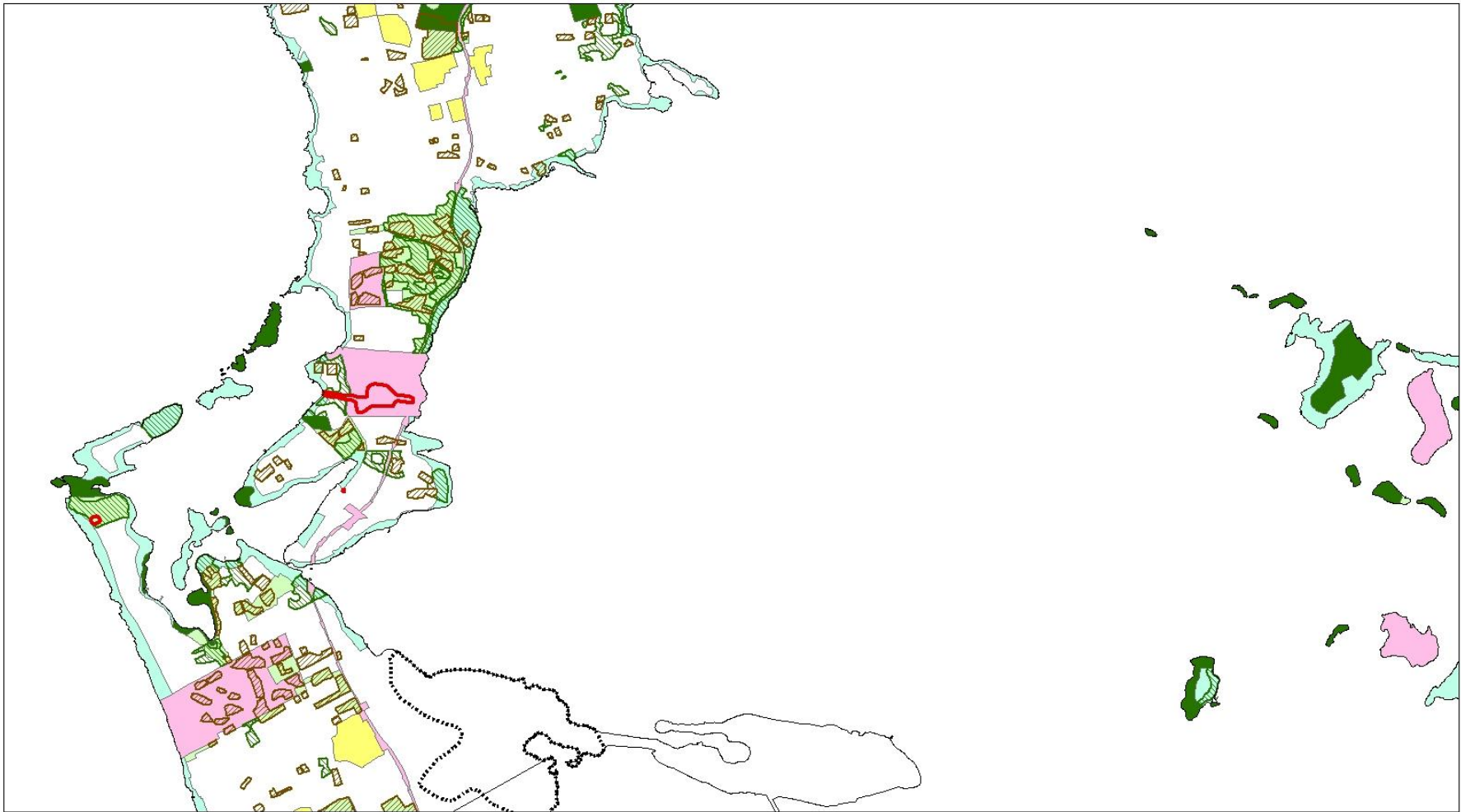
Legend

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







**MAP
01**

Source: Department of Planning



Legend

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



**MAP
02**

Source: Department of Planning



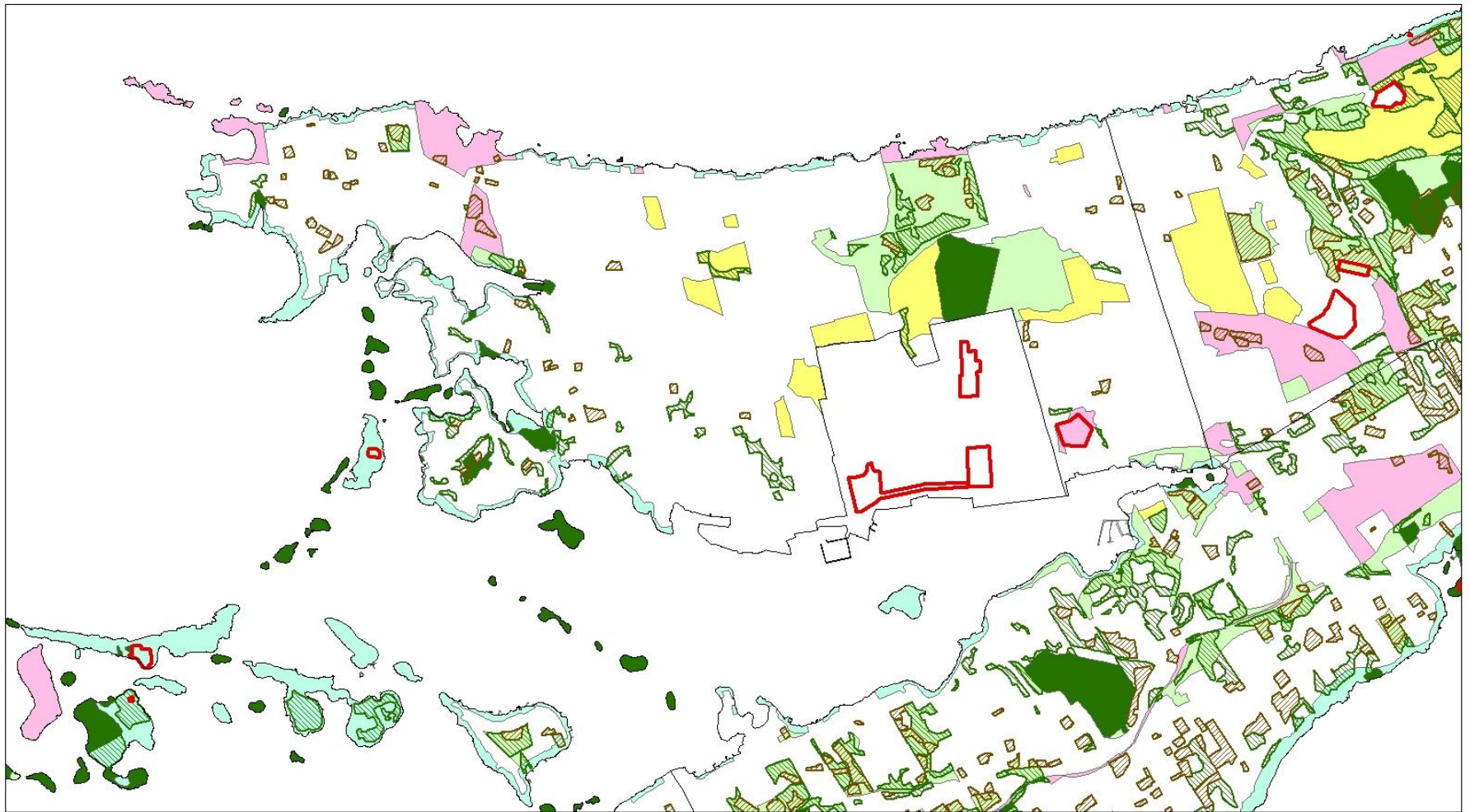
Legend

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













**MAP
03**

Source: Department of Planning



Legend

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













**MAP
04**

Source: Department of Planning



Legend

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













**MAP
05**

Source: Department of Planning



Legend

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













**MAP
06**

Source: Department of Planning



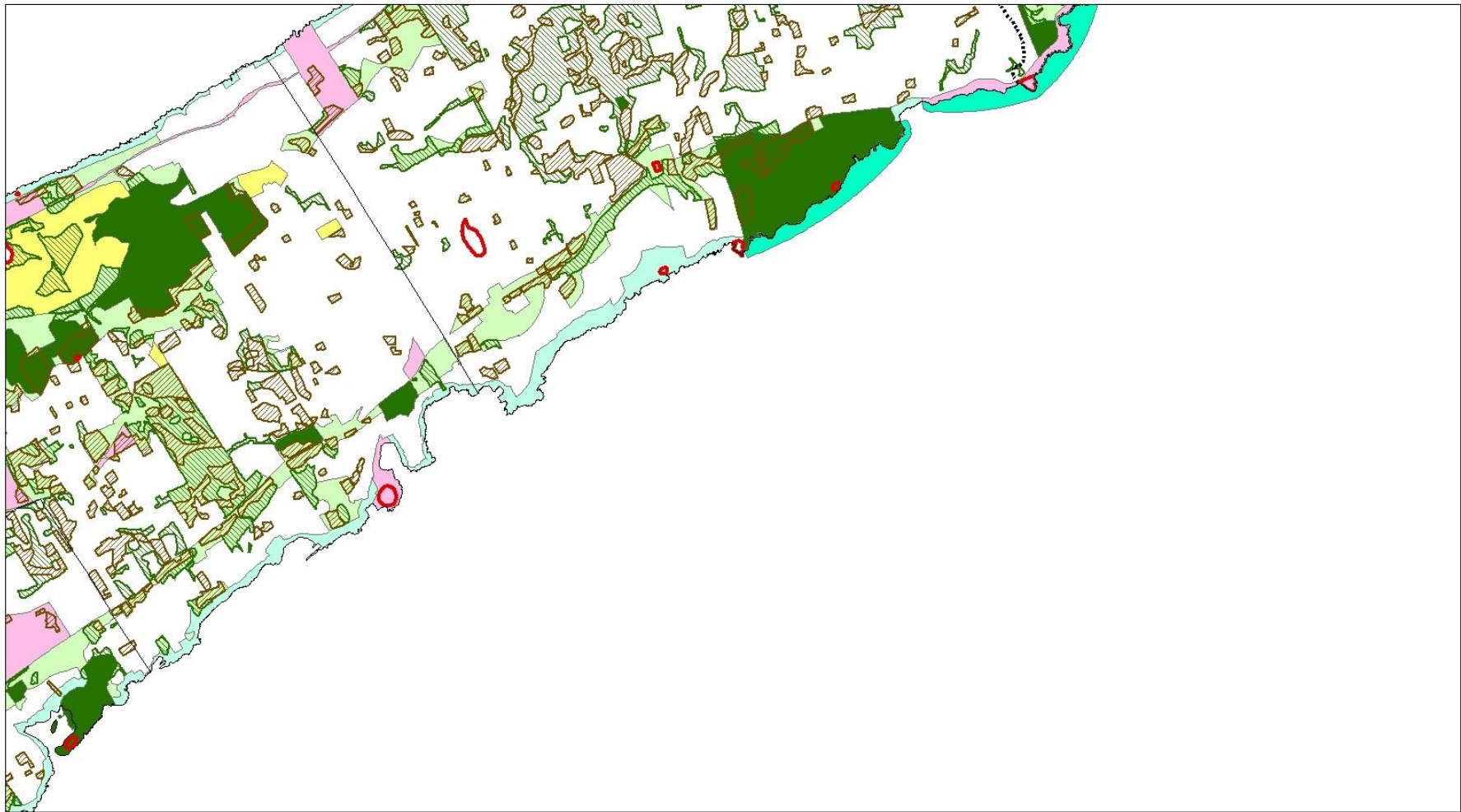
Legend

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



**MAP
07**

Source: Department of Planning



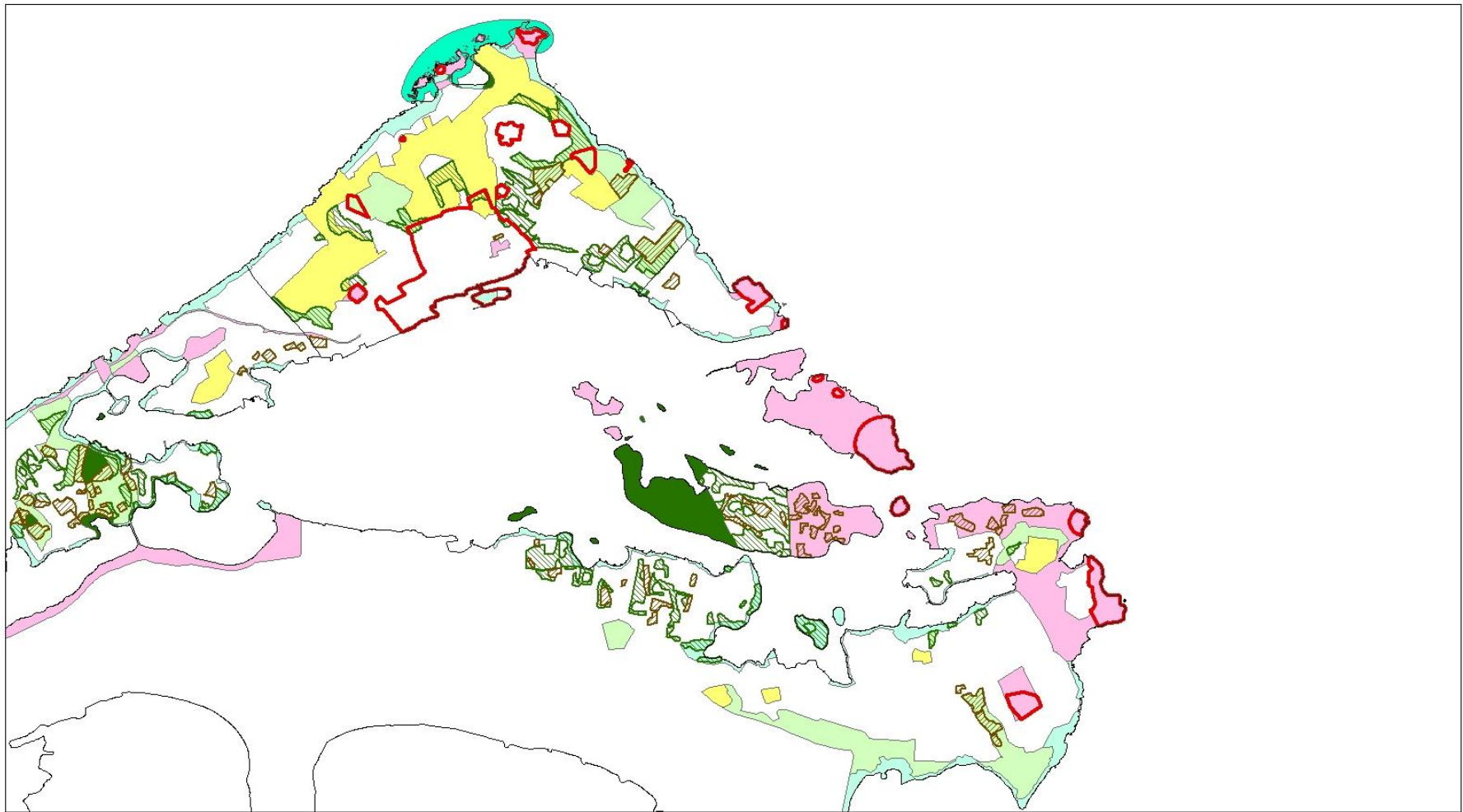
Legend

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













**MAP
08**

Source: Department of Planning



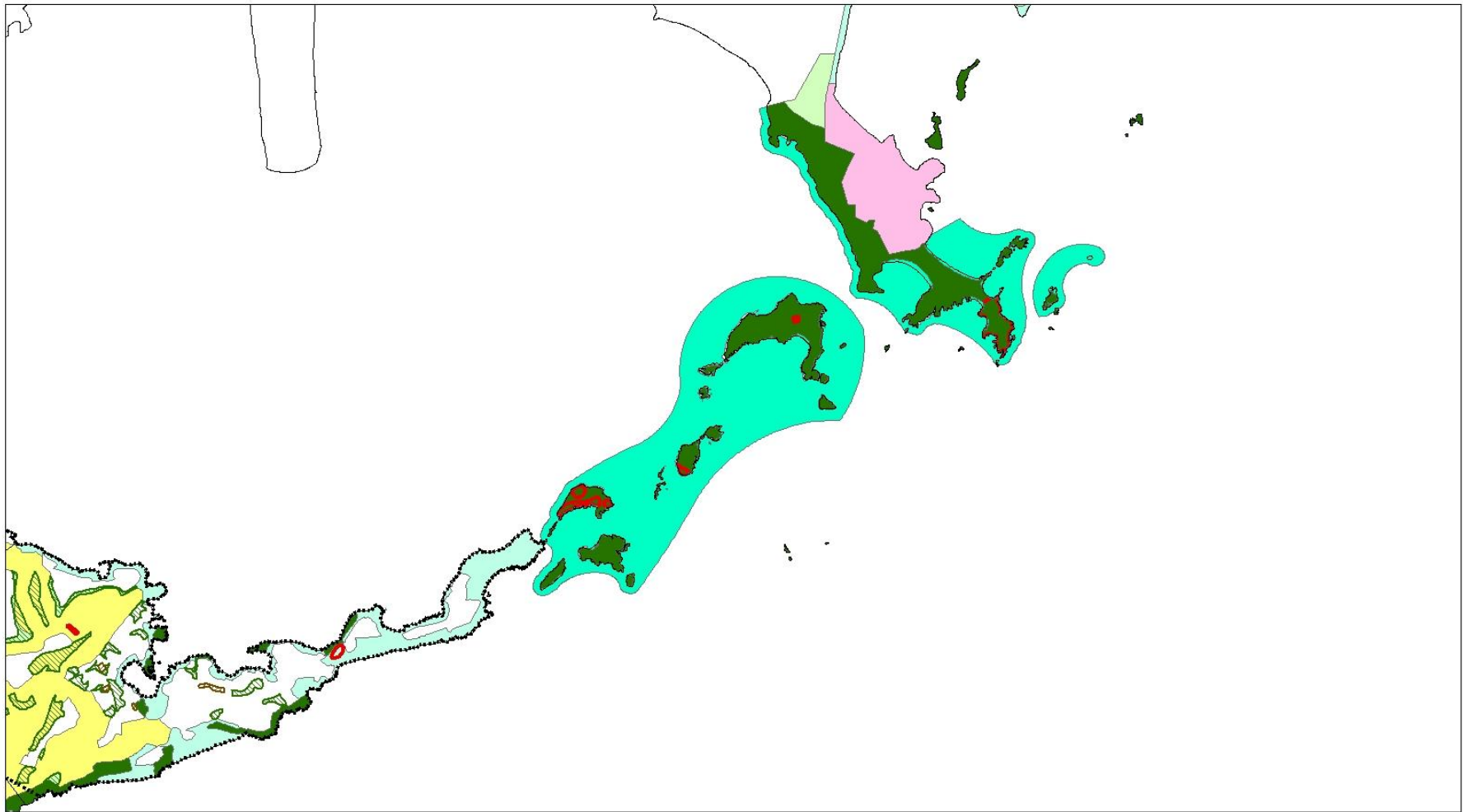
Legend

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













**MAP
09**

Source: Department of Planning



Legend

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



**MAP
10**

Source: Department of Planning

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