2020 ENVIRONMENTAL STATISTICS COMPENDIUM

GOVERNMENT OF BERMUDA
Department of Statistics

Published by

GOVERNMENT OF BERMUDA

Department of Statistics

Research Division
Cedar Park Centre
48 Cedar Avenue
Hamilton, HM 11

Telephone: (441) 297-7761
Fax: (441) 295-8390

E-mail: statistics@gov.bm
Website: www.gov.bm
Social Media: @BermudaStats

CONTENTS

FOREWORD

The Department of Statistics is pleased to release its tenth issue of the *"Environmental Statistics Compendium"*. In alignment with the Department's mission to produce and provide statistical information for the data-driven decision making for Bermuda; this publication reflects the collation of existing data sourced from stakeholders and awareness about issues affecting Bermuda's environment.

Additionally, the delivery of this report supports the combined efforts of the United Nations Statistics Division and the Caribbean Community to strengthen capacity and harmonize the compilation of social, gender and environmental statistics and indicators.

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

1. Population and Housing
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 totals for calendar months for the period 2015 to 2019.

The Department 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
Director
Department of Statistics

December 2020

EXPLANATORY NOTES

-	Not applicable	km	Kilometer
..	Not available	km^2	Square kilometer
**	Less than one percent	kWh	Kilowatt-hour
r	Revised figure	mio m^3/y	Million cubic meters per year
e	Estimated figure	mT	Metric tonnes
—	Nil or negligible	No.	Number
'000	Thousands	$\mu g/m^3$	Microgram
°	Degrees	NO_2	Nitrogen Dioxide
%	Percent	SO_2	Sulfur Dioxide
$	Bermuda dollar	ppb	Parts per billion
F	Fahrenheit	TSP	Total Suspended Particles
ha	Hectare	$PM_{10}/PM_{2.5}$	Fine Particulate Matter
kg	Kilograms	mg/nm^3	Milligrams per cubic meter
//	Axis scale has a discontinuity	NTR	Note to Reader

Note: In some tables, figures may not add to totals due to rounding.

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					
1 degree Celsius (°C)		33.8 degrees Fahrenheit (°F)	1 degree Fahrenheit (°F)		-17.2 degrees Celsius (°C)

CONTRIBUTORS

Ascendant Group Limited
Bermuda Fire and Rescue Services
Bermuda Hospitals Board
Bermuda Tourism Authority
Department of Environmental and Natural Resources, Marine Management Section
Department of Environmental Protection
Department of Health
Department of Planning
Department of Statistics
Department of Works and Engineering - Waste and Enforcement Section
The Bermuda Business Development Agency
The Bermuda Weather Service
Transport Control Department

SECTION 1

POPULATION AND HOUSING

The Population and Housing Section contains information on the number of persons in Bermuda and the type of households they occupied.

Population

• In 2019, the population of Bermuda was projected to be 64,027 persons, a 0.4% increase from the 63,779 persons counted in the 2016 Population and Housing Census (Table 1.1).

• Population projections were used to estimate the population for 2015 and 2017 to 2019. A Population and Housing Census was conducted in 2016.

Households

• During the period 2010 to 2016, there was a 4.7% increase in the total number of households (Table 1.2).

• In 2016, over one-third (35.4%) of the households were two-unit dwellings (Table 1.2).

• One-person households accounted for 34.1% of the total households in Bermuda in 2016 (Table 1.3).

• The average size of a household continued to drop from 2.4 persons in 2010 to 2.3 persons in 2016 (Table 1.3).

• The number of rental units increased by 0.9 percentage points over the seven-year period 2010 to 2016 to 51.6% (Table 1.4).

• In 2016, private dwelling units with two bedrooms accounted for over one-third (36.0%) of households in Bermuda (Table 1.5).

• The average number of persons per bedroom was 1.1 persons in 2016 (Table 1.5).

NOTE TO READER

Group Dwelling Unit: where the occupants live collectively for disciplinary, health, custodial, work or other reasons and share the cooking, sleeping and/or sanitary facilities with other households. Generally, group dwellings are available primarily to selected persons, not the general population. They differ from institutions in that occupants movements to and from the premises are less restricted. Examples of group dwellings include hotel staff quarters, nurses' hostels, transitional housing, police barracks and rooming houses catering for six or more paying guest as well as Mid-Atlantic Wellness Institute group homes catering to any number of clients.

Household: a person or group of persons living together in a dwelling unit.

Population Density: a measure of the average non-institutional population per unit of land area. It is calculated by dividing the de jure civilian non-institutional population by the total land area. Bermuda's land area as of 2008 was 21.0 square miles and as of 2016 was 20.7 square miles (source: Department of Land Title and Registration 26 January, 2018).

$$\textit{Population Density} = \frac{\textit{De Jure Civilian Non-Institutional Population}}{\textit{Total Land Area}}$$

Private Dwelling Unit: a room or group of rooms used, or intended to be used, for living purposes. It must be capable of permanent human habitation and must have its own:

- separate access to the street or common landing or staircase, and,
- cooking, living, sleeping and sanitary facilities which the occupants of the dwelling do not have to share with any persons other than their own household members.

From a structural perspective, a private dwelling may be contained within a one-unit dwelling, a house comprising two or more apartments, an apartment building, or within part of a building which is used for residential as well as business or other purposes.

Source: Department of Statistics

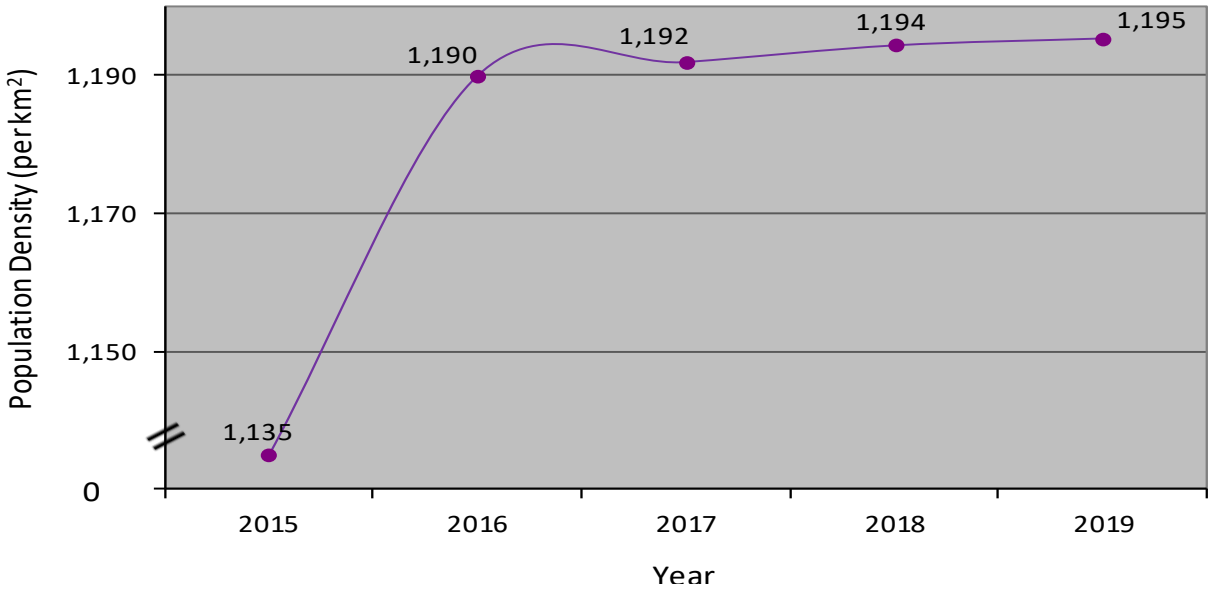
Table 1.1
POPULATION AND POPULATION DENSITY, 2015-2019

Year	Population	Population Density (per km^2)
2015	61,735 [1]	1,135 [4]
2016	63,779 [2]	1,190 [5]
2017	63,892 [3]	1,192 [5]
2018	63,973 [3]	1,194 [5]
2019	64,027 [3]	1,195 [5]

Sources: Department of Statistics, Department of Planning and the Land Title and Registration Office

[1] Based on Bermuda's Population Projections 2010-2020.
[2] Based on the 2016 Population and Housing Census.
[3] Based on Bermuda's Population Projections 2016-2026.
[4] Bermuda's land area as of 2008 was 54.4 km^2 (21.0 square miles) Department of Planning.
[5] Bermuda's land area as of 2016 is 53.6 km^2 (20.7 square miles) Land Title and Registration Office.

Chart 1.1
POPULATION DENSITY, 2015-2019



Source: Department of Statistics

The 2015 figure is based on Bermuda's Population Projections 2010-2020.
The 2016 figure is based on the 2016 Population and Housing Census.
The 2017-2019 figures are based on Bermuda's Population Projections 2016-2026.

Table 1.2
NUMBER OF HOUSEHOLDS BY TYPE OF DWELLING, 2010 AND 2016

Type of Dwelling	Number		Percentage Distribution	
	2010	2016	2010	2016
Total	26,923 [1]	28,192	100.0 [2]	100.0
One-Unit Dwelling	6,280	6,767	24.3	24.0
Two-Unit Dwelling	8,870	9,972	34.4	35.4
Three-Unit Dwelling	4,639	4,849	18.0	17.2
Four or more apartments	5,024	5,253	19.5	18.6
Group dwellings	696	751	2.7	2.7
Residential/commercial premises	281	577	1.1	2.1
Other/not stated	27	23	**	**

Sources: 2010 and 2016 Population and Housing Censuses

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

[2] The denominator for percentage distribution is 25,817 (26,923 - 1,106).

Table 1.3
HOUSEHOLDS BY SIZE OF HOUSEHOLD, 2010 AND 2016

Persons in Household	Number		Percentage Distribution	
	2010	2016	2010	2016
Total households	26,923 [1]	28,192	100.0 [2]	100.0
Average size of household	2.4	2.3		
One	7,942 r	9,611	30.8 r	34.1
Two	7,999 r	8,841	31.0 r	31.4
Three	4,515 r	4,802	17.5 r	17.0
Four	3,540 r	3,317	13.7 r	11.8
Five	1,238 r	1,141	4.8 r	4.0
Six	385	329	1.5	1.2
Seven	112	99	**	**
Eight	52	35	**	**
More than eight	34	17	**	**

Sources: 2010 and 2016 Population and Housing Censuses

[1] Includes 1,106 households for which there is no data by size of household.

[2] The denominator for percentage distribution is 25,817 (26,923 - 1,106).

Table 1.4
PRIVATE DWELLING UNITS BY TYPE OF TENURE, 2010 AND 2016

Type of Tenure	Number		Percentage Distribution	
	2010	2016	2010	2016
Total	26,200 [1]	27,418	100.0 [2]	100.0
Non-Owner Occupied	12,723	14,140	50.7	51.6
Rented - unfurnished	7,747	8,356	30.9	30.5
Rented - partly/fully furnished	3,972	4,650	15.8	17.0
Rent Free	1,004	1,134	4.0	4.1
Owner-Occupied	12,238	13,267	48.8	48.4
Owned without a mortgage	6,417	7,483	25.6	27.3
Owned with a mortgage	5,821	5,784	23.2	21.1
Other/Not Stated	133	11	**	**

Sources: 2010 and 2016 Population and Housing Censuses

[1] Includes 1,106 households for which there is no data by type of tenure.
[2] The denominator for percentage distribution is 25,094 (26,200 - 1,106).

Table 1.5
PRIVATE DWELLING UNITS BY NUMBER OF BEDROOMS, 2010 AND 2016

Type of Household	Number		Percentage Distribution	
	2010	2016	2010	2016
Total	26,200 [1]	27,418	100.0 [6]	100.0
Average number of bedrooms per household	2.1 [2]	2.1 [4]		
Average number of persons per bedroom	1.1 [3]	1.1 [5]		
None (studio)	790	1,145	3.2	4.2
One	6,101	6,469	24.4	23.6
Two	8,944	9,857	35.8	36.0
Three	7,473	7,928	29.9	28.9
Four or more	1,645	2,018	6.6	7.4
Not Stated	141	1	**	**

Sources: 2010 and 2016 Population and Housing Censuses

[1] Includes 1,106 households for which there is no data by number of bedrooms.
[2] The calculation is 53,544 bedrooms ÷ 24,953 households.
[3] The calculation is 60,503 persons ÷ 53,544 bedrooms.
[4] The calculation is 58,604 bedrooms ÷ 27,417 households.
[5] The calculation is 62,668 persons ÷ 58,604 bedrooms.
[6] The denominator for percentage distribution is 24,953 (26,200 - 1,106 - 141).

Table 1.6
PRIVATE DWELLING UNITS BY NUMBER OF FULL BATHROOMS, 2010 AND 2016

Number of Full Bathrooms	Number		Percentage Distribution	
	2010	2016	2010	2016
Total	26,200 [1]	27,418	100.0 [2]	100.0
None	41	16	**	**
One	15,340	16,146	61.5	58.9
Two	7,532	8,550	30.2	31.2
Three or More	2,046	2,705	8.2	9.9
Not Stated	135	1		

Sources: 2010 and 2016 Population and Housing Censuses

[1] Includes 1,106 households for which there is no data by number of full bathrooms.

[2] The denominator for percentage distribution is 24,959 (26,200 - 1,106 - 135)

SECTION 2

TOURISM

Bermuda's tourism industry is the second largest source of foreign exchange revenue to the economy, only following international business.

Visitor Arrivals

• The total number of visitors to Bermuda increased by 5.1 percent from 766,226 in 2018 to 805,039 in 2019 (Table 2.1).

• Air passenger arrivals decreased 4.4 percent from 2018 to 2019 (Table 2.1).

• Cruise ship passenger arrivals increased 10.6 percent from 484,339 in 2018 to 535,561 in 2019 (Table 2.1).

• In 2019, the average length of stay for air passengers increased to 6.0 days (Table 2.1).

Air Passengers

• Air passenger arrivals from the United States decreased 5.6 percent from 2018 to 2019 (Table 2.2).

• In 2019, air passengers from the United States accounted for 75.1 percent (202,460) of the total number of air visitors in 2019 (Table 2.2).

• Over the five-year period, 2015 to 2019, hotel properties remained the most popular/used accomodation type as more than two-thirds (67.7%) of all air passengers stayed at hotel properties (Table 2.3).

Tourist Properties

• The total number of tourist properties (41) in Bermuda remained the same from 2018 to 2019 (Table 2.4).

• The total number of rooms available increased by 0.2 percent from 2,404 rooms in 2018 to 2,409 rooms in 2019 (Table 2.4).

• There was a 0.6 percent increase in the total number of beds from 5,110 in 2018 to 5,140 in 2019 (Table 2.4).

Section Cont'd.

Visitor Expenditure

• Visitor expenditure increased over the period 2015 to 2019 with the largest increase in absolute terms occurring between 2017 ($468.0 million) and 2018 ($544.2 million), a $76.2 million increase (Table 2.5).

• In 2019, there were 4,689 persons directly employed in the tourism industry; an increase of 3.1 percent over 2018. Males accounted for 2,847 persons compared to 2,842 females (Table 2.5).

NOTE TO READER

Air Passenger Arrivals: includes all stay-over (overnight) visitors. It does not, however, include cruise passenger and yacht arrivals.

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 km^2: 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 (53.6 km^2).

Occupancy Rate: 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.

Note to Reader Cont'd.

Tourism Density Ratio (TDR): ratio attempts to show the density of tourist in the country at any one time on average. Its value is limited by the fact that tourists flows are seasonal and tourism activity tends to be concentrated in specific geographical areas. *(Caribbean Tourism Organization)* Tourism Density Ratio is calculated as:

$$\text{Tourism Density Ratio} = \frac{\textit{Number of visitors * average length of stay}}{\textit{land area (53.6 km}^2\textit{) * 365}}$$

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

Tourism Intensity Rate (TIR): the indicator 'arrivals/population' provides an estimate of tourism intensity in the country of reference. This indicator is calculated by World Tourism Organization (UNWTO) based on the available basic data on inbound and domestic tourism, which can be be either the number of visitors or the number of tourists. *(UNWTO Methodological Notes to the Tourism Statistics Database at http://cf.cda.unwto.org/sites/all/files/pdf/2015_meth_notes_eng_0.pdf)* Tourism Intensity Rate is calculated as:

$$\text{Tourist Intensity Rate} = \textit{Number of visitors/1,000 population/land area (53.6 km}^2\textit{)}$$

Tourism Penetration Ratio (TPR): the penetration ratio quantifies the average number of tourist arrivals by air, per thousand local inhabitants, in the country at any one time. *(modified Caribbean Tourism Organization definition)* Tourist Penetration Ratio is calculated as:

$$\text{Tourism Penetration Ratio} = \frac{\textit{Average length of Stay * number of air visitors * 1,000}}{\textit{365 * mid-year population estimates}}$$

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.

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.

Source: CARICOM Environment Program

Table 2.1
AIR PASSENGER ARRIVALS, CRUISE SHIP ARRIVALS, AVERAGE LENGTH OF STAY, TOURISM INTENSITY RATE AND PENETRATION RATIO, 2015-2019

Indicator	Year 2015	2016	2017	2018	2019
Total visitors[1]	597,212	642,395	687,625	766,226	805,039
Percentage change (%)	+2.9	+7.6	+7.0	+11.4	+5.1
Air passengers	219,814	244,491	269,576	281,887	269,478
Percentage change (%)	-2.0	+11.2	+10.2	+4.6	-4.4
Average length of stay for air passengers[2]	6.3	6.0	6.3	5.9	6.0
Air passengers to residents ratio	3.6	3.8	4.2	4.4	4.2
Tourism density ratio	69.8	75.0	86.9	85.1	82.7
Cruise ship passengers	377,398	397,904	418,049	484,339	535,561
Percentage change (%)	+6.1	+5.4	+5.1	+15.9	+10.6
Cruise ship passengers to residents ratio	6.1	6.2	6.5	7.6	8.4
Cruise ship arrivals	132	139	161	171	181
Percentage change (%)	+4.8	+5.3	+15.8	+6.2	+5.8
Population	61,735 [3]	63,779 [5]	63,892 [7]	63,973 [7]	64,027 [7]
Visitors to residents ratio	9.7	10.1	10.8	12.0	12.6
Land area km^2	54.35 [4]	53.56 [6]	53.56	53.56	53.56
Tourism intensity rate	177.2	187.4	200.6	233.6	234.8
Tourism penetration ratio	61.5	63.0	72.8	71.2	71.2

Sources: Bermuda Tourism Authority, Department of Statistics, Department of Planning and the Land Title and Registration Office.

[1] Does not include yacht passengers.

[2] Bermuda Tourism Authority.

[3] Bermuda's Population Projections 2010-2020.

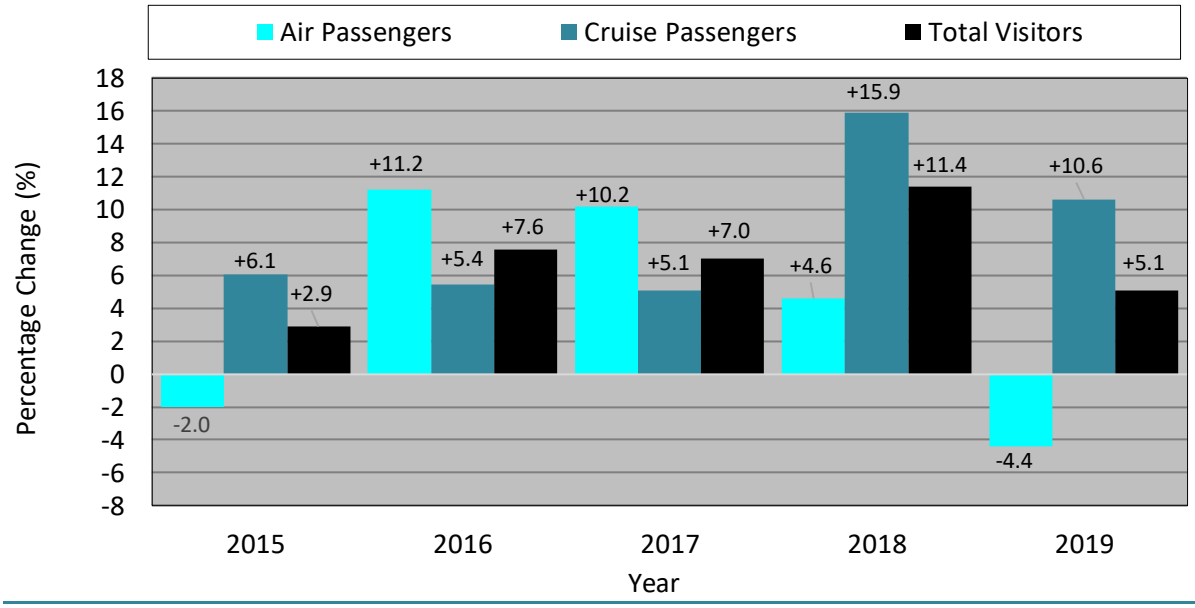
[4] Bermuda's land area in 2015 was 54.4 km^2 (21.0 square miles) Department of Planning.

[5] 2016 Population and Housing Census.

[6] Bermuda's land area as of 2016 was 53.6 km^2 (20.7 square miles) Land Title and Registration Office.

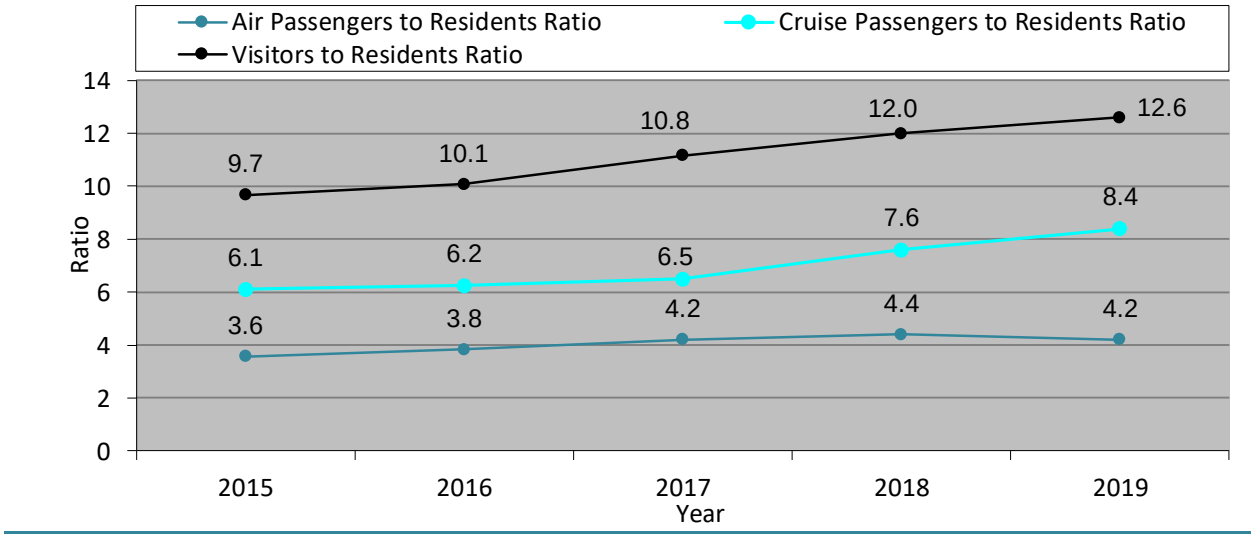
[7] Bermuda's Population Projections 2016-2026.

Chart 2.1
GROWTH IN AIR PASSENGERS, CRUISE SHIP PASSENGERS AND TOTAL VISITORS, 2015-2019



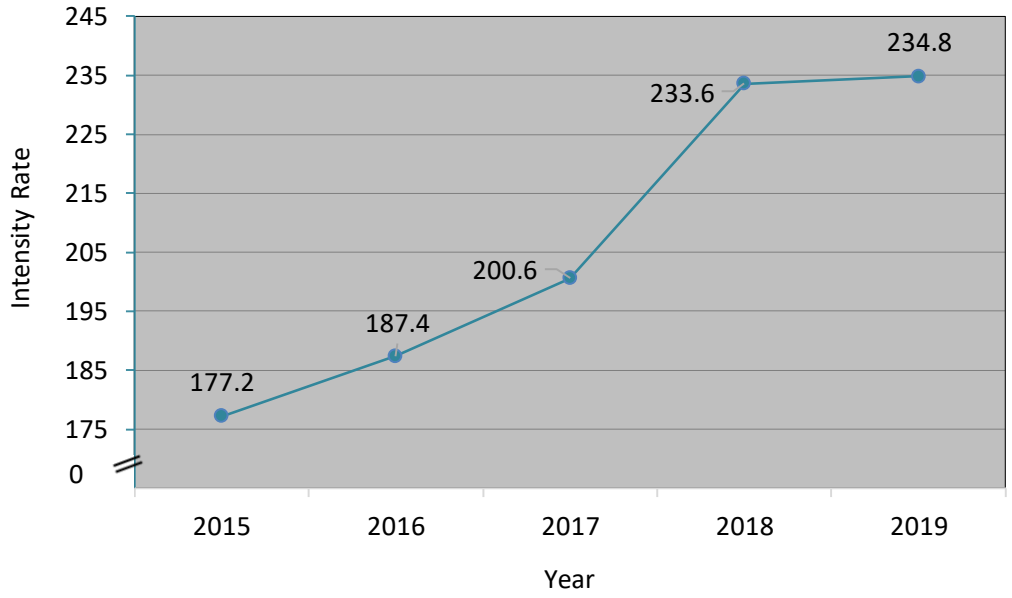
Sources: Bermuda Tourism Authority and Department of Statistics

Chart 2.2
AIR PASSENGERS TO RESIDENTS, CRUISE SHIP PASSENGERS TO RESIDENTS AND VISITOR TO RESIDENTS RATIO, 2015-2019



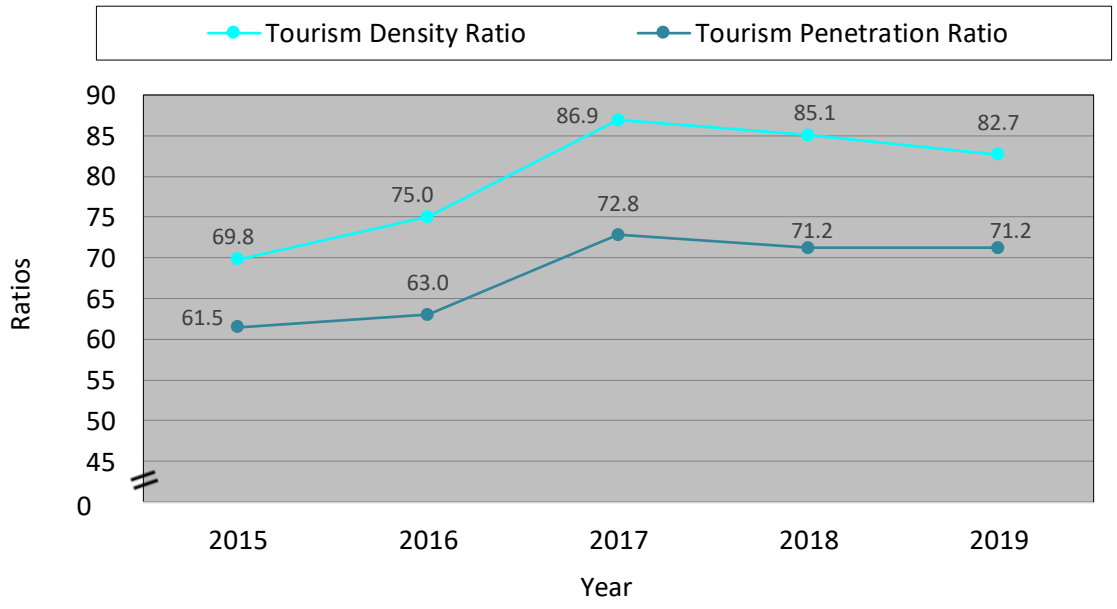
Sources: Bermuda Tourism Authority and Department of Statistics

Chart 2.3
TOURISM INTENSITY RATE, 2015-2019



Sources: Bermuda Tourism Authority and Department of Statistics

Chart 2.4
TOURISM DENSITY AND PENETRATION RATIOS, 2015-2019



Sources: Bermuda Tourism Authority and Department of Statistics

Table 2.2
AIR PASSENGER ARRIVALS BY COUNTRY OF ORIGIN, 2015-2019

Country of Origin	Year 2015	2016	2017	2018	2019
Total	219,814	244,491	269,576	281,887	269,478
United States	157,158	182,896	198,259	214,499	202,460
Canada	24,986	23,744	27,416	27,638	27,748
United Kingdom	22,511	21,738	22,997	20,955	21,641
Other	15,159	16,113	20,904	18,795	17,629

Source: Bermuda Tourism Authority

Table 2.3
AIR PASSENGERS BY INTENDED TYPE OF ACCOMMODATION, 2015-2019

Type of Accommodation	Year 2015	2016	2017	2018	2019
Total	219,814	244,491	269,534	281,887	269,478
Hotels or similar[1]	152,176	171,472	179,257	192,963	182,388
Friends and Relatives/Rental House or Apt.[2]	57,501	54,362	66,194	69,382	62,973
Bed and Breakfast/Guest House[3]	5,575	10,646	10,252	10,939	11,901
Other[4]	4,562	8,011	13,831	8,603	12,216

Source: Bermuda Tourism Authority

[1] Includes resort hotels, small hotels, cottage colonies and clubs.
[2] Includes private homes.
[3] Includes housekeeping accommodations, guest houses and bed and breakfast.
[4] Includes not stated.

Table 2.4
NUMBER OF TOURIST PROPERTIES, OCCUPANCY RATE AND NUMBER OF ROOMS PER KM^2, 2015-2019

Item	Year 2015	2016	2017	2018	2019
Number of properties	42	42	42	41	41
Total number of rooms available	2,372	2,334	2,409	2,404	2,409
Total number of beds	4,852	4,866	5,120	5,110	5,140
Total number of room nights sold	..	..	..	..	..
Occupancy rate (%)[1]	52.5	57.7	63.1	63.7	61.0
Number of rooms per km^2	43.6 r[2]	42.9 r[2]	44.9 r[3]	44.9[3]	44.9[3]

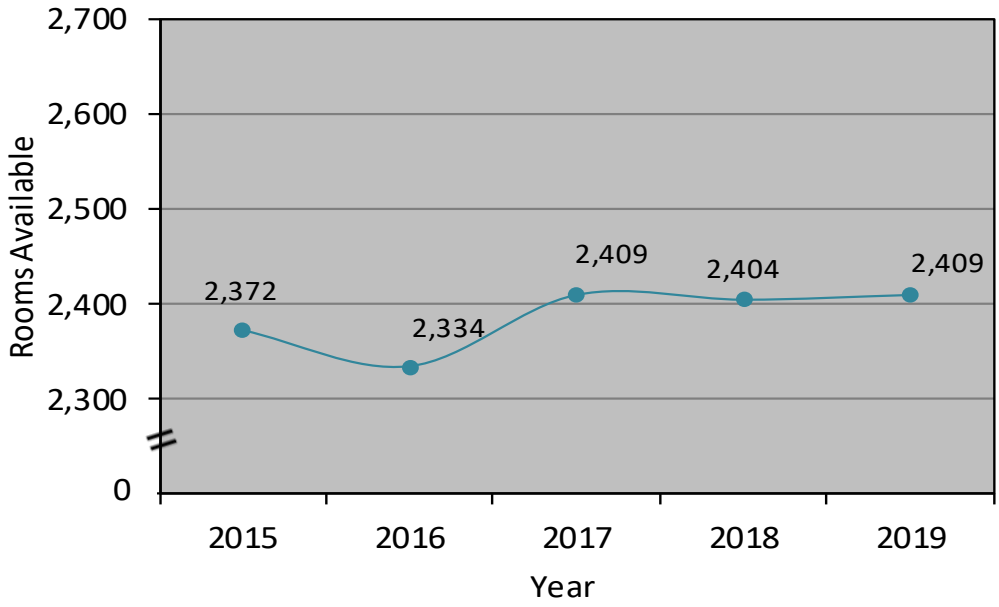
Sources: Bermuda Tourism Authority, Department of Planning and the Land Title and Registration Office

[1] Occupancy rate is only reported by the Bermuda Hotel Association which accounts for approximately 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 Bermuda Tourism Authority.

[2] Bermuda's land area as of 2008 was 54.4 km^2 (21.0 square miles) Department of Planning.

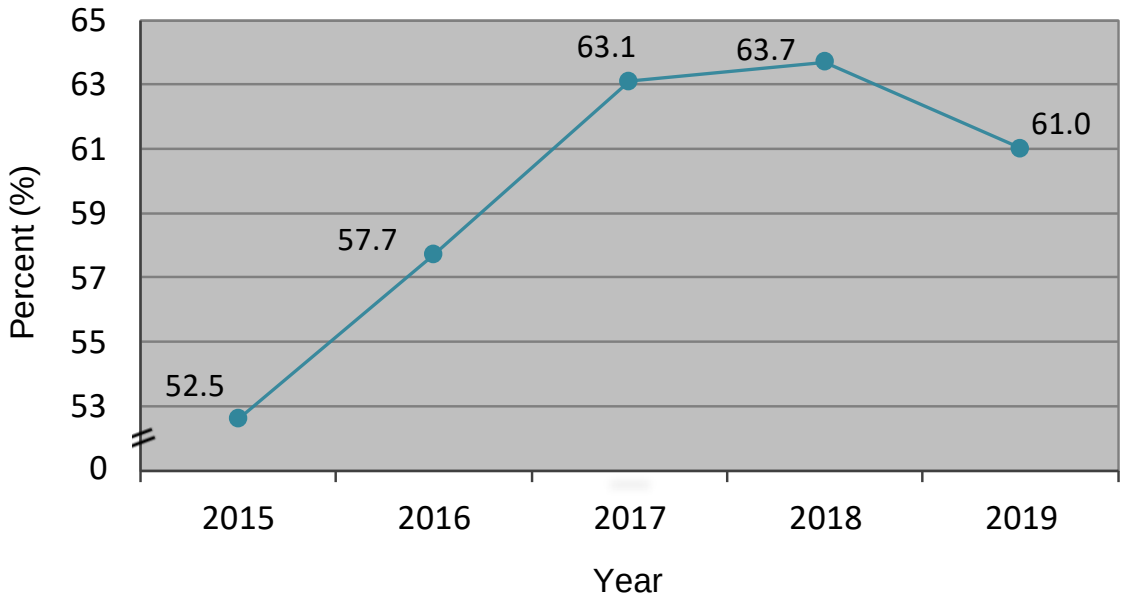
[3] Bermuda's land area as of 2016 was 53.6 km^2 (20.7 square miles) The Land Title and Registration Office.

Chart 2.5
NUMBER OF HOTEL ROOMS AVAILABLE, 2015-2019



Source: Bermuda Tourism Authority

Chart 2.6
OCCUPANCY RATE, 2015-2019



Source: Bermuda Tourism Authority

Table 2.5
VISITOR EXPENDITURE AND NUMBER EMPLOYED IN TOURISM, 2015-2019

Item		Year 2015	2016	2017	2018	2019
Visitor expenditure (in US$'000)[1]		335,600	398,230	468,760	544,180	556,520
Expenditure on same-day visits		62,200	65,450	66,040	130,670	141,740
Expenditure on accommodation, meals and drinks, shopping, entertainment, etc.		273,400	332,780 r	402,720 r	413,510	414,780
Total directly employed in tourism[2]						
	Total	4,012	4,127	4,371	4,547	4,689
	Male	2,396	2,480	2,649	2,786	2,847
	Female	1,616	1,647	1,722	1,761	1,842

[1] Source: Bermuda Tourism Authority.
[2] Includes hotels, restaurants, cafés and bars.

SECTION 3

ENVIRONMENTAL HEALTH AND WEATHER

The Environmental Health and Weather Section contains information concerning environmentally-related diseases as well as weather data for Bermuda.

Environmental Health

• In 2019, there were 5,786 reported cases of environmentally-related diseases in Bermuda, with males accounting for less than half (44.0%) (Table 3.1).

• Respiratory diseases accounted for 5,071 (87.6%) of the total reported cases in 2019 (Table 3.1).

• In 2019, females accounted for the largest proportion (56.0%) of environmentally-related diseases (Table 3.1).

Weather

• Total rainfall in Bermuda decreased by 0.2% over the period 2018 to 2019 (Table 3.2)

• In 2019, the months with the most rain days (20) were January, August, and December while the least (8) was recorded in April (Table 3.2).

• August had the highest mean air temperatures during 2019 with an average daily air temperature of 82.5°F. The lowest mean air temperature during the same year was recorded in March (65.0°F) (Table 3.3).

• Over the five-year period, 2015 to 2019, the average daily air temperature reported was 72.9°F. The average daily maximum air temperature was 76.5°F while the average daily minimum was 68.9°F for the same period (Table 3.3).

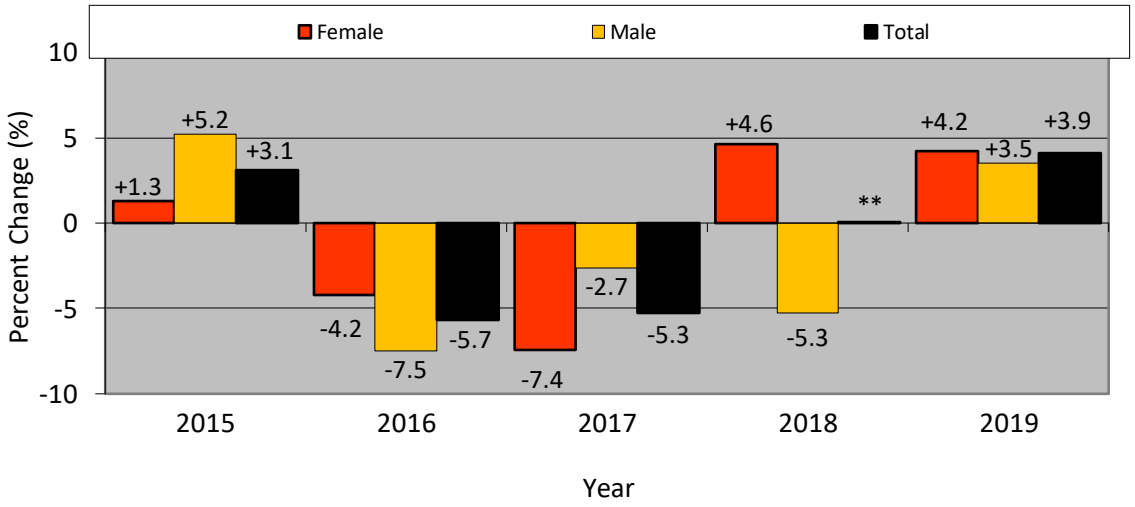
• In 2019, June had the highest average humidity (82.2%), while the lowest was recorded in December (73.3%). The average relative humidity for the five-year period, 2015 to 2019, was 74.7% (Table 3.4).

Table 3.1
REPORTED CASES OF ENVIRONMENTALLY-RELATED DISEASES BY SEX, 2015-2019

Cause	Sex	Year 2015	2016	2017	2018	2019
Gastroenteritis [1, 2]	Total	682	466	446	529	467
	Male	309	202	187	234	194
	Female	373	264	259	295	273
Malaria (imported)	Total	2	—	1	3	1
	Male	2	—	1	3	1
	Female	—	—	—	—	—
Dengue (imported)	Total	2	—	—	—	2
	Male	2	—	—	—	1
	Female	—	—	—	—	1
Accidental pesticide	Total	1	1	1	4	1
	Male	1	—	—	3	1
	Female	—	1	1	1	—
Poisoning	Total	48	69	96	66	75
	Male	24	30	46	34	34
	Female	24	39	50	32	41
Diarrhea	Total	134	116	96	133	169
	Male	53	51	42	49	76
	Female	81	65	54	84	93
Respiratory diseases (all) [3]	Total	5,367	5,224	4,927	4,833	5,071
	Male	2,492	2,380	2,317	2,133	2,236
	Female	2,875	2,844	2,610	2,700	2,835
Acute bronchitis	Total	384	370	407	420	546
	Male	144	137	159	169	218
	Female	240	233	248	251	328
Chronic sinusitis	Total	99	126	88	113	29
	Male	30	37	30	40	10
	Female	69	89	58	73	19
Other	Total	4,884	4,728	4,132	4,300	4,496
	Male	2,318	2,206	1,828	1,924	2,008
	Female	2,566	2,522	2,304	2,376	2,488
TOTAL CASES, all causes	Total	6,232	5,877	5,567	5,568	5,786
	Male	2,879	2,664	2,593	2,456	2,543
	Female	3,353	3,213	2,974	3,112	3,243
Percentage change (%)	Total	+3.1	-5.7	-5.3	**	+3.9
	Male	+5.2	-7.5	-2.7	-5.3	+3.5
	Female	+1.3	-4.2	-7.4	+4.6	+4.2

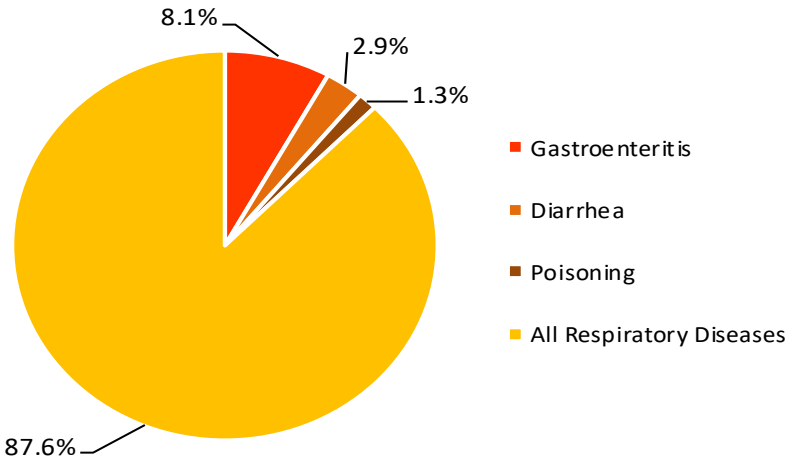
Sources: Department of Health and Bermuda Hospitals Board

Chart 3.1
PERCENTAGE CHANGE IN REPORTED CASES OF ENVIRONMENTALLY-RELATED DISEASES BY SEX AND TOTAL, 2015-2019



Sources: Department of Health and Bermuda Hospitals Board

Chart 3.2
REPORTED CASES OF ENVIRONMENTALLY-RELATED DISEASES BY CAUSE, 2019[1]



Sources: Department of Health and Bermuda Hospitals Board

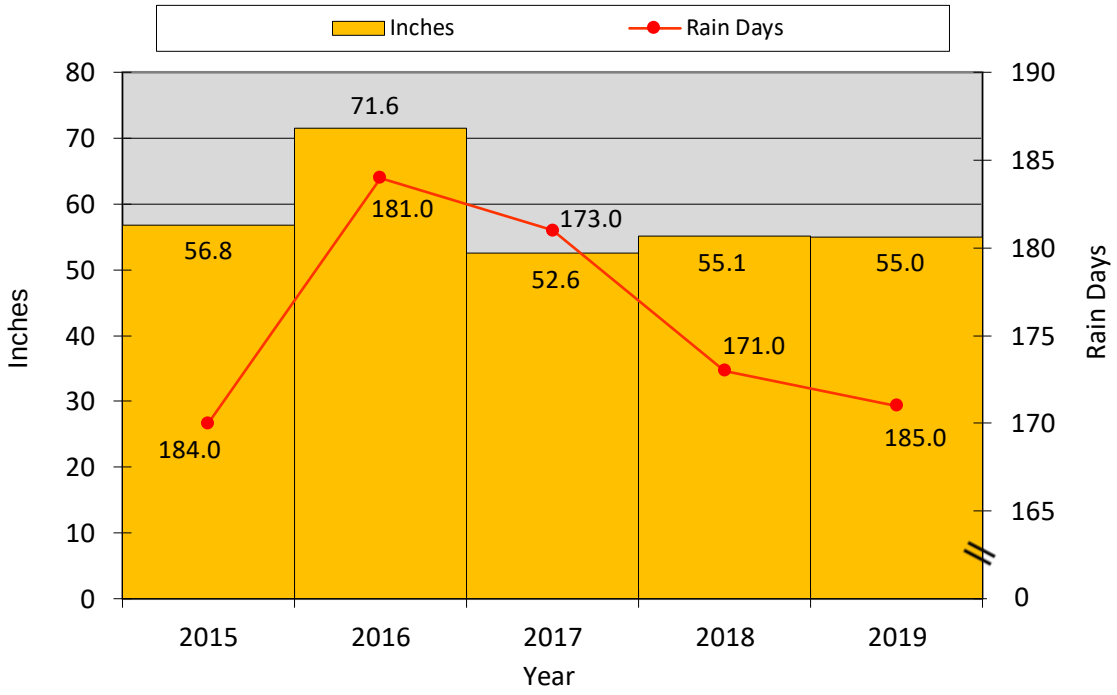
[1] Excludes Malaria (0.02%), Dengue (0.03%) and Accidental Pesticide (0.02%)

Table 3.2
TOTAL NUMBER OF INCHES OF RAINFALL AND RAIN DAYS, 2015-2019

Year		Month												
		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
2015	Inches	4.0	9.2	2.9	4.0	1.2	3.0	8.9	5.6	5.0	6.1	2.9	4.1	56.8
	Rain Days	19	19	17	14	8	8	20	14	17	20	17	11	184
2016	Inches	6.9	5.5	7.7	2.9	6.6	5.0	4.1	3.3	11.8	10.7	3.5	3.6	71.6
	Rain Days	24	18	16	16	11	16	10	15	17	13	12	13	181
2017	Inches	9.7	3.8	2.8	0.7	0.8	4.8	5.6	5.6	4.0	6.4	3.6	4.8	52.6
	Rain Days	15	13	16	8	10	18	17	15	13	16	15	17	173
2018	Inches	3.8	2.9	7.6	3.6	2.7	5.8	3.7	3.2	6.8	3.3	8.2	3.5	55.1
	Rain Days	16	12	20	10	6	16	16	14	15	12	19	15	171
2019	Inches	7.0	4.9	9.0	1.6	3.0	4.2	2.8	7.6	4.2	1.1	4.8	4.8	55.0
	Rain Days	20	15	16	8	11	18	12	20	15	11	19	20	185

Source: The Bermuda Weather Service

Chart 3.3
TOTAL NUMBER OF INCHES OF RAINFALL AND RAIN DAYS, 2015-2019



Source: The Bermuda Weather Service

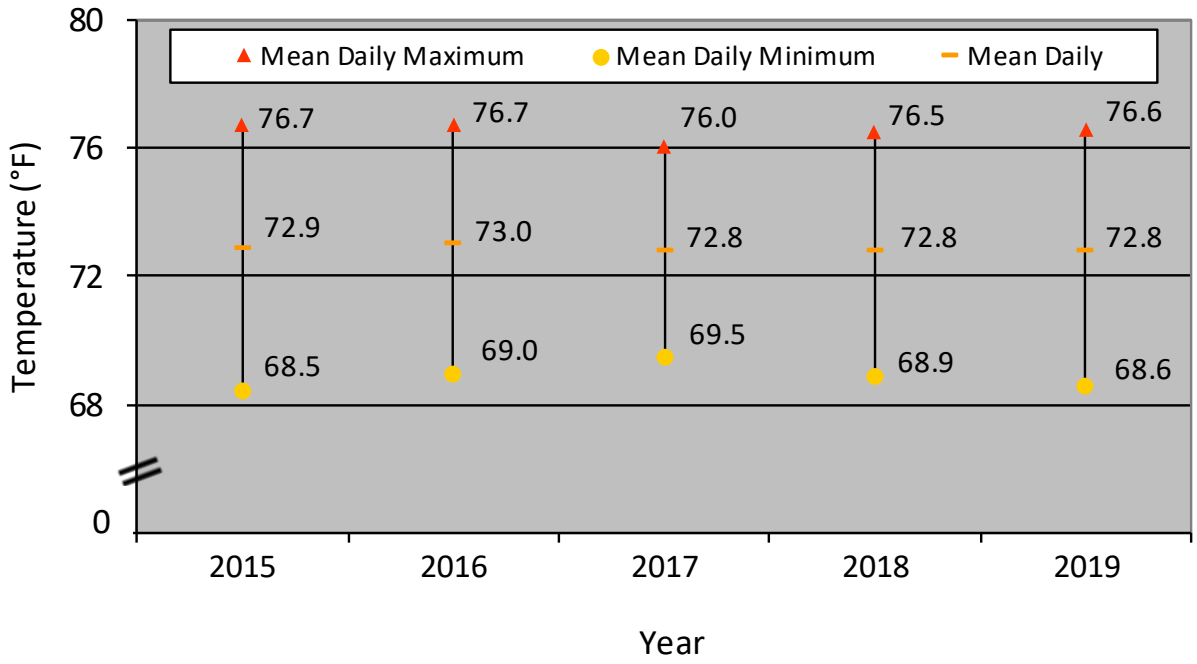
Table 3.3
MEAN DAILY MAXIMUM, MINIMUM AND DAILY AIR TEMPERATURE, 2015-2019

(°F)

Year		Month												Yearly Averag
		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
2015	Mean Daily Max.	70.6	67.7	68.9	71.7	75.4	82.1	85.8	85.3	84.4	79.9	75.3	73.4	76.7
	Mean Daily Min.	61.9	58.5	60.6	63.6	68.5	74.6	71.1	77.9	77.1	72.7	68.7	66.2	68.5
	Mean Daily	66.6	63.4	64.8	67.8	71.6	78.2	81.4	81.7	80.7	76.5	72.1	70.0	72.9
2016	Mean Daily Max.	70.4	69.4	71.2	71.6	76.9	80.6	85.4	86.5	84.8	79.9	72.7	71.2	76.7
	Mean Daily Min.	62.6	61.1	63.1	63.8	69.5	73.5	77.9	78.2	76.8	72.8	65.0	63.5	69.0
	Mean Daily	66.6	65.6	67.6	67.9	73.3	76.9	81.5	82.3	81.2	76.4	69.2	67.5	73.0
2017	Mean Daily Max.	69.4	68.9	67.0	71.9	68.7	82.2	85.6	86.4	84.2	79.6	76.1	72.4	76.0
	Mean Daily Min.	61.8	60.4	58.8	64.4	76.8	74.3	77.4	78.3	77.3	71.7	67.8	64.4	69.5
	Mean Daily	65.9	64.9	62.9	67.9	72.3	78.1	81.7	82.5	80.8	75.9	72.0	68.6	72.8
2018	Mean Daily Max.	68.8	70.9	67.8	72.3	78.3	81.5	83.4	85.8	84.7	79.2	75.1	70.7	76.5
	Mean Daily Min.	61.5	63.9	59.0	64.4	70.6	74.2	75.9	78.2	76.1	71.7	68.0	63.3	68.9
	Mean Daily	65.4	67.1	64.0	68.4	74.2	77.8	79.7	82.0	80.6	75.6	71.7	67.5	72.8
2019	Mean Daily Max.	68.8	68.8	68.8	72.6	76.1	81.7	85.4	86.5	84.2	79.8	75.5	70.4	76.6
	Mean Daily Min.	60.8	60.6	61.0	64.8	67.9	74.1	77.3	77.9	76.5	72.5	67.3	62.5	68.6
	Mean Daily	65.4	65.1	65.0	68.7	72.1	77.8	81.5	82.5	80.2	76.0	71.7	67.1	72.8

Source: The Bermuda Weather Service

Chart 3.4
MEAN DAILY MAXIMUM, MINIMUM AND DAILY AIR TEMPERATURE, 2015-2019



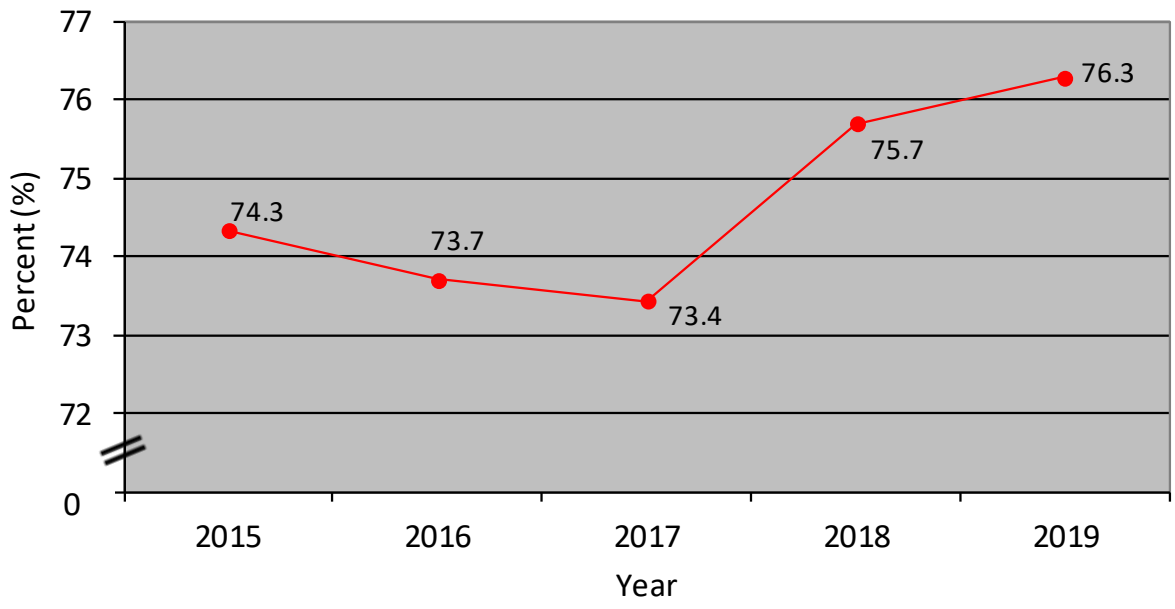
Source: The Bermuda Weather Service

Table 3.4
MEAN RELATIVE HUMIDITY, 2015-2019

Year	Month												(%) Yearly Average
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	
2015	70.2	70.8	69.6	74.2	73.5	79.2	75.7	76.6	76.0	76.9	71.3	77.9	74.3
2016	72.3	73.8	74.9	71.6	80.2	79.4	77.4	73.8	74.9	70.7	64.3	71.2	73.7
2017	74.3	69.9	66.4	71.0	74.2	78.2	76.1	74.3	73.4	74.0	77.2	72.1	73.4
2018	73.1	78.3	69.8	78.1	79.7	80.9	80.4	75.5	75.2	70.0	75.7	71.1	75.7
2019	75.8	75.9	77.3	75.4	74.7	82.2	76.9	78.7	75.6	74.3	75.9	73.3	76.3

Source: The Bermuda Weather Service

Chart 3.5
MEAN RELATIVE HUMIDITY, 2015-2019



Source: The Bermuda Weather Service

SECTION 4

NATURAL AND ENVIRONMENTAL DISASTERS

Occurrences of natural and environmental disasters are very rare in Bermuda.

Hurricanes

• One hurricane, Humberto, affected Bermuda in 2019 causing $25M in damages and 80% (49,356) of customers lost electricity (Table 4.1).

Fires

• In 2019, there were 2,620 reported incidences of fire in Bermuda. This represented a 24.6% increase from the 2,102 reported incidences in 2018 (Table 4.2).

• In 2019, most of the fires (41.3%) were classified as "Structural" fires (Table 4.2).

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.

Types of Disaster: Avalanches, floods, earthquakes, hurricanes, torrential rains, volcanic eruptions, droughts, landslides, mudslides, fires, blizzards, tsunamis, etc.

Source: CARICOM Environment Programme

Table 4.1
NATURAL DISASTERS, 2019

Item	
Type of disaster	Hurricane
Date started	18-Sep-19
Total casualties:	—
of which: dead	—
Total population affected [1]	49,356
Damage ($ million) [2]	25

Source: Bernews

[1] Bermuda Electric Company - 80% of customers

[2] Insured Loses

Table 4.2
INCIDENCES OF FIRE BY TYPE, 2015-2019

		Type					
Year	Total	Minor Incidents[1]	Structure[2]	Island Fires	Vehicle	Boat Fires	Other[2,3]
2015	1,875	318	933	..	26	..	598
2016	2,033	298	1,069	..	18	..	648
2017	2,033	337	1,049	..	18	..	629
2018	2,102	384	1,109	..	15	..	594
2019	2,620	553	1,081	..	28	..	958

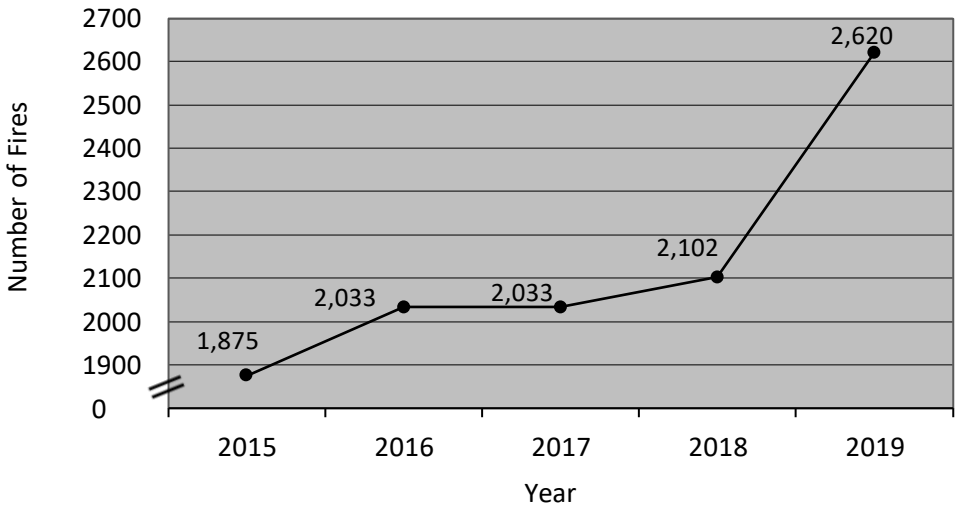
Source: Bermuda Fire and Rescue Service

[1] Includes brush, trash, gas cylinder leaks, oil spills, floodings, pole fires, etc.

[2] Includes false alarms.

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

Chart 4.1
TOTAL INCIDENCES OF FIRES, 2015-2019



Source: Bermuda Fire and Rescue Service

SECTION 5

ENERGY, MINERALS AND TRANSPORT

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

Fuel

• In 2019, the value of imported petroleum oils and oils from bituminous minerals, other than crude imported into Bermuda, was $97.6 million, a decrease of 22.4 percent from the total value imported in 2018 (Table 5.1).

• The quantity of gas oils (diesel) decreased to 28.8 million kg in 2019, a decrease of 22.4 percent over the previous year (Table 5.1).

• Both the value and quantity of kerosene & other medium oils (not including gas oils) decreased from 2018 to 2019, with the value decreasing more rapidly. (Table 5.1).

Mineral Fuels

• In 2019, the value of imported mineral fuels, mineral oils and related products fell to $100.3 million. This is a 56.9% decrease from the $232.5 million imported in 2018 (Table 5.2).

Electricity

• Total electricity consumption in 2019 dropped to approximately 554 million kWh from 568 million kWh in 2018. The commercial sector accounted for just under half (47.6%) of all electricity consumed in Bermuda (Table 5.3).

Transport

• In 2019, there were 49,647 registered road vehicles in Bermuda. Private cars accounted for nearly half (44.8%) of this total, while just over one-third (36.0%) were motorcycles and scooters (Table 5.6).

Table 5.1
VALUE AND QUANTITY OF IMPORTED FUEL[1] BY TYPE, 2017-2019

Type	2017 Value ($)	2017 Quantity (kg)	2018 Value ($)	2018 Quantity (kg)	2019 Value ($)	2019 Quantity (kg)
Total	102,503,736	226,371,307	125,771,352	224,051,499	97,593,222	184,782,215
Percentage change (%)	+20.1	+26.5	+22.7	-1.0	-22.4	-17.5
Light oils and preparations (i.e. motor spirits)	16,070,815	18,204,666	21,151,146	21,472,971	13,504,338	13,819,065
Gas oils (diesel)	39,203,843	69,961,446	26,399,712	37,088,222	20,757,302	28,793,199
Gas oils (heavy	2,015	213	-	-	-	-
Kerosene and other (not including gas oils)	8,237,528	15,387,924	21,034,479	30,170,302	14,474,603	25,851,350
Fuel oils not elsewhere	35,144,801	122,073,991	54,250,523	134,601,158	45,794,276	115,422,850
Other lubricating oils and	3,723,735	733,046	2,916,711	713,767	3,045,498	891,539
Other waste oils	120,999	10,021	18,781	5,080	17,205	4,213

Source: Department of Statistics

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

Table 5.2
VALUE AND QUANTITY OF IMPORTED MINERAL FUELS, MINERAL OILS AND RELATED PRODUCTS CONSUMED BY TYPE, 2017-2019

Type	2017 Value ($)	2017 Quantity (kg)	2018 Value ($)	2018 Quantity (kg)	2019 Value ($)	2019 Quantity (kg)
Total	106,840,391	232,510,172	129,818,819	240,463,839	100,302,740	199,736,387
Percentage change (%)	+21.6	+13.1	+21.5	+3.4	-22.7	-16.9
Coal, briquettes	97,505	5,666	36,956	15,921	14,301	8,125
Lignite	—	—	214	18	760	72
Peat	486,080	46,951	158,333	43,432	165,783	78,180
Coke and semi coke	48,082	30,049	82,437	49,623	46,019	30,786
Coal gas, water gas	—	—	2,027	50	—	—
Tar distilled	4,603	4,470	—	—	—	—
Oils and other products	49,347	615	3,275	702	1,967	626
Pitch and pitch coke	167	16	—	—	—	—
Petroleum oils	—	—	—	—	—	—
Petroleum oils other than crude	102,503,736	226,371,307	125,771,352	224,051,499	97,593,222	184,782,215
Petroleum gases & other gaseous hydrocarbons	2,614,178	4,389,752	3,215,651	15,538,081	1,560,651	13,825,338
Petroleum jelly	76,129	5,433	41,681	5,221	47,161	4,610
Petroleum coke	184,523	32,402	42,648	3,628	38,659	3,919
Other bitumen and asphalt	162,106	331,730	38,040	67,341	588,921	647,407
Bituminous mixtures	613,935	1,291,781	426,205	688,323	245,296	355,108
Electrical energy	—	—	—	—	—	—

Source: Department of Statistics

Table 5.3
ELECTRICITY CONSUMPTION BY TYPE OF CONSUMER, 2015-2019

Year	Total ('000 kWh)	Type		
		Residential ('000 kWh)	Commercial ('000 kWh)	Other[1] ('000 kWh)
2015	590,427	245,498	290,552	54,377
2016	585,774	245,105	286,588	54,081
2017	584,518	245,124	284,866	54,528
2018	567,827	240,302	274,770	52,755
2019	554,100	237,710	263,793	52,597

Source: Ascendant Group Limited

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

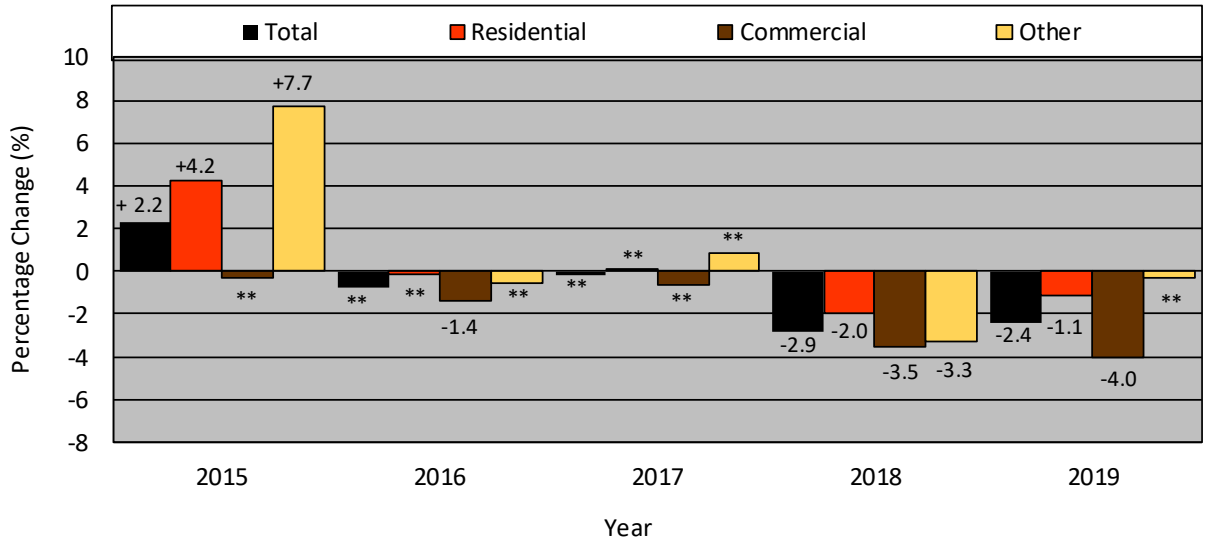
Table 5.4
GROWTH IN ELECTRICITY CONSUMPTION BY TYPE OF CONSUMER, 2015-2019

Year	Growth	Type		
	Electricity Consumptio	Residential Percentage	Commercial Percentage	Other[1] Percentage
2015	+2.2	+4.2	**	+7.7
2016	**	**	-1.4	**
2017	**	**	**	**
2018	-2.9	-2.0	-3.5	-3.3
2019	-2.4	-1.1	-4.0	-0.3

Source: Ascendant Group Limited

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

Chart 5.1
GROWTH IN ELECTRICITY CONSUMPTION BY TYPE OF CONSUMER AND TOTAL CONSUMPTION, 2015-2019



Source: Ascendant Group Limited

Table 5.5
PERCENTAGE OF TOTAL ELECTRICITY CONSUMPTION BY TYPE OF CONSUMER, 2015-2019

		Type		
Year	Total	Residential Percentage	Commercial Percentage	Other[1] Percentage
2015	100	41.6	49.2	9.2
2016	100	41.8	48.9	9.2
2017	100	41.9	48.7	9.3
2018	100	42.3	48.4	9.3
2019	100	42.9	47.6	9.5

Source: Ascendant Group Limited

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

Table 5.6
REGISTERED ROAD VEHICLES[1], 2015-2019

Type	Year 2015	2016	2017	2018	2019
Total	47,092	47,482	49,019	49,047	49,647
Percentage change (%)	+1.0	**	+3.2	**	+1.2
Private Cars	21,607	21,709	22,046	22,151	22,238
Buses, Minibuses & Limousines	208	225	250	258	292
Taxis	564	553	555	557	573
Trucks	3,583	3,624	3,742	3,762	3,778
Trailers	280	288	258	276	280
Farm Tractors	29	26	26	27	27
Ambulances & Fire Engines	45	46	47	48	46
Military Vehicles	33	36	42	49	47
Tractors & Tractor Trailers	319	262	254	241	324
Light Private Cars	76	73	71	63	64
Auxiliary Cycles[2]	4,074	3,933	3,925	3,547	3,351
Motor Cycles & Scooters	15,659	16,116	17,148	17,438	17,857
Construction Vehicles[3]	53	51	45	47	44
Government Private (GP) Vehicles[4]	244	241	272	246	245
Other[5]	318	299	338	337	481

Source: Transport Control Department

[1] Number of vehicles for which a valid license was in effect as of 31st December.

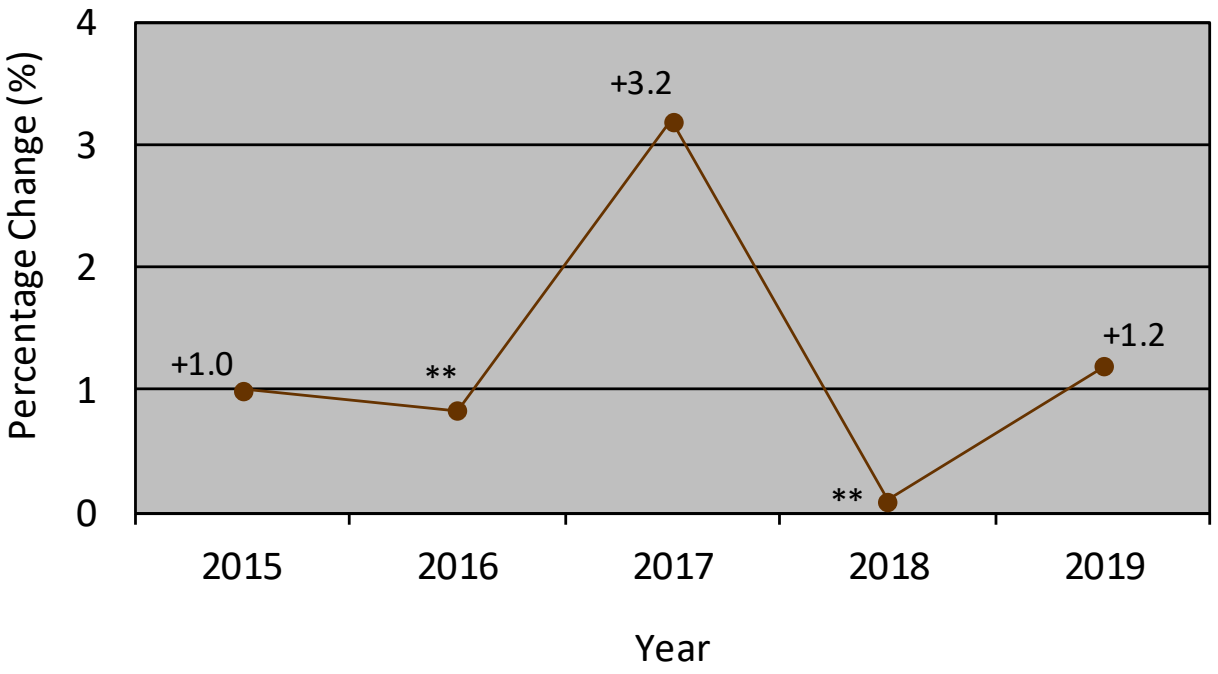
[2] Includes livery cycles.

[3] Includes cement mixers.

[4] Includes cars (classes A-H) and minibuses.

[5] Includes classic cars, community service vehicles, doctors' cars, garbage trucks, hearses, instructional vehicles, loaner vehicles, locomotives, police utility vehicles, public carriages and sporting associations.

Chart 5.2
PERCENTAGE CHANGE IN REGISTERED ROAD VEHICLES, 2015-2019



Source: Transport Control Department

SECTION 6

AGRICULTURE

The Agriculture Section includes tables and charts on the importation of fertilizers and pesticides to Bermuda.

Fertilizers and Pesticides

In 2019:

• the value of fertilizers imported into Bermuda totaled nearly $632 thousand for 285,545 kg, a 1.1% decrease from 2018 (Table 6.1).

• other fertilizers accounted for two thirds (66.6%) of the total value of fertilizers imported to Bermuda (Table 6.1).

• the total value of pesticides imported into Bermuda rose to approximately $2.1 million for 360,631 kg, a 5.9% increase from 2018 (Table 6.2).

• insecticides accounted for over one-third (39.5%) of the total value of imported pesticides (Table 6.2).

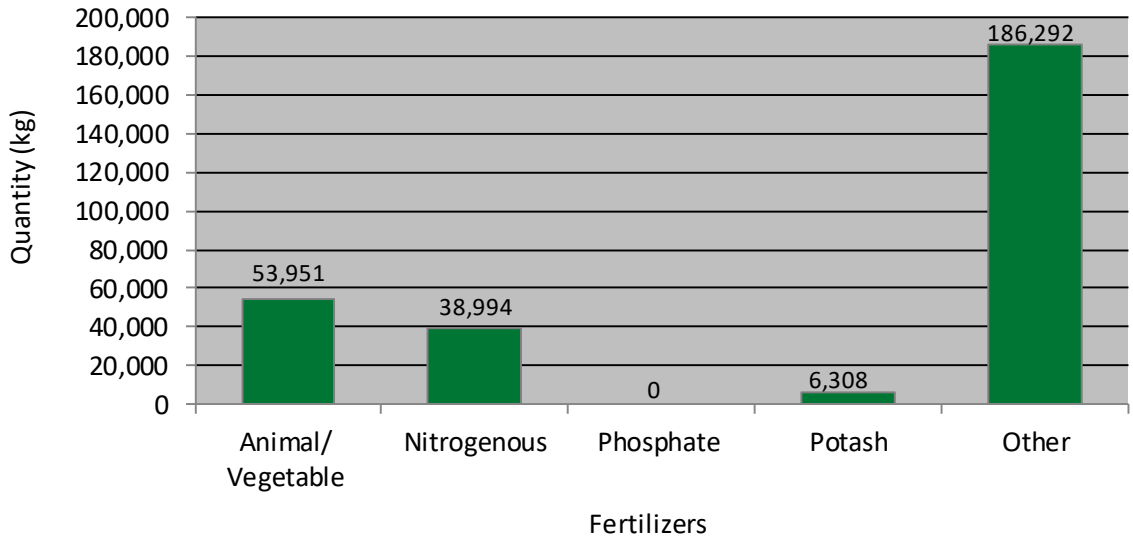
Table 6.1
IMPORTED FERTILIZERS BY TYPE, 2017-2019

Category	2017 Value ($)	2017 Quantity (kg)	2018 Value ($)	2018 Quantity (kg)	2019 Value ($)	2019 Quantity (kg)
Total	905,296	226,284	638,810	284,394	631,678	285,545
Percentage change (%)	+66.9	-26.8	-29.4	+25.7	-1.1	+0.4
Animal/Vegetable fertilizers	155,703	49,108	150,552	69,439	129,279	53,951
Nitrogenous fertilizers	85,013	29,098	153,880	67,578	77,176	38,994
Phosphate fertilizers	6,721	1,935	9,680	9	0	0
Potash fertilizers	158	50	716	62	4,448	6,308
Other fertilizers [1]	657,701	146,093	323,982	147,306	420,774	186,292

Source: Department of Statistics

[1] Other fertilizers include mixtures of two or three of the fertilizing elements nitrogen, phosphorus or potassium.

Chart 6.1
IMPORTED FERTILIZERS BY TYPE, 2019



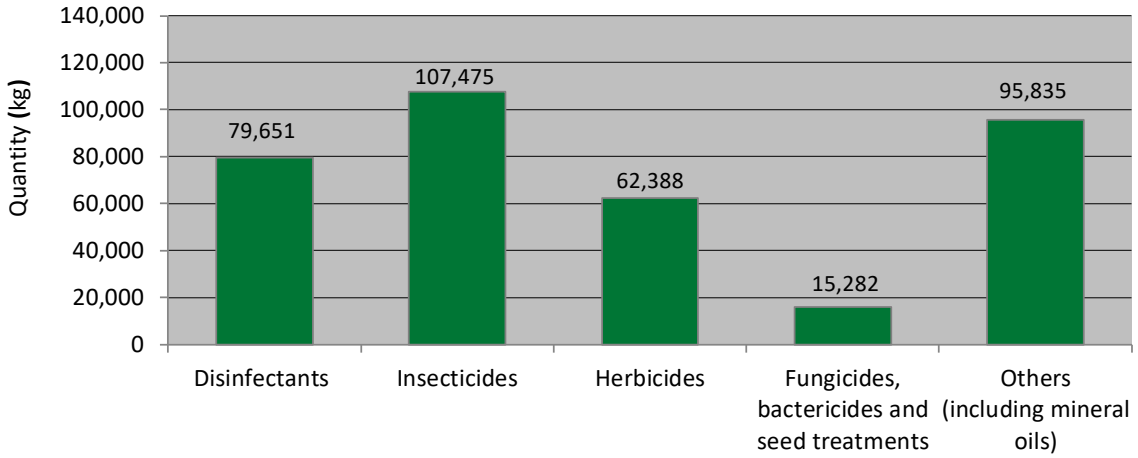
Source: Department of Statistics

Table 6.2
IMPORTED PESTICIDES BY TYPE, 2017-2019

Category	2017 Value ($)	2017 Quantity (kg)	2018 Value ($)	2018 Quantity (kg)	2019 Value ($)	2019 Quantity (kg)
Total	2,816,075	378,677	1,963,623	344,427	2,079,537	360,631
Percentage change (%)	+38.7	-42.9	-30.3	-9.0	+5.9	+4.7
Disinfectants	1,064,364	91,826	623,956	74,870	677,375	79,651
Insecticides	848,090	114,094	769,367	112,743	821,973	107,475
Herbicides	297,809	52,154	279,645	48,745	305,915	62,388
Fungicides, bactericides and seed treatments	299,155	41,097	75,096	8,851	80,377	15,282
Others (including mineral oils)	306,657	79,506	215,559	99,218	193,896	95,835

Source: Department of Statistics

Chart 6.2
IMPORTED PESTICIDES BY TYPE, 2019



Source: Department of Statistics

SECTION 7

LAND USE

The data in the Land Use Section was collected in 2001 and 2016, respectively by the Department of Planning and has not been updated.

Land Use

• Residential land occupied 46.7 percent of all land in Bermuda, covering roughly 6,210 acres of land (Table 7.1).

• 4,335 acres were dedicated to open space land use which is comprised of nature reserves, rural areas, golf courses, recreational spaces and other open spaces. This represents nearly one-third (32.6%) of Bermuda's land (Table 7.1).

• Land used for commercial purposes (such as retail and office space) accounted for 2.0 percent of all occupied land space in Bermuda (Table 7.1).

Parishes

• A comparison of land use by parish showed that St. George's holds the largest share of land (2,162.7 acres) and Pembroke has the least (1,170.3 acres) (Table 7.2.1).

Municipalities

• Among the two municipalities, the City of Hamilton occupies the least amount of land in Bermuda (176.3 acres) and the Town of St. George holds the most (341.0 acres) (Table 7.2.1).

Note: The Land Use Section uses data collected from the Department of Planning, Land Use Survey 2001 and 2016, respectively. In some tables, figures will not be comparable.

Table 7.1
LAND USE, 2019

Main Use	Sub-Category	Total Area (Acres)	Percentage Distribution
Total		13,298.4	100.0
Residential	Total	6,209.8	46.7
	Housing	5,924.1	44.5
	Condos	257.7	1.9
	Institutional	28.0	**
Open space	Total	4,335.0	32.6
	Nature reserve	1,231.4	9.3
	Rural	1,088.7	8.2
	Other	960.7	7.2
	Golf courses	790.1	5.9
	Recreation	264.1	2.0
Utilities	Total	752.0	5.7
	Airport	548.6	4.1
	Waste	89.7	**
	Transport	44.0	**
	BELCO	37.9	**
	Docks	31.8	**
Institutional	Total	580.6	4.4
	Education	258.0	1.9
	Religious	106.0	**
	Government	78.1	**
	Police	31.5	**
	Hospital	34.7	**
	Prison	29.3	**
	Social	43.0	**
Tourism	Total	293.2	2.2
	Cottage colonies	185.4	1.4
	Hotels	107.8	**
Industrial	Total	313.4	2.4
	General	197.9	1.5
	Light industrial	65.2	**
	Quarry	50.3	**
Vacant	Total	553.7	**
	Vacant land	506.2	4.2
	Vacant buildings	47.5	3.8
Commercial	Total	260.7	2.0
	Retail	144.8	1.1
	Office	64.4	**
	Mixed-use	51.5	**

Source: Department of Planning, Land Use Survey 2016

The 2016 Land Use Survey was based on the 2012 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 time mark) in 2007 as a result of the more accurate 2003 Topographic Mapping Database.

Note: The Land Use Section uses data collected from the Department of Planning, Land Use Survey 2001 and 2016, respectively. In some tables, figures will not be comparable.

Table 7.2.1
LAND USE BY PARISH, CITY AND TOWN IN ACRES, 2019

Main Use / Sub-Category	Parish/Town/City										
	St. George's	Town of St. George	Hamilton	Smith's	Devonshire	Pembroke	The City of Hamilton	Paget	Warwick	South-ampton	Sandy's
Total	2,162.7	341.0	1,312.2	1,216.3	1,221.4	1,170.3	176.3	1,303.0	1,415.4	1,511.7	1,438.4
Residential	450.3	98.6	585.4	709.7	562.4	758.1	27.4	803.6	707.0	610.7	669.5
Housing	444.2	95.9	570.1	696.0	527.2	742.8	25.7	780.0	686.2	586.1	645.4
Condos	6.1	2.7	15.3	10.6	28.0	11.9	—	21.8	20.8	24.6	20.4
Institutional	—	—	—	3.1	7.2	3.5	1.7	1.8	—	—	3.7
Open space	715.6	138.8	611.3	432.7	499.3	132.3	7.9	296.8	584.8	614.4	383.0
Nature reserve	296.4	8.4	156.2	106.0	163.7	74.0	6.4	70.3	164.5	104.3	107.8
Other	218.9	30.2	167.9	75.3	57.0	25.4	1.5	59.3	65.3	121.7	124.0
Golf courses	139.5	79.7	127.7	—	76.6	—	—	10.8	171.0	198.1	5.4
Recreation	36.0	—	9.1	24.8	35.4	27.3	—	4.2	53.4	16.9	33.9
Rural	24.9	20.4	150.4	226.6	166.6	5.7	—	152.2	130.7	173.5	111.9
Utilities	606.2	9.4	10.8	6.7	23.5	23.5	26.4	—	—	4.7	20.2
Airport	548.4	—	—	—	—	—	—	—	—	—	—
Waste	37.0	2.4	10.8	—	14.1	—	—	—	—	—	2.7
Transport	10.2	3.2	—	—	5.0	3.2	16.1	—	—	3.3	2.5
Docks	6.5	3.7	—	—	—	—	10.3	—	—	—	15.1
BELCO	4.1	—	—	6.7	4.4	20.3	—	—	—	1.4	—
Institutional	48.1	33.9	13.0	15.8	72.6	96.2	29.9	66.4	54.6	30.7	60.6
Education	27.3	20.4	8.9	11.3	36.0	47.8	4.4	27.9	28.0	17.0	25.3
Police	15.5	0.5	—	—	9.3	1.3	1.1	—	9.0	6.8	15.4
Religious	2.3	10.0	4.1	4.5	5.0	15.7	6.6	10.3	10.3	6.9	11.9
Prison	1.5	—	—	—	—	2.8	5.3	4.6	2.6	—	—
Government	1.5	2.9	—	—	11.0	25.5	12.5	8.9	—	—	1.2
Hospital	—	—	—	—	11.3	—	—	14.7	—	—	3.2
Social	—	—	—	—	—	3.2	—	—	4.7	—	3.7

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 13,430.4 acres (low time mark) in 2007 as a result of the more accurate 2003 Topographic Mapping Database.

Note: The Land Use Section uses data collected from the Department of Planning, Land Use Survey 2001 and 2016, respectively. In some tables, figures will not be comparable.

Table 7.2.2
LAND USE BY PARISH, CITY AND TOWN IN ACRES, 2019

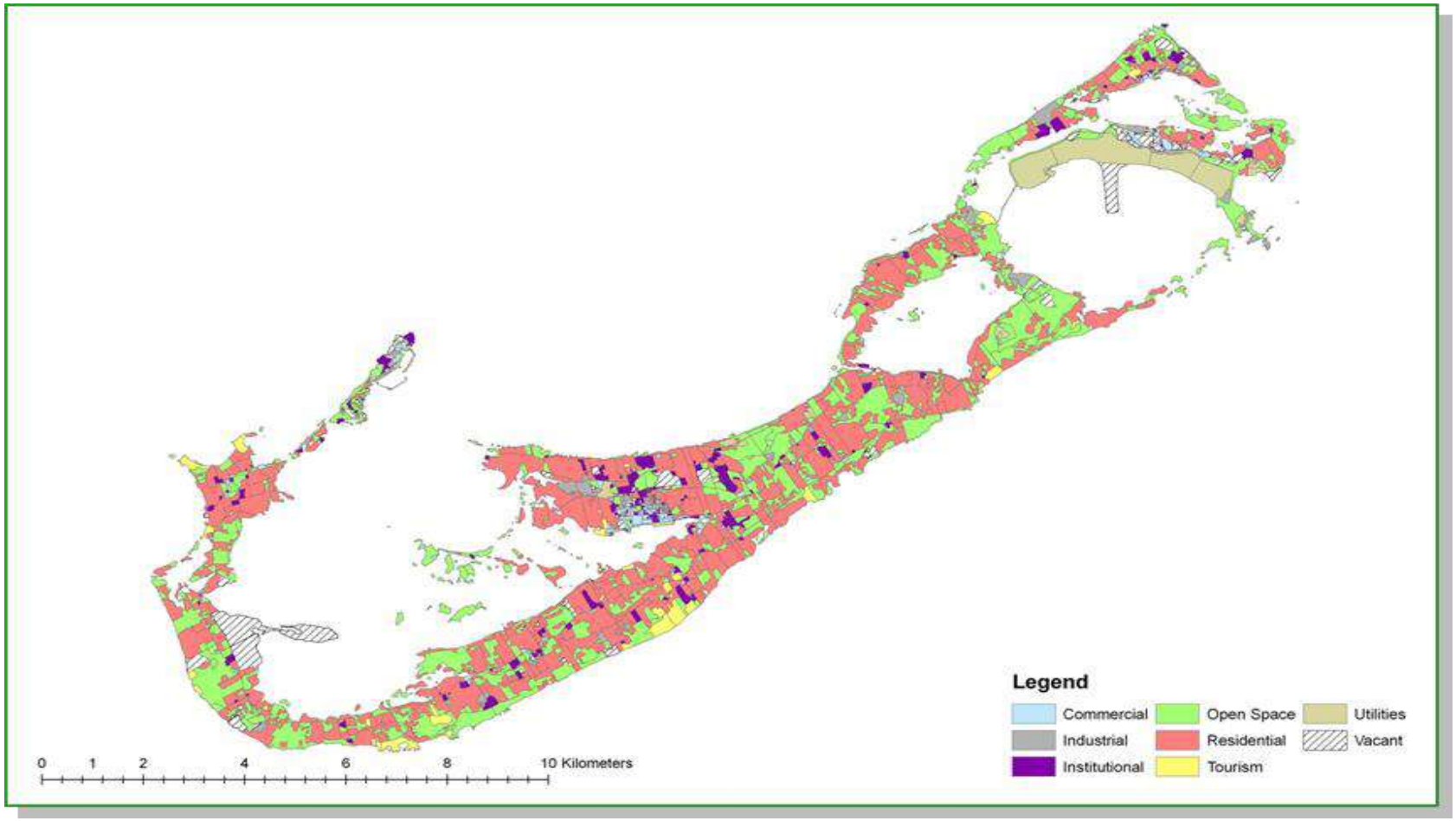
Main Use / Sub-Category	Parish/Town/City										
	St. George's	Town of St. George	Hamilton	Smith's	Devonshire	Pembroke	The City of Hamilton	Paget	Warwick	South-ampton	Sandy's
Tourism	4.0	10.2	18.7	15.3	14.2	15.7	—	112.1	8.7	88.7	44.7
Cottage colonies	4.0	10.2	18.7	15.3	14.2	3.0	—	62.4	8.7	23.6	44.7
Hotels	—	—	—	—	—	12.7	—	49.8	—	65.2	—
Industrial	99.6	8.9	47.5	21.1	18.9	55.6	12.3	4.1	18.0	21.8	13.9
General	66.6	1.3	11.5	9.5	11.3	52.9	6.0	0.7	7.8	18.9	13.9
Light industrial	33.0	7.6	—	—	7.5	2.7	6.4	3.4	1.0	2.9	—
Quarry	—	—	36.0	11.6	—	—	—	—	9.2	—	—
Vacant	206.5	29.1	14.0	12.2	19.5	60.5	3.6	3.1	30.8	130.2	219.4
Vacant land	155.4	10.3	—	12.2	19.5	60.5	3.6	—	21.3	130.2	197.1
Vacant buildings	51.2	18.8	14.0	—	—	—	—	3.1	9.5	—	22.3
Commercial	32.5	10.6	11.01	2.9	10.8	27.2	66.8	16.4	9.1	10.2	27.0
Office	19.0	—	—	—	4.2	15.1	16.9	6.6	—	—	—
Retail	13.5	6.3	11.01	2.9	6.6	12.1	17.7	9.8	9.1	10.2	27.0
Mixed-use	—	4.3	—	—	—	—	32.2	—	—	—	—

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 13,430.4 acres (low time mark) in 2007 as a result of the more accurate 2003 Topographic Mapping Database.

Note: The Land Use Section uses data collected from the Department of Planning, Land Use Survey 2001 and 2016, respectively. In some tables, figures will not be comparable.

Map 7.1
LAND USE SURVEY, 2019



Source: Department of Planning

SECTION 8

COASTAL AND MARINE RESOURCES

This Section includes information on various marine areas by name, location, 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

• Bermuda's total marine area covers 4,236.1 km^2, of which 7.0% or 294.7 km^2 is classified as protected marine area (Table 8.1 and Chart 8.1).

• There are 29 protected dive sites located in Bermuda covering an area of 13.9 km^2 (Table 8.2).

• A total of 12 marine parks have been established in Bermuda covering an area of 1.9 km^2 (Table 8.2).

• There are two fisheries seasonal protected areas that measure 153.4 km^2 (Table 8.2).

• Two coral reef preserves occupy a total of 131.1 km^2 (Table 8.2).

Fisheries

• Fish landings, excluding bait and shellfish, totaled 306.6 metric tonnes (mT) in 2019, a increase of 3.8% from 2018 (Table 8.4).

• Tuna and pelagic group remained the most popular catch at 160.2 mT, an increase of 19.6% from 2018.

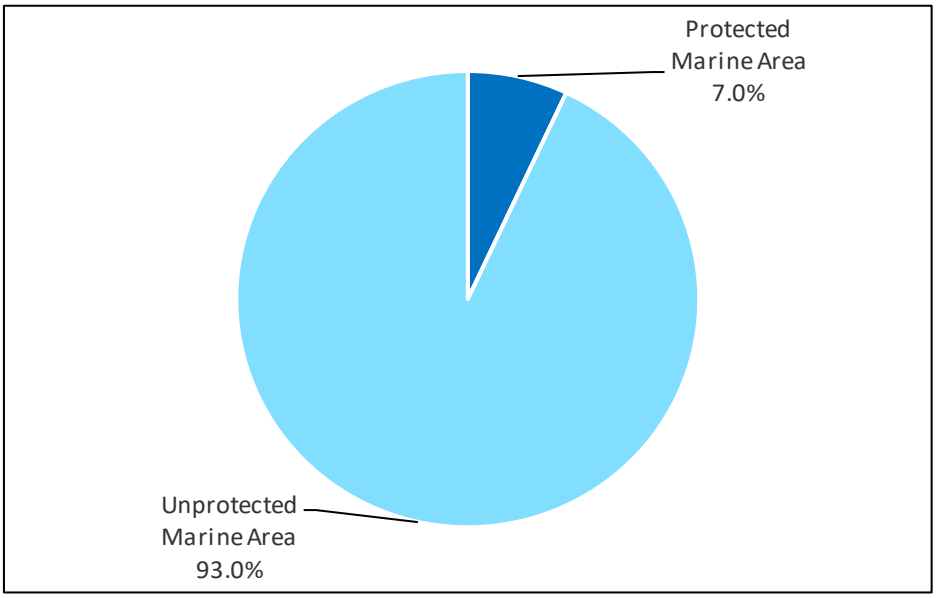
• In 2019, 309 registered fishermen spent a total of 68,868 hours at sea. There was a 1.9% decrease in registered fishermen which accounted for 3,363 less hours spent at sea (Table 8.5).

Table 8.1
TOTAL AND PROTECTED MARINE AREA, 2019

Indicator	
Total land and marine area (km^2)	4,289.7
Total marine area (km^2)	4,236.1
Protected marine area (km^2)	294.7
Protected marine area as a % of total marine area	7.0
Protected marine area as a % of total land and marine area	6.9

Source: Department of Planning

Chart 8.1
PROTECTED MARINE AREA AS A PERCENTAGE OF TOTAL MARINE AREA, 2019



Source: Department of Planning

Table 8.2
MARINE PROTECTED AREAS BY CATEGORY AND AREA, 2019

Marine Protected Areas	Area (km^2)	Areas: Protected Dive Sites	Areas: (km^2)
Coral Reef Preserves			
Subtotal	131.1	Subtotal	13.7
North Shore Coral Reef Preserve	126.3	North Rock	3.1
South Shore Coral Reef Preserve	4.8	SW Breaker	1.1
		Eastern Blue Cut	1.1
Fisheries Seasonal Protected Areas		Pelinaion	0.8
Subtotal	153.4	Hermes	0.8
South Western Area	114.7	Constellation	0.8
North Eastern Area	38.7	Cristobal Colon	0.3
		NE Breaker	0.3
Marine Parks		Taunton	0.3
Subtotal	1.9	Aristo	0.3
Castle Island Marine Park	0.7	Mills Breaker	0.3
South Shore Marine Park	0.4	Cathedral	0.3
Cooper's Island Marine Park	0.3	Kate	0.3
Walsingham Marine Park	0.2	Tarpon Hole	0.3
John's Smiths Bay Marine Park	0.1	Marie Celeste	0.3
Tobacco Bay Marine Park	0.1	North Carolina	0.3
Spittal Pond Marine Park	0.1	Airplane	0.3
Church Bay Marine Park	0.0	Blanche King	0.3
Astwood Bay Marine Park	0.0	Darlington	0.3
Shelly Bay Marine Park	0.0	L'Herminie	0.3
Daniel's Head Marine Park	0.0	Lartington	0.3
Somerset Long Bay Marine Park	0.0	Montana	0.3
		Snake Pit	0.3
		Hog Breaker	0.3
		Caraquet	0.3
		Madiana	0.3
		Commissioner's Point	0.1
		Xing Da	0.1
		Vixen	0.0

Marine Protected Areas	Area (km^2)
Merged marine protected areas (no overlaps)[1]	294.7
Territorial area (net)[2]	4,236.1

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 (5.3 km^2)

[2] Territorial area (net) means total water area and does not include the land area of 54.4 km^2.

Table 8.3.1
MARINE PROTECTED AREAS AROUND BERMUDA, 2019

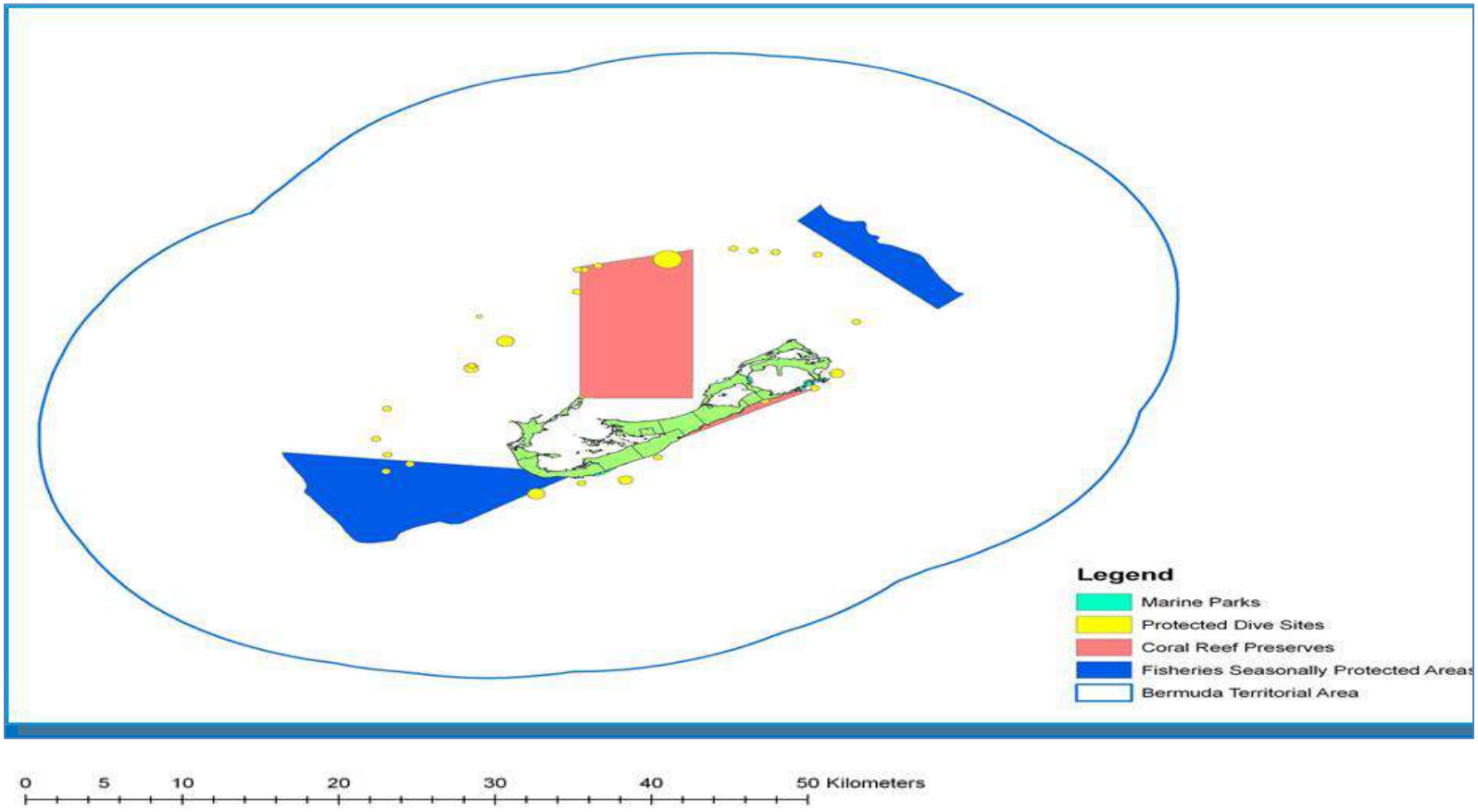
Marine Protected Area/ No-Take Reserve	Year Established	Anchoring Permitted	Scuba Diving Permitted?	No-Take Reserve?
North Shore Coral Reef Preserve	1966	Yes	Yes	Line fishing is permitted throughout this Preserve, as is lobster diving and spear fishing provided they are within the limits of the prevailing 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 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.
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, 2019

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	1989	No	Yes	Yes
Kate (Wreck)	1989	No	Yes	Yes
Hermes and Minnie Bressleur	1989	No	Yes	Yes
North Rock	1990	No	Yes	Yes
The North Eastern Area	1990 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

Source: Department of Environmental Protection

Map 8.1
MARINE PROTECTED AREAS, 2019



Source: Department of Planning

Table 8.4
QUANTITY OF FISH LANDINGS BY TYPE, 2015-2019

Species Group (mT)	Year 2015	2016	2017	2018	2019
Total including bait and shellfish	402.3	402.9 r	385.0	353.8	376.6
Percentage change (%)	-1.5	+0.2 r	-4.4 r	-8.1	+6.4
Total fish	333.1	331.9	320.7	295.5	306.6
Tuna and pelagic	136.4	142.8	151.5	133.9	160.2
Groupers	70.8	64.0	45.1	55.2	49.4
Jacks and related species	58.4	53.2	41.0	40.7	41.6
Snappers	39.7	47.9	53.5	42.1	37.1
Miscellaneous	24.0	18.8	25.2	20.6	15.3
Sharks	3.9	5.2	4.4	3.1	3.0
Bait	31.5	37.9	35.5	32.2	37.6
Shellfish[1]	37.7	33.1	28.8	26.2	32.4

Source: Department of Environmental and Natural Resources, Marine Management Section

[1] Shellfish includes spiny lobster.

Table 8.5
TOTAL CATCH BY HOURS AT SEA, AVERAGE CATCH OF FISHING AREA AND NUMBER OF REGISTERED FISHERMEN, 2015-2019

Indicators	Year				
	2015	2016	2017	2018	2019
Total catch[1] (mT)	402.3	402.9 r	385.0	353.8	376.6
Percentage change (%)	-1.5	+0.2 r	-4.4 r	-8.1	+6.4
Average catch of fishing area[2] (mT per km^2)	0.1	0.1	0.1	0.1	0.1
Total hours at sea	77,112.0	67,709.0	74,019.0	72,231.0	68,868.0
Percentage change (%)	+1.0	-12.2	+9.3	-2.4	-4.7
Total number of licences[3]	183	176	174	168.0	167.0
Percentage change (%)	+2.8	-3.8	-1.1	-3.4	-0.6
Total hours at sea per licence	421.4	384.7	425.0	430.0	412.0
Percentage change (%)	-11.2	-8.7 r	+10.5 r	+1.2	-4.2
Total registered fishermen	300.0	277.0	325.0	315.0	309.0
Percentage change (%)	+2.4	-7.7	+17.3	-3.1	-1.9

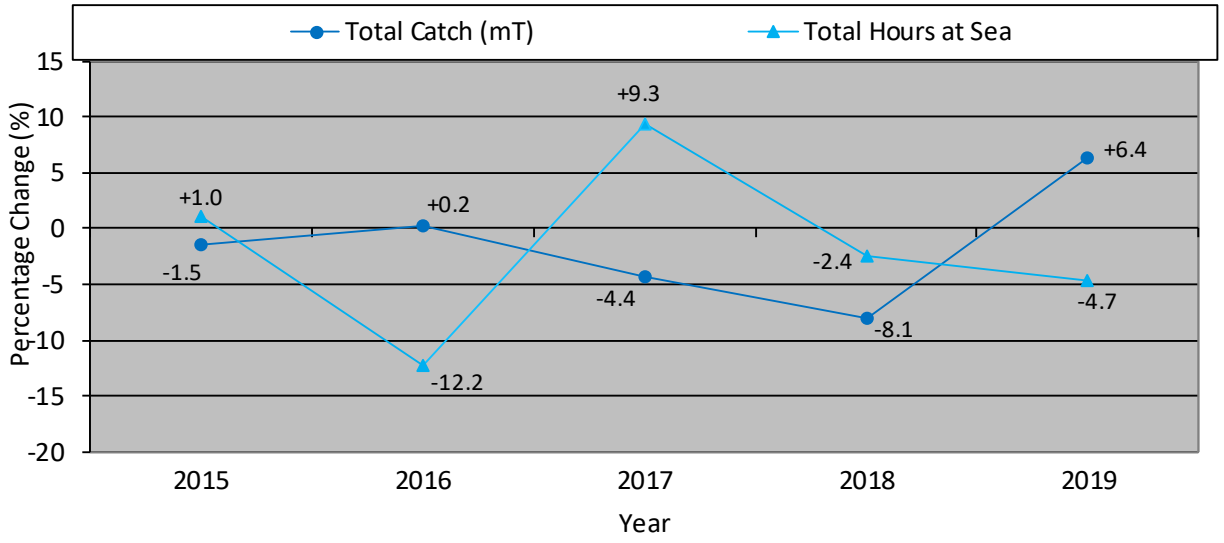
Source: Department of Environmental and Natural Resources, Marine Management Section

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

[2] Total fishing area is estimated as 4,236.1 km^2 (Department of Planning, see Table 8.1). Fishing area includes the fisheries seasonal protected areas (153.4 km^2) which are closed between May 1st and August 31st.
Computation: Average catch of fishing area = Total catch (mT) / Total estimated fishing area of 4,236.1 km^2.

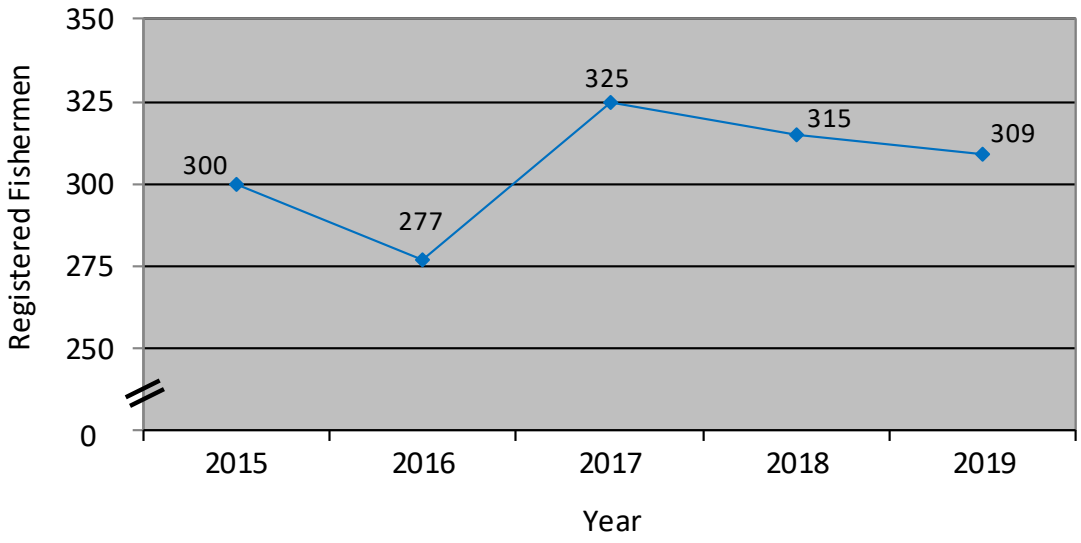
[3] Some licences have a smaller ancillary vessel attached.

Chart 8.2
GROWTH IN TOTAL CATCH AND TOTAL HOURS AT SEA, 2015-2019



Source: Department of Environmental Protection, Marine Resources Section

Chart 8.3
NUMBER OF REGISTERED FISHERMEN, 2015-2019



Source: Department of Environmental Protection, Marine Resources Section

Table 8.6
NUMBER OF HOUSEHOLDS AND POPULATION OF COASTAL AREAS FOR CENSUS YEARS 1980, 1991, 2000, 2010 AND 2016

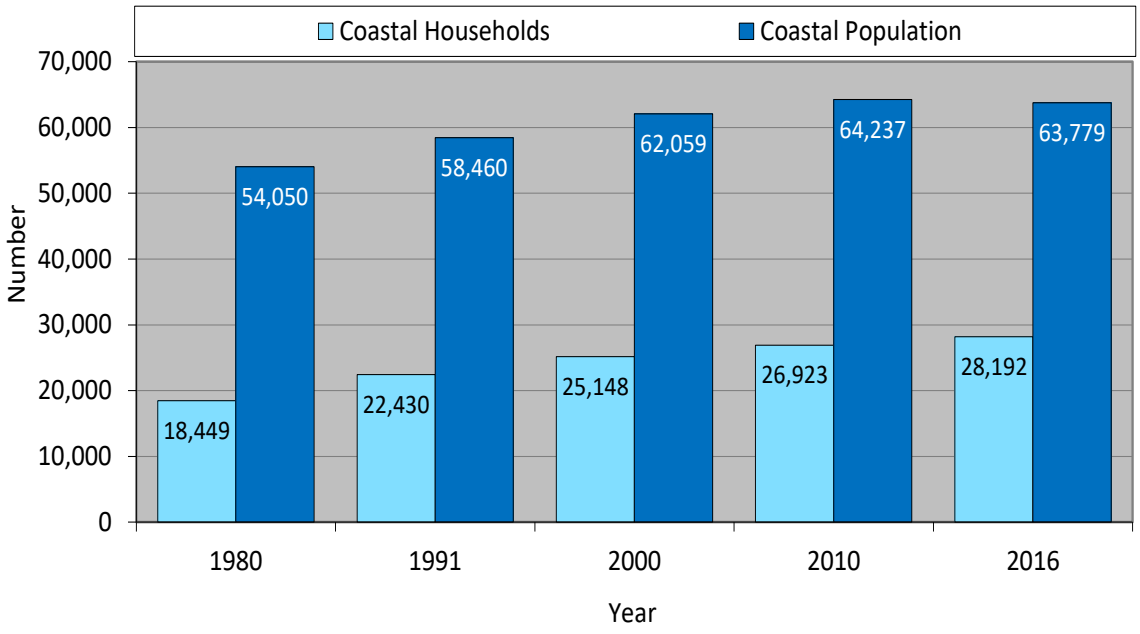
Indicators	Census Years				
	1980	1991	2000	2010	2016
Number of households in coastal areas	18,449	22,430	25,148	26,923	28,192
Ten-year growth rate (%)	..	+21.6	+12.1	+7.1	+4.7
Population in coastal areas [1]	54,050	58,460	62,059	64,237	63,779
Ten-year growth rate (%)	..	+8.2	+6.2	+3.5	**

Sources: 1980 to 2016 Population and Housing Censuses

[1] Does not include the non-sheltered and institutionalized populations.

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

Chart 8.4
NUMBER OF HOUSEHOLDS AND POPULATION OF COASTAL AREAS FOR CENSUS YEARS 1980, 1991, 2000, 2010 AND 2016



Sources: 1980 to 2016 Population and Housing Censuses

SECTION 9

BIODIVERSITY

The Biodiversity Section contains information on the protected land areas in Bermuda such as; protected coastal reserves, protected open space, historical cove areas and parks.

Protected Area: Land and Water

• Bermuda's protected area, inclusive of land and water, totals 319.6 km^2 This represents 7.5 percent of the total area (6.9% water and 0.6% land) (Table 9.1).

• As a proportion of the total land area (53.6 km^2), protected land area represents 46.5 percent or 24.9 km^2. Protected water area represents 7.0 percent of 294.7 km^2 of the total water area (Table 9.1).

NOTE TO READER

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

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

Protected Area: is 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, natural and associated cultural resources and managed through legal

Category Ia: Strict Nature Reserve

Category Ib: Wilderness Area

Category II: National Park

Category III: National 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 off-shore territorial waters (= total land area + water).

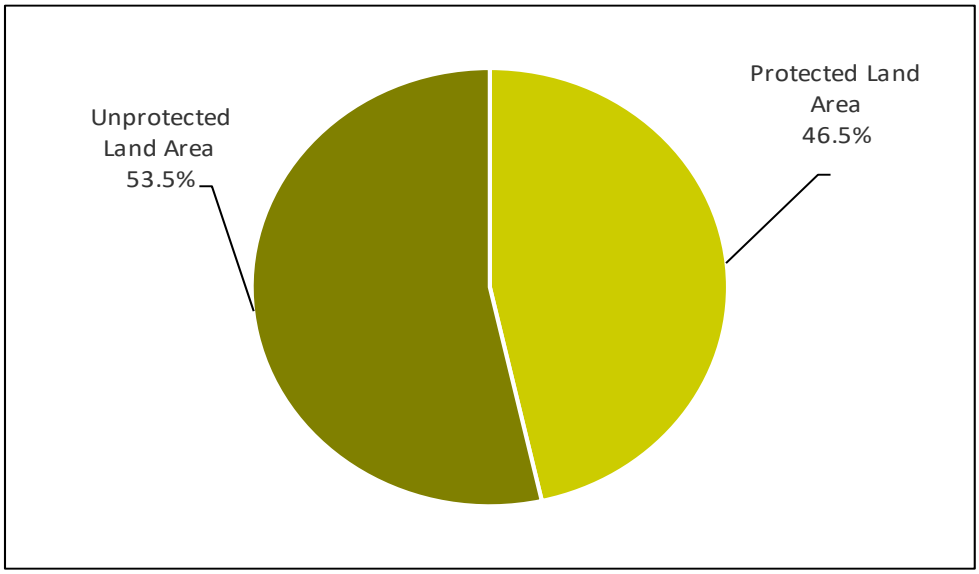
Source: CARICOM Environment Programme

Table 9.1
PROTECTED AREAS, 2019

Category	
Total area (km^2)	4,289.7
Total land area (low tide mark) (km^2)	53.6
Total water area (km^2)	4,236.1
Protected land area (km^2)	24.9
Protected land area as a % of total land area	46.5
Protected land area as a % of total area	**
Protected water area (km^2)	294.7
Protected water area as a % of total water area	7.0
Protected water area as a % of total area	6.9
Total protected area (land and water) (km^2)	319.6
Total protected area as a % of total area	7.5

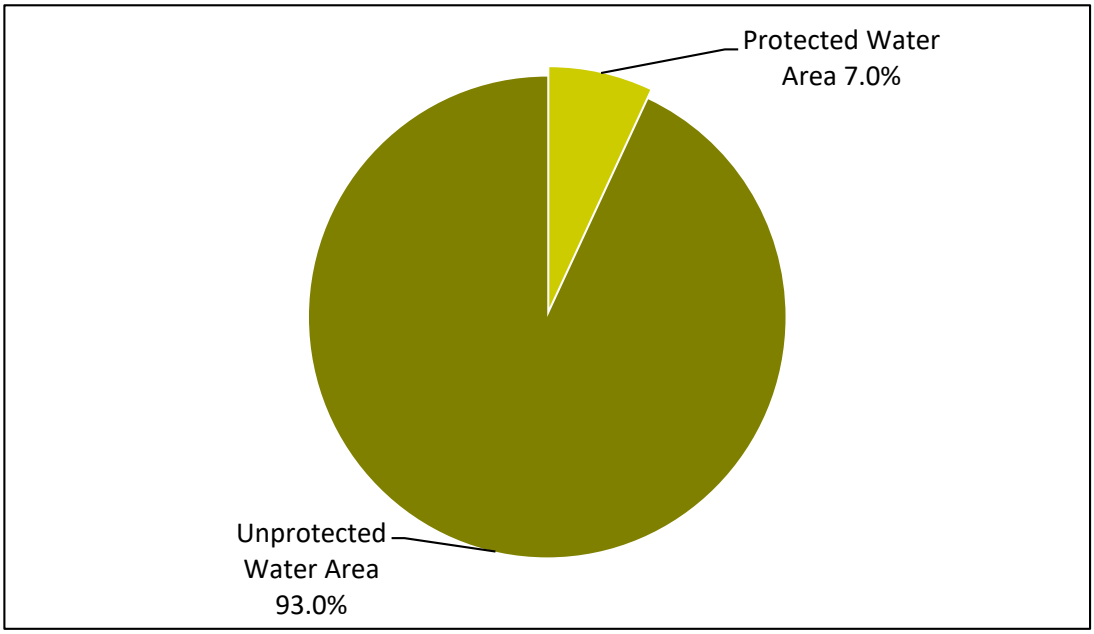
Source: Department of Planning

Chart 9.1
PROTECTED LAND AREA AS A PERCENTAGE OF TOTAL LAND AREA, 2019



Source: Department of Planning

Chart 9.2
PROTECTED WATER AREA AS A PERCENTAGE OF TOTAL WATER AREA, 2019



Source: Department of Planning

Table 9.2
PROTECTED AREAS BY CATEGORY AND AREA, 2019

Protected Area Category	Acres	km^2
Conservation base zones		
Open space reserve	1,298.1	5.3
Recreation	963.9	3.9
Park	884.6	3.6
Coastal reserve	823.3	3.3
Nature reserve	770.1	3.1
Sub-total	4,740.0	19.2
Conservation areas		
Woodland reserve	983.9	4.0
Agricultural reserve	731.6	3.0
Sub-total	1,715.5	6.9
Cave protection area	1,107.2	4.5
Historic protection area	201.1	**
Conservation base zone and conservation areas (no overlap)	6,156.8	24.9
Overlapping area	1,670.1	6.8
Total terrestrial area (low tide mark)	13,430.4	53.6
Water resources protection area[2]	4,000.6	16.2

Source: Bermuda Plan 2008, Department of Planning

[1] Total protected area does not equal to the sum of the sub-totals as it excludes any overlapping areas (6.8 km^2) 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 24.9 km^2 of protected area but is contained in the total terrestrial area of 53.6 km^2.

Note: 1 km^2 = 247.1 acres

Map 9.1
TERRESTRIAL PROTECTION AREAS INCLUDING MARINE PARKS, 2019

Source: Department of Planning

SECTION 10

FORESTRY

The Forestry Section of the Environmental Statistics Compendium includes a table and chart with information on the forest area in Bermuda.

Forestry

• In 2019 Bermuda's total forest area was 4.2 km^2. This represents 7.8% of Bermuda's total land area and is inclusive of woodland reserves (Table 10.1).

NOTE TO READER

Forest: is land under forestry or no land use, spanning more than 0.005 km^2 (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.

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

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, 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).

Source: CARICOM Environment Program

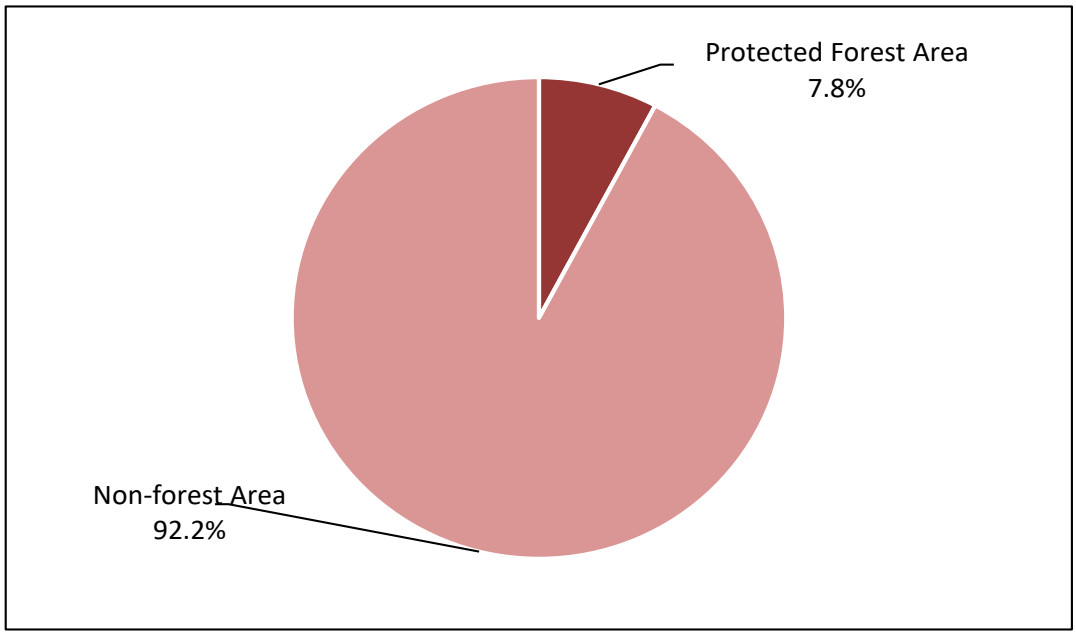
Table 10.1
PROTECTED FOREST AREA AS A PERCENTAGE OF TOTAL LAND AREA, 2019

Protected Area Category	Area km^2
Total forest area	4.2 [1]
Total land area	53.6
Protected forest area as a % of total forest area	100.0
Protected forest area as a % of total land area	7.8

Source: Department of Planning

[1] This includes woodland reserves.

Chart 10.1
PROTECTED FOREST AREA AS A PERCENTAGE OF TOTAL LAND AREA, 2019



Source: Department of Planning

SECTION 11

AIR

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

Air Emissions

• In 2019, the highest concentrated pollutant of air emissions from Tynes Bay waste to energy incinerator was NO_2 (353.3 mg/Nm^3). All pollutants increased from their previous year levels (Table 11.1).

Air Concentrations

• Bermuda contains five ambient air monitoring sites that are located across the island (Table 11.2).

• The maximum daily concentrations for the ambient air monitoring sites recorded pollutant concentration levels below Bermuda's limit, except for the pollutant PM_{10} (Table 11.3).

Table 11.1
ANNUAL AIR EMISSIONS FROM TYNES BAY WASTE TO ENERGY INCINERATOR, 2015-2019

	Year				
Pollutant	2015 [1]	2016	2017	2018	2019
VOCs (mg/Nm^3)	**	**	2.0	**	**
NO_2 (mg/Nm^3)	259.3	274.4	242.9	322.7	353.3
SO_2 (mg/Nm^3)	52.6	36.5	43.8	1.7	69.4
Lead (mg/Nm^3)	**	**	**	**	**
Particulate Matter (mg/Nm^3)	11.9	3.9	8.1	2.8	39.6

Source: Department of Environmental Protection

[1] One field of the 3-field Electrostatic Precipitator exhaust abatement system was down during testing.

Note: The data is captured through isokinetic sampling over a two day period each year and is reported normalised to 11% oxygen.

Table 11.2
AVERAGE CONCENTRATIONS FOR AMBIENT AIR MONITORING SITES, 2017-2019

	Pollutants	Units	Bermuda Limit (Clean Air Regulations 1993)	2017					2018					2019				
				Prospect	East Broadway	Cemetery Lane (BDA#1) (Belco-Operated ISO14001)	Langton Hill (BDA#2) (Belco-Operated ISO14001)	BIOS	Prospect	East Broadway	Cemetery Lane (BDA#1) (Belco-Operated ISO14001)	Langton Hill (BDA#2) (Belco-Operated ISO14001)	BIOS	Prospect	East Broadway	Cemetery Lane (BDA#1) (Belco-Operated ISO14001)	Langton Hill (BDA#2) (Belco-Operated ISO14001)	BIOS
Hourly	NO_2	$\mu g/m^3$	**400**	21.6	11.7	14.0	6.0	-	18.9	10.8	19.5	17.8	-	23.7	14.4	14.4	4.0	-
	SO_2	$\mu g/m^3$	**450**	2.1	5.5	9.6	9.5	-	1.1	10.3	8.9	2.8	-	3.4	0.4 ‡	5.1	3.8	-
	PM_{10}	$\mu g/m^3$	**-**	-	25.5	-	-	-	-	33.8	4.3	5.2	-	-	26.3	13.0	11.5	-
	$PM_{2.5}$	$\mu g/m^3$	**-**	6.0	8.4	-	-	-	6.1	10.6	14.2	13.1	-	5.9	11.8	-	-	-
	TSP	$\mu g/m^3$	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-Hour	NO_2	$\mu g/m^3$	**200**	21.6	11.7	14.0	6.0	-	18.1	10.6	9.1	2.6	-	23.2	13.8	14.3	4.1	-
	SO_2	$\mu g/m^3$	**150**	2.1	5.5	9.7	9.6	-	1.3	10.3	4.3	5.1	-	3.0	0.4 ‡	5.1	3.9	-
	PM_{10}	$\mu g/m^3$	**50**	19.2	32.7	16.1	13.8		16.2	22.1	14.3	13.0	14.6	19.8	13.9	13.0	11.5	-
	$PM_{2.5}$	$\mu g/m^3$	**-**	6.0	8.0	-	-	-	6.0	10.0	-	-	-	5.6	12.4	15.6	-	-
	TSP	$\mu g/m^3$	**100**	19.4	34.5	31.1	31.0	-	16.3	27.3	-	-	-	-	-	-	16.6	-
1-year	NO_2	$\mu g/m^3$	**60**	21.4	-	14.0	6.0	-	18.5	-	19.5	17.8	-	23.2	-	14.2	3.9	-
	SO_2	$\mu g/m^3$	**30**	2.1	-	9.6	9.5	-	1.3	-	8.9	2.8	-	3.0	-	5.1	3.9	-
	PM_{10}	$\mu g/m^3$	**30**	20.9	34.8	16.0	13.8		18.8	13.9 †	14.3	13.0	17.4	19.5	13.8	13.2	11.6	16.4
	$PM_{2.5}$	$\mu g/m^3$	**-**	5.9	-	-	-	-	6.0	-	-	-	-	5.6	-	-	-	-
	TSP	$\mu g/m^3$	**60**	21.1	36.4	31.1	31.0	-	19.5	29.5	-	-	-	-	-	15.5	15.8	-

Source: Department of Environmental Protection

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

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

Note: East Broadway monitoring station had a new PM-2.5 sensor installed in November 2017.

† - The second PM-10 BAM-1020 sensor operated at East Broadway station, which is considered a US EPA Federal Equivalent Method, demonstrated an exceedance of the annual average PM-10 concentration at 33.8µg/m3.

Table 11.3
MAXIMUM CONCENTRATIONS FOR AMBIENT AIR MONITORING SITES, 2016-2018

	Pollutants		Bermuda Limit (Clean Air Regulations 1993)	2017					2018					2019				
				Prospect	East Broadway	Cemetry Lane (BDA#1) (Belco-Operated ISO14001)	Langton Hill (BDA#2) (Belco-Operated ISO14001)	BIOS	Prospect	East Broadway	Cemetry Lane (BDA#1) (Belco-Operated ISO14001)	Langton Hill (BDA#2) (Belco-Operated ISO14001)	BIOS	Prospect	East Broadway	Cemetry Lane (BDA#1) (Belco-Operated ISO14001)	Langton Hill (BDA#2) (Belco-Operated ISO14001)	BIOS
Hourly	NO_2	µg/m^3	**400**	62.8	87.6	280.5	122.3	-	85.3	84.3	298.2	114.7	-	119.5	90.1	272.1	116.4	-
	SO_2	µg/m^3	**450**	120.2	39.3	174.8	286.9	-	27.7	73.2	71.9	270.6	-	131.1	22.3	88.8	186.8	-
	PM_{10}	µg/m^3	**-**	-	178.0	-	-	-	-	262.0	98.7	224.3	-	-	273.0	75.2	87.0	-
	$PM_{2.5}$	µg/m^3	**-**	35.2	43.0	-	-	-	129.5	-	-	-	-	48.4	-	-	-	-
	TSP	µg/m^3	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-Hour	NO_2	µg/m^3	**200**	36.5	48.7	133.2	57.2	-	65.3	43.2	95.1	34.7	-	85.0	49.5	110.6	50.7	-
	SO_2	µg/m^3	**150**	31.4	34.1	73.0	129.2	-	7.9	27.9	25.2	50.3	-	17.7	5.2	33.2	73.4	-
	PM_{10}	µg/m^3	**50**	46.9	71.3	74.6	55.6	49.0	62.7	87.0	75.7	38.3	85.5	53.1	48.3	47.0	43.8	52.3
	$PM_{2.5}$	µg/m^3	**-**	15.0	12.0	-	-	-	24.0	-	-	-	-	24.0	-	-	-	-
	TSP	µg/m^3	**100**	57.1	82.0	75.2	110.4	-	73.0	66.7	41.7	35.7	-	73.0	-	37.9	30.2	-
Total number of exceedances of the limits set in the Clean Air Regulations 1993 over each year				0	5 †	4	3	0	1	1†	1	0	1	1	0	0	0	1

Source: Department of Environmental Protection

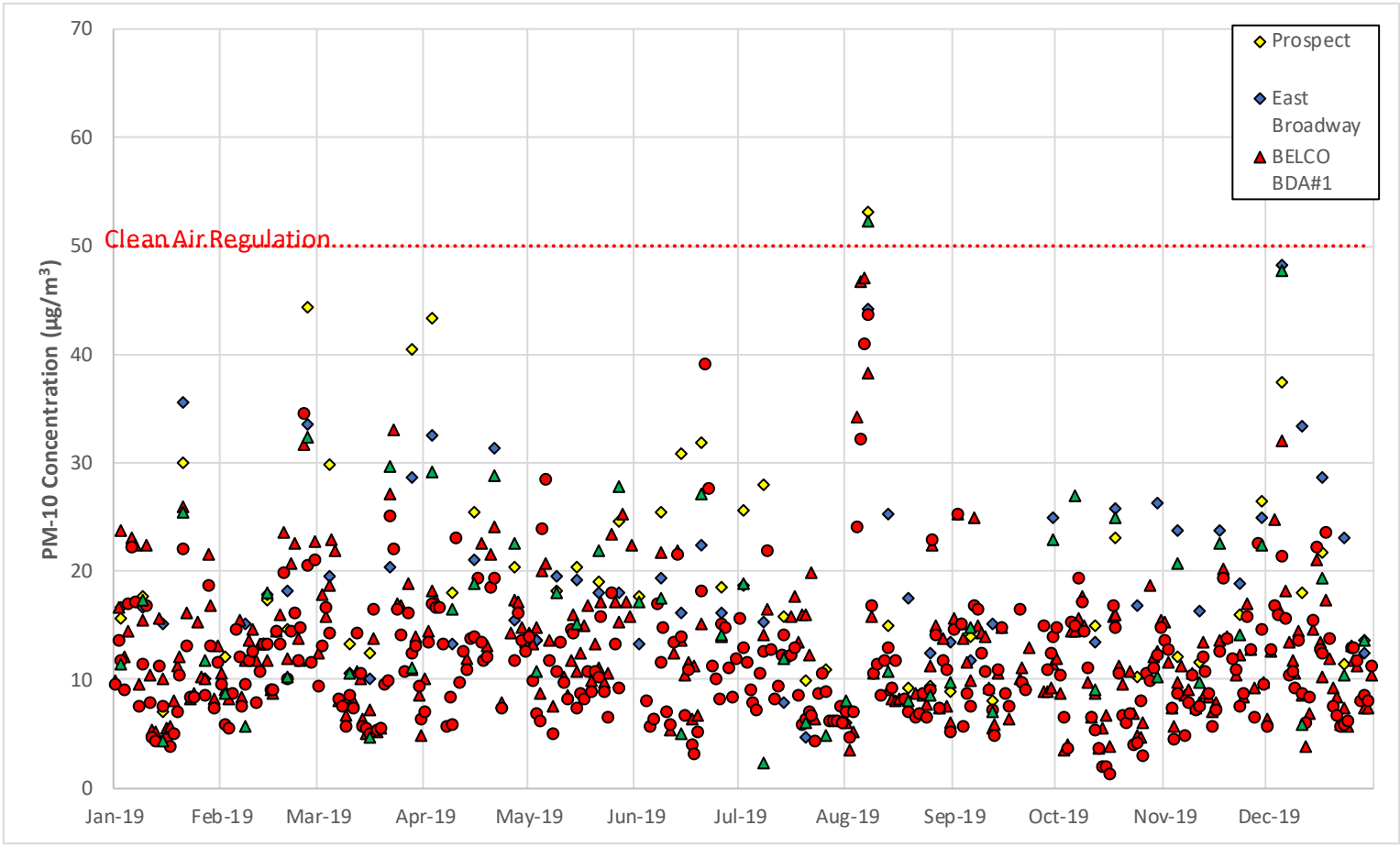
- Not determined as part of the current protocols.

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

* 10 of the 17 exceedances occurred before calibration highlighted a problem with the instruments.

† A second PM_{10} sensor at East Broadway that uses a US EPA Federal Equivalent Method records data every hour and identified a total of 10

Figure 11.1
24-HOUR AVERAGE PM_{10} CONCENTRATION, 2019



Source: Department of Environmental Protection

SECTION 12

WASTE

The Waste Section comprises of information regarding the generation and disposal of solid waste in Bermuda.

• In 2019, the amount of waste totaled 86,400 mT. This represents a decrease of 7.9% over the 93,800 mT of waste in 2018 (Table 12.1).

• In 2019, 400 mT of waste was recycled, 11,000 mT was composted, 65,000 mT was incinerated to generate electricity and approximately 10,000 mT was land-filled (Table 12.2).

• There were 80 container loads of materials recycled in 2019. Eight container loads of special waste items were processed and exported for the United States recycling market (Chart 12.1).

• Bermuda exported 1,698,000 pounds of hazardous waste in 2019 (Table 12.3).

NOTE TO READER

Household Waste: 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: 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.

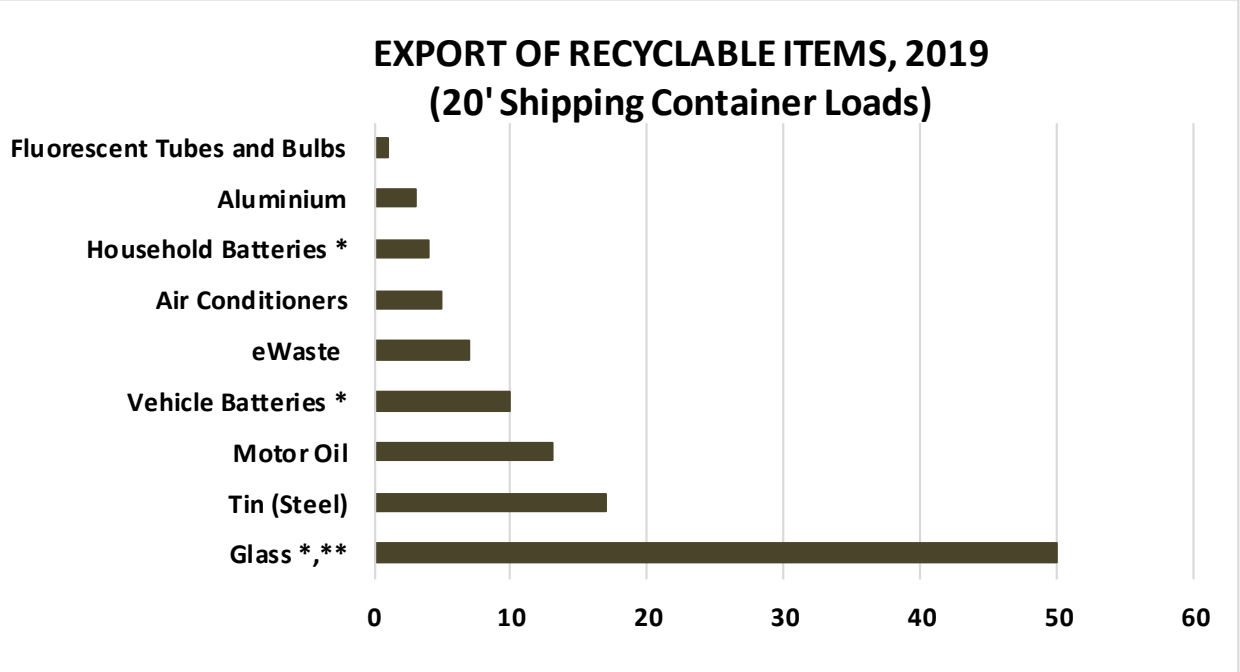
These definitions are taken from the Waste and Litter Control Act, 1987

Table 12.1
GENERATION OF WASTE BY SOURCE, 2015-2019

Indicator (1,000 mT)	Year				
	2015	2016	2017	2018	2019
Total amount of waste	83.6	89.8	95.7	93.8	86.4
Waste from households	27.9	29.9	31.9	31.3	28.8
Waste from other origins	55.7	59.9	63.8	62.5	57.6

Source: Department of Works and Engineering, Waste and Enforcement Section

Chart 12.1
ESTIMATED EXPORT OF RECYCLABLE WASTE, 2019



Source: Department of Works and Engineering, Waste and Enforcement Section

* Estimated data for 2019. **All Glass is reused on-island as a drainage medium.

Table 12.2
MANAGEMENT OF MUNICIBLE WASTE, 2015-2019

Indicator (1,000 mT)	Year 2015	2016	2017	2018	2019
Total amount of waste	83.6	89.8	95.7	93.8	86.4
Amounts going to:					
Recycling	1.6 e	1.6 e	1.0	1.5	0.4
Composting	18.0 e	18.0 e	18.0 e	13.0	11.0
Incineration	54.0	60.2	66.6	69.3	65.0
Landfilling	10.0 e	10.0 e	10.0 e	10.0 e	10.0 e

Source: Department of Works and Engineering, Waste and Enforcement Section

Table 12.3
MANAGEMENT OF SPECIAL WASTE, 2015-2019

Indicator (1,000 lbs)	Year 2015 e	2016 e	2017 e	2018	2019
Stock of hazardous waste at the beginning of the year	88.0	20.4 r	20.4 r	15.4	153.4
Hazardous waste generated during the year	601.5	600.0	525.0	1,500.0	1,800.0
Hazardous waste exported during the year:					
Recycling	401.0	400.0	310.0	633.0	642.0
Incineration	6.6	10.0	5.0	-	-
Landfilling	261.5	190.0	215.0	729.0 *	1,056.0 *
Total Hazardous Waste	669.1 r	600.0	530.0	1,362.0	1,698.0
Stock of hazardous waste at the end of the year	20.4 r	20.4 r	15.4 r	153.4	255.4

Source: Department of Works and Engineering, Waste and Enforcement Section

* Increase in Landfilling of Special Waste is the result of the export of a large backlog of asbestos to the USA where it is being landfilled in Title D regulated landfill facilities.

Table 12.4
MANAGEMENT OF WASTE BY TYPE, 2014, 2016, 2017, 2018 AND 2019

Indicator	Year				
	2014 e	2016 e	2017	2018 e	2019 e
Total (%)	100.0	100.0	100.0	100.0	100.0
Paper, paperboard	29.0	29.0	27.0	27.0	27.0
Textiles	17.0	17.0	4.0	4.0	4.0
Plastics	13.0	13.0	19.0	19.0	19.0
Glass	9.0	9.0	13.0	13.0	13.0
Metals	6.0	6.0	5.0	5.0	5.0
Other inorganic material	9.0	9.0	8.0	8.0	8.0
Organic material	17.0	17.0	24.0	24.0	24.0

Source: Department of Works and Engineering, Waste and Enforcement Section

Between 2006 and 2017, the Waste Management Section of the Ministry of Public Works conducted four waste audits.

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 2019, the total volume of precipitation in Bermuda was 68.2 mio m^3/y (Table 13.1). This represents a 9.1% deccrease from the level received in 2018.

NOTE TO READER

Actual Evapotranspiration: total actual volume of evaporation from the ground, wetlands, 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.

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

Regular Freshwater Resources 95.00% of the Time: a 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 95.00% 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.

Renewable Freshwater Resources: equal internal flow plus any inflow of surface and groundwaters.

Sources: United Nations Statistics Division (UNSD) and United Nations Environment

Table 13.1
RENEWABLE FRESHWATER RESOURCES, 2015-2019

	Year				
Category (mio m3/y)	2015 [1]	2016 [2]	2017 [2]	2018 [2]	2019 [2]
Precipitation	78.4	98.8	72.6	75.0	68.2
Actual evapotranspiration	53.3	67.2	49.4	51.7	46.4
Internal flow	25.1	31.6	23.2	23.3	21.8
Renewable freshwater resources	3.7	4.7	3.4	3.6	3.3
Regular freshwater resources 95.00% of the time	2.6	2.6	2.6	2.6	2.6

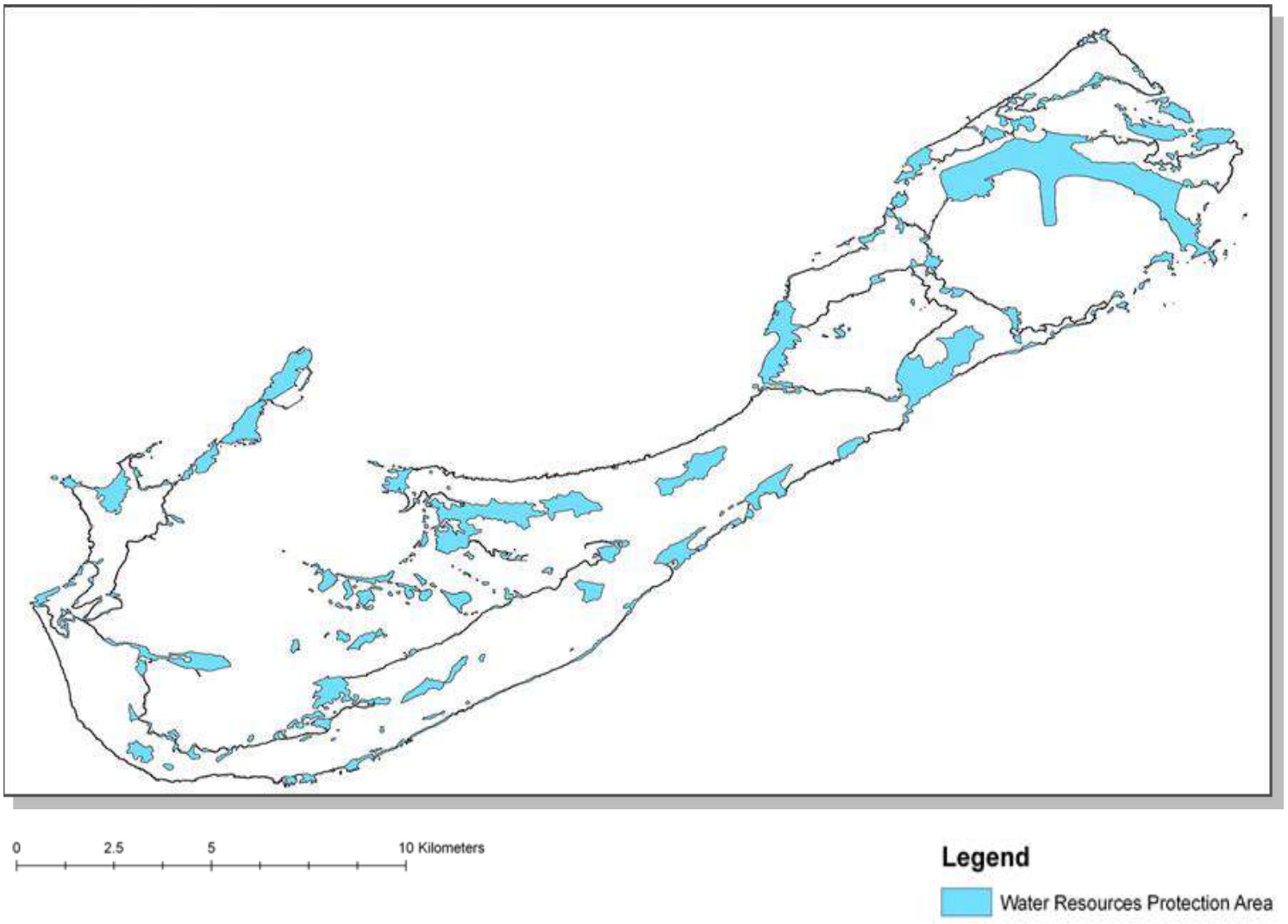
Source: Department of Environmental Protection

Source: Department of Environment and Natural Resources

(1) Bermuda is frost-free; precipitation consists of rainfall only. Precipitation = annual rainfall in m (from BWS), multiplied by land area of 54.4 sq. km. (PRIOR TO 2016)

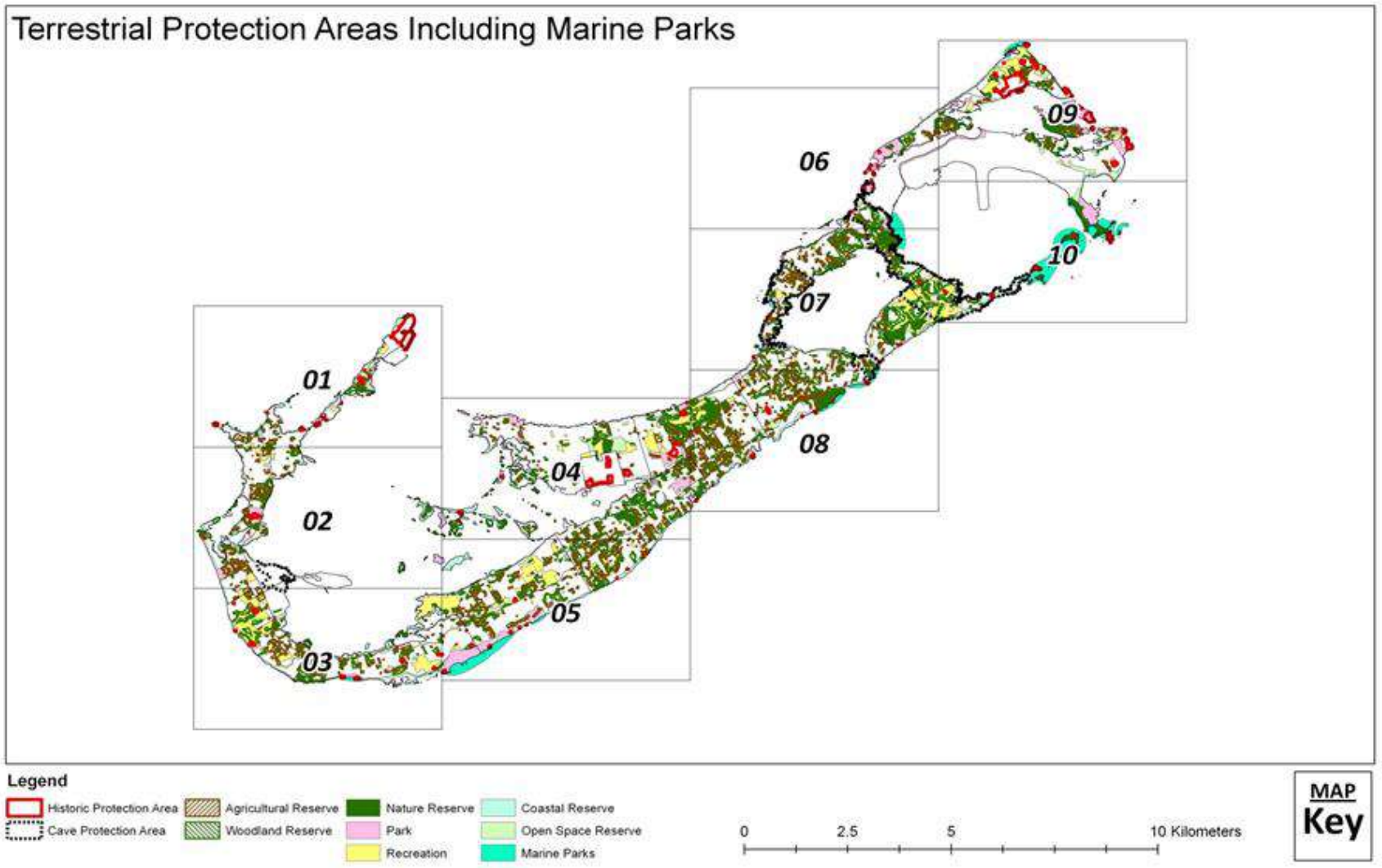
(2) Bermuda is frost-free; precipitation consists of rainfall only. Precipitation = annual rainfall in m (from BWS), multiplied by land area of 53.7 sq. km. (FROM 2016 to 2019)

Map 13.1
WATER RESOURCES PROTECTION AREAS, 2019

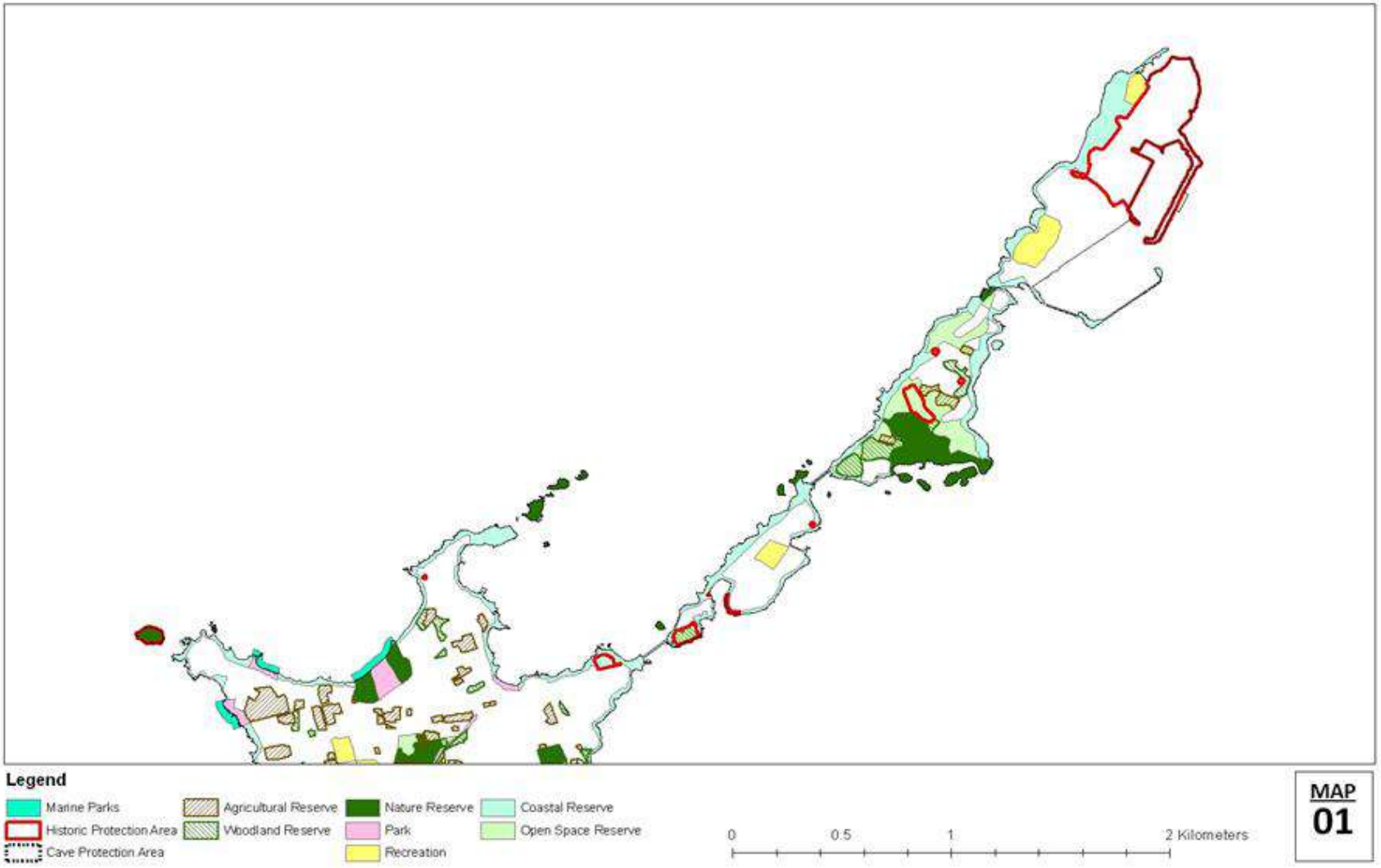


Source: Department of Planning

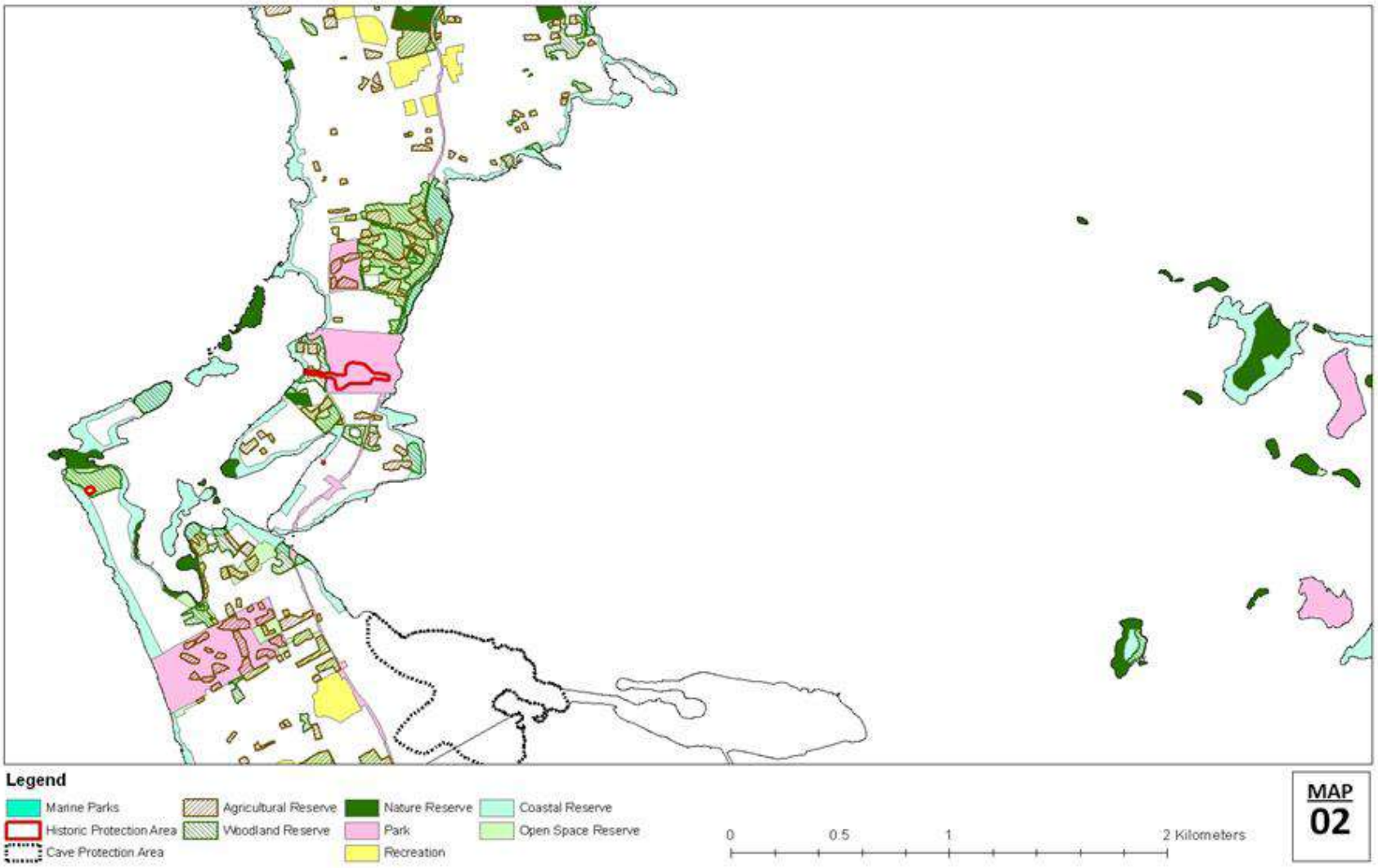
ANNEX



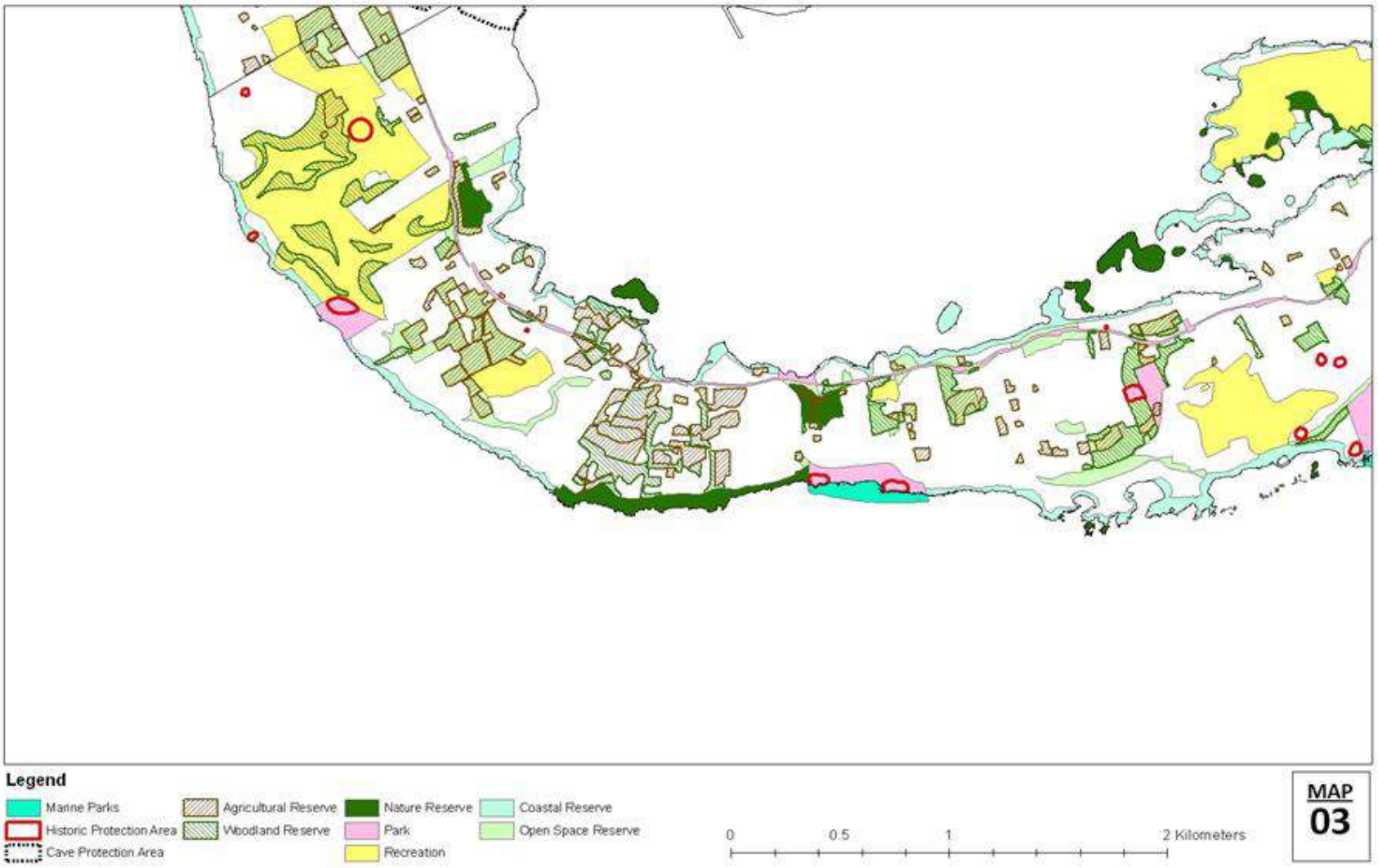
Source: Department of Planning



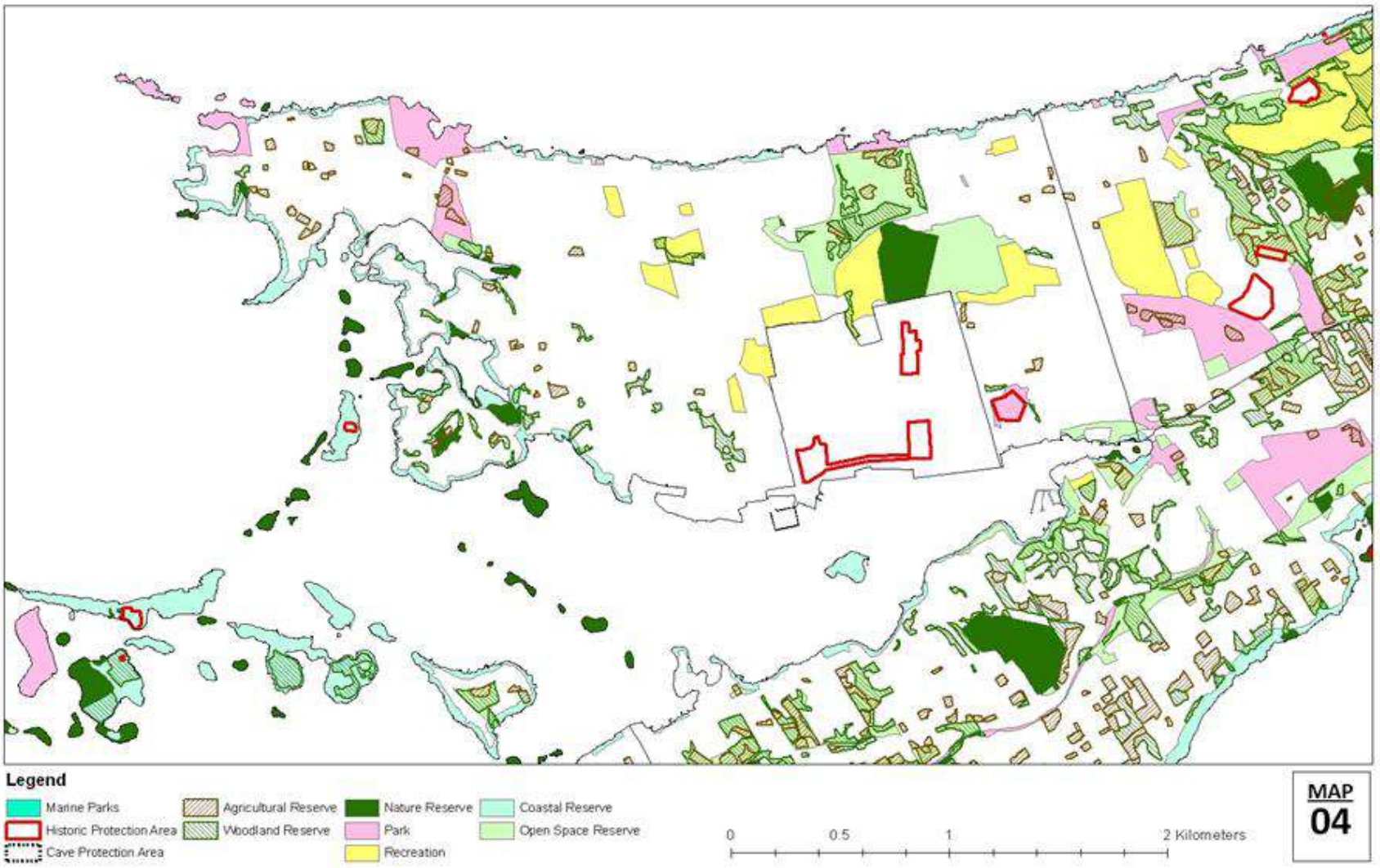
Source: Department of Planning



Source: Department of Planning

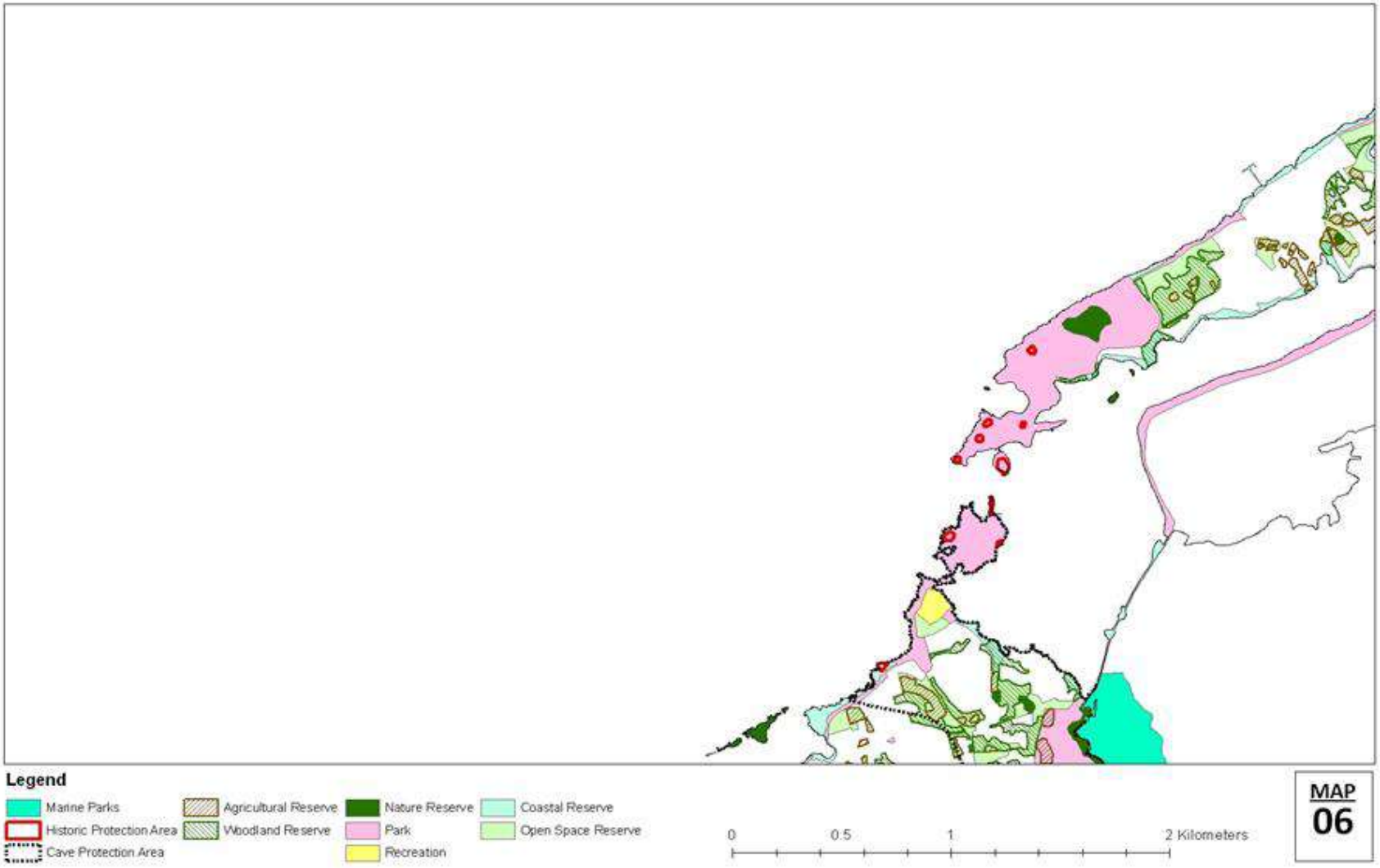


Source: Department of Planning

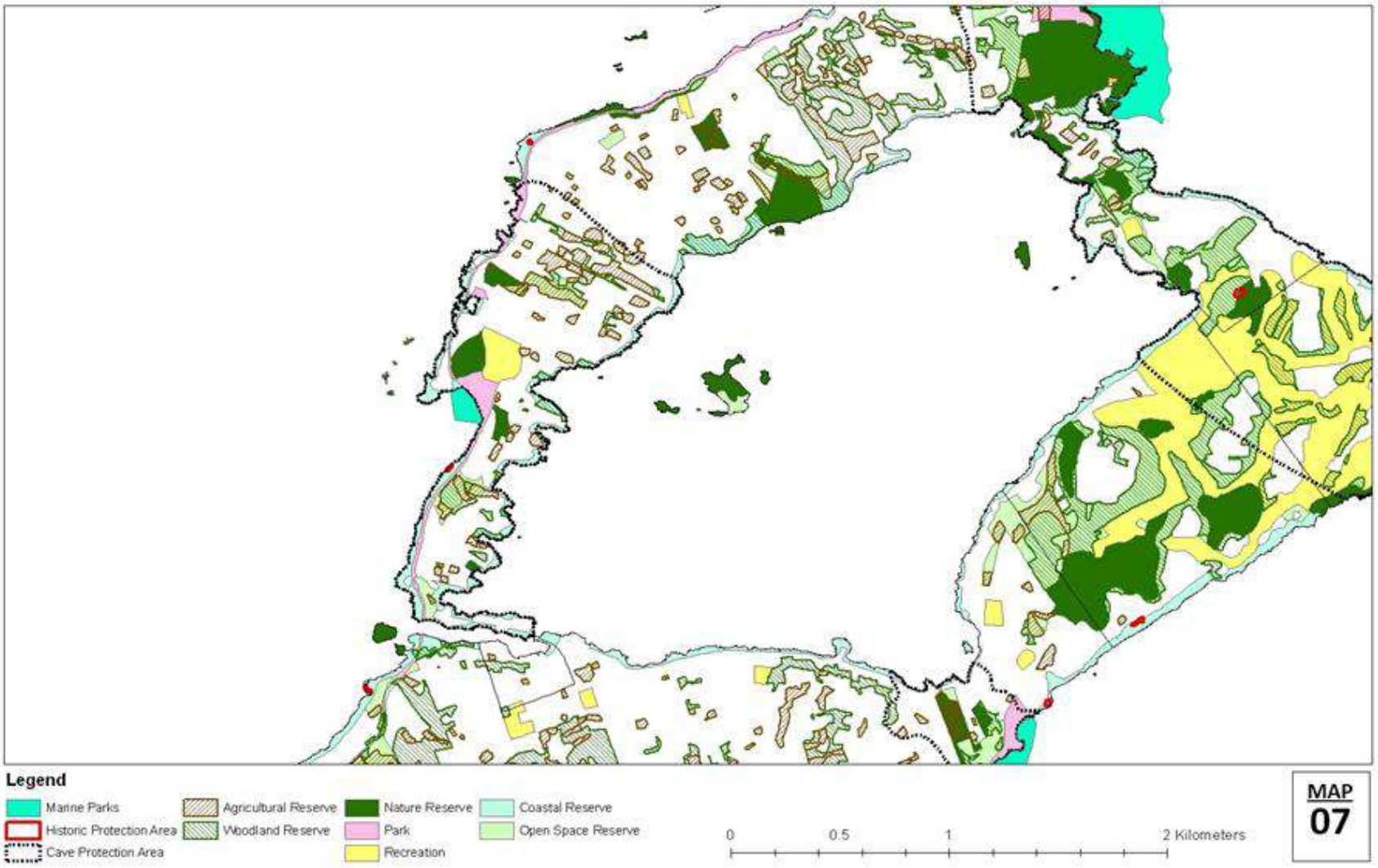


Source: Department of Planning

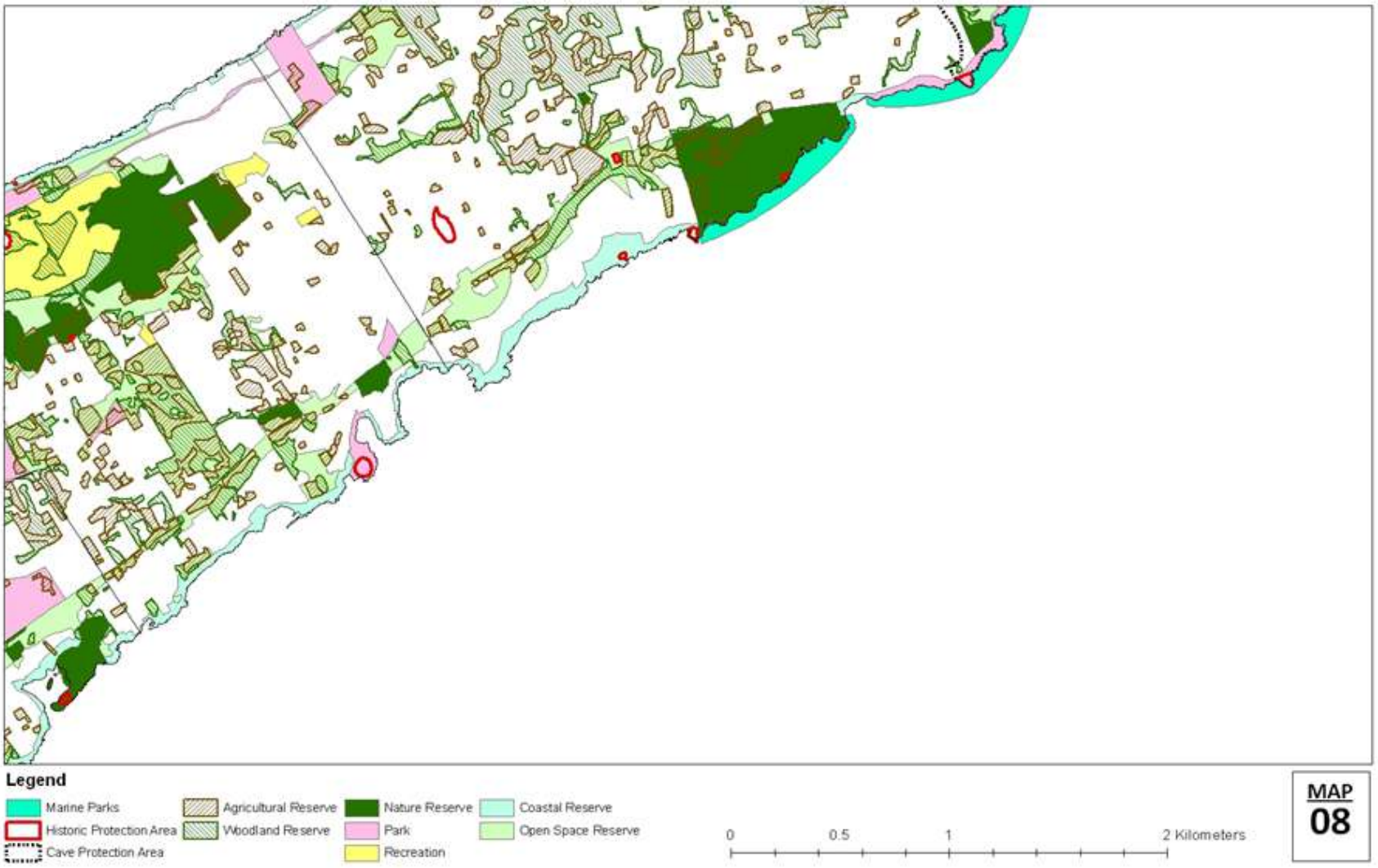
Source: Department of Planning



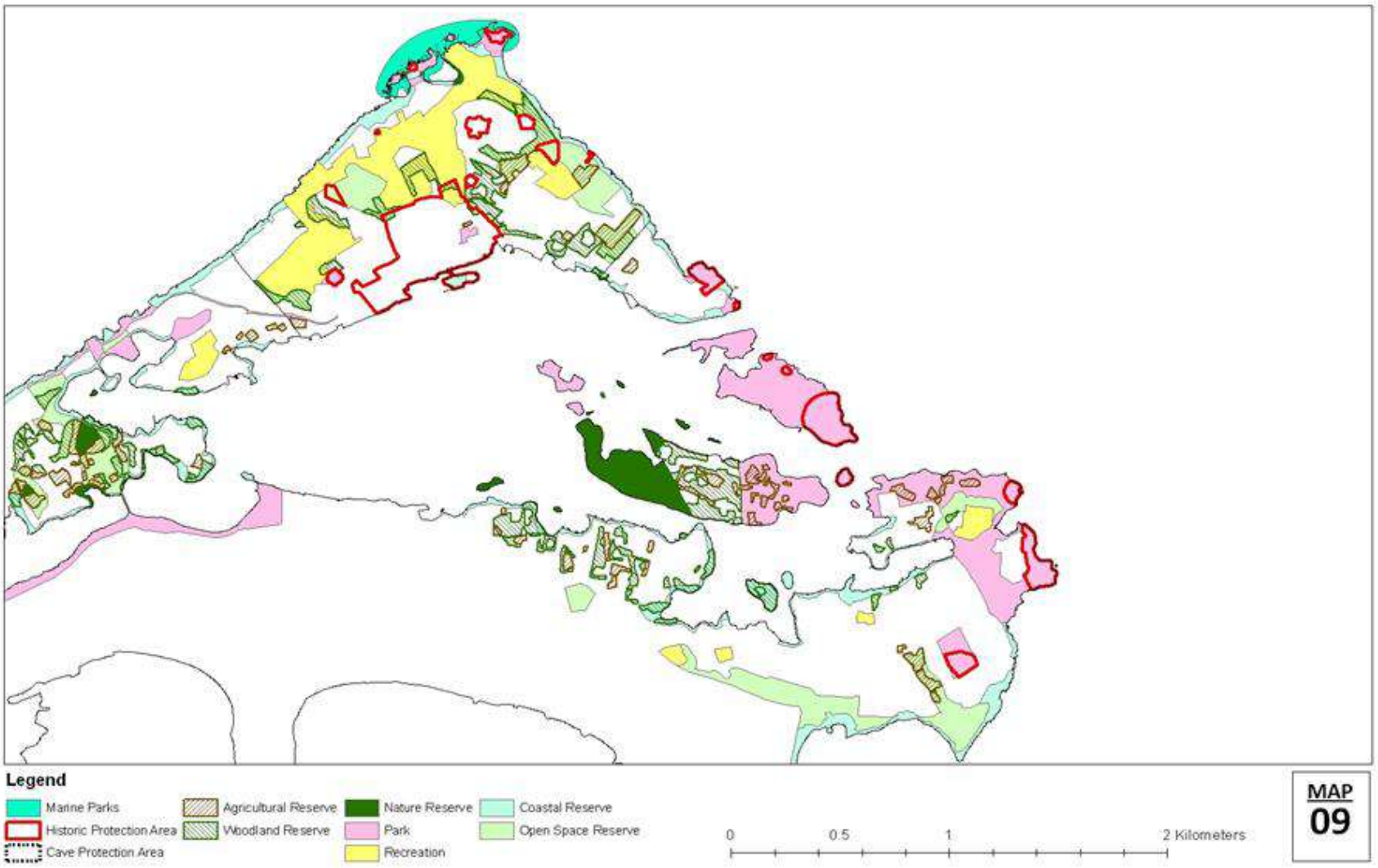
Source: Department of Planning



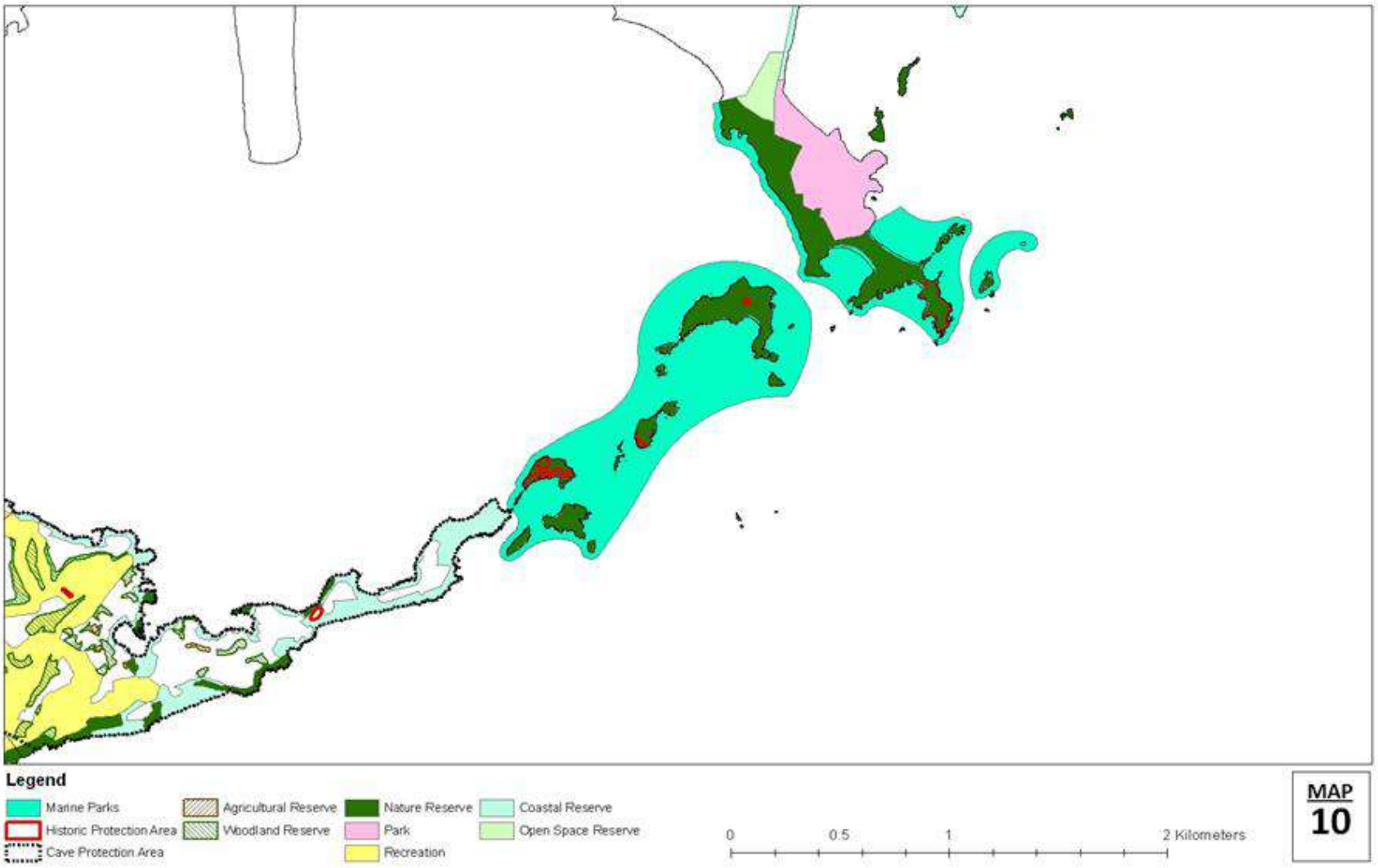
Source: Department of Planning



Source: Department of Planning



Source: Department of Planning



Source: Department of Planning

GOVERNMENT OF BERMUDA

Department of Statistics