

What is the Blue Belt Programme?

The specification

AQA A Level 3.2.1.5.1 Antarctica as a global common. Demonstrate the role as a global common and illustrate its vulnerability to global economic pressures and environmental change.

Edexcel A Level 6.8.c. Threats to ocean health pose threats to human wellbeing, especially in developing regions that depend on marine resources as a food source and for tourism and coastal protection.

OCR A Level Topic 3.3 – Exploring Oceans. 2.c. Governing the oceans poses issues for the management of resources.

WJEC A Level 3.2.6 to 3.2.10: Global Governance of the Earth's Oceans. Laws and agreements regulating the use of the Earth's oceans in ways that promote sustainable economic growth and geopolitical stability.

The tragedy of the commons

Oceans are a part of the 'global commons' – a term which describes an area with the potential for tragedy when there is little control over the way the common resources, such as fish stocks, are accessed and used. The expected outcome is a decline in resources when the rate of use exceeds the rate of natural replacement and regeneration. This leads to over-exploitation, depletion, degradation and ultimately scarcity.

The metaphor refers to areas which lie outside the political reach of nation-states. There are four global commons: the high seas, the Antarctic, the atmosphere, and outer space. These areas are largely uncharted, unregulated, and ungoverned. They are therefore in special need of being managed and protected.

- Fishing is found in all the world's oceans – in open international waters – unless it is close to land in exclusive economic zones. As no single country 'owns' the ocean or the resources in them, it is a global common, which is very vulnerable to exploitation.
- Equally, adventure tourism to the global commons is growing. For example, tourist numbers are steadily increasing to Antarctica and remote holiday destinations, such as the South Pacific Pitcairn Islands.

As a result, ocean pollution is increasing around the world due to a combination of fishing, marine plastic pollution, travel, tourism, and development.

2022 is dubbed a 'super year' for the world's oceans, with several key international summits set to occur, (the G7, the Convention on Biological Diversity COP15, and the United Nations Framework Convention on Climate Change). The 2020s are also the UN Decade of Ocean Science.

In response to the threats to the global commons, the UK government initiated the Blue Belt initiative in 2016 to support UK Overseas Territories to enhance the protection and management of their surrounding marine environments.

The hope is that the initiative is a starting point for further conservation efforts around the world – with the UK government calling upon the global community to build on the initial effort by committing to protect 30% of all the world's oceans by 2030. These marine areas will be conserved and titled as MPAs (marine protected areas). They are designed to protect and conserve marine life and its habitats by restricting activities such as fishing, resource extraction, and mass tourism.

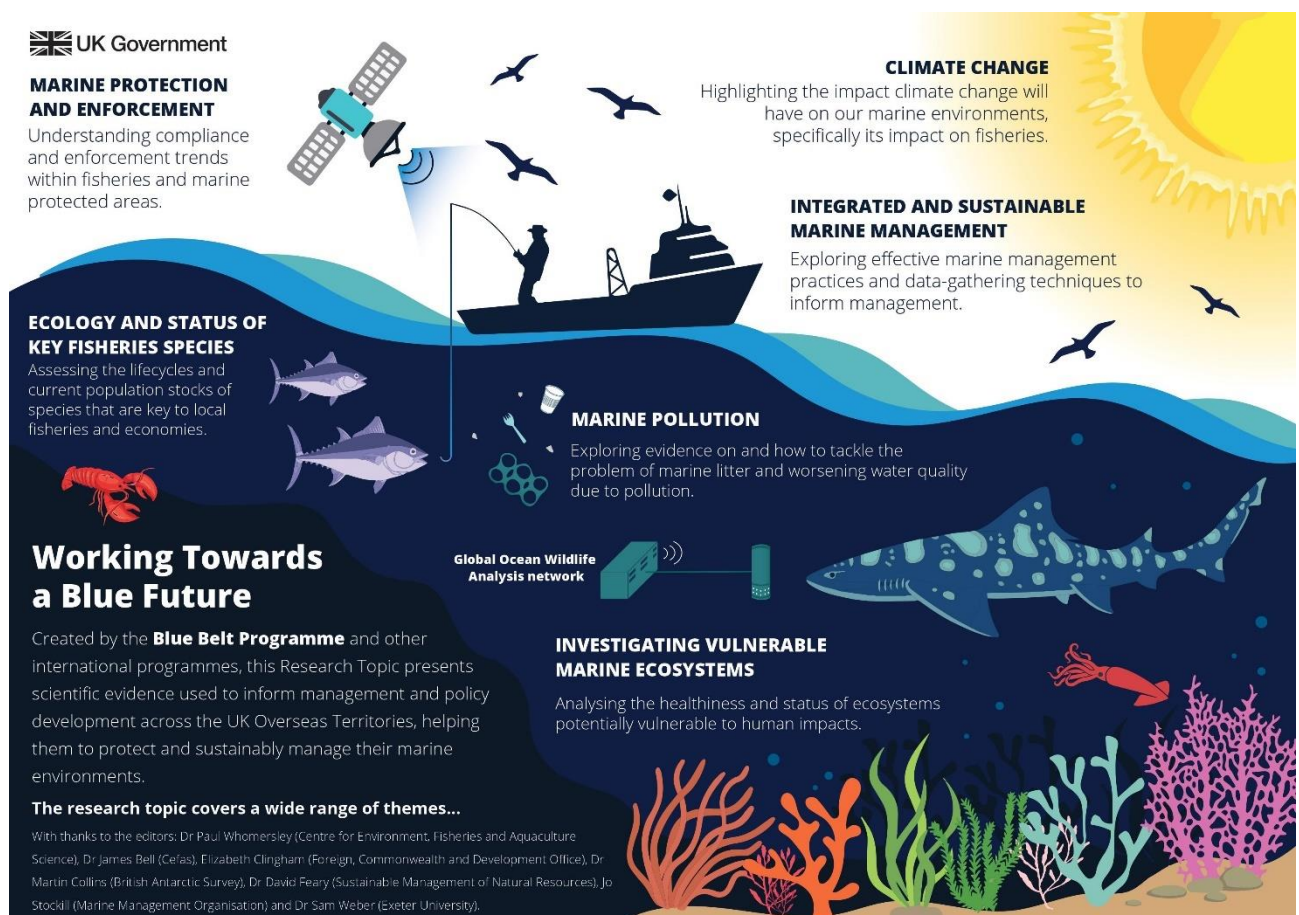


Figure 1 the purpose of MPAs © Joe Wells CEFAS

What is the Blue Belt Programme?

The Blue Belt programme set out to protect 4 million km² of ocean under British governance around the UK Overseas Territories. There are 7 key territories around the world which have come under this protection, namely: Ascension Island, British Antarctic Territory, British Indian Ocean Territory, South Georgia and the South Sandwich Islands, Pitcairn Islands, Saint Helena, and Tristan da Cunha.

These overseas territories have made massive commitments to protect their waters for biodiversity, sustainable fishing, and for future conservation. Reducing the detrimental impact of human activity has been an important facet of the programme. Jane Rumble OBE, Head of the FCDO's Polar Regions Department, explains:

We are having a demonstrable effect on those marine environments. You can see where there have been improvements – including the return of species, more abundance, cleaner oceans, better resilience to climate change.

The Blue Belt Programme demonstrates the major role that small, remote islands can have in achieving global change.

There are 3 islands in the Atlantic Ocean which collectively form the British Overseas Territory of Saint Helena, Ascension, and Tristan da Cunha. These landmasses are volcanic islands formed by the divergent plate boundary of the mid-Atlantic Ridge. Each of these territories has a 370-kilometre Exclusive Economic Zone (EEZ) extending out from the islands' territorial sea baseline.

a strong legal framework in place in order to set up a marine tourism policy for the island. This is seen by many as a key future industry.

Table 1 below shows the average weather of St Helena, including Sea temp °C and Hours of daylight, to compare against Ascension (Table 3), and Tristan da Cunha (Table 5). The data helps to build a profile for each of the islands.

St Helena	J	F	M	A	M	J	J	A	S	O	N	D
Average max °C	27	27	28	27	24	23	22	22	22	23	23	24
Average mean °C	24	24	24	24	22	21	20	20	20	20	21	22
Average min °C	21	21	22	21	19	18	17	17	17	18	18	19
Sea temp °C	15	15	15	19	23	27	28	28	27	23	18	16
Precipitation mm	8	10	20	10	18	18	33	10	5	2	0	3
No. of wet days	4	4	5	3	4	6	8	3	2	1	0	1
Hours of daylight	13	12	12	11	11	11	11	11	12	12	12	13
Rel. humidity %	63	65	64	65	72	72	74	76	75	72	72	65

Table 1 Jamestown, expected weather statistics, St Helena [Island Info](#)

International tourists visit St Helena for the dark skies, endemic wildlife, and the opportunities to hike on a warm isolated island (yearly mean 21°C). Once regarded as ‘the best-kept secret in the South Atlantic’ St Helena is now well-known and there is growing concern about the impact of climate change and unregulated tourism on the marine environment.

As a result, a number of marine studies have been undertaken to assess the future impact of climate change. Table 2 below shows the projected impact on the different species of Atlantic tuna with future RCP4.5 and RCP8.5 scenarios to 2050.

Atlantic tuna species around St Helena	Suitable habitat present day	Habitat change medium emissions scenario 2050 ¹	Habitat change high emissions scenario 2050 ²	Total suitable habitat medium emissions 2050	Total suitable habitat high emissions 2050
Southern bluefin	237.0123431	-49.18265098	-79.21284436	187.8296921	157.7994988
Albacore	257.6995009	90.57220116	186.444201	348.2717021	444.143702
Yellowfin	242.5747391	149.0750196	271.7288082	391.6497587	514.3035474
Bigeye	267.2012379	192.3912238	319.999521	459.5924618	587.2007589
Skipjack	161.9206967	199.7019081	397.5399786	361.6226047	559.4606753

Table 2 St Helena's projected suitable habitat for Atlantic tuna 2050 © [Dr Bryony Townhill](#) CEFAS Blue Belts*

It is the southern bluefin tuna which will see a *decrease* in suitable habitat around St Helena. Whilst all other species will see an *increase*, particularly the skipjack tuna.

¹ RCP4.5

² RCP8.5

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**The data used the Maxent model whereby each grid cell shows the degree of habitat suitability on a scale of 0 to 1, with 0 being not suitable at all, and 1 being completely suitable. It can be thought of like a probability. The total suitability is then this number for all of the grid cells in the waters of St Helena or Ascension added together. Consequently, the datasets doesn't have a unit.*

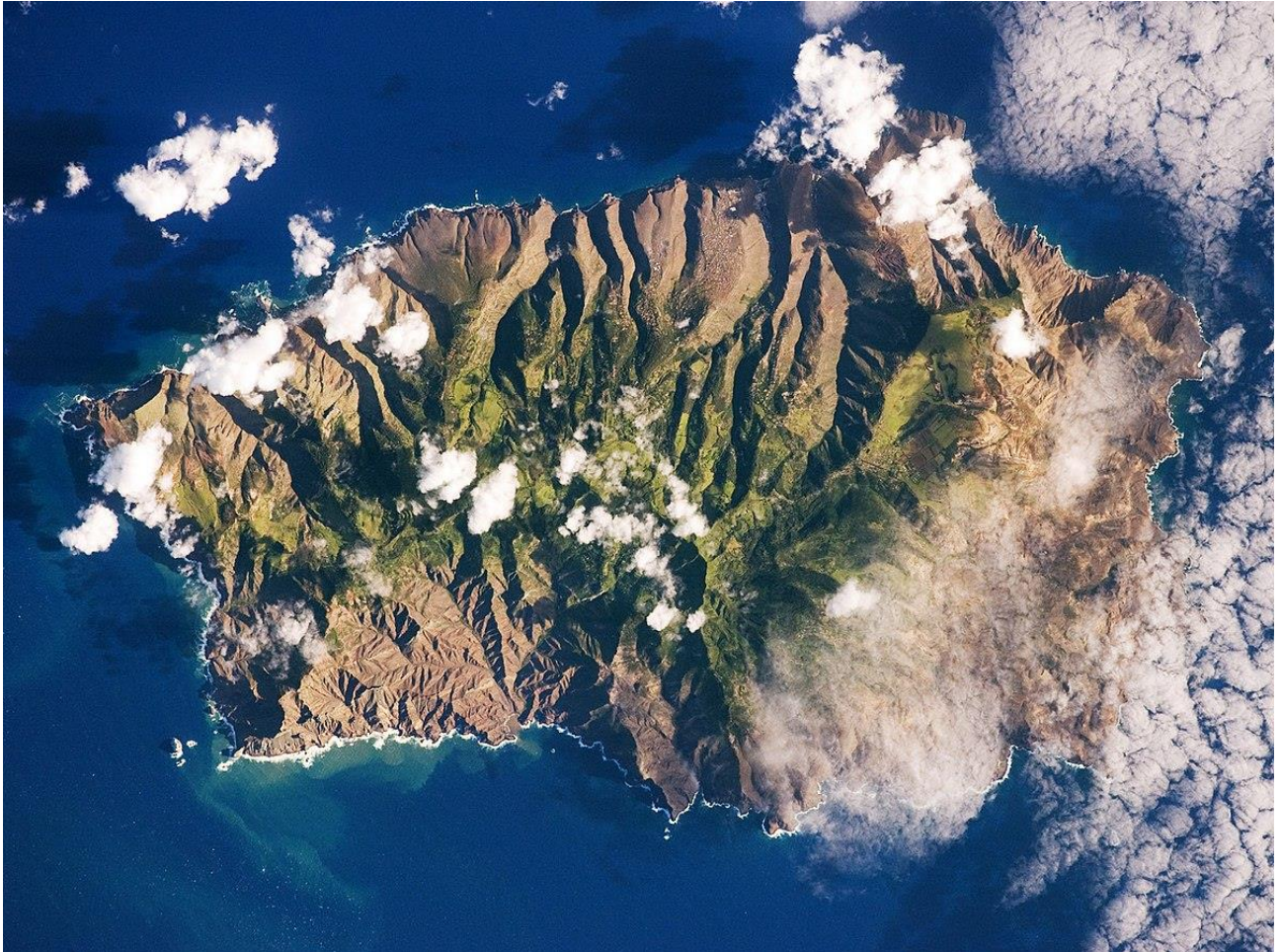


Figure 3 St Helena © NASA Earth Observatory

Ascension

Ascension is an unusual British Overseas territory as the UK government does not allow right of abode on the island, therefore, all 800 British citizens of Ascension are only 'temporary visitors' officially. Located halfway between Brazil and Africa, the summers on this island are short, hot, and oppressive whilst winters have uncomfortably high humidity.

Due to its isolation, volcanology, and exposure to the ocean Ascension was once renowned for being desolate – devoid of flora and fauna. At one time it was reported that there was only a single, solitary tree on Ascension. However, in the 19th century, a naturalist called Joseph Hooker brought in non-native species to create the world's first 'artificial ecosystem', which has since threatened the small amount of native vegetation on the island.

The surrounding marine environment is described as globally important. Examples of the island's exceptional biodiversity are green turtles, Galapagos sharks, and Atlantic tuna. Ascension Island Council hope that the MPA will repeat the success of the green turtle conservation, which began in the 1970s (after decades of 'harvesting' by passing ships).

Since the instigation of the MPA in 2019, commercial fishing and extractive industries have been prohibited, allowing, for example, birds like the Sooty Tern to re-establish around the island (after years of over-fishing Atlantic tuna).



Figure 4 in 2019 Ascension Island MPA was designated © J Brown Ascension Island Government

Like St Helena, Ascension is a tropical island. The waters around the island are warm with an average sea temperature of 26°C. They teem with marine life. As a result there is again concern that the delicate marine ecosystem surrounding the island will be altered by the impacts of climate change. For example, the ‘deadly trio’ of heat, acidity, and loss of oxygen will damage the habitat for Atlantic tuna and many other species.

Increasing sea temperature and ocean acidification will pose a serious threat to the island’s limited number of scleractinian corals (there are no coral *reefs*) and the abundant marine life which enjoy the nutrient-rich waters such as surgeonfish, longfin crevalle jack, squirrelfish, sergeant-majors and the black triggerfish (one of Ascension’s best known species).

Ascension	J	F	M	A	M	J	J	A	S	O	N	D
Average max °C	28	29	30	30	29	28	27	26	26	26	27	27
Average mean °C	26	27	27	27	27	26	25	24	24	24	24	25
Average min °C	24	25	26	26	25	24	23	23	22	22	23	23
Sea temp °C	26	27	28	28	27	26	26	25	24	24	25	25
Precipitation mm	0.5	0.9	2.5	3.7	2.1	1.0	0.2	0.4	0.1	0	0	0.2
No. of wet days	2	2	6	9	5	1	1	1	0	0	0	1
Hours of daylight	12	12	12	11	11	11	11	11	12	12	12	12
Rel. humidity %	90	99	100	100	99	89	63	42	42	41	54	71

Table 3 climate data on RAF Ascension Island, [WeatherSpark](#)

Atlantic tuna species around Ascension	Suitable habitat present day	Habitat change medium emissions scenario 2050 ³	Habitat change high emissions scenario 2050 ⁴	Total suitable habitat medium emissions 2050	Total suitable habitat high emissions 2050
Southern bluefin	266.0491273	-64.77538121	-106.786049	201.2737461	159.2630783
Albacore	232.7107052	83.43057209	169.4581103	316.1412773	402.1688155
Yellowfin	226.9134418	165.8858757	274.6747407	392.7993175	501.5881825
Bigeye	191.20338	191.9264457	330.8246757	383.1298257	522.0280557
Skipjack	151.8376979	211.2637305	359.5886312	363.1014284	511.4263291

Table 4 Ascension's projected suitable habitat for Atlantic tuna 2050 © [Dr Bryony Townhill](#) CEFAS Blue Belts*

Around Ascension, the southern bluefin is again anticipated to suffer the most habitat change. The albacore, yellowfin, bigeye, and skipjack are all likely to benefit from an *increase* in marine habitat.

Tristan da Cunha

Tristan da Cunha is an archipelago with its main village, Edinburgh of the Seven Seas, renowned as the world's most remote settlement on Earth. There is no airport, and no deep harbour. The island lies roughly halfway between Buenos Aires, in Argentina, and Cape Town, in South Africa – even now getting there requires a 7-day journey at sea. The island is so remote that only 7 surnames still exist, among a population of only 241 people.

The MPA that surrounds the 4 main islands of Tristan da Cunha is the largest 'no-take' area in the Atlantic. 90% of the island's waters are closed to fishing and other extractive activities. The total area stretches across an enormous 700,000 km² and, crucially, hosts a number of endemic species.

The nearby Isle of Nightingale, part of the archipelago, is home to rockhopper penguins, known by Tristan islanders as 'Pinnamin' and the 3 endemic Tristan albatrosses, which breed on the island: Atlantic yellow-nosed albatross, sooty albatross, and the Tristan wandering albatross.



Figure 5 Tristan da Cunha © Brian Gratwicke Flickr

In spite of being on the same latitude as Melbourne in Australia, the climate of the island is a cool temperate oceanic one due to the cooling effect of the surrounding sea in the summer (with a maximum of 18°C in February) and the reverse (warming effect) happening in winter when sea temperatures only drop to 13°C. Due to these favourable and mild conditions the northern rockhopper penguin, which is only on a few islands in the Atlantic, is found in abundance on Tristan da Cunha – 99% of the population make the island their home.

³ RCP4.5

⁴ RCP8.5

Tristan da Cunha receives a high level of precipitation throughout the year with an average of 140mm per month. As climate change is expected to alter ocean weather patterns (and ocean currents) in the future Tristan da Cunha will be severely impacted.

It is an important area in the South Atlantic as the island archipelago lies in the convergence zone between subtropical and Southern Ocean currents. Changes to the convergence zone will alter the species-rich waters which are currently home to blue sharks, cold-water coral, the Tristan rock lobster (foundational to the Tristan economy), whales (Southern Right, Fin, Humpback, Antarctic Minke, Sperm, and Orcas), dolphins, Antarctic fur, elephant seals, and seabirds.



Figure 6 the famous Rockhopper penguins on Inaccessible Island, Tristan da Cunha © Brian Gratwicke Flickr

Tristan da Cunha	J	F	M	A	M	J	J	A	S	O	N	D
Average max °C	14	14	14	15	17	19	20	21	20	18	17	15
Average mean °C	12.5	12	12	13	15	17	18	19	18	16.5	15	13
Average min °C	11	10	10	11	13	15	16	17	16	15	13	11
Sea temp °C	14	13	13	14	15	16	17	18	18	17	16	15
Precipitation mm	160	175	169	151	128	127	93	113	121	129	155	160
No. of wet days	25	26	24	22	18	19	18	16	17	20	23	23
Hours of daylight	10	11	12	13	14	14.5	14	13	12	11	10	9.5
Rel. humidity %	79	79	78	79	79	80	79	77	75	78	78	79

Table 5 Tristan da Cunha's climate, the [Tristan Government and the Tristan Association](#)

Another threat to the marine ecosystem of Tristan da Cunha are ship wrecks. The last major disaster occurred in 2011 when the MS Oliva ran aground releasing 800 tonnes of fuel. This significantly affected the local northern rockhopper penguin population on the Isle of Nightingale.

As a result of this event, and the fact that some cruise ships now visit, plus the more recent sinking of the MFV Geo Searcher in 2020 (a fishing vessel which sank off Gouch Island) an island monitoring system has been set up to track ships and human activity within the newly designated *Areas to be Avoided*.

Activity

1. Use an atlas to map the 7 territories involved in the Blue Belt Programme onto Figure 2.
2. The St Helena website explains 'it can be bright, sunny and hot in Jamestown while simultaneously cold and wet in Longwood. A single forecast can rarely be correct for every possible location'. Can you explain why the weather is so variable across the island?
3. Create a factfile on the famous giant green turtles of Ascension.
4. Everything on Tristan da Cunha 'depends on the weather'. Create a climate graph to visualise the yearly changes.
 - a. Repeat this task for St Helena and Ascension.
 - b. Due to climate change, how might weather and climate alter on St Helena, Ascension, and Tristan da Cunha?
5. There is concern about the impact of climate change on Atlantic tuna around these remote islands. Using the medium emissions scenario for St Helena, create a line graph to show how the habitat for the 5 different types of tuna will change from now until 2050.
 - a. Repeat this task for Ascension.
6. Create a spider diagram for the positives impacts from the Blue Belt programme. Are there any negatives?

Further reading

- GOV.UK [The Blue Belt Programme: looking back on 2020/2021](#)
- GOV.UK [Blue Belt annual report 2021](#)
- The Blue Belt Programme [video explainer](#)
- [Climate Change Impacts on Atlantic Oceanic Island Tuna Fisheries](#) from a collection of scientific papers titled [Working Towards a Blue Future](#)
- The Guardian [St Helena's airport finally ready for touchdown](#)
- DW documentary: [St Helena – a remote island in the Atlantic](#)
- National Geographical [Ascension](#)
- BBC News [Ascension: The island where nothing makes sense](#)
- Ascension Island Government [The Sooty Tern](#)
- Scientific American [The Unusual Abundance of Ascension Island](#)
- The Guardian [Tristan da Cunha islanders rescue rockhopper penguins threatened by oil](#)
- Tristan da Cunha website [Tristan's Climate in a Nutshell](#)
- Tristan da Cunha [Wildlife and conservation](#)
- Tristan da Cunha [Island at the End of the World](#)
- Pew By [Protecting Its Ocean, Tristan da Cunha Safeguards Its Future](#)

Answers

1. The 7 territories involved in the Blue Belt Programme are mapped below in Figure 6.

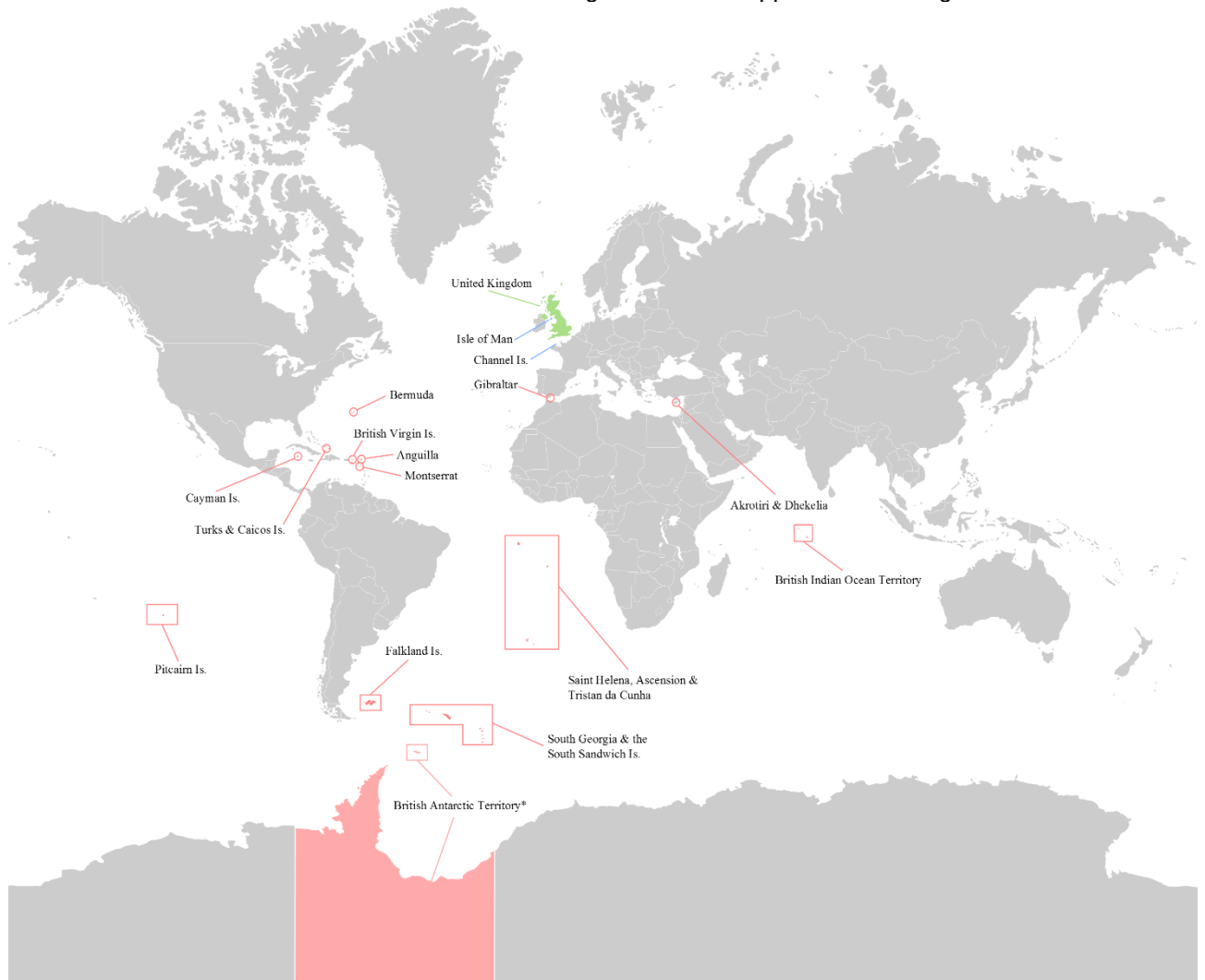


Figure 6 the British Overseas Territories Wikimedia

2. Throughout the year bright sunshine, clear skies, gentle breezes and deep blue seas describe St Helena. Day length does not vary greatly due to the island's location close to the equator. However, strong south-easterly trade winds mean the weather can change fast as weather patterns can roll in quickly.
3. The giant green turtles of Ascension are on the ICUN (International Union for Conservation of Nature) red list as an endangered species. Whilst they have over 80 nesting sites worldwide there are only 9 in the Atlantic (in Costa Rica, Ascension Island, Guinea-Bissau, Florida, Suriname, Mexico, Brazil, Equatorial Guinea and Venezuela). Giant green turtles are herbivores and undertake cyclical, long-distance migrations between coastal feeding habitats and nesting sites (which are often on oceanic islands like Ascension). Read more about the [Ascension Island Green Turtle Action Plan](#).
4. As instructed.
5. Line graphs for St Helena (SH) and Ascension (A) are below.

The data from the paper [Climate Change Impacts on Atlantic Oceanic Island Tuna Fisheries](#) measures the degree of habitat suitability on a scale of 0 to 1, with 0 being not suitable at all, and 1 being completely suitable. It can be thought of like a probability. The total suitability is then this number for all of the gridcells in Ascension or St Helena waters added together, therefore it does not have a unit.

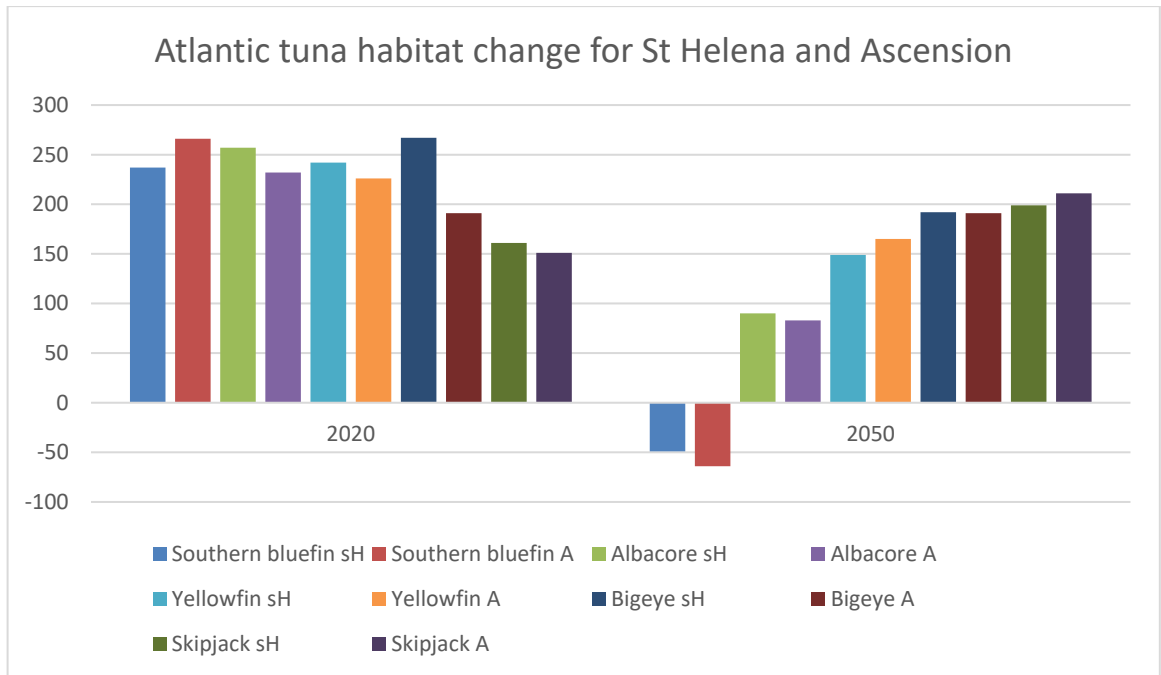


Figure 7 RCP4.5 from © [Dr Bryony Townhill](#) CEFAS Blue Belts, sH = St Helena, A = Ascension

- The Blue Belt programme promotes sustainable management of marine environments around the world. It is a landmark effort in conservation and has led to the protection of 4 million km² around 7 UK Overseas Territories. Within these waters many endangered species now have safe habitats, free from fishing, mass tourism, and extractive industry. For example the endangered whale sharks of St Helena, the Giant Green Turtle of Ascension, and the Tristan albatrosses of Tristan da Cunha. The archipelago of Tristan da Cunha now has the largest fully protected marine reserve in the Atlantic Ocean at 687,000 kilometres².