

Bermuda Biodiversity Action Plan Activity Report 2020



GOVERNMENT OF BERMUDA

Department of Environment and Natural Resources

Bermuda Biodiversity Action Plan Objectives

- A:** To ensure effective **coordination**, improved **collaboration** and ongoing **communication** in support of efficient biodiversity conservation such that all key stakeholders are engaged throughout the implementation of this plan.
- B:** To ensure that biodiversity conservation is integrated into all **Government policies, programmes and plans** by 2007.
- C:** To improve and strengthen **environmental education and training** programmes for every age group by 35% over the next 5 years.
- D:** To increase **public awareness of biodiversity**, its inherent values and conservation activities throughout the community by 100% over the next 5 years.
- E:** To increase the active participation of the **community** and the **private sector** in **ecologically responsible behaviours** by 25 % by 2007.
- F:** To provide appropriate economic and other **incentives** to effectively encourage people **to protect and enhance biodiversity**.
- G:** To revise and develop laws that address all key identified gaps in existing **environmental legislation** for implementation by 2007.
- H:** To ensure that **enforcement** effectively deters infractions against legislation such that violations decline by 50% by 2007.
- I:** To strengthen the level of protection, where appropriate, through the re-designation of existing **protected areas**, and to increase the area of fully protected **nature reserves** and **marine protected areas** through land acquisition or marine designation by 25% and 10% respectively; and to ensure the effective management of the protected areas network by 2007.
- J:** To develop new and revise existing **management plans** for all key **species and habitats** and to ensure their implementation by 2007.
- K:** To increase **research and monitoring** by 25% by 2007, as demonstrated by outputs, so as to support the management of Bermuda's biodiversity.
- L:** To secure from both public and private sources the **financial commitment** and other investment necessary for full implementation of the BSAP as required.

Bermuda Biodiversity Action Plan Summary of Actions Completed by Partners in 2020

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This report is a compilation of activities reported to the National Biodiversity Strategy and Action Plan (NBSAP) Coordinator by partners or appearing in the local news. Activities are listed in chronological order to provide a snapshot of what was happening in Bermuda at various points in the year. The activities below are either directly called for in the Bermuda NBSAP or were carried out in the spirit of biodiversity conservation and met the goals of the NBSAP. The bracketed numbers and letters are references to specific lines in the 2003 Bermuda Biodiversity Action Plan. The complete plan can be viewed at http://environment.bm/s/Biodiversity-Action-Plan_March2003.pdf

This document is a searchable PDF. The best way to search for specific information within the report is to search keywords in the Adobe search function. Key words have been **bolded** to aid skimming. Photos are the author's unless otherwise indicated.

Any errors or comments on this report can be submitted to the Biodiversity Action Plan Coordinator at environment@gov.bm.

Literature Reference: Copeland, Alison. 2021. Bermuda Biodiversity Action Plan Activity Report 2020. Government of Bermuda, Department of Environment and Natural Resources, Flatts, Bermuda. 40 pages.



ABBREVIATIONS USED IN THIS REPORT

BAMZ – Bermuda Aquarium, Museum and Zoo

BAS – Bermuda Audubon Society

BEST – Bermuda Environmental and Sustainability Taskforce

BOPP- Bermuda Ocean Prosperity Programme

BIOS – Bermuda Institute of Ocean Science

BNT – Bermuda National Trust

BUEI – Bermuda Underwater Exploration Institute

BZS – Bermuda Zoological Society

DENR – Department of Environment and Natural Resources

IUCN – International Union for the Conservation of Nature

KBB – Keep Bermuda Beautiful

NOAA – National Oceanic and Atmospheric Administration (USA)

UKOT – United Kingdom Overseas Territories

KEY ACTIVITIES 2020

The global pandemic of COVID-19, a novel coronavirus discovered in China in late 2019, affected all activities this year. The World Health Organisation declared the world-wide spread of COVID-19 a pandemic on March 11th. On March 18th the **first two cases of COVID-19** were reported in Bermuda, and the airport was closed on March 20th. The Government announced a **24-hour ‘shelter in place’**, beginning on April 4th until May 2nd. The airport re-opened on July 1st with scattered cases arriving over the summer. A spike in cases just before Christmas led to another round of restrictions and event cancellations.

In February, zoo-reared, critically endangered lesser Bermuda land snails (*Poecilozonites circumfirmatus*) arrived in Bermuda from the UK and were released on Nonsuch Island.

Bermuda’s first **Coast Guard Unit** was launched on February 6th.

Buy Back Bermuda’s **restoration of Eve’s Pond** began on March 6th and excavation of the pond was completed on May 15th. Throughout 2020 volunteers planted trees and shrubs at the site, and endemic killifish were introduced to the brackish pond.

In March Bermuda became the first UKOT to join the **Queen’s Commonwealth Canopy** programme when the designation of the Walsingham Trust’s nature reserve was announced.

BELCO began commissioning new machinery at its plant in February. As it became operational over the summer, issues with **poor air quality and ash fallout** arose. Mitigation measures and **air quality and tank water monitoring** programmes were established.

Protected species plans for seahorses, *Campylopus* moss, land hermit crabs, giant land crabs and freshwater molluscs were published in 2020. The 2012 recovery plan for endemic killifish was also updated.

In July the **‘Riddell’s Bay (Warwick Parish) Special Development Order 2020’** was approved by the House of Assembly and the Senate.

To create refugia from turtle grazing, and allow seagrasses to recover, the DENR installed **exclusion cages over degraded seagrass beds** at several inshore and offshore sites in 2020. Additionally, turtles were removed from the Lagoon at Ireland Island, and prevented from returning by the installation of grates at the openings.

In July planted **Governor Laffan’s Ferns** were observed **producing spores in the wild**, likely for the first time in over 100 years.

Category 2 **Hurricane Paulette** passed over Bermuda on September 14th 2020, with the eye of the storm remaining over the island for about 3 hours. Tropical Storm (later

Hurricane) **Teddy** then brushed the island a week later on September 21st. On November 30th the Bermuda Weather Service reported the **record-breaking 2020 hurricane season** had 5 storms that warranted watches or warnings for the Bermuda area. They were Post-tropical Storm Arthur, TS Edouard, Hurricane Paulette, Hurricane Teddy and Hurricane Epsilon. The Atlantic saw 30 named storms this season, including 13 that became hurricanes, 6 of which became major hurricanes.

On September 30th the Royal Botanic Gardens Kew published a 100 page **‘State of the World’s Plants and Fungi Report’** focused on Britain and the UK Overseas Territories.

Throughout the year, the **Bermuda Ocean Prosperity Programme** held consultations with stakeholder groups to understand priority areas and ocean activities to be incorporated into marine spatial planning. All Bermudians were encouraged to take the **Ocean Use Survey**.

Bermuda’s **biosecurity** procedures were tested in 2020 by the ongoing need to inspect all **imported bananas** and the discovery of **Dodder** on nursery plants in August. Due to COVID-19 travel restrictions, all incoming **Christmas trees** had to be inspected on-island in November and December.

The **new terminal** of the L.F. Wade International Airport became operational and received its first flight on December 9th.

JANUARY 2020

Bermuda's 45th annual Christmas Bird Count was held the week of December 29th 2019 to January 4th 2020. This year 7,919 birds were counted, including a tagged snow goose, a Trinitade petrel, a northern mockingbird and a Townsend's warbler. [The count itself is BSAP item E3.8 and K3.5 as data is collected by the public.]

- http://www.audubon.bm/images/pdf/Newsletters/Vol_31_No1_2020.pdf
- <http://www.royalgazette.com/news/article/20200125/2019-bird-count-logs-some-very-rare-visitors>



Northern Mockingbird (Photo: Alison Copeland)

The Bermuda National Trust held a **tree planting blitz** at several of its properties on New Year's Day. [F3.3 ngo, E1.6 tree planting, E1.4 cull & plant].

- <http://www.royalgazette.com/environment/article/20191229/new-years-day-tree-planting-drive-by-bnt>
- <http://bernews.com/2019/12/public-invited-plant-trees-start-new-year/>
- <http://bernews.com/2020/01/photos-bermuda-national-trust-tree-planting/>

Bermuda's 6th annual **winter lionfish derby** was held during the month of January. 87 lionfish hunters caught 1,072 lionfish during the month-long tournament. [J.1, K3.4 research invasives, K3.5 volunteers collect data, K6.1 invasive sp., D.4 communication, D4.2 feral animal control, K1.7, E3 community monitoring, A2.5 social event]. <http://www.royalgazette.com/news/article/20200210/lionfish-cull-results-in-record-haul>

In early January, the aircraft from UK Hydrographic Office continued its **hydrographic mapping surveys** to update Bermuda's marine charts, provide high resolution inshore bathymetry and update the terrestrial aerial imagery. [I1.7 aerial photo survey, H4 detecting infractions, A3.4, K1.9 habitat maps, L4]. <http://bernews.com/2020/01/minister-desilva-meets-ukho-surveyors/>

On January 14th the Bermuda Botanical Society and the Bermuda Zoological Society co-hosted a lecture entitled **'People and Plants: An Exploration of Humanity's**

Unique Association with the Plant Kingdom, presented by Michael Lavelle and Sandra Nicholson from Writtle University College, UK. [A2.4 lecture, A3.4].

In early January the Bermuda Ocean Prosperity Programme appointed two staff members [I3.3, A3.4, L]

- <http://bernews.com/2020/01/bermuda-ocean-prosperity-appoint-wade-mapp/>
- <https://www.gov.bm/articles/bermuda-ocean-prosperity-programme-announces-new-coordinators>

From January 28th to 30th the DENR hosted colleagues from environment departments in the **Caribbean UK Overseas Territories** for a 3-day **oil spill response and shoreline clean up (SCAT)** course. The course was the first in a series of training initiatives to be held this year. It involved lectures delivered by experts and field trips for shoreline sites [B4.10 list personnel, D3.2, B4.12 emergency plan, A3.4 collaboration, E10.17 oil spill at sea, H2.6 regiment, A3 regional, C7 training, K5.4 risk assessment, L4.1].

- http://bernews.com/2020/01/shoreline-oil-spill-clean-up-course-to-be-held/?fbclid=IwAR3X6dLFkvgE90vxB_p9LrDKib9cORcs5Xu9s49Iz_cbTKQugglGRTYRGO
- <http://www.royalgazette.com/environment/article/20200128/expert-to-teach-skills-on-oil-spill-clean-up>
- <https://www.gov.bm/articles/shoreline-oil-spill-clean-course>

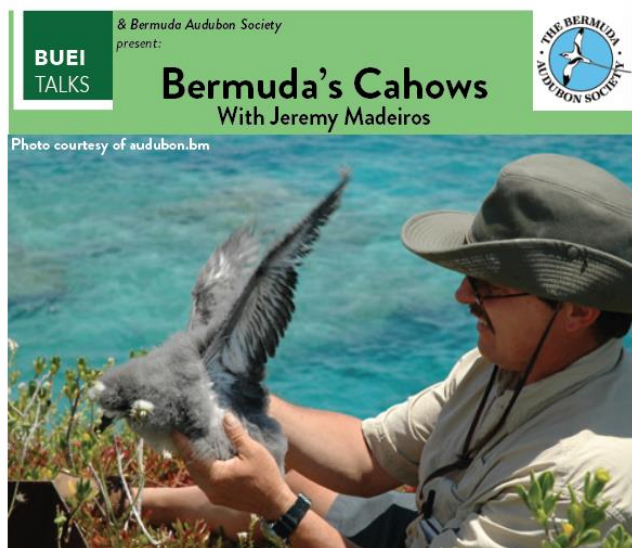


SCAT workshop attendees at John Smith's Bay (Photo: Dept. of Communications and Information).

In January, Bacardi Ltd. announced a project to house **hives of honey bees** on the roof of its Pembroke headquarters. [E5.5 beekeeping, E10 business].
<http://bernews.com/2020/01/roof-wetting-held-for-new-bacardi-beehives/>

In January, Cabinet approved the appointments of two **commissioners to the Sargasso Sea Commission**. Professor Howard Roe (UK) is serving a third term as commissioner, and Mrs. Rochelle Newbold (Bahamas) became a commissioner. Dr. Billy Causey became an Emeritus Commissioner upon his retirement from NOAA in January. [A3.4, A3.3 agreement]. <https://www.gov.bm/articles/two-international-experts-appointed-sargasso-sea-commission>

On January 29th DENR's Senior Terrestrial Conservation Officer Jeremy Madeiros gave a **public lecture on Bermuda's Cahows** at the BUEI as part of their lecture series. The talk was co-hosted by the Bermuda Audubon Society. [A2.4, K1.7].
<http://bernews.com/2020/01/buei-talks-bermudas-cahows-january-29/>



Poster: BUEI

On January 30th DENR Marine Resources Officer Dr. Joanna Pitt gave a lecture at BAMZ on **Bermuda's Baitfishes**. The talk focused on the ecological and economic importance of bait fish, and the fisheries and management challenges associated with them [A2.4 lecture, A3.4 collaboration, K1.7 feedback, J5].

FEBRUARY 2020

Representatives from the Jewish, Muslim and Christian communities gathered at the corner of Court and Dundonald streets on February 2nd to plant a loquat tree. The **tree planting** marked the beginning of the 10th annual United Nations World Interfaith Harmony Week, as well as **Vision 2020's campaign to plant 2,020 trees** by the end of this year. The Corporation of Hamilton facilitated the tree-planting as a part of their 225th anniversary initiative to plant fruit trees throughout the city. [E8.2 int'l day, A3.4, E1.6 tree planting, F3.3, E6 religious collaboration].
<http://bernews.com/2020/02/faith-community-leaders-plant-loquat-tree/>

On February 4th and 5th Bermuda celebrated **World Wetlands Day**, and this year's 'Wetland Biodiversity' theme, by conducting a '**bioblitz**' at two Ramsar Sites. Students from the Bermuda home school network, led by educators from the Bermuda National Trust, visited Paget Marsh, while students from the Massachusetts Maritime Academy, led by BIOS educators, visited Lover's Lake. The students photographed any animals or plants they could find and uploaded their species to inaturalist.org to create a final species list. In total, 72 species were recorded at the two sites (43 at Lover's Lake, 21 at Paget Marsh). [E8.2 int'l day, I4.7 Ramsar, E3.5 photos, E3.6 sightings, E7 youth, K3.5 comm data, C2].

<https://www.inaturalist.org/projects/world-wetlands-day-2020-bermuda-bioblitz>



MMA bioblitz team at Lover's Lake (Photo: Alison Copeland)

Students from Whitney Institute and Somersfield Academy met up with Dr. David Wingate at BAMZ in early February to mark the January 28th anniversary of the **rediscovery of the Cahow** in 1951. [E7].

- <http://bernews.com/2020/02/column-students-benefit-from-collaboration/>
- <http://www.royalgazette.com/environment/article/20200207/wingate-recounts-cahow-story-for-students>

The Thirteenth Meeting of the Conference of the Parties to the Convention on Migratory Species met in Gandhinagar, India from Feb. 16-22. This CoP adopted a decision on the internationally **critically endangered European eel**, a species also listed as protected in Bermuda. A Species Action Plan for the European eel is now being drafted by CMS partners, which will be approved by range states. The Sargasso Sea Commission is supporting the drafting. [J5, K3.3 economically important, J1 plan, A3.5 CMS, K6].

On February 11th a shipment of ***Poecilozonites bermudensis* and *Poecilozonites circumfirmatus* land snails arrived in Bermuda from the UK**. The snails were bred at the Zoological Society of London and Chester Zoo, and were being returned to Bermuda for release into the wild. Dr Kristiina Ovaska (Royal British Columbia Museum) and Tamas Papp (Chester Zoo) were in Bermuda from February 7th to 19th to assist DENR staff with the releases on several offshore island and mainland sites. Most importantly, *P. circumfirmatus* was returned to Bermuda for the first time and released at Nonsuch Island. [A3.4, J1.3 implement plan, J3.1 husbandry, J3.11 reintroduction, J3.3 overseas zoo, K1.3, K1.5 gov't support, K2.1 critical habitat, K3.1, K3.2 and K3.4 biocontrol and IAS monitoring, K4 reintroduction, K4.2 ecol. req.]. <http://bernews.com/2020/03/chester-zoo-releases-snails-bermuda/>



Kristiina Ovaska and Tamas Papp sewing soft-release cages for *Poecilozonites circumfirmatus* on Nonsuch Island (Photo: Alison Copeland).

On February 18th Dr Mark Outerbridge (Department of Environment & Natural Resources) and Dr Kristiina Ovaska (Royal British Columbia Museum) gave a presentation as part of the BZS lecture series entitled '**A Short History of Bermuda's Endemic Land Snails; Their Past, Present and Future**'. [A2.4 lecture, K1.7 research, E3.9 visiting scientists].

Bermuda's first **Coast Guard Unit**, composed of soldiers from the Royal Bermuda Regiment and members of the Bermuda Police Service, was launched on February 6th. Marine patrols and working with fisheries enforcement officers will be among the coast guard's duties. [E1.7, H2, H2.3, H2.6 regiment, H4.4, G2, J5]. <http://bernews.com/2020/02/bermudas-first-coast-guard-unit-launched/>

The Bermuda National Trust held their **Annual Children's Nature Walk** at Spittal Pond Nature Reserve on February 13th. [D5 regulations to children, C3.10 outdoor teaching, D9 event].

- <http://www.royalgazette.com/environment/article/20200215/exploring-history-and-nature-at-spittal-pond>
- <http://bernews.com/2020/02/bnt-childrens-nature-walk-spittal-pond/>

Gardeners were able to purchase native and endemic plants, vegetables and vegetable plants, and ornamental species at the **Bermuda National Trust's annual plant sale** on February 15th. [E2.4]

Researchers at BIOS were awarded a Triton remotely operated vehicle (ROV) by a US Tech company to **study micro-organisms in Bermuda's flooded caves**. Use of this technology is safer than cave diving and should be less disruptive to the rare organisms and their habitat. [K2.1 critical habitat, K3.1 poorly studied taxa, K5.2, L, A3.4]. <http://www.royalgazette.com/environment/article/20200214/robot-triton-to-explore-underwater-caves>



Triton ROV (Photo: Alison Copeland)

The Lunch and Learn series co-hosted by the Bermuda College and BEST continued on February 27th with a lecture by Dr. Annie Glasspool entitled '**Climate Change: How can Bermuda respond?**' [A2.4, K6.2]. <http://bernews.com/2020/02/eco-lunch-learn-series-returns-spring/>

On February 28th a **cahow chick hatched** in burrow 831 on Nonsuch Island. The chick will be monitored over the next few months via the CahowCam. Another chick hatched in the second CahowCam-enabled burrow on March 13th. The chick with CahowCam 1 was named Nemo, while the CahowCam 2 chick was called Zephyr. [D2, A3.4 collaboration + technology, L4.3 overseas funding, C].

- <http://www.royalgazette.com/environment/article/20200303/cahow-chick-takes-centre-stage>
- <http://bernews.com/2020/03/video-cahow-chick-hatches-live-camera/>
- <http://www.royalgazette.com/environment/article/20200312/second-cahow-hatches-on-nonsuch-island>
- <http://bernews.com/2020/03/video-second-cahow-chick-finally-revealed/>

MARCH 2020

Buy Back Bermuda, a joint initiative of the Bermuda Audubon Society and the Bermuda National Trust, purchased 3.5 acres of land along the Shelly Bay stretch with public donations in 2012. Work is now underway to restore the land as a nature reserve and open it to the public. On Friday March 6th excavators from Island Construction began clearing the site at **Eve's Pond** nature reserve. Re-excavation of the pond itself began on March 6th but was halted by the Covid-19 lockdown. Work began again when the pandemic restrictions were eased during the first week of May. Excavation of the pond was completed on Friday, May 8th, and contouring work around the edge was completed the week of May 15th. [A3.4, F3.3, L6, I2.1, I2.3 new ngo protected area, I3.2 cmp, I3.4, I5.2 rehab area, J3.11 translocation].

- <http://www.royalgazette.com/environment/article/20200310/reclamation-work-begins-at-shelly-bay-reserve>
- <http://bernews.com/2020/03/buy-back-bermuda-create-nature-reserve/>
- http://www.audubon.bm/images/pdf/Newsletters/Vol_31_No1_2020.pdf
- Drone video over the pond:
https://www.youtube.com/watch?v=_vlydih1C8U&feature=youtu.be



Newly excavated Eve's Pond in May 2020 (Photo: Bermuda Audubon Society)

Guy Carpenter released a **report** entitled '**Protecting our planet and the public purse**' highlighting 21st century challenges such as climate change and its financial and socio-economic impacts. [E10, K6.3]. <http://bernews.com/2020/03/protecting-planet-public-purse/>

Monday March 9th was Commonwealth Day, and it was announced that Bermuda had become the first UK overseas territory to have a project join the **Queen's Commonwealth Canopy**. The project, proposed by the Walsingham Trust, includes

habitat restoration and rare plant conservation at the **Walsingham Nature Reserve**. The QCC is a partnership between the Royal Commonwealth Society, Cool Earth and the Commonwealth Forestry Association. It currently recognises 60 projects in 45 countries of the 53 commonwealth countries. [F3.3 project support, I4 protection increased, I5 habitat restoration, L4 funding, A3.4 collaboration, A3.3 int'l agreement, C4 training, C7.3 land mgt, J3.11 reintroduction, D3.7, E8.2 int'l day].

- <https://queenscommonwealthcanopy.org/projects/walsingham-nature-reserve/>
- <http://www.royalgazette.com/environment/article/20200309/walsingham-reserve-commonwealth-first>

On March 11th Cedarbridge Academy and the Bermuda National Trust held a **tree planting** for **International Women's Day** to celebrate the contributions to the school of Mrs. Kalmar Richards, Ms Rosemary Mathews and Mrs. Devina Butterfield. Three Bermuda Cedar trees were planted. [E8.2 int'l day, E1.6 tree planting, C teachers]. <http://bernews.com/2020/03/cedarbridge-honour-3-women/>

On March 18th Premier David Burt confirmed that the **first two cases of COVID-19** had been diagnosed in Bermuda. The airport was subsequently closed on March 20th. The World Health Organisation had declared the world-wide spread of **COVID-19 a pandemic** on March 11th. The unknown disease was first reported to WHO in China on Dec. 31st 2019, and was named COVID-19 on Feb. 11th. The virus that causes this disease is SARS-CoV-2. This pandemic led to many events and activities being cancelled in 2020. [K6.1 threat monitoring].

- <https://www.gov.bm/articles/bermuda-confirms-first-two-cases-covid-19>
- <https://www.gov.bm/articles/premier-david-burt-statement-covid-19>
- <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>

The Bermuda Audubon Society began an extensive **restoration** project at their **Somerset Long Bay West nature reserve** this spring. The initial phase of the work involved clearing invasive vines and cow cane from the site and removing dead trees which had been smothered by the vines. A contractor was hired to do much of the work, assisted by work parties of volunteers. [E1.3 habitat restoration, E1.4 culling, F3.3 NGO sponsorship, I1.3 protected area mgt].

- <http://www.royalgazette.com/environment/article/20200323/restoration-project-for-nature-reserve>
- http://www.audubon.bm/images/pdf/Newsletters/Vol_31_No1_2020.pdf

Greenrock undertook a media campaign encouraging Bermudians to turn off unnecessary lights and electrical devices for **Earth Hour** on March 28th from 8:30 to 9:30pm. [E8.1 dates, D9.2 festival, D2.7 consumer, A2.5 social event].

- <http://www.royalgazette.com/environment/article/20200318/earth-hour-to-go-ahead>
- <http://www.royalgazette.com/environment/article/20200328/take-part-in-earth-hour-from-home>
- <http://bernews.com/2020/03/earth-hour-turn-unnecessary-lights-tonight/>

On March 31st the Minister of Home Affairs advised that due to movement restrictions from the ongoing COVID-19 regulations, fishermen were being given a longer than normal time to **sell lobsters** they had already caught. [E5.3 fishermen, J5.2].

<https://www.gov.bm/articles/lobsters-available-until-end-april>

<https://www.gov.bm/articles/relicensing-period-commercial-fishing-vessels-extended>

APRIL 2020

In response to the global and local threat from the novel coronavirus COVID-19, a state of emergency was declared in Bermuda on April 1st. The Government announced a 14-day period of **24-hour 'shelter in place'**, beginning on April 4th. During this time, residents were only allowed to leave their properties for groceries, pharmaceuticals and emergencies. On April 14th, the shelter in place was extended for 14 more days. [K6 global threat].

A previously un-aired episode of the **Ocean Vet TV series**, featuring the work of the Bermuda Turtle Project and BAMZ animal hospital, with narration by Dr. Neil Burnie was released online in April by UK-based gassProductions. [D2.9 TV].

- <http://www.royalgazette.com/environment/article/20200406/unseen-ocean-vet-episode-to-be-aired-online>
- <http://bernews.com/2020/04/secret-episode-ocean-vet-revealed/>

An update on the survivorship of the **Governor Laffan's Ferns** introduced to the wild in 2019 was published in the Envirotalk newsletter on April 6th, and later followed up by a Royal Gazette article. [D2.2].

<http://www.royalgazette.com/environment/article/20200423/governor-laffans-fern-replanting-hit-by-storm>

Articles in the April 6th edition of **Envirotalk for Spring 2020** included a piece on the lack of local bananas at present, the Governor Laffan's Fern recovery project, lionfish control efforts, and marine spatial planning. There were also public advisories about the upcoming seasonal fisheries protected areas closures. [D2.1 articles, D2.5 online content, E8.1 dates, D7, K1.7, D4 animal control, J5 fisheries, K4.2 reintroduction, J3 ex situ, J3.11, D3.3 mpa, I3 mpa].

<https://environment.bm/s/Envirotalk-841-Spring-2020.pdf>

A suspected breeding pair of migrating **Snow Geese** appeared at the old St. Georges golf course during high winds on April 8th. [K3.5 community spp data, E3 comm. data]. <http://www.royalgazette.com/environment/article/20200408/snow-geese-stop-off-for-round-of-golf>

A number of **bluebird box kits** featuring a novel design that does not require nails or tools to assemble were sold online this spring. [F3.3 private sector support, E2.8 bluebird box].

- <http://www.royalgazette.com/environment/article/20200421/eastern-bluebirds-not-put-off-from-nesting>
- <http://bernews.com/2020/04/happy-bird-company-offers-bluebird-boxes/>

2020 marked the **50th anniversary of the first celebration of Earth Day**. Bermuda held several virtual celebrations due to the COVID-19 shelter-in-place restrictions. On **Earth Day**, April 22nd, Bermudians were encouraged to **germinate seeds** at home for tree planting as part of the Vision 2020 initiative of the Bermuda Climate Action Network. The BUEI marked the 50th anniversary of Earth Day by sharing activities to do at home through their Eco-Schools Bermuda social media platforms, including an instructional [video](#) on building a **compost critter bin**. [E8.1, E8.2 int'l day, E2.4 gardeners, E2.2, F2.3 compost].

- <http://www.royalgazette.com/environment/article/20200423/trees-planted-for-earth-day>
- <http://bernews.com/2020/04/earth-day-virtually-pandemic/>
- <http://bernews.com/2020/04/bzs-online-celebration-of-earth-day/>

The annual **Agricultural Exhibition** due to be held April 23rd to 25th was cancelled due to the COVID-19 pandemic. [C3.9, D9.2].

A 2,000-pound, 15 ft long female **great white shark**, tagged by Ocearch researchers off Cape Breton, Nova Scotia in September 2019 approached Bermuda in April 2020. The great white is one of the sharks Bermuda reports on under the Convention on Migratory Species. The shark approached the island from the NW on April 30th, skirted the east end, and then moved off to the SW on May 4th. [D2.2, A3.4, K migratory, K3.1, A3.3 MEA].

- <http://bernews.com/2020/04/white-shark-unamaki-tracked-near-bermuda/>
- <https://www.oearch.org/tracker/?details=355>

MAY 2020

On May 1st the Minister of Home Affairs announced that a **license had been granted** for a **solar farm** at the airport to operate and that it would come online soon. The project by Saturn Solar Bermuda is a 19-acre, 6-megawatt installation on the brownfield site at the 'finger' at LF Wade airport. [F5, F5.4].

<https://www.gov.bm/articles/regulatory-authority-approves-operating-licence-new-solar-farm-l-f-wade-international>

The **Cahow nesting population** expanded to 134 pairs raising 68 chicks in 2020. Last year 131 pairs raised 73 successfully fledging chicks. [J1.3 implement plan, K1.5 gov priority, A3.4, D3.7 success, J2.3 gov adopted plan, J2.5 report].

<http://bernews.com/2020/05/2020-cahow-nesting-season-record-number/>

Recreational fishing in Bermuda was suspended during the COVID-19 shelter-in-place in April and early May. Activity resumed on May 21st 2020 with some restrictions, which were published online at <https://environment.bm/recreational-fishers>. [J5, D5 regulations].

In celebration of **Endangered Species Day** on May 15th and the **UN International Day for Biological Diversity** on May 22nd, the DENR compiled a blog post highlighting

Bermuda's protected species and tips to protect biodiversity and enhance your garden for wildlife. [E8.2 int'l day, D2.13 protect biodiv, E2.2 backyard wildlife, E2.3 backyard conservation, J2 protected sp.]. <https://environment.bm/news-hot-topics//celebrating-biodiversity>

In a Facebook post on May 17th, the Bermuda Turtle Project reported that a **Bermuda-tagged green turtle nested on a beach near Melbourne Beach, Florida**, on 14 August 2019. The BTP tagged her outside Daniel's Head in 1994 and caught her again in 1995. She was not seen again until volunteer beach monitors in Florida noticed her tag in 2019 and reported their discovery. [A3.4 collaboration, K2.2 tracking].

On May 22nd Minister Walter Roban spoke in the **House of Assembly on food security**. He thanked the farmers, fishermen and local food suppliers for their efforts during COVID-19 disruptions and noted that the public could visit roadside stands for local produce and fish. He encouraged home gardening and public reporting of theft from commercial fields. [J5.2 adaptive mgt]. <https://www.gov.bm/articles/promoting-local-food-security>

A **letter to the Editor** appeared in the Royal Gazette on May 23rd commending the work of Buy Back Bermuda and the restoration of Eve's Pond. [D8.3 letters to the editor, F6]. <http://www.royalgazette.com/letters-to-the-editor/article/20200523/eves-pond-national-treasure-restored>

On May 27th the BZS gave a virtual presentation updating members and volunteers on what has been achieved over the last 5 years with **creating a living classroom on Trunk Island**. Large parts of the island have been cleared of invasive plants, and over 900 native or endemic plants have been planted. Other projects include the installation of bee hives, the introduction of 1600 *Poecilozonites* land snails, and the installation of over 30 longtail igloos planting culling pa mgt [A2.4, E1.3, E2.8 igloo, E5.5 bees, F3.3 private sector support, E1.3 habitat restoration, E1.4 culling and planting, E1.6 tree planting, J3.11 reintroduction].



Volunteers at Trunk Island (Photo: Alison Copeland)

JUNE 2020

Due to the ongoing COVID-19 restrictions on public gatherings, **World Environment Day** on Wednesday, June 5th, and **World Ocean's Day** on June 8th were celebrated with virtual or online events in 2020. [E8.1 int'l date, E8.2].

- <http://bernews.com/2019/06/world-environment-day-world-ocean-day/>
- <http://bernews.com/2020/06/bzs-host-virtual-world-oceans-day-celebration/>

Many of Bermuda's environmental educators and NGO's have embraced creative ways to deliver **online learning and virtual lectures** this spring, through new collaborations and the use of technology. [C2.2 educators, C2.3].

- <http://www.royalgazette.com/environment/article/20200528/virtual-series-to-explore-ocean-depths>
- <http://bernews.com/2020/05/ocean-educators-unite-virtual-series/>
- <https://bernews.com/2020/06/bnt-launches-virtual-education-programmes/>
- <https://bernews.com/2020/06/bzs-to-host-virtual-lecture-series/>

On June 5th the **Merchant Shipping Amendment Act** was approved in the House of Assembly. The Act gives the Minister of Transport power to direct ships and ship owners following any accident that could **pollute Bermuda's waters**. [B4.12 emergency response, G2 legislative amendment, G3.6 adopt legislation].

<http://www.royalgazette.com/politics/article/20200606/house-law-change-on-marine-pollution>

On June 11th the BZS held a virtual lecture on Zoom by Stratton Hatfield entitled **Energy Empowerment**. The talk included suggestions on installation of solar technology, and advice on saving money and reducing pollution through renewable energy. [F2, A2.4].

A large cloud of **dust from the Sahara** could be seen blowing across the Atlantic to the Caribbean in mid-June. <http://www.royalgazette.com/weather---news/article/20200627/saharan-dust-cloud-expected>

In a press article at the end of June, BIOS scientists explained this month's exceptionally low tides, noting the new moon on June 21st caused a larger tide range. This was compounded by a '**cyclonic eddy**' **creating lower than average sea surface heights** around the island. June's tides were measured at 3 to 4 inches lower than predicted, exposing marine life along the shore. BIOS noted ocean eddies in summer 2010 had also cause exceptionally low tides; while in February 2015 and 2017 they had cause higher than normal tides. The 2017 eddy added 18 inches to the tides, flooding low-lying land. [K6.2 local process].<http://www.royalgazette.com/weather---news/article/20200627/cyclonic-eddy-responsible-for-low-tides>

On June 24th the DENR published the **summer 2020 edition of the Envirotalk** newsletter. It contained articles on recent findings on baitfish, telemetry tracking a

rehabilitated female peregrine falcon, the veterinary services support role during the COVID-19 pandemic, and data from the air pollution monitoring station during the shelter in place period, compared to April 2019. [D2.1 articles, D2.5 online content, E8.1 dates, D7, K1.7, J4 vet facility, J5.1 harvested spp., K5 anthropogenic impacts]. <https://environment.bm/s/Envirotalk-842-Summer-2020.pdf>



Milly the Peregrine Falcon in rehab at BAMZ (Photo: Patrick Talbot)

News articles based on the Envirotalk appeared in the Royal Gazette on the 27th and 29th. [D2.2].

- <http://www.royalgazette.com/environment/article/20200627/air-quality-improved-during-shelter-in-place>
- <http://www.royalgazette.com/health/article/20200627/covid-19-warning-for-pets>
- <http://www.royalgazette.com/environment/article/20200629/rescued-raptor-finds-fertile-hunting-ground>

On June 6th the Bermuda Audubon Society advised members via its Facebook page that thousands of **seabirds were migrating** past Bermuda, with at least 1200 counted passing by that morning. Large numbers of Great Shearwaters in particular were seen off South Shore. [K3.5 community spp data, E3 comm data].

On Thursday, June 25th Dr. Thomas Iliffe from Texas A&M University gave an online lecture for the Bermuda National Trust on **Bermuda's Caves**. The talk highlighted the importance of cave habitats and their endemic invertebrate fauna, both to Bermuda, and globally. Projects discussed included recent deep dives around the Bermuda platform and Challenger Bank to investigate caves under 200-600ft of water; and

investigations of caves at Walsingham, Morgan's Point and Wilkinson Quarry. [K1.7, A2.4].

A Planning Application to quarry the entrance to the **Wilkinson Quarry Cave** received objections from BEST and the Bermuda National Trust ([BNT objection](#)). It was later approved by the Development Applications Board [A2.6 public input, I4.3 habitat legislation, I4.4 planning applications, K6.4 Planning critical habitat, H1].

The **new logo** for the LF Wade International Airport was unveiled by Skyport in June. The logo by SDJ World, features a **flying Cahow**, which is a nod to both Bermuda's national bird and the address of the airport at Cahow Way. [E5.4 symbols].

<http://www.royalgazette.com/news/article/20200616/new-airport-terminal-logo-takes-flight>



The new airport logo (Graphic from the Royal Gazette online).

The Bermuda Bluebird Society circulated an **online questionnaire** in late June asking the public to select how many pairs of bluebirds had nested in their yard this year, and which parish they lived in. The data should give a snapshot of the **breeding bluebird population**. [K3.5 community spp data, E3 comm data].

<http://www.royalgazette.com/news/article/20200625/watch-birdies-help-count-bluebirds>

The BUEI's summer [camps](#) began on June 29th. Camp themes included caves, sharks, the deep ocean, weather and seashells. [C2.7, C2.8, C3.11].

In late June a **research paper** on lionfish by Dr. Corey Eddy was published online. His research on stable isotopes explores **lionfish feeding ecology** and the extent to which they compete with other small predators on Bermuda's reefs. The work was funded by a DEFRA Darwin Plus grant, NSF, BZS and the Bermuda Lionfish Task Force. See: Eddy, C., J.M. Pitt, J. Larkum, M.A. Altabet and D. Bernal. 2020. Stable Isotope Ecology of Invasive Lionfish (*Pterois volitans* and *P. miles*) in Bermuda. **Frontiers in Marine Science**, 26 June 2020. <https://doi.org/10.3389/fmars.2020.00435>. [D4.2 invasive article, K1.5 govt support, K1.6, K3.3 economically important, K3.4 invasive impacts, D9, J5, L4 grant].

JULY 2020

On July 3rd a Special Development Order (SDO) was laid in the House of Assembly by the Minister of Home Affairs. The Order, titled '**Riddell's Bay (Warwick Parish) Special Development Order 2020**' will allow subdivision of the former Riddell's Bay golf course to create 18 lots for residential development and two conservation areas. The SDO was debated and approved by the House of Assembly on July 17th and the senate on July 22nd. [I4.4, I4.3, C7.5 EIA, I2].

- <https://www.gov.bm/articles/riddell%E2%80%99s-bay-warwick-parish-special-development-order>
- <https://www.gov.bm/articles/riddell%E2%80%99s-bay-sdo-approved-legislature>
- <https://www.gov.bm/articles/riddell%E2%80%99s-bay-warwick-parish-special-development-order-2020>

The Aquarium facility reopened to the public on July 6th, following its closure due to the COVID-19 restrictions. The BZS held **summer camps** for all ages in July and August, including the Conservationist Camp at Trunk Island the week of August 10th. [C2.7 camps].

- <https://bernews.com/2020/07/bzs-aqua-camps-full-swing/>
- <https://www.gov.bm/articles/bermuda-aquarium-museum-and-zoo-re-open-6th-july>

In a press statement in early July, the DENR responded to concerns from the public and a local farmer over **glyphosate-based weedkillers** such as Roundup. Following a review in 2015, Bermuda banned products containing greater than 2% glyphosate. Ready-to-use products containing lower concentrations can still be imported. The Government stated that the Department of Parks, DENR and the Highways Section of Public Works do not use Roundup in their operations. [K6.5 int'l data, G2.4, E10.11, D2.7 consumer choice, E5.7 sustainable agriculture].

<http://www.royalgazette.com/environment/article/20200703/roundup-settlement-prompts-farmer-to-demand-ban>

On July 14th Sandys Middle School announced that their Aqua Farm programme had expanded to include **aquaculture and hydroponic farming**. The aquaculture programme began in 2013 when the school received Bermuda's first aquaculture license to grow tilapia. The Aqua Farm has been integrated into the school's curriculum and STEM programme. [E5.7 sustainable agriculture, E5].

<https://bernews.com/2020/07/sandys-middle-school-aquafarm-finds-new-life/>

In July the Ministry of Public Works **demolished a dock** which had been built in **Rocky Hill Park** by residents living nearby, without Planning permission or permission from the Parks Commission. The Minister of Public Works warned that illegal foreshore developments and future encroachments on public land would be taken seriously. [H1.4 penalty, I4.4 protected area, 14.5, H5.1 police and gov].

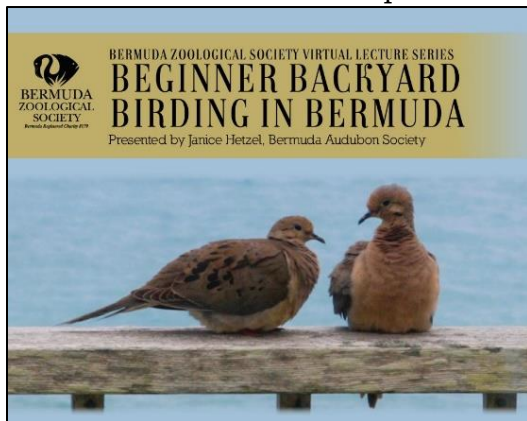
- <https://www.gov.bm/articles/minister-public-works-addressing-illegal-foreshore-encroachments>
- <https://www.gov.bm/articles/addressing-illegal-foreshore-encroachments>

- <http://www.royalgazette.com/environment/article/20200715/dock-built-by-locals-at-rocky-hill-torn-down>

In July the Ministry of Public Works warned that members of the public found illegally **dumping** waste in **parks, bus stops and public docks** will face prosecution. Boaters were also urged to take trash home and not leave it at public bins. [D10.6].

<https://www.gov.bm/articles/illegal-dumpers-face-prosecution>

Janice Hetzel, secretary of the Bermuda Audubon society, presented a virtual lecture via Zoom on July 15th as part of the BZS lecture series. During the talk, entitled **“Beginner Backyard Birding in Bermuda”**, she presented basic birding techniques, introduced common bird species and demonstrated helpful online resources. [A2.4].



Poster by BZS

This summer the BUEI began hosting **Ocean Hour**, an online ocean education series showcasing local Bermudian projects and initiatives which support protecting the oceans while inspiring the next generation. In the [first episode](#), **Hannah Horsfield** discussed ocean plastics and upcycling marine debris into artwork. On July 29th in the [second episode](#), **JP Skinner** discussed the ongoing seagrass conservation project and learn-to-dive programme of Waterstart. [A3.4, A2.4 lecture, C2.2 network of educators, K1.7, D2 message].

Other planned episodes include:

- September - BIOS with Lakshmi Magon & Kyla Smith - Devil's Hole Microbial Ecology Laboratory - Ocean Dead Space Research.
- October - Teddy Gosling - Bermuda's Invasive Lionfish.
- November - Phillippe Rouja - Wrecks and Teddy Tucker Week - History of wrecks and the peoples' stories plus underwater archaeology.
- December - Weldon Wade - Ocean Advocacy, Free diving and Bermuda Ocean Prosperity Programme.

On July 24th Minister of Public Works Lt.Col. David Burch announced in the House of Assembly the Government's intention to establish a **community garden in every parish** to promote agriculture. Sites at Avocado Lodge and TN Tatum School are currently being prepared, and other projects are planned. [A3.4, E5.5 cottage industries, F3.3 govt sponsor, E5.6 home gardening].

- <https://bernews.com/2020/07/plan-for-a-community-garden-in-every-parish/>

- <https://bernews.com/2020/07/new-community-garden-project-in-friswells-hill/>
- <https://bernews.com/2020/11/photosvideo-minister-community-gardens/>
- <https://www.gov.bm/articles/minister-public-works-community-gardens-update-4-november>

In July it was discovered that the **Governor Laffan's Ferns** planted by the DENR at the Audubon Society's Sear's Cave nature reserve had **produced spores**. This was significant, as it was the first known evidence of reproduction in the wild for over 100 year's.



Spores on Governor Laffan's Fern in Sear's Cave (Photo: Alison Copeland)

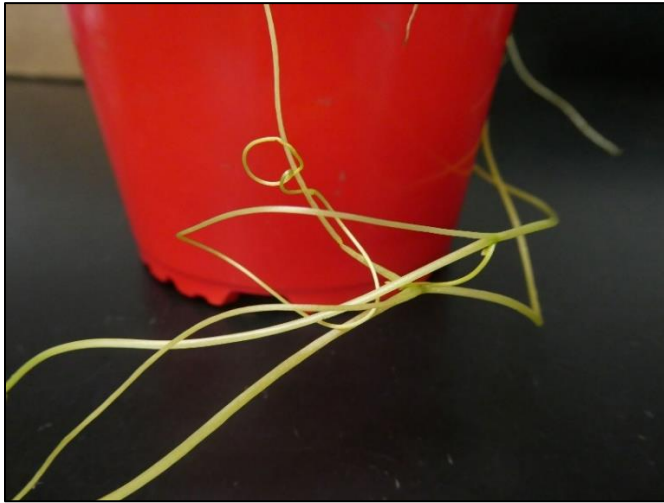
AUGUST 2020

The DENR issued a press statement on August 4th explaining that the brown foamy scum floating in Hamilton Harbour is the result of a **plankton bloom**, not marine pollution. [E3 reporting, D2 news]. <https://www.gov.bm/articles/degrading-plankton-bloom-produces-brown-surface-layer-areas-hamilton-harbour>

On August 6th the DENR released a statement encouraging the public to report sightings of **Dodder, an invasive parasitic plant**. A single basil plant with dodder on it had been brought to the plant protection lab earlier in the week. A check of local plant nurseries by DENR staff did not turn up any other infestations, but several affected plants were surrendered by members of the public. It is thought the dodder originated from contaminated seed. [B4.11 IAS list, B4.12 emergency response, D4 invasive, E10.12 garden centre].

- <https://www.gov.bm/articles/parasitic-dodder-plant-recently-found-again-bermuda-threat-native-plant-species>
- <http://www.royalgazette.com/environment/article/20200806/warning-over-dodder-plants>
- <https://bernews.com/2020/08/people-urged-to-check-for-parasitic-dodder/>
- <https://bernews.com/2020/08/working-to-track-down-dodder-infested-plants/>

- <https://www.gov.bm/articles/denr-working-aberfeldy-nurseries-track-down-basil-plants-seeds-infested-dodder>



Invasive Dodder plant on infested Basil (Photo: Alison Copeland)

The Bermuda Electric Light Company (**BELCO**) began **commissioning new machinery** at its North Power Plant in February 2020. As the plant became operational over the summer, issues arose with poor air quality and fallout of soot and ash in nearby neighbourhoods. Following investigation by the DENR, the Environmental Authority instructed BELCO to take mitigation actions. **Air quality** and **tank water monitoring** programmes were set up in collaboration with DENR, BIOS and overseas labs. [B4.10 advice, E10 private sector, K5 anthropogenic impacts, K5.4 industrial, K1.5 govt support, K1.7updates].

- <https://www.gov.bm/articles/denr-monitoring-and-assessing-belco-emissions-ensure-public-safety>
- Autumn 2020 Envirotalk article on air quality around BELCO: <https://environment.bm/s/843-Envirotalk-Autumn-2020.pdf>
- Spring 2021 Envirotalk article on tank water testing: <https://environment.bm/s/851-Envirotalk-Spring-2021.pdf>

The ongoing situation at BELCO generated numerous news stories from August until the end of the year.[D2.2].

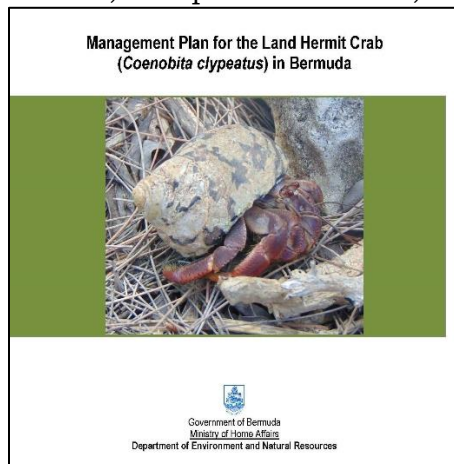
- <http://www.royalgazette.com/environment/article/20200806/government-to-test-air-quality-near-belco>
- <http://www.royalgazette.com/environment/article/20200805/angry-residents-want-action-on-belco-pollution>
- <http://www.royalgazette.com/news/article/20200801/residents-call-for-action-belco-debris>
- <https://bernews.com/2020/08/ed-belcos-advisory-north-power-station-emissions/>
- <http://www.royalgazette.com/environment/article/20200806/belco-to-shut-offending-smokestacks>

- <http://www.royalgazette.com/news/article/20200812/belco-aims-to-dispel-misinformation>
- <https://bernews.com/2020/08/ed-belco-fully-compliant-clean-air-act/>
- <https://bernews.com/2020/08/ed-denr-monitoring-assessing-belco-emissions/>
- <http://www.royalgazette.com/environment/article/20200827/belco-hires-firm-to-test-emissions>
- <https://www.royalgazette.com/news/article/20201031/clean-air-campaigners-meet-belco-to-discuss-pollution-problems/>
- <https://www.royalgazette.com/environment/news/article/20201119/a-problem-at-the-main-belco-power-plant-that-caused-clouds-of-soot-to-be-thrown-over-the-surroundin/>
- <https://www.royalgazette.com/environment/news/article/20201209/belco-retires-engines-and-stacks/>

A **Planning application** to build 4 residential units behind **Tom Moore’s Tavern** met with objections from a number of environmental groups in August. The proposed development is situated within a known cave area that is prone to flooding, and adjacent to a nature reserve. The development application was approved by the Development Applications Board on September 9th. [A2.6 public input, I4.3 habitat legislation, I4.4 planning applications, K6.4 Planning critical habitat, H1].

- <http://www.royalgazette.com/environment/article/20200805/audubon-society-objects-to-plan-for-tourist-units>
- <http://www.royalgazette.com/news/article/20200810/national-trust-to-oppose-walsingham-project>

In August the DENR published **protected species recovery plans or management plans** for lined and longsnout seahorses, the *Campylopus* moss, land hermit crabs, giant land crabs and the freshwater pea clam and limpet. The 2012 recovery plan for both endemic killifish species was also updated. These 5 new plans and 1 updated plan can be found online at: <https://environment.bm/species-recovery-plans>. [J1.6 new plan, J1.5 updated plan, J1.7 listed spp, J2.1 plan on web, J3 ex situ, K2 critical habitat, K3 species research, K4 spp. restoration].



Management plan cover (DENR)

The Bermuda Weather Service stated on August 13th that the island was experiencing a **dry spell**, not a drought, and this was typical July and August weather. This followed news reports that farmers had lost crops, including sweet corn, due to the lack of rain in July.

- <http://www.royalgazette.com/weather---news/article/20200813/guishard-dry-spell-but-not-drought>
- <http://www.royalgazette.com/news/article/20200812/low-rainfall-affects-summer-crop-harvest>

In August the Marine Conservation Section of the DENR carried out a series of dives to install **exclusion cages over degraded seagrass beds** at Trunk Island, Bailey's Bay, Chub Heads and Bethel's Island. This management activity aims to create refugia from turtle grazing to allow the seagrass to recover and provide habitat for other species. [K6.2, K2.2 monitoring, K2.1 habitat, K1.7, K1.5, A3.4, F3.3, K4 restoration, E1].



DENR divers installing exclusion cages at Chubb Head (Photo: Alison Copeland)

Mr. Nasir Rudolph, who will be studying marine science at the University of Miami, was announced as the **Environmental Education Grant** winner for 2020/21. [C6, C7, L]. <https://environment.bm/environmental-education-grant?rq=environmental%20education%20grant>

Corals spawning during usually calm weather produced an oily slick on the ocean during the week of August 10th. The productivity caught the attention of divers, fishermen and photographers, as well as hungry wildlife.

In late August the Ministry of Health announced that their seawater monitoring programme had recorded **significantly lower levels of bacteria at swimming beaches** in 2020 compared to previous years. The drop was attributed to fewer tourists and locals using the beaches due to the COVID-19 pandemic. Cruise ship visits had been cancelled since March, and the airport had been closed from March until July 1st. [K5 water quality, K6 potential threats, K5.5 sewage monitoring].

- <http://www.royalgazette.com/environment/article/20200824/water-pollution-levels-down-on-beaches>
- <https://bernews.com/2020/08/seawater-monitoring-results-are-encouraging/>

Saturday August 15th Bermuda National Trust conservation officer at the **Butterfield Nature Reserve** in Pembroke with 15 silver and gold **Duke of Edinburgh's Award** participants. The students cleared the path through the reserve to allow access to clean up damage from last autumn's Hurricane Humberto. They also cleared the roadside of an overgrowth of invasive plants and planted an endemic Bermuda Palmetto. [E1.4 culling invasives, F3.3 NGO, I3 protected area mgt activity, A3.4, E7.2 youth]. <https://bernews.com/2020/08/photos-video-dofe-partners-bnt/>



Duke of Edinburgh's Award participants and BNT staff at Butterfield Nature Reserve (Photo: Alison Copeland)

In late August the DENR advised the public that they were receiving a higher than normal number of **sightings of Giant Land Crabs (*Cardisoma guanhumi*)**. In a press release, DENR advised the public that crabs migrate to the sea in the summer to reproduce then return to their home territory. The public were urged to leave the crabs alone to make their journey unless they were trapped or in danger. [K3.5 community spp. data, E3 comm. data, E3.6 sightings].



Blue or Giant Land Crab (Photo: Alison Copeland)

On August 27th, Patrick Talbot, the Curator of the Aquarium and Zoo at BAMZ gave a virtual lecture entitled **'What is a Fish?'** The talk highlighted the various forms of marine fish, their common features and special adaptations to a watery habitat. [A2.4 lecture].

SEPTEMBER 2020

Members of the Bermuda Audubon Society marked the autumn bird migration and World Shorebirds Day by participating in the **Global Shorebird Count**. The group visited Spittal Pond on September 6th and submitted a list of observed species to the global count database. [E8.2 international day event, K3.5 community spp. data, E3 comm data, C3.10 field trip].

The BZS announced an update to its popular **Reef Life app** in September. The app, aimed at marine life identification, features the work of photographer and BZS volunteer Ron Lucas [E5.2 art].

- <http://www.royalgazette.com/environment/article/20200918/reef-life-app-updated>
- <https://bernews.com/2020/09/ron-lucas-upgrades-bermuda-reef-life-hd-app/>

In early September the **DENR installed grates** across the openings to the saltwater pond at **Lagoon Park** on Ireland Island to keep turtles from entering the pond. The aim of this action is to allow the seagrass in the lagoon to recover from overgrazing. [K6.2, K2.2 monitoring, K2.1 habitat, K1.7, K1.5, A3.4, F3.3, K4 restoration, E1]. <https://environment.bm/s/843-Envirotalk-Autumn-2020.pdf>

In September the Custodian of Historic Wrecks advised that a number of international **media** items on Bermuda's **shipwrecks and marine environment** had been shown around the world in recent months. [D2.9 TV]. <https://www.gov.bm/articles/bermuda%E2%80%99s-shipwrecks-and-ocean-environment-featured-internationally-during-covid-19>

The Bermuda Cabinet approved the appointment of three international experts to the **Sargasso Sea Commission** on September 22nd. The appointees are Dr. Tammy Warren, Senior Marine Resources Officer for the Bermuda Department of Environment and Natural Resources [serving a third term]; The Honourable Wilfred P. Moore, former Canadian Senator [serving a second term]; and Mr. Frederico Cardigos of the Regional Directorate for Sea Affairs for the Government of the Azores [serving a second term]. As of September 2020, the ten Signatory Governments to the Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea are the Azores, The Bahamas, Bermuda, British Virgin Islands, Canada, Cayman Islands, the Dominican Republic, the Principality of Monaco, the United Kingdom and the United States." [A3.4, A3.5 Bda rep., A3.3 agreement]. <https://bernews.com/2020/09/three-appointed-to-sargasso-sea-commission/>

On Friday September 11th, around 20 **volunteers from RenRe** helped the Bermuda National Trust plant around 150 native and endemic plants at buy Back Bermuda's new **Eve's Pond** Nature Reserve. This is the first volunteer work day in the new

reserve. [E1.6 tree planting, F3.3 corporate +NGO sponsorship, I3 protected area mgt activity].



Young cedars planted at Eve's Pond (Photo: Alison Copeland)

Category 2 **Hurricane Paulette** passed over Bermuda on September 14th 2020, with the eye of the storm remaining over the island for about 3 hours. Tropical Storm (later Hurricane) **Teddy** then brushed the island a week later on September 21st. These storms caused extensive sand loss from the South Shore beaches, as well as vegetation damage. [B4.12 response plan].

- <http://www.royalgazette.com/weather---news/article/20200922/island-escapes-worst-of-ocean-bound-teddy>
- <http://www.royalgazette.com/weather---news/article/20200921/teddy-brings-spectacular-sights>
- <http://www.royalgazette.com/weather---news/article/20200921/teddy-key-details-3pm-update>
- <https://www.gov.bm/articles/hurricane-paulette-update-bermuda-weather-service-update-0>
- <https://www.gov.bm/articles/minister-ming-emo-press-conference-statement-21-september>
- <https://www.gov.bm/articles/emo-press-release>
- <https://www.gov.bm/articles/restoration-progress-following-hurricane-paulette>
- <https://www.gov.bm/articles/hurricane-paulette-update-bermuda-weather-service-update-0>
- <https://bernews.com/2020/09/public-urged-stay-away-elbow-beach/>

The **Bermuda Ocean Prosperity Programme** held a webinar on September 17th to update the public on the ongoing stakeholder consultations taking place as part of the BOPP marine spatial planning project. All Bermudians were encouraged to fill out the **Ocean Use Survey** to share what parts of the marine environment they use and feel are important. This information will be used to better understand priority areas and ocean activities, which will help develop the Marine Spatial Plan (MSP) for Bermuda. [B4, I1.1 participatory assessment, I2 PA coverage, I5, I4, J5 fisheries, K1.5, K5.6

recreational users, A2.1 stakeholders, A2. Ngo involvement, A3.4, E1 community protection].

- <https://bernews.com/2020/09/ocean-prosperity-programme-webinar/>
- <https://environment.bm/news-hot-topics//get-involved-in-the-bermuda-ocean-prosperity-programme>

On September 30th the Royal Botanic Gardens Kew published a 100 page **‘State of the World’s Plants and Fungi Report’**. This regularly produced report focuses on a different area of the world each time, and this year focused on Britain and the UK Overseas Territories. The Department of Environment and Natural Resources contributed Bermudian data to the report. A peer-reviewed journal article on the UKOT data was published simultaneously in the journal *Plants, People, Planet*. [A3.4, A2.8 govt held data, K3.1 poorly studied taxa, K1.9 spp. occurrence].

- Link to report: <https://www.kew.org/sites/default/files/2020-09/Kew%20State%20of%20the%20Worlds%20Plants%20and%20Fungi.pdf>
- Link to journal article: <https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10142>

During its virtual Annual Conference in September, the Association of Zoos and Aquariums (AZA) awarded a **Significant Achievement Award** to the Bermuda zoological Society for the restoration of **Trunk Island** into a ‘living classroom’ [E1.3 restoration, F6.2 recog. organisation].

<https://bernews.com/2020/10/bzs-recipient-significant-achievement-award/>

OCTOBER 2020

On October 7th Miguel Mejias presented the results of his PhD research on the White-eyed Vireo during a virtual presentation for the BZS Lecture Series. His talk, entitled **“Getting to know the Chick-of-the-Village of Bermuda”** highlighted new knowledge of its breeding biology, vocalisations, territorial behaviour and the genetic distinctiveness of the Bermudian birds. [K1.7, A2.4 lecture, K3.1 taxa].



White-eyed Vireo captured in a mist net (Photo Miguel Mejias)

The Bermuda Audubon Society's annual **Bird Camp** was held on Darrell's Island on the weekend of October 9th to 11th. The camp this year involved a quiz and bird banding. [C2.7 camp, **K3.5** community spp data collection, E3 comm. data collection, A2.5 social event].

KBB hosted Bermuda's **annual Marine clean up** on Saturday October 17th. Among the participants were a team from Government House who used so of the plastic they collected to make an angelfish collage later in the year. [E1.5, E7.2].

- <https://bernews.com/2020/10/photos-kbb-coastal-cleanup-mangrove-bay/>
- <https://bernews.com/2020/11/photos-angel-fish-artwork-govt-house/>

Bermuda's birders took part in the **Global Big Day** on October 17th. The Bermuda Audubon Society gathered data from birders throughout the weekend to submit to various migratory bird databases, as well as helping break a world record from the number of bird watchers mobilised in October world-wide. [E8.2 international day event, K3.5 community spp data, E3 comm data].

The Bermuda National Trust held their AGM virtually in October, and the annual **environmental awards** were cancelled for this year.

A higher than normal number of **bat sightings** were reported in October. In addition to emails and photographs from the public, one dead bat was brought to the museum and a **silver-haired bat was rehabilitated** at BAMZ and released. Bermuda has recorded at least 6 species of migratory bats [K3.5 community spp. data, E3 comm. data, J4 vet facility, E3.7 museum, E3.6 sightings].

<https://environment.bm/bats?rq=bats>

In October the **Department of Public Prosecutions** provided **training to enforcement teams** across government departments on developing cases for prosecution. The fisheries wardens of the DENR benefited from this training. [H3 enforcement training, H2 enforcement resources, H1 enforcement powers, H4 technologies, H5 relationships, B4.6].

<https://www.gov.bm/articles/investigation-and-prosecution-training-seminar-non-police-departments>

The autumn edition of the **Envirotalk** newsletter was published on October 13th. It contained an update on the air quality issues in the neighbourhood around BELCO caused by the commissioning of the new power plant. There was also an article on the establishment of a seagrass sanctuary in the Lagoon at Ireland Island. The Royal Gazette published a newspaper article a few days later on the removal of turtles from the Lagoon to create the sanctuary. [D2.1 articles, D2.5 online content, E8.1 dates, D7, K1.7 research, K5.1 contaminants, E1 habitat restoration].

- <https://environment.bm/envirotalk>
- <https://www.royalgazette.com/news/environment/article/20201016/seagrass-sanctuary-set-to-protect-species-from-turtles/>

On October 15th a **Townsend's warbler** was photographed in a backyard in Pembroke. This songbird is native to western North American and is very rarely seen in Bermuda. [K3.5 community spp data, E3 comm data, E3.6].



Townsend's Warbler in Bermuda (Photo: Liz Copeland)

On Sunday, October 18th, the Bermuda Botanical Society hosted a walk around the Botanical Gardens to view the newly installed **'Tree Tales' signs**. The information signs, including various activities for children, were placed on trees with interesting stories by the BBS in collaboration with the Parks Department. Featured species include the popular Banyan tree, the Monkey's Dinner Bell tree and the Rubber Tree. [C3.10 outdoor teaching, C1 materials].



Bermuda Botanical Society members viewing the Tree Tales tour of the Botanical Gardens (Photo: Alison Copeland).

On October 31st Bermudian designer Jasmine Hendrickson launched a pop-up book called “**Let’s go to the Aquarium – A pop up adventure**” at BAMZ. Part proceeds from the book will support the BZS.

- <https://www.royalgazette.com/news/article/20201103/pop-up-book-set-in-the-aquarium-launched/>
- <https://bernews.com/2020/11/young-bermudian-publishes-childrens-pop-book/>

NOVEMBER 2020

On November 3rd, Minister of Home Affairs Walter Roban revealed that under a **rebate** programme to help people **invest in solar power**, the Bermuda Government had provided \$320,000 in backing for 50 solar installations since 2018. The Bermuda Government and the Regulatory Authority were also working with telecommunications firms and overseas partners in early November to **facilitate sub-marine cable laying** in Bermuda’s waters and the establish the appropriate regulatory framework for such activities. [K6.3 business infrastructure, F5 businesses, F2, L].

<https://www.gov.bm/articles/minister-roban-press-conference-remarks-economic-recovery-initiatives-ministry-home-affairs>

To mark the 400th anniversary of the first general assembly in Bermuda, the convening of the Legislature and reading of **the Speech from the Throne** took place in the town square in St. Georges this year. Environmental items in the Throne Speech included:

- The introduction of a Green Energy and Environmental justice Fund to encourage **investment in solar energy** installations for homes and businesses, training for solar energy job seekers and funding for renewable energy entrepreneurs .
- A regulatory sandbox to allow developers of **new renewable energy technologies** to build and test technologies in Bermuda
- A **subsea cable fees** regime to create a communications hub in Bermuda [F2 economic incentives, F5, L5 investment, L6, C6 training, K6.3 infrastructure].

<https://www.gov.bm/throne-speech>

In early November a coalition of environmental and health **advocacy groups opposed** the introduction of **5G communications technology** to Bermuda. 5G has been controversial worldwide in 2020. It offers faster data transmission, but has been criticized for being harmful to plants, animals and humans [K6].

- <https://www.royalgazette.com/news/article/20201102/pressure-groups-unite-to-oppose-introduction-of-5g-mobile-phone-technology/>
- <https://www.royalgazette.com/environment/news/article/20201207/5g-submissions-deadline-is-tonight/>
- <http://www.royalgazette.com/news/article/20200713/petition-to-block-5g-gathers-3200-signatures>

The **Bermuda Lionfish Grand Prix** was held in November. Organisers Guardians of the Reef reported that during the month-long event 29 lionfish cullers captured 472

lionfish. [J.1, K3.4 research invasives, K3.5 volunteers collect data, K6.1 invasive sp., D.4 communication, D4.2 feral animal control, K1.7, E3 community monitoring, A2.5 social event]. <https://bernews.com/2021/01/nearly-500-lionfish-caught-grand-prix-event/>



A speared lionfish (Photo: Alison Copeland)

The annual **Joint Ministerial Council (JMC)** was held virtually from November 23rd to 26th, with elected leaders from the UK and UK Overseas Territories discussing a number of issues. HRH the Prince of Wales opened the discussions on the environment, biodiversity and COP26. The UK is set to host the 26th UN Climate Change Conference of Parties (COP26) in November 2021. [A3, L4.1].

- <https://www.gov.bm/articles/overseas-territories-come-together-coronavirus-cop26-and-economy>
- <https://ukcop26.org/>

In November the filleted remains of five **illegally killed parrotfish** were found off Alexandra Battery Park by lionfish cullers. All parrotfish species are protected in Bermuda under the Fisheries Act 1972. [D3.6 publicise infractions, D3.4 report violations].

- <https://www.royalgazette.com/environment/news/article/20201123/penalties-for-killing-protected-species-may-be-increased/>
- <https://www.royalgazette.com/environment/news/article/20201119/diver-calls-for-probe-into-parrotfish-killings/>
- <https://bernews.com/2020/11/investigation-underway-into-killing-of-parrotfish/>
- <https://www.gov.bm/articles/minister-roban-condemns-illegal-killing-parrotfish-investigation-underway>

Between November 21st and December 7th staff from the DENR were engaged in **inspecting all imported Christmas trees** arriving in Bermuda. Due to COVID-19 related restrictions on travel to Canada, inspectors from DENR were not able to pre-inspect the Bermuda-bound trees on the farms where they are harvested. Therefore, all trees landing in Bermuda had to be checked for insect pests and diseases. Trees infested with scale insects were incinerated to ensure the safety of plants and habitats

on the island. [D4 invasive animals, K6.1 potential threats, D2.2, A3.4, B4.5 Customs]. <https://www.gov.bm/articles/annual-christmas-tree-inspection-underway>



Christmas tree inspections on the Hamilton docks (DENR)

On November 30th the Bermuda Weather Service reported that today ends the **record-breaking 2020 hurricane season**, and that 5 storms had warranted watches or warnings for the Bermuda area. They were Post-tropical Storm Arthur, TS Edouard, Hurricane Paulette, Hurricane Teddy and Hurricane Epsilon. The Atlantic saw 30 named storms this season, including 13 that became hurricanes, 6 of which became major hurricanes. <https://bernews.com/2020/12/30-storms-hurricane-season-officially-ends/>

DECEMBER 2020

On December 3rd the BZS's **virtual lecture** series continued with '**Geology rocks!**' a lecture by Bermudian teacher Robert Chandler. The lecture attendees were invited to a follow-up field trip to the Walsingham Nature Reserve to see cave formations and habitats. [A2.4 lecture].

On December 3rd the National Museum of Bermuda announced the 36 finalists from over 400 submission in the **second Dr. Reg Grundy Photography Competition**. Entries were received in 4 age categories, under several themes including 'Bermuda Ecosystem'. [D9.1 photo contest].

- <https://bernews.com/2020/12/photos-dr-grundy-contest-15-18-division/>
- <https://bernews.com/2020/12/photos-dr-grundy-contest-11-14-division/>
- <https://bernews.com/2020/12/photos-dr-grundy-contest-7-10-division/>

In early December Government assured the Bermuda Agricultural Group that a public/private partnership with a development company at **Tudor Hill Farm** would not result in the loss of agricultural land. [I4.4, E5.7]. <https://www.royalgazette.com/environment/news/article/20201210/open-space-advocates-have-their-farmland-fears-allayed/>

The Winter 2020 edition of the DENR's **Envirotalk newsletter** was published online on December 15th. It contained a summary of the 2020 cahow breeding season, an

updated on the Ocean Prosperity Programme, tips for gardening with children, insights into recent research on the white-eyed vireo and news of the establishment of the fig sphinx moth on Bermuda. [D2.1 articles, D2.5 online content, E8.1 dates, D7, K1.7 research info]. <https://environment.bm/s/844-Envirotalk-Winter-2020.pdf>



Fig Sphinx Moth (*Pachylia ficus*) picture from Envirotalk. (Photo: Claire Jessey)

The winter Envirotalk resulted in two news articles in the Royal Gazette. [D2].

- <https://www.royalgazette.com/news/article/20201218/mystery-moth-moves-in-to-bermuda/>
- <https://www.royalgazette.com/news/article/20201218/hurricanes-highlight-the-need-to-protect-cahow-nest-sites/>

The **new terminal building at the L.F. Wade International Airport** welcomed its first flight on December 9th. The new building is energy efficient and features a pond and extensive native vegetation plantings. It should be less prone to storm surge and flooding than the old airport. The interior features longtail sculptures and many photos of local habitats and species. Passengers on the Delta flight to New York arrived to check in following a ribbon cutting, and the arriving Delta flight from JFK became the first to use the terminal. [D6.2 port of entry, F4, E5.2 art, F3 plants].

- <https://bernews.com/2020/12/new-airport-terminal-building-officially-opens/>
- <https://www.royalgazette.com/tourism/news/article/20201210/new-airport-terminal-takes-flight-into-21st-century/>



New airport under construction in January 2019

In a statement to the Senate on December 9th, Government Senator Lindsay Simmons addressed recent concerns about **illegal fishing**. She highlighted the recent training of fisheries wardens by the Department of Public Prosecutions, the added **enforcement** capacity provided by the Coast Guard, the Marine Resources Enforcement Strategy that is being developed and the potential use of new technologies for enforcement. She alluded to the recent parrotfish killing, and encouraged the public to only buy fish from registered fishermen and report wildlife crimes in a timely manner. [F1 fines, D3.6 publicise infractions, D3.4 report violations, H3 enforcement training, H2 enforcement resources, H1 enforcement powers, H4 technologies, H5 relationships, B4.6, G3 legislation].

- <https://www.gov.bm/articles/ministerial-statement-efforts-improve-marine-enforcement>

In the last week of December, a **juvenile mako shark** was photographed in Hamilton Harbour, near the flagpole on Front Street. It was captured on video a few days later at Barr's Bay Park.

<https://www.royalgazette.com/environment/news/article/20210104/baby-mako-shark-spotted-in-hamilton-harbour/>

Two green turtles were found by walkers on Long Bay beach at Cooper's Island on December 27th. One was already dead, but the other was alive and taken to the rehabilitation hospital at BAMZ, where it died a short time later. A news story on the strandings appeared in the Royal Gazette, encouraging the public to report dead turtles, as they provide valuable data when necropsied. [D2.2, J4 vet facility, D3 public role].

<https://www.royalgazette.com/environment/news/article/20201228/stranded-turtle-rescue-by-walkers-on-beach/>

New Scientific Papers at BAMZ Library

Biodiversity publications that became available at the library in 2020:

Angel, M. V., **Studies on Atlantic Halocyprid Ostracods: their vertical distributions and community structure in the central gyre region along latitude 30°N from off Africa to Bermuda**, Prog. Oceanog., 8: 3-124, 1979. (BAMZ #3403)

Antonelli, A., Fry, C., Smith, R.J., Simmonds, M.S.J., Kersey, P.J., Pritchard, H.W., et al. (2020). **State of the World's Plants and Fungi 2020. Royal Botanic Gardens, Kew**. DOI: <https://doi.org/10.34885/172>.
<https://www.kew.org/sites/default/files/2020-09/Kew%20State%20of%20the%20Worlds%20Plants%20and%20Fungi.pdf>

Bachman, Steven, Barnaby Eliot Walker, Sara Barrios, Alison Copeland, Justin Moat. 2020. **Rapid Least Concern: towards automating Red List assessments**. Biodiversity Data Journal 8: [e47018](https://doi.org/10.1093/bdx/8/1/e47018). Jan. 23rd 2020.

Bates, Nicholas Robert & Rodney J. Johnson, **Acceleration of ocean warming, salinification, deoxygenation and acidification in the surface subtropical North Atlantic Ocean**, Communications Earth & Environment, 1(33): 12pp., 2020. (BAMZ #3431)

Blanco-Bercial, L., **Metabarcoding Analyses and Seasonality of the Zooplankton Community at BATS**, Frontiers in Marine Science, 24 March 2020. (BBP 282).
<https://doi.org/10.3389/fmars.2020.00173>

Clubbe, Colin; Ainsworth, Martyn; Barrios, Sara; Bensusan, Keith; Brodie, Juliet; Cannon, Paul; Chapman, Ted; Copeland, Alison; Corcoran, Marcella; Dani Sanchez, Michele; David, John; Dines, Trevor; Gardiner, Lauren; Hamilton, Martin; Heller, Thomas; Hollingsworth, Peter; Hutchinson, Nicola; Llewellyn, Theo; Lowe Forrest, Laura; MacDonald, Iain; McGinn, Kevin; Miles, Stephanie; Woodfield-Pascoe, Nancy; Rich, Tim; Rumsey, Fred; Sharrock, Suzanne; Simm, Jolene; Smith, Robbie; Spence, Nicola; Stanworth, Andy; Stroh, Peter; Taylor, Ian; Trivedi, Clare; Twyford, Alex; Viruel, Juan; Walker, Kevin; Wilbraham, Jo; Woodman, Julian; Fay, Michael. 2020. **Current knowledge, status and future for plant and fungal diversity in Great Britain and the UK Overseas Territories**. Plants, People, Planet. Vol.2, issue 5. Special Issue: Protecting and sustainably using the world's plants and fungi. Pp.557-579. Published Sept 30th 2020. <https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10142>

Copeland, A., **Walsingham Trust Nature Reserve: Special features and potential projects**, Department of Environment and Natural Resources, Government of Bermuda, 15 pp., 2019. (BAMZ #3405)

Copeland, A., **Management Plan for the Bermuda Campylopus Moss *Campylopus bermudianus* syn. *Campylopus trachyblepharon***, Department of Environment and Natural Resources Report, 2020. (REF BDA GOVT REPORTS) (BAMZ #3414)

Copeland, A., **Management Plan for the Land Hermit Crab (*Coenobita clypeatus*) in Bermuda**, Department of Environment and Natural Resources Report, 2020. (REF BDA GOVT REPORTS) (BAMZ #3415)

Copeland A., **Management Plan for the Giant Land Crab (*Cardisoma guanhumii*) in Bermuda**, Department of Environment and Natural Resources Report, 2020. (REF BDA GOVT REPORTS) (BAMZ #3416)

Copeland, Alison I. 2020. **IUCN Red List assessment of Bermuda's endemic plants 2013-2016**. Technical Report of the Biodiversity Section, Department of Environment and Natural Resources, Government of Bermuda. Flatts, Bermuda. 176 pages. BBP#290. BAMZ# 3440.

Courtney, T. A., T. Kindeberg & A. J. Andersson, **Coral calcification responses to the North Atlantic Oscillation and coral bleaching in Bermuda**, PLoS ONE, 15(11): 18 pp., 2020. (BAMZ #3437)

Eddy, C., J.M. Pitt, J. Larkum, M.A. Altabet and D. Bernal. 2020. **Stable Isotope Ecology of Invasive Lionfish (*Pterois volitans* and *P. miles*) in Bermuda**. *Frontiers in Marine Science*, 26 June 2020. <https://doi.org/10.3389/fmars.2020.00435>

Gonzalez-Rivero, M. et al., **Monitoring of Coral Reefs Using Artificial Intelligence: A Feasible and Cost-Effective Approach**, *Remote Sensing*, 12(489): 22 pp., 2020. (BAMZ #3384)

Ivory, J. A., **Diel, seasonal, and interannual patterns in mesozooplankton abundance in the Sargasso Sea**, *ICES Journal of Marine Science*, 76(1): 217-231, 2019. (BAMZ # 3400)

Lewington, Katherine Paige, **An Evaluation of the Caribbean and Western Atlantic United Kingdom Overseas Territories in Response to the Lionfish Invasion**, Thesis submitted to the University of Plymouth in partial fulfilment of the requirements for the degree of MSc Marine Conservation, 42 pp., 2020. (BAMZ #3429)

Lima, L. F. O. et al., **Modeling of the coral microbiome: the influence of temperature and microbial network**, *mBio* 11: e02691-19, 2020. (BAMZ #3399)

Mejias, Miguel A., Wingate, David B., Hetzel, Erich & Nisbet, Ian C. T., **Nesting of Roseate Terns (*Sterna dougallii*) in Bermuda after Extirpation for Nearly 150 Years**, *Waterbirds*, 43(1): 101-106, 2020. (BAMZ #3404)

Mejias, M. A. & A. J. Mejias, **Mass fallout and stopover duration of migratory Black Warblers (*Setophaga striata*) in Bermuda and after Hurricane Nicole**, *Journal of Caribbean Ornithology*, 33: 15-21, 2020.

Mejias, M. A. & E. Nol, **Woodland size and vegetation effects on resident and non-resident woodland birds in Bermuda**, *Journal of Caribbean Ornithology*, 33: 22-32, 2020

Mejias, M. A. et al., **Relationships of song structure to phylogenetic history, habitat, and morphology in the vireos, greenlets, and allies (Passeriformes: Vireonidae)**, 20 pp., 2020. (BAMZ #3428/BBP #284)

Meylan, A., P. Meylan & J. Gray, **Bermuda Turtle Project: Annual Report for 2018**, 7pp., 2019.

Meylan, A., P. Meylan & J. Gray, **Bermuda Turtle Project: Annual Report for 2019**, 7pp., 2020.

Outerbridge, M., **Recovery Plan for Bermuda's Seahorses; *Hippocampus erectus* and *Hippocampus reidi***, Department of Environment and Natural Resources Report, 2020. (REF BDA GOVT REPORTS) (BAMZ #3412)

Outerbridge, M., **Recovery Plan for the endemic freshwater molluscs of Bermuda; the limpet *Ancylus bermudensis* and the pea clam *Pisidium volutabundum***,

Department of Environment and Natural Resources Report, 2020. (REF BDA GOVT REPORTS) (BAMZ #3413)

Outerbridge, M., **Recovery Plan for the killifishes of Bermuda (*Fundulus bermudae* & *Fundulus relictus*)** Department of Environment and Natural Resources Report, 2020. (REF BDA GOVT REPORTS) (BAMZ #3417)

Pitt, J., J. Welch & C. Eddy, **The Reproductive Biology of Baitfish Species in Bermuda**, Proceedings of the 72nd Gulf and Caribbean Fisheries Institute, November 2-8, 2019, Punta Cana, Dominican Republic, 2pp., 2019. (BAMZ #3435)

Santos, Armando J. B. et al., **Long-Range Movements and Growth Rates of Brazilian Hawksbill Turtles: Insights from a Flipper-Tagging Program**, Chelonian Conservation and Biology, 18(1): 75-81, 2018. (BAMZ #3385)

Schneider, C. W., et al., **Proposal of the new genus *Gazzaea* (*Rhodymeniaceae*, *Rhodophyta*) to accommodate *Botryocladia flookii*** C. W. Schneider & C. E. Lane, Notulae Algarum, 153: 4 pp., 2020. (BAMZ #3412/BBP #287)

Silbiger, N. J. et al., **Comparative thermal performance of the reef-building coral *Orbicella franksi* at its latitudinal range limits**, Marine Biology, 166(126): 14 pp., 2019. (BAMZ #3438)

Simons, S., **An Analysis of Microplastic Content in Bermuda Mangroves**, University of Southampton 3rd year Biology Dissertation, 50 pp., 2020. (BAMZ #3430)

Sims, Z. C. et al., **Uptake of groundwater nitrogen by a near-shore reef community on Bermuda**, Coral Reefs, 39: 215-228, 2020. (BAMZ #3382)

Stone, J. P. & D. K. Steinberg, **Long-term time-series study of salp population dynamics in the Sargasso Sea**, Marine Ecology Progress Series, 510: 111-127, 2014. (BAMZ #3401)

Stone, J. P. & D. K. Steinberg, **Salp contributions to vertical carbon flux in the Sargasso Sea**, Deep-Sea Research I, 113: 90-100, 2016. (BAMZ #3402)

Valente, L. et al., **A simple dynamic model explains the diversity of island birds worldwide**, Nature, <https://doi.org/10.1038/s41586-020-2022-5>, 2020. (BAMZ #3394)

van Hengstum, P. J., et al., **Development of anchialine cave habitats and karst subterranean estuaries since the last ice age**, Nature Scientific Reports, 9:11907(10 pp.), 2019. (BAMZ #3380)

Welch, J. L., T. J. T. Murdoch, S. R. Smith & J. Pitt, **Examining the Temporal and Spatial Distribution of Baitfish Species in Bermuda's Coastal Waters**, Proceedings of the 72nd Gulf and Caribbean Fisheries Institute, November 2-8, 2019, Punta Cana, Dominican Republic, 3 pp., 2019. (BAMZ #3436)

Wingate, D. B & I. C. T. Nisbet, **Historical review of information on terns nesting in Bermuda, with prospects for re-establishing some of the lost species**, Journal of Caribbean Ornithology, 33: 33-42, 2020