WELCOME

to our winter edition of Envirotalk.

In this issue –

- Jeremy Madeiros reports new findings on where Cahows go to find food for their chicks, and summarizes the 2020 breeding season, including impacts of hurricanes and COVID-19.
- Miguel Mejías summarizes his PhD research on the songs and breeding biology of Bermuda's endemic White-eyed Vireo – the "chick-of-the-village".
- Jameka Smith shares ten tips for gardening with children.
- The Bermuda Ocean Prosperity Programme team provides an update on the Ocean Use Survey, Ocean Village stakeholder groups and ongoing public consultations on Bermudians use of marine space.
- Claire Jessey tells us about a new Bermuda resident – the Fig Sphinx Moth.
- Also See:
    - Our **News & Notices** for reminders and upcoming events
    - The **Planting Calendar** to get a head start on what to plant this winter.

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2020 RECOVERY SUMMARY AND GPS TRACKING PROJECT FOR BERMUDA'S NATIONAL BIRD, THE ENDANGERED CAHOW

Despite the disruption caused by the Covid-19 pandemic to human society and economies world-wide, recovery projects for Bermuda's most endangered and iconic endemic species have been able to continue. There has been good news from the Recovery Project for Bermuda's endangered National Bird, the endemic Cahow, or Bermuda Petrel (*Pterodroma cahow*). The Cahow's 2020 breeding season saw its population increase to a record number of 134 breeding pairs, with 69 chicks confirmed as successfully fledging out to sea, just below 2019's record number of 73 fledged chicks.

The Cahow now nests on 6 islands in the Castle Harbour Islands Nature Reserve, ranging from just over half an acre in area, to the 16.5-acre Nonsuch Island. These islands are kept free of introduced species such as rats through rigorous management and eradication efforts, as the Cahow cannot survive in the presence of introduced mammal predators, such as rats, cats and dogs.

Two colonies of Cahows were established on Nonsuch Island between 2004 and 2017 through the translocation of near-fledged chicks from the original small, eroding nesting islets, to artificial burrows constructed on Nonsuch. These chicks were then hand-fed daily and allowed to imprint upon the new location, until they fledged about 3 weeks later. These projects were successful, with almost 50% of the translocated chicks returning 3 to 5 years later when mature to Nonsuch to choose nest sites and life-long mates.

J. Madeiros and P. Drew measuring chick Horn Rock C24 before translocating it to Nonsuch Island, May 16 2008. (Photo: Chris Burville).

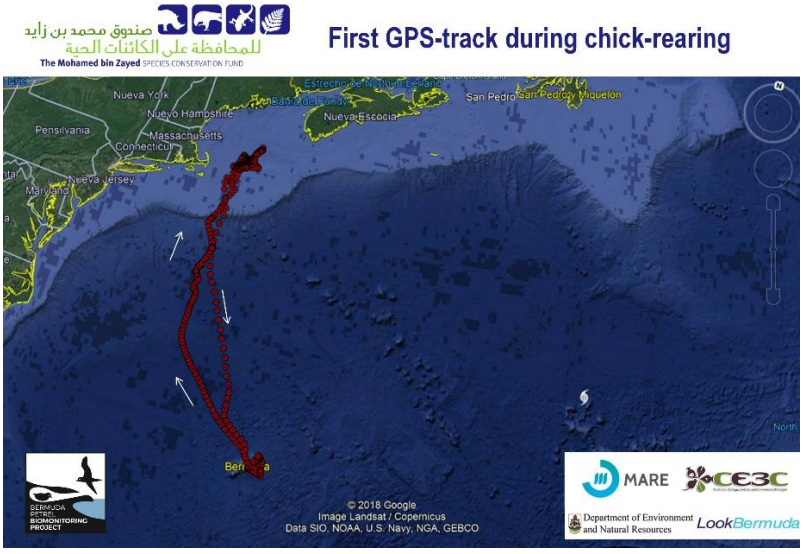
The first of these returned pairs in 2009 produced the first cahow chick to naturally hatch on Nonsuch since the 1620s, and this new population has since increased to a total of 25 breeding pairs in 2020, making Nonsuch the second-largest Cahow breeding colony. This new population has already produced a total of 87 fledged chicks between 2009 and 2020! So far, 13 of these Nonsuch-born chicks have been

recorded as returning to breed, including 9 settling back on Nonsuch, so these colonies are well on their way to becoming self-sustaining.

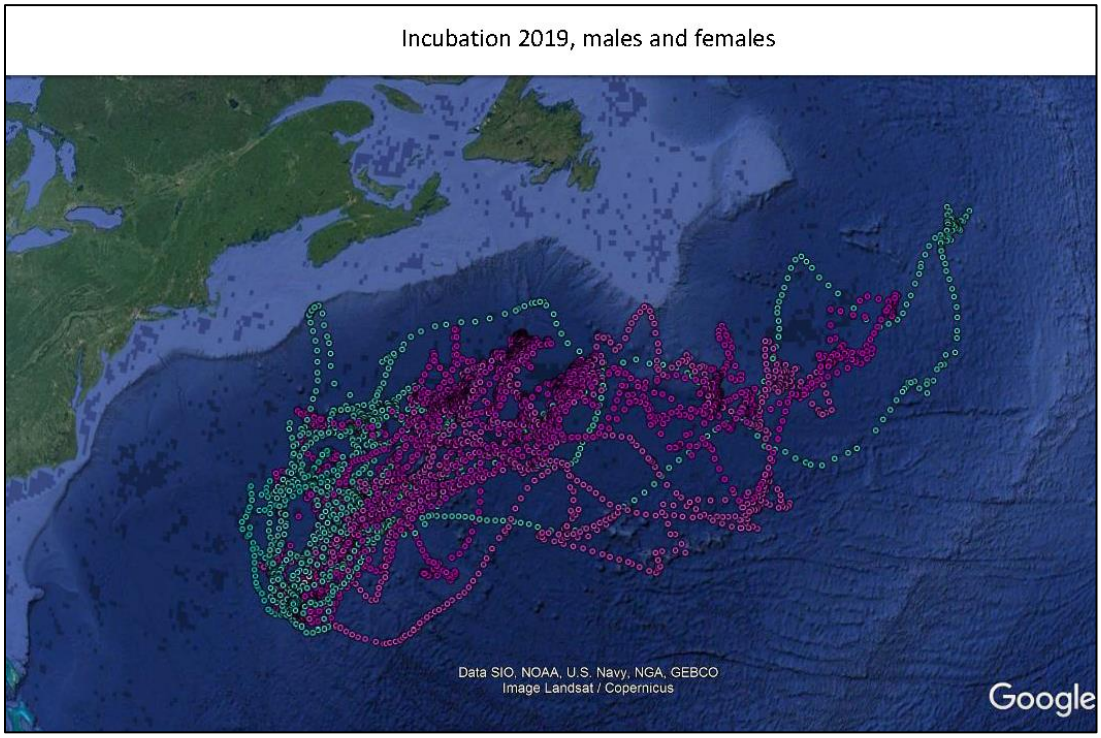
The Nonsuch Cahow colonies were primarily established as a response to increasing erosion and flooding of the original tiny nesting islets from a combination of increased strong hurricanes over the last 25 years, coupled with accelerating sea-level rise due to the melting of ice caps and thermal expansion of warming oceans due to climate change.

The value of the Nonsuch populations was proven during hurricanes “Paulette” and “Teddy” in September, 2020. Two of the original nesting islets were completely submerged by the 21 to 28 foot waves of these two storms. Many of the artificial concrete nest burrows were damaged, with concrete nest lids washed overboard, burrows filled with debris, and quarter-ton boulders rolled across the nesting colonies, damaging burrows and requiring lengthy repairs. By contrast, the Nonsuch colonies, with burrows constructed at higher elevations than is possible on the smaller islets, were completely unaffected by the storms.

A new, exciting project involving the at-sea tracking of Cahows using advanced GPS tags weighing only 3.3 grams apiece was started in 2019, with a partnership between the Department of Environment and Natural Resources and several international researchers. These include Letizia Campioni of Italy, Monica Silva of Portugal, Carina Gjerdrum of the Canadian Department of Environment and Climate Change, and Andre Raine of the Hawaii Endangered Seabird Recovery Project. Two types of GPS tags were used during egg incubation and early chick rearing, tracking the at-sea movements of adult Cahows as they carried out feeding trips during these periods. These tags are accurate to within a meter or two, enabling tracking the movement of the birds very precisely, and even to determine the speed of the birds flying between their nests in Bermuda and the distant foraging areas. The information gained revealed that Cahows regularly carry out feeding trips to gather food for the growing chicks spanning thousands of miles, to the edge of the Canadian Continental Shelf, and beyond to the Grand Banks.



The first GPS track of *Pterodroma cahow* April 2019. A feeding trip by adult Cahow to Georges Bank (off Cape Cod) to gather food for its chick (Letizia Campioni).



GPS tracks of at-sea movement of female (purple) and male (green) adult Cahows during egg incubation Jan-Feb 2019. (Compiled by Letizia Campioni).

In addition, blood and feather samples were collected from nearly 90 Cahows, to investigate a number of factors, including testing for persistent organic contaminants, genetics, sexing etc. We have already confirmed that the pesticide DDT and its breakdown component DDE, which caused the near-extinction of many bird species and contaminated many people until banned in North America in the early 1970s, is still present in most Cahows. Although the contamination is not in as high amounts as during the 1960s and early 1970s, when it contributed to breeding success rates as low as 27-28%, it is still present in high enough concentrations that it may be causing a reduction in breeding success. It may well be the reason why a relatively high percentage of eggs fail during incubation, keeping breeding success no higher than 53% to 60%, despite intensive management. By comparison, my other main study and management species on Bermuda, the Longtail or White-tailed Tropicbird, has breeding success rates ranging from 68% to nearly 80% at the study locations.

Researchers Letizia Campioni of Italy and Maria Diaz (with Birdlife International in the U.K.) visited Bermuda again between 22 January and 14 February 2020, and worked with me to fit 23 archival GPS tags, all of which have since been recovered. These helped us to determine that the Cahows foraged in very different areas much closer to Bermuda than in 2019 (400 – 800 miles, compared to 800 – 1250 miles). This may account for record high weights of both adult Cahows and chicks in 2020, compared to those recorded over the last 18 years, which bodes well for the survival of the fledged chicks this year.

Attaching GPS tags to the tail feathers of adult Cahows (Photos: J.P. Rouja).

Although a second trip to Bermuda planned by Letizia in April was cancelled due to the Covid-19 pandemic, funding is being secured for a third field season in 2021, which will hopefully provide additional information important for the survival of Bermuda's amazing, and recovering, National Bird.

Jeremy Madeiros,
Principle Scientist – Terrestrial Conservation Section

GETTING TO KNOW THE "CHICK-OF-THE-VILLAGE"

The Bermuda White-eyed Vireo (*Vireo griseus bermudianus*) is the last remaining endemic terrestrial bird on the island, making it a species of extreme conservation importance. "*Vireo*" is a neo-Latin word which translates to "I am green" or "to be green" but a popular rendition of its loud song prompted Bermudians to fondly nickname it the "chick-of-the-village." Roughly the size of a small chicken drumstick, this non-migratory bird has greenish upperparts, a whitish-grey belly, yellowy sides, grey hood, and a bright yellow border outlining the base of their bill and pearly white eyes (**Figure 1**); the latter trait gives the bird its common name. This songbird is incredibly adaptable, being readily found across woods, thickets, gardens, and fields island-wide, despite Bermuda's flora being dominated by introduced species. Despite its high abundance, conspicuous vocal displays, tame and bold nature, the species is poorly understood. Collectively, these traits made the Bermuda vireo an ideal study species for an animal behaviour doctoral thesis in Biology. My thesis is focused on addressing four components, three of which will form the basis of this article: (1) vireo song evolution, (2) vireo song perception, and (3) their breeding biology.

Figure 1. An adult Bermuda White-eyed Vireo captured at Ferry Point Park. (Photo: Miguel Mejías).

My first thesis chapter focused on the evolution of song structure in the vireo family (Vireonidae), which consists of approximately 63 species, the majority of which are endemic to the western hemisphere. I tested several factors that could explain the temporal and frequency components of a vireo song. Two out of three of my tested variables emerged as significant in explaining song structure, including (1) evolutionary history and (2) morphology. More specifically, I discovered, for the first time, that vireo species which are more closely related showed great song trait similarity, whereas distantly related vireos showed greater song trait dissimilarity; this finding is congruent with the idea of evolution by common decent. With respect to morphology, I discovered that larger-bodied vireonids with larger, deeper bills, sang songs with lower frequencies, whereas tinier vireonids with smaller, thinner bills, sang more complex songs with higher frequencies (**Figure. 2**; adopted from Mejías et al. 2020). In other words, larger-bodied birds with larger bills can experience frequency constraints, compared to the broader frequency ranges sung by smaller-bodied vireonids with smaller bills. Collectively, my findings showed how both the evolutionary history of a species and its morphology can influence the kinds of songs any given species of birds produce.

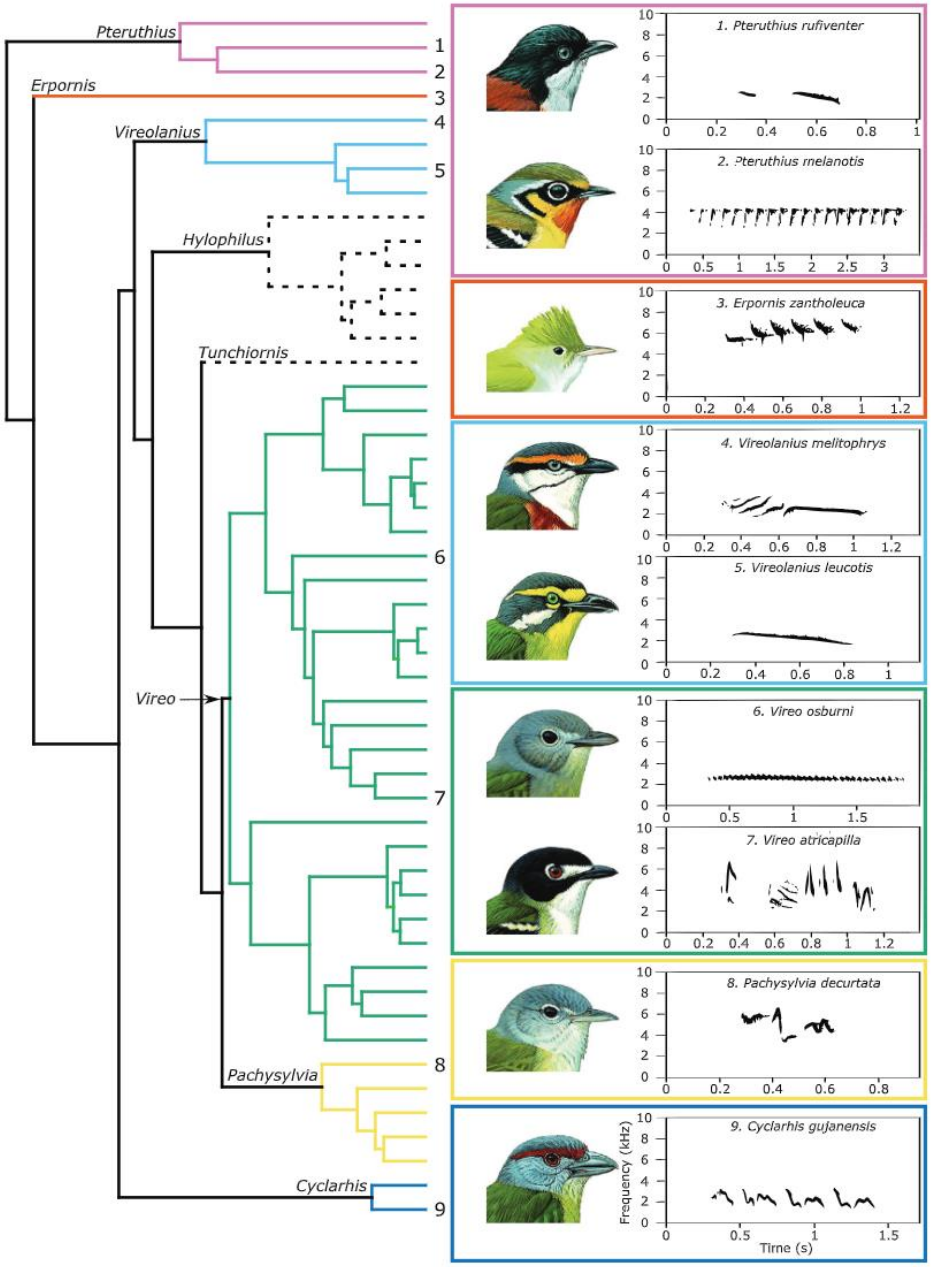


Figure 2. Sonograms and illustrations of vireonid species and their relative positions on the Vireonidae family tree. The colours of the outlines of spectrograms and illustrations match portions of the tree where species are located. Species were selected to highlight relationships between bill shape and song structure across the family. Vireonids with shorter, deeper bills produce songs of lower minimum and maximum peak frequency, compared with Vireonids with longer, thinner bills. Time on sonogram x-axis is variable to accommodate differences in song lengths. Illustrations reproduced with permission of Lynx Edicions; Brewer, D., R. Orenstein, and A. Bonan. 2019. Vireos (Vireonidae). In J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie and E. de Juana (eds.). Handbook of the Birds of the World. Vol. 15. Weavers to New World Warblers. Lynx Edicions, Barcelona. Figure from Mejías et al. 2020.

For my second thesis chapter, I tested how the Bermuda vireo responded to vireonid songs belonging to both close and distant relatives. Birdsong is incredibly important in territory defense and mate attraction. Thus, a male which responds strongly (i.e., insistent singing, emitting alarm calls, and close approaches) to songs from either the same species or a different species suggests males perceive the signaler as a threat. My experiment in exposing our local vireo to other vireonid songs is unique because the Bermuda vireo is the only vireonid that sings and breeds on the island. Even though Bermuda receives a small number of migratory vireos from North America, none of these migrant vireos sing while in Bermuda (Paul Watson, pers. comm; M. Mejías, pers. observations), making Bermuda vireos naïve to all other vireonid songs. First, I had to capture Bermuda vireos by luring them into a mist net (**Figure 3**) and fitting each bird with a unique combination of colour leg rings for visual recognition in the field (**Figure 4**); on 11 separate occasions, I briefly exposed 15 territorial male Bermuda vireos to the songs of 11 vireo species, comprised of both closely and distantly related species. I found that Bermuda vireos reacted strongly to the similar-sounding songs of its closest relatives, compared to the dissimilar songs of its distant relatives. Thus, I learned that songbirds have an innate ability to respond to unfamiliar songs that most resemble their own. Fun fact: my vireo family tree, based on DNA sequencing, is the first to show how the Bermuda vireo is related to other vireonids, as well as confirming that our vireo's closest relative is indeed the North American White-eyed Vireo.

Figure 3. A Bermuda White-eyed Vireo captured in a mist net inside territory. Birds were always removed seconds after becoming trapped inside the net. (Photo: Miguel Mejías).

Figure 4. A colour-ringed ("white over green") Bermuda White-eyed Vireo male inside territory. This bird was banded in Dec 2018, and photographed in Nov 2020 inside the same territory (Photo: Neal Morris).

My third thesis chapter described the breeding ecology of the Bermuda White-eyed Vireo; observations were based on approximately 50 nests between 2016 and 2020. Bermuda vireos construct pensile nest cups that are commonly hung from the end of a forked branch (**Figure 5**). Although both sexes build the nest, males stop helping when the nest nears completion, and instead follows the female on her collecting trips, giving a copulatory wing display all the while. The nest is comprised of plants, lichen, garbage bits, and insect silk/webbing. Nest construction ranges from 3-12 days. The small, grape-sized eggs are white, with heavy brown spots/blotches on the rounder end. Clutch size ranges from 2-4 eggs, 3 being the average. Both the male and female incubate eggs which hatch in approximately 14 days. Nestlings are fed largely green caterpillars, as well as spiders, moths, dragonflies, and even juvenile anoles lizards!

Parents dispose of nestling fecal sacs either by eating them or dropping them a couple meters from the nest. The nestlings fledge 9-12 days after hatching, at which point they are fed by both parents in the natal territory for no more than two months. The fledglings ultimately disperse from their natal territories in search of their own territories. Bermuda vireo pairs only rear 1 brood a year, although as many as 5 nesting attempts are made if nest failure occurs. Factors that contributed to nest failure included predation from rats, ants, and kiskadees, as well as nest cups falling apart after egg laying.

Figure 5. A photograph of a Bermuda White-eyed Vireo nest cup hanging from an Allspice tree branch. Note that the bottom of the nest cup hangs freely, and is not sitting on top of the branch. (Photo: Miguel Mejías).

Observations from colour-ringed individuals provided additional insight in Bermuda vireo behaviour. First, male vireos (note, only males sing the “chick-of-the-village” song) are the ones who own and defend territories year-round. One male, banded by Paul Watson in December 2015, was seen in the exact same territory nearly four and a half years later in May 2020. Territories are about 0.5 hectare in size and are well defined (**Figure 6**; Mejías and Misiuk, unpubl. data). More aggressive males can drive out their neighbours to increase their own territory size. Second, divorce between breeding pairs is not uncommon, with females often leaving males, usually after a failed breeding attempt, to form a new pair bond with a neighbouring male. Male birds will remain in their territory, regardless if paired with a female or not. Lastly, Bermuda vireos appear to fair well during hurricanes. For example, 11/12 studied birds (92%) were found alive and well, in the same territories, following Category 3 Hurricane Humberto, in October 2019.

In conclusion, the Bermuda White-eyed Vireo belongs to a large avian family whose members have highly diverse, yet distinctive, song structures. Their vocal displays are essential in territory defense, mate attraction, and assessing threat levels from potential rivals. Despite significant human-induced changes to the island's flora and fauna, Bermuda vireos still breed successful throughout the island and maintain a large population. In addition to future research, a management plan will be created in order ensure the continued survival of the species. If you wish to see a Bermuda White-eyed Vireo, especially a colour-banded one, be sure to visit the woodland area at Spittal Pond and Ferry Reach/Lover's Lake Nature Reserves!

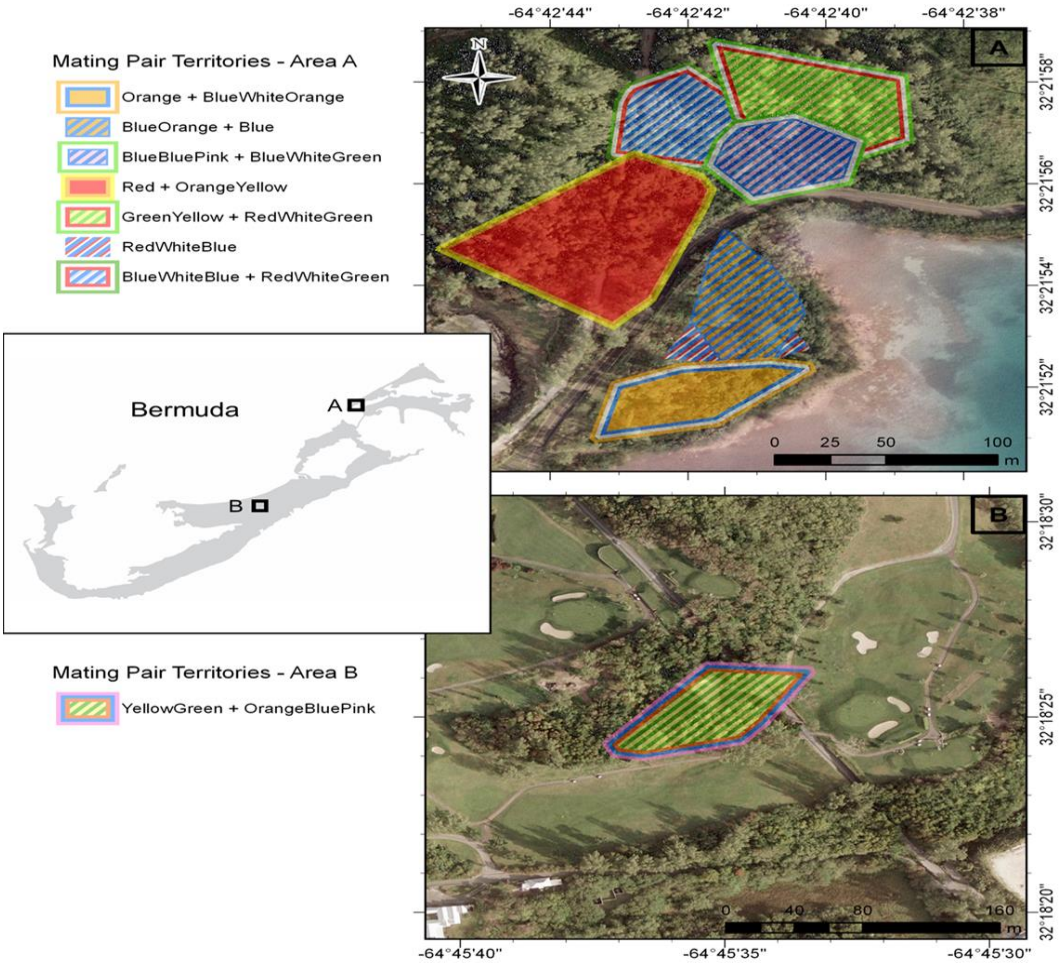


Figure 6. Two maps depicting preliminary territory data collected from colour-ringed male and female Bermuda White-eyed Vireos. Each uniquely coloured polygon refers to the approximate territory boundaries of a single male in 2017, at Ferry Point Park (top panel) and Oceanview Golf Course (bottom panel).

Miguel Mejías, PhD. Candidate.
Department of Biology, Memorial University of Newfoundland

10 TIPS FOR GARDENING WITH YOUR CHILD

Gardening can offer a world of excitement and intrigue for children. There is plenty to occupy and educate them, which will help them develop a meaningful relationship with the outdoors.

1 Grow food. Growing fruit and vegetables is one of the best ways to get children into gardening. Choose easy crops to grow like strawberries, beans, and tomatoes. Pumpkins can be lots of fun to grow, especially if you then carve them for Halloween.

Learning to grow peppers (Photos: Jameka Smith)

2 Eat the fruits of your labour. Children get first-hand experience of the food cycle when the plants they grew appear on your dinner table. Cook a meal with vegetables grown in your garden and let your child help prepare it.

3 Grow sunflowers. Sunflowers are easy to grow from seed and can grow up to 6 feet tall if fed and watered carefully. It's fun for children to measure how tall their plants grow.

4 Add wildlife lures and art items. Gardening isn't always about growing plants. Children will love to make a scarecrow, a bird feeder, a bird box or even paint their own rocks to use as plant labels and garden art.

5 Grow fragrant flowers. Recommended plants are lavender, rose, alyssum, and marigolds. Encourage your children to pick out their favourite smells. You could even encourage them to mash up flowers of different plants to create their own 'perfume'.

6 Create a butterfly garden. To create a butterfly garden ensure that you plant nectar plants (milkweed) and attractant plants for butterflies (zinnias), as well as provide areas for them to attach their chrysalis (wood pieces) and also to sun bask (gravel).

Growing milkweed for monarch butterflies (Photo: Andrea Carreiro)

7 Plant the Right Plants for the Season and Climate Zone. Children will quickly lose interest if seeds don't germinate or plants die, so make sure that the plants you grow are appropriate to your climate zone and the planting season.

8 Cultivate good habits. Teach your child to store the garden tools away after use. Set aside time to tend the garden. Show your child how to pull weeds and water the garden. These experiences offer lessons in responsibility and consistency.

9 Create a plant journal. Help children record notes in a plant journal, draw pictures or take photos to reinforce what they have learned and enjoyed.

10 Explore the garden at night. Grab some flashlights and set out for some fun night time exploration. You will be amazed at what you find.

Jameka Smith,
Assistant Park Planner, Department of Parks

BERMUDA OCEAN PROSPERITY PROGRAMME

The Bermuda Ocean Prosperity Programme (BOPP) launched its public engagement phase in September. This effort aims to connect with and gain input from Bermudians and residents regarding their use of the marine environment in order to help us develop a comprehensive ocean use plan.

BOPP has several goals:

- **Support a Thriving Blue Economy** by exploring avenues to diversify revenue opportunities and strengthen the sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and continued ecosystem health.
- **Create a Marine Spatial Plan**, a comprehensive and scientifically-based plan designed to balance marine activities while sustainably managing resources, and protect important habitats as fisheries replenishment zones.
- **Promote Sustainable Fisheries** through improved management, stakeholder consultations, and pilot projects to support important livelihoods.

But how these goals are accomplished depends on the people of Bermuda. Everyone can get involved.

The first stage of public engagement is to have the public provide input on *what they do* in our waters and *where they do it*, with our easy to use Ocean Use Survey. In the Survey, you can draw on a map your favourite spots for fishing, diving, snorkeling, surfing, or simply enjoying nature, and share why these areas are important to you. The survey will remain confidential and your responses will be combined into a large dataset for the Marine Spatial Planning modelling process. The model will combine environmental and human use data, along with infrastructure considerations like shipping lanes, to allow BOPP to understand which areas are important and why.

We need your voice! The survey can be taken on a mobile device or a computer. BOPP has a team of volunteers who can help you with the survey, or you can try it yourself on the website: https://www.bermudaoceanprosperity.org/oceanusesurvey

The second public engagement component is the Stakeholder Focus Groups. These groups, called the Ocean Village, have been created around 8 topic areas. The ocean environment is rich and affects the lives of all of us. However, everyone's needs might be different, so through stakeholder meetings we hope to find common ground on what kind of future we want to see.

The groups have been meeting regularly through the fall to share their perspectives. The Ocean Village has three main tasks:

- to review the Core Principles that underpin our Marine Spatial Planning work,
- to review a set of key Resource and Foundational Goals which highlight areas of significance within the different focus groups, and
- to develop specific Objectives that will help to achieve the Goals.

By encouraging the flow of ideas and data from the public and stakeholders through the Ocean Village to the BOPP Steering Committee, we can ensure that important issues are incorporated into any plans that are developed. In this way, Bermudians' interests and concerns can be considered as we move ahead in establishing effective conservation areas and developing our sustainable Blue Economy. Please take a few minutes and let us hear from YOU!

There are many ways to share your vision with us, now and into the future. Find out more about our stakeholder engagement and how you can get involved on our website: https://www.bermudaoceanprosperity.org/stakeholders

You can also find us on Facebook and Instagram @BermudaOceanProsperity. Join us!

*The **Bermuda Ocean Prosperity Programme** is a partnership between the Government of Bermuda, the Waitt Institute, and Bermuda Institute of Ocean Sciences (BIOS). The goal of Bermuda Ocean Prosperity Programme is to foster the sustainable, profitable, and enjoyable use of ocean resources for present and future generations.*

THE FIG SPHINX *(Pachylia ficus)* A NEW BERMUDA RESIDENT

In October 2017, a large and unfamiliar moth was presented to the Department of Environment and Natural Resources for identification. After a little research, it was identified as *Pachylia ficus*, the Fig Sphinx moth. This moth was not previously recorded in Bermuda and so its unexpected presence was duly noted as a random and unexplained occurrence – possibly as a sole migrant blown off course - and documented for the natural history records with no expectation of seeing another. However, over the next several months, specimens of the same moth were reported periodically from several locations island wide. About every four or five months another adult moth would be submitted for identification. Specimens were collected, preserved, pinned and stored in the island's insect collections at BAMZ and the Department of Environment and Natural Resources.

***Pachylia ficus* adult (Photo: Tommy Sinclair October 2017)**

An exceptionally large moth, such as this one, has an accordingly large larval stage (caterpillar) and based on the number of adult moths appearing over this extended period of time, it did suggest that there was now an established population of these moths on the island. It would only be a matter of time therefore until the caterpillar was noticed and submitted for identification. However, it was not until many months later that an image of the larva was sent to this Department for identification. The distinctive appearance made it easy to confirm that it was the same *Pachylia ficus* species.

Although the plant host species was known from scientific information available online, there was no confirmation of the caterpillar actually feeding on or being associated with the suspected host plants in Bermuda. Until, surprisingly, several large and distinctive droppings (frass) were found outside at the author's residence. This frass was a crucial clue to the active feeding of a large caterpillar nearby. Investigation revealed one large caterpillar of the Fig Sphinx feeding on an Indian laurel (*Ficus microcarpa*) seedling growing out of a Bermuda stone wall. This final piece of evidence confirmed that *Pachylia ficus* was a new resident of the island, capable of surviving on Indian Laurel host plants, of which Bermuda has plenty, and presumably breeding and producing the multiple generations seen over the preceding months.

***Pachylia ficus* caterpillar with frass (Photo: Claire Jessey January 2020)**

***Pachylia ficus* caterpillar in Indian laurel (Photo: Claire Jessey January 2020)**

Pachylia ficus is a member of the Sphingidae family of moths which are commonly referred to as Hawk Moths, Sphinx Moths and Hornworms. This family contains some of the largest recorded moths in the world and they are known for their agile and sustained flying ability, similar to that of hummingbirds. The Fig Sphinx caterpillar feeds on hosts in the Moraceae family which includes ornamental ficus, the Indian laurel and edible fig trees. Mango (Mangifera) and breadfruit (Artocarpus) trees within the Moraceae family are also recorded as occasional hosts.

The caterpillars are large and have several different colour forms (called morphs) and are often well camouflaged in the foliage in which they feed. They often pose as motionless stems or twigs during the day, becoming active at night and feeding voraciously on the leaves of their host plants. The young caterpillar is often uniformly bright green, turning mottled brown, beige and white as it develops, and changing to a striking teal and orange colour combination just prior to pupation into the adult moth.

Pupation takes place in a silken cocoon on the ground in the leaf litter not far from the host trees. The adult moth that emerges after approximately 22 days is bulky and large, with a wingspan of 4 ½ to 5 ½ " across with a mottled olive green and drab brown appearance with white wing spots at the tip of the leading edge of each forewing. The adult moths fly at dusk, feeding on the nectar of flowers with their long proboscis (straw like mouthparts). The adults are often attracted to artificial lights and found resting on the sides of buildings.

***Pachylia ficus* adult pinned specimen (Photo: Claire Jessey November 2020)**

How this moth ended up in Bermuda is still a mystery. Ficus plants have not been imported through the Department of Environment and Natural Resources for at least ten years, so it has not entered unnoticed as eggs on a plant in this way. However, if a plant was smuggled into the island to circumvent the strict entry requirements, it is possible. This activity is illegal and puts the entire island at risk of hitchhiking pests that can be devastating for our natural environment.

The natural range of Fig Sphinx moths is throughout Central and South America, the West Indies, Florida and Texas. The moth has been recorded venturing as far as 1,000km or more away from its natural range. These large moths are considered to be long distance migrants and strong fliers. It is possible that storm winds may have blown several of these moths (or possibly just one gravid (pregnant) female) off course and they managed to survive the long journey, as unusual as that seems.

A similar occurrence with migrating Monarch butterflies was recorded in 1970 by Dr. Walwyn Hughes, Director of the Department of Agriculture at the time. He photographed a large number of Monarch butterflies flying in towards the island over the water from the north and landing on casuarina trees in Ferry Reach. Similar sightings were noted in other years, particularly in the months of September and October. It was proposed that these sightings were associated with the passage of swiftly moving cold fronts. Other sightings were of flocks of Monarchs leaving Bermuda in those same months heading south

at wave top level from several locations on the island on their way to some unknown destination. Just as migratory birds can make their way to our small island, so too can these larger moths. Occasional visitors have included the Black Witch moth (*Ascalapha odorata)* and the Death's-Head Hawk moth (*Achrontia atropoes))*. Mimic butterflies (*Hypolimnas missipus*), Painted Ladies (*Vanessa cardui*) and Red Admirals (*Vanessa atalanta*), although smaller, are just some of the butterflies that have survived the long flight to Bermuda to grace us with their presence. Unlike many of the visiting moths and butterflies, the Fig Sphinx moth has decided to take up residence with us.

Claire Jessey,
Entomologist, Dept. of Environment and Natural Resources

References.

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- https://www.acguanacaste.ac.cr/paginas-de-especies/insectos/101-sphingidae/402-i-pachylia-ficus-i-sphingidae
- https://www.sphingidae.us/pachylia-ficus.html
- https://www.butterfliesandmoths.org/species/Pachylia-ficus
- https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.108518/Pachylia_ficus

News & Notices

Spearfishing Reminder

Recreational spear fishers are reminded that spearfishing statistics should be submitted **monthly** using the online portal at www.fisheries.gov.bm. Please call 293-5600 or email fisheries@gov.bm if you are having difficulties accessing the portal.

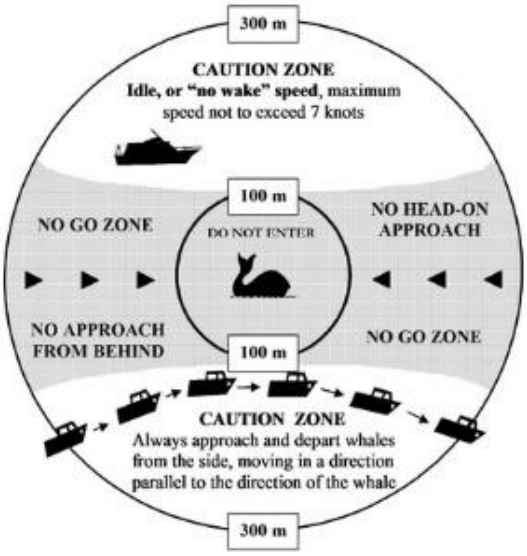
Lobster Diving Reminder

Now that lobster season is underway, recreational lobster divers are reminded that they should fly a standard red and white dive flag when they are diving for lobsters, and must avoid diving in the vicinity of commercial lobster traps. Catch statistics must be reported using the online portal at www.fisheries.gov.bm.

Keeping lobster catch statistics up to date through the season helps improve accuracy, particularly when it comes to reporting locations, and avoids a rush or complications as the reporting deadline of **April 30th** approaches. Please call 293-5600 or email fisheries@gov.bm if you are having difficulties accessing the portal.

Whale Watching Guidelines

Whale watching can be enjoyed in Bermuda's waters in winter and spring. The public are reminded that all whales and dolphins are protected by law. Boaters should follow the whale watching guidance located at: https://environment.bm/whale-watching-guidelines



Planting Calendar – What to plant in the Winter…

VEGETABLES

December
Beans, Beets, Broccoli, Brussels Sprouts, Cabbage, Carrots, Cauliflower, Celery, Chard, Chives, Kale, Leeks, Lettuce, Mustard Greens, Onions, Potatoes, Radish, Rutabaga, Spinach, Squash, Strawberry, Tomato, Turnip.

January
Beans, Beets, Broccoli, Brussells Sprouts, Cabbage, Carrots, Cassava, Cauliflower, Celery, Chard, Christophine, Kale, Leeks, Lettuce, Mustard Greens, Potatoes, Radish, Rutabaga, Spinach, Squash, Tomato, Turnip.

February
Beans, Beets, Broccoli, Cabbage, Carrots, Cassava, Cauliflower, Celery, Chard, Christophine, Corn, Cucumber, Kale, Leeks, Lettuce, Mustard Greens, Potatoes, Pumpkin, Radish, Rutabaga, Spinach, Squash, Sweet Potato, Tomato, Turnip.

FLOWERS

December
Ageratum, antirrhinum (snapdragon), aster, aubrieta, begonia, bells of ireland, candytuft, carnation, centaurea, chrysanthemum, cineraria, dahlia, dianthus, geranium, gerbera, gypsophila, impatiens, larkspur, lathyrus, nasturtium, nicotiana, pansy, petunia, phlox, rudbeckia, salpiglossis, salvia, statice, snow-on-the-mountain, spider flower/cleome, star-of-the-veldt, stock, sweet william, verbena and viola.

January
Agratum, antirrhinum, aster, aubrieta, begonia, bells of ireland, candytuft, carnation, centaurea, chrysanthemum, cinerariam, dahlia, dianthus, geranium, gerbera, gypsophila, impatiens, larkspur, lathyrus, nasturtium, nicotiana, pansy, petunia, phlox, rudbeckia, salpiglossis, salvia, statice, snow-on-the-mountain, spider flower/cleome, star-of-the-veldt, stock, sweet william, verbena and viola.

February
Acrolinium, ageratum, alyssum, antirrhinum, aster, aubrieta, baby blue eyes, bachelor's buttons, bird's eyes, blanket flower, begonia, bells of ireland, calendula, candytuft, carnation, centaurea, chrysanthemum, cineraria, coreopsis, dahlia, Africa daisy, dianthus, forget-me-not, geranium, gerbera, globe amaranth, globe gilia, godetia, gypsophila, hollyhock, impatiens, larkspur, lathyrus, marigold (African), marigold (French), nasturatium, nicotiana, pansy, petunia, phlox, phlox (annual), red tassel flower, rose everlasting, rudbeckia, salpiglossis, salvia, scabiosa, statice, snow-on-the- mountain, spider flower (cleome), star-of-the-veldt, stock, sweet pea, sweet william, verbena and viola.

GOVERNMENT OF BERMUDA

Department of Environment and Natural Resources

ON HER MAJESTY'S SERVICE

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