WELCOME

to our Fall edition of Envirotalk.

In this issue –

- Dr. Joanna Pitt introduces us to a new species of shark- 'The Ragged Tooth Shark'
- Dr. Mark Outerbridge discusses pollinating insect of Bermuda
- Dr.Shaun Lavis and associates discuss 'Solution Pipes' in Bermuda
- Jeremey Madeiros gives us an update on the 2022 Cahow recovery program
- Indigenous plant spotlight- Bermuda sedge (*Carex bermudiana*)

- Also, See:
  - Our **News & Notices** for reminders and upcoming events
  - The **Planting Calendar** to get a head start on what to plant this autumn.

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New shark species added to Bermuda's fish fauna

A new species of shark, the Ragged-tooth shark (also known as the Small tooth sand tiger and, scientifically, as *Odontaspis ferox*), has now been officially added to list of fishes found in Bermuda waters. As often happens, the first encounter with this species was at the end of a fishing line.

A commercial fishing vessel, captained by Mark Terceira, was fishing in 731 metres (2,400 feet!) of water off the east end of the island on the 19th of August, 2020, using deep set vertical lines to target deep-dwelling species such as Wreckfish. The shark did not actually take the bait, but one of the hooks snagged in its dorsal fin. Mr Terceira brought the shark to the surface alongside the vessel, and snapped a few photos before releasing the shark alive. He estimated the total length of the shark to be about 275 cm (9 feet).

These photos were shared with DENR's Marine Resources staff in order to facilitate identification of the shark, and also posted online. The post came to the attention of Dr Jeremy Higgs of the Gulf Coast Research Lab at the University of Southern Mississippi, who has been tracking observations of the Ragged-tooth shark, and a flurry of emails ensued. Much of the information that follows comes from the recent article that Dr Higgs published with some colleagues, which constitutes the official record of this species for Bermuda.

Fortunately, Mr Terceira's photographs captured all the key identifying features of this species, including the distinctive shape of its head, and the relative size, shape and placement of the fins (Figure 1 a and b). The flattened head with a long, conical snout, large first dorsal fin compared to the second dorsal, and even grey-brown coloration are important identifiers of the Ragged-tooth shark (Figure 2). In contrast, the Bigeye sand tiger (*Odontaspis noronhai*) is dark brown, with a white tip on the dorsal fin, and has a much larger eye – as you might expect from its name. The Sand tiger shark, *Carcharias taurus*, which has also been encountered in Bermuda waters under similar circumstances, is pale grey with darker blotches and has a very different fin pattern. Of course, you can always examine the teeth of a shark to help confirm its identity, but few people are willing to do this on a live specimen.

The Ragged-tooth shark is known to inhabit tropical, subtropical and temperate marine waters around the world, and is often associated with the deep shelf or slope habitats of both continents and islands. However, reports of this species are rare, and mostly consist of isolated observations. Captures or sightings from places as distant as the Canary Islands and New Zealand indicate this species inhabits depths as shallow as 1 m and as deep as 928 m (3.5 to 3,000 feet), although shallow encounters are rare. As a result, even shark experts know little about the life cycle of this species because of the small number of specimens that have been examined.

The photographs showed that the Bermuda specimen was a male and, based on its size and the length of its claspers, likely mature (Figure 1a). The largest Ragged-tooth shark on record is a female that was 520 cm long (17 feet), caught in the open waters of the southeastern Atlantic Ocean. This species bears live young, and females become mature at lengths of 300–350 cm (10-12 feet), while males are approximately 200-250 cm (7-8 feet) long when they mature. The pups are approximately 100 cm long (3.3 feet) at birth. Based on the biology of closely related species of lamnid sharks, it is assumed that this species produces only two pups per year.

With this extremely low predicted birth rate and the general paucity of information about the species, the International Union for the Conservation of Nature (IUCN) has assigned a precautionary assessment of "Vulnerable" for the Ragged-tooth shark on their Red List of Threatened Species. The Red List is considered the most comprehensive inventory of the conservation status of animals globally.

A common feature of the case studies that form the basis of Dr Higgs' article is that each shark was encountered as a result of fishing in deep waters (>300 m / 990 feet). As fisheries activities have expanded into deeper water, they have also begun to overlap with the known depth range of the Ragged-tooth shark. As this expansion continues, interactions with the Ragged-tooth shark will likely increase, highlighting the importance of fishery observations to provide insight into the distribution of this species.

This first record of the Ragged-tooth shark from Bermuda waters is the deepest known capture of this species in the North Atlantic Ocean to date. Previous studies on the deep slope around the Bermuda platform noted *Lophelia* deepwater corals in the area where Mr Terceira was fishing, and these corals have also been present in conjunction with other observations of Ragged-tooth sharks from the western North Atlantic. Dr Higgs believes that future studies should investigate both deepwater coral habitats and deep slope areas around the region in an effort to further describe the preferred habitat of Ragged-tooth sharks. With a better understanding of their distribution and habitat preferences, it may be possible to adjust fishing practices in order to reduce the chances of capturing this vulnerable species.

This newly recorded species is automatically protected under the recent legislative amendments that were made to protect and manage sharks in Bermuda waters, which were passed in March of this year. There is now a general prohibition on taking sharks, although commercial fishers may apply for a special licence to catch limited amounts of three common species: the Galapagos shark, *Carcharhinus galapagensis* (locally called a Dusky shark); the Smooth dogfish, *Mustelus canis* (which Bermudians refer to as a Gummy shark); and the deep-dwelling Six-gill shark, *Hexanchus griseus*.

For more information about the Ragged-tooth shark / Smalltooth sand tiger, along with some great photos, see https://www.sharksandrays.com/smalltooth-sandtiger/ For the new report of this species in Bermuda waters, refer to Higgs, Hoffmeyer, Driggers, Jones and Hendon (2022), 'New records of the ragged-tooth shark, *Odontaspis ferox*, from the western North Atlantic Ocean, with a summary of regional occurrences', published in volume 98 of the Bulletin of Marine Science. A summary of this paper is available online at https://doi.org/10.5343/bms.2021.0045, a hard copy is available in the library of the Natural History Museum at BAMZ, or you can request a pdf by emailing fisheries@gov.bm.

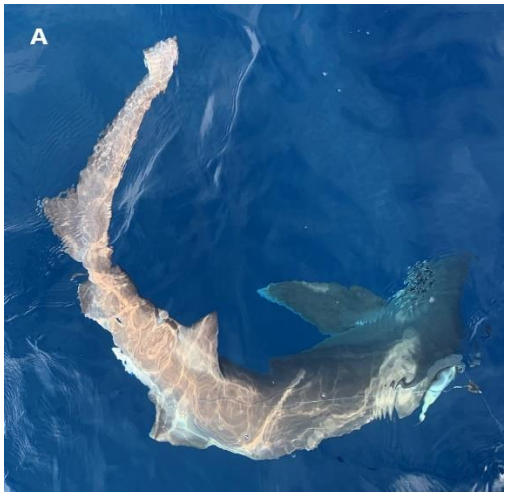


Figure 1 a and b. Photographs of the Ragged-tooth shark caught in 2020 by commercial fisherman Mr. Mark Terceira and subsequently released.

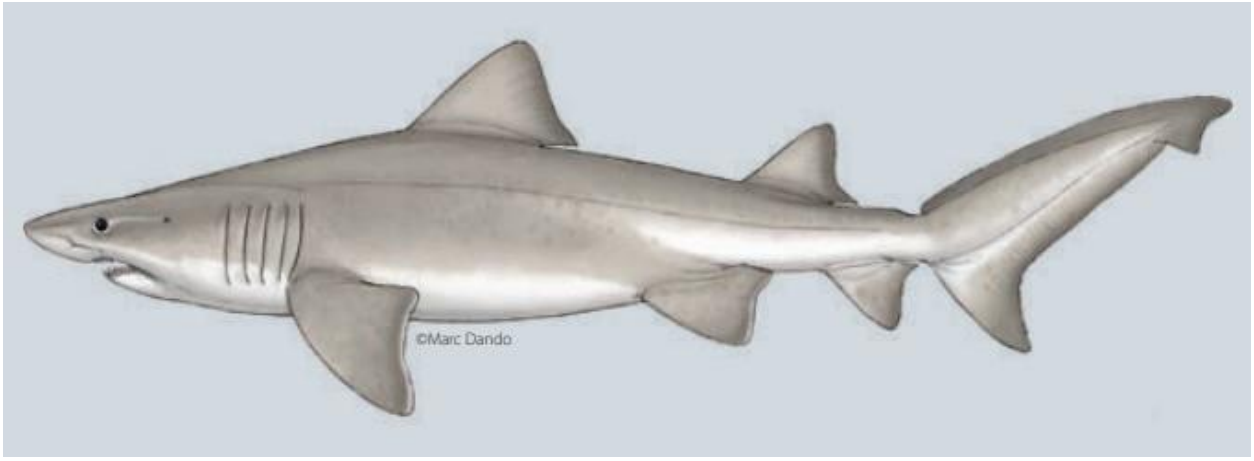


Figure 2. Technical drawing of *Odontaspis ferox* from the shark identification guide produced by the Food and Agriculture Organisation (FAO) of the United Nations.

Unsung heroes: the lesser known pollinating insects of Bermuda

By Dr Mark Outerbridge
Senior Biodiversity Officer

When asked to name which insects in Bermuda pollinate local flowers, most people would reply 'honeybees and butterflies'. And of course they would be right. The European honeybee *Apis mellifera* is commonly seen visiting flowers for nectar and pollen and is our most significant agricultural pollinator. However, there are many more insects present here that also fill the very important role of pollinators for reasons of improved biodiversity as well as food production for us. They include another bee, a variety of wasps, the hoverflies, and a number of moths.

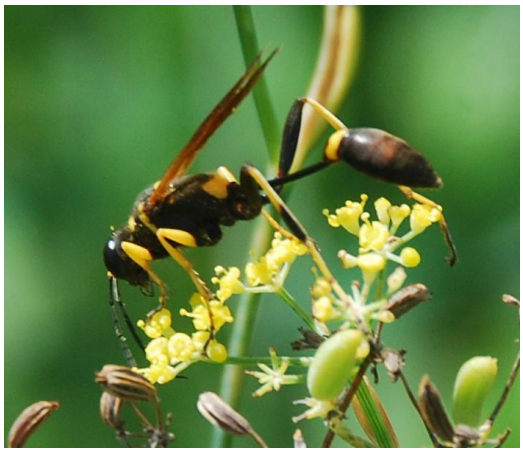
Let's start with the other bee. The leafcutter bee *Megachile pruina pruina* is a rare native known only from a few locations on South Shore (see the summer 2018 edition of Envirotalk Vol. 82 No. 2). It is a solitary species but we don't know much about its role as a local pollinator, other than the fact that it frequents the flowers of some coastal shrubs (i.e. sea ox-eye, prickly pear) and females have a predilection for harvesting supple leaves with which they line their nest cells.

Leafcutter bee Photo credit: Luke Foster

Butterflies do not visit flowers as frequently as bees do but they appear to fly further and therefore are capable of transferring pollen over longer distances. There are at least 16 species of butterflies reported from Bermuda[1], of which two-thirds are considered migratory and the remaining one-third are permanently resident. Those that live here year-round include the cabbage white butterfly *Pieris rapae*, the gulf fritillary *Agraulis vanillae,* the monarch butterfly *Danaus plexippus,* and the Bermuda buckeye *Junonia coenia bergi.* Adult butterflies feed on nectar from a very wide range of plants; however the caterpillars are typically much more discerning. For example, gulf fritillary caterpillars feed exclusively on the leaves of passion flower vines, monarch caterpillars are well known to munch on milkweed leaves, and the Bermuda buckeye (an endemic sub-species) is very fond of English plantain (aka ribwort) leaves in addition to those from acanthus, verbenas, and figworts.

Buckeye butterfly Photo credit: Drew Pettit

There are a surprising number of wasp species recorded from Bermuda (over 150!).[2] Most are quite small and parasitic in nature, preying upon other insects. However, we do have a few who appreciate the taste of local nectar and these include the paper wasps, mud dauber wasps, and mason wasps. Wasps are not as efficient pollinators as bees because they lack the body hair which pollen is so good at sticking to. The three most common species found here are the red wasp *Polistes bellicosus* (locally, but incorrectly, called the 'red bee'), the black and yellow mud dauber *Sceliphron caementarium*, and the mason wasp *Euodynerus hidalgo*. The best time of year to see them is during the late summer when they are most active building their nests and provisioning them with paralyzed caterpillars, spiders, and beetle larvae which are consumed by the developing wasp larvae. Did you know that we also have endemic wasps? They don't have any common names that I am aware of but their scientific names are *Stenodynerus bermudensis* and *Anoplius bermudensis*. Both species are colloquially referred to as hunting wasps (because they too feed their developing larvae with insects), although the adults feed on flowers.



Black and yellow mud dauber wasp Photo credit: Drew Pettit

Hoverflies are a specific group of flies that are very important pollinators of flowering plants, including some agricultural crops. In fact, they are actually considered the second-most important group of insect pollinators after bees. Hoverflies in Bermuda are known to feed upon many different flowers, including those on avocado and peach trees. They are less effective pollinators per floral visit than honeybees, but they make up for this by visiting the flowers much more frequently. Furthermore, some of the hoverflies

found here (e.g. the oblique streaktail hoverfly *Allograpta obliqua* and the calligrapher hoverfly *Toxomerus marginatus*) are important agents of biological control because their larvae prey upon pest aphids, thrips, leafhoppers, and small caterpillars.

Oblique streaktail hoverfly Photo credit: Robert E. Marcotte

Calligrapher hoverfly Photo credit: Carol Davis

The insects mentioned above are nature's diurnal pollinators; however moths have the nightshift. Moths belong to the same group of insects as butterflies. Bermuda is home to approx. 100 species of resident moths, 26 species that are occasional visitors, and another 40 or so whose status we aren't really sure about[1]. Most of the moths are very small and inconspicuous, however some are surprisingly large, such as the migratory black witch moth *Ascalapha odorata* which can easily be mistaken for a bat because of its dark colouration and wingspan of 5-10 inches. A few of Bermuda's moths are paradoxically both a beneficial nectar eater and an agricultural pest. For example, the night-blooming cereus is a vine-like cactus that produces very large, pale, fragrant flowers which are pollinated by our native pink spotted hawkmoth *Agrius cingulata* at night (and honeybees during the early hours of the morning before the flowers fully close). The extraordinary looking fruit from this vine is quite delicious and goes by the name of dragon fruit or pitahaya. However, the caterpillar of the pink spotted hawkmoth is a pest to sweet potatoes, eating the leaves on the potato vines and lowering crop yield. Many gardeners and farmers are all too familiar with the damage cutworms and hornworms (the common names for the caterpillars of some moths) can do to plants, no matter how useful or endearing the adult moths are. A local study during the 1990s reported that modern use of mercury vapor lamps for outdoor lighting negatively impacted flight activity and reproduction of Bermuda's moth populations[1], and recent investigations in the United Kingdom found that artificial street lights (especially LEDs) were disruptive to the behaviour of nocturnal moths and greatly reduced caterpillar abundance[3]. This has negative consequences for birds and other wildlife that rely on caterpillars for food as well as the plants that rely on the pollination service.

Pink spotted hawkmoth Photo credit: Alison Copeland

Another study[4] in the UK looked at restoring urban green spaces as a means of improving insect pollinator diversity and stated that "*global populations and species richness of pollinating insects have been decreasing at an alarming rate over the last fifty years. The result is a warning from experts of a 'pollination crisis', in which the losses of key pollinators become detrimental to human populations*". Many of us are aware of Bermuda's huge dependence on imported food, so it would be sensible if we collectively cared for our local pollinators in the best interests of biodiversity and future food security.

Here are just a few things you can do to help Bermuda's pollinating insects:

1. Diversify the flowering plants in your garden and make an effort to grow flowers that produce nectar and pollen at different times of the year. This reduces the length of dearth or dry periods as well as provides a more varied diet.
2. Reduce the use of chemical pesticides and seek alternative ways to control garden pests.
3. Use companion plants to attract beneficial insects. Hoverflies, for example, are reputed to favour Alyssum, statice, and parsley, so plant those next to your vegetables and fruit trees.

4. Do not be afraid of mason and mud dauber wasps if they decide to use parts of your house to nest in. They will ignore you if you ignore them. You may also find that there are fewer garden pests around while these parasitic wasps are in the neighborhood.
5. Think about your outdoor lighting needs. Do the lights need to be on all night? Consider using less disruptive light bulbs, colour filters that cut out the most harmful wavelengths, or use motion activated lights that can automatically switch off.

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SOLUTION PIPES IN BERMUDA

By Matej Lipar[1], Mateja Ferk[1], Andrej Šmuc[2], and Shaun Lavis[3]
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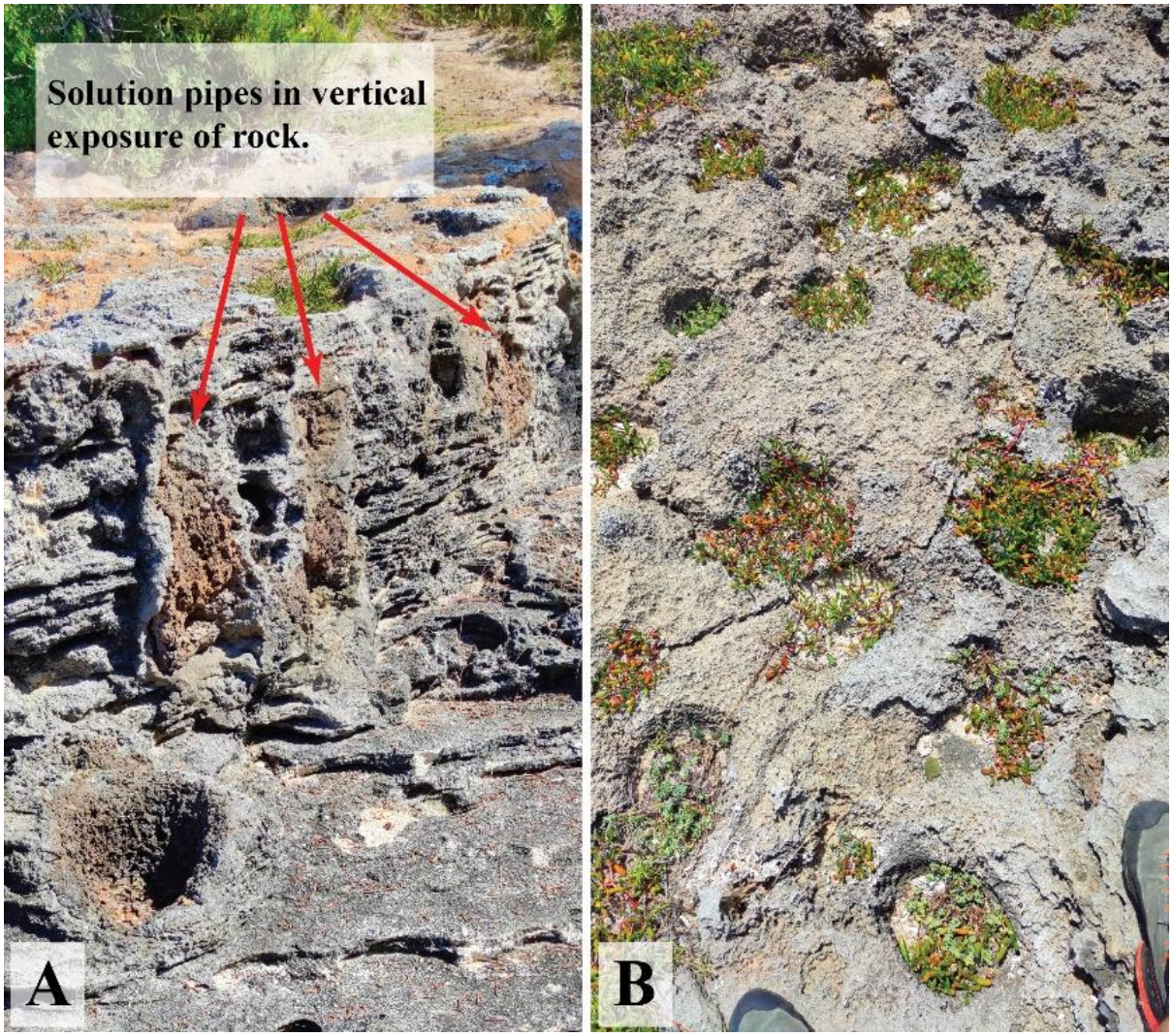
Bermuda's shallow geology is in the majority layered, hardened calcium carbonate sand dunes known as "eolianites" (eolian means "wind-blown"); a term coined by Sayles in 1931 specifically to describe Bermuda's rocks (Vacher and Rowe 1997 and references therein; Rowe and Bristow, 2015). Calcium carbonate (limestone) eolianites are prone to being dissolved by water, which results in the landscape known as karst (Bretz, 1960). Karst phenomena include sinkholes, caves and, especially in Bermuda, solution pipes.

Solution pipes are often buried beneath modern (i.e. recently deposited) soil, so their exposures are usually limited to the coasts, where soils have been eroded away. In vertical exposures of rock (Figure 1 A), solution pipes form vertical tubular, finger-like structures (usually 20 to 100 cm in diameter and up to several metres in length) that continue across several layers of rock and typically contain ancient reddish-brown soil (known as paleosols), which used to fill the pipe (Herwitz and Muhs, 1995). The pipes also contain a type of rock known as calcrete, which is a rock produced by cementing soil, sand, gravel and shells by calcium carbonate precipitated from water. When viewed "from above" (Fig 1 A and B) solution pipes form bowl-like depressions, with a well-cemented calcrete-bearing rim that



occasionally preserves some red-brown paleosol. These circular depressions are often referred to as "palmetto stumps" and, in many occasions, these bowl-like depressions trap sediment and offer refuge for vegetation (Fig 1 B).
In Bermuda, the most extensive outcrops of solution pipes can be seen in Hog Bay, Church Bay, Devonshire Bay, Whalebone Bay and along the coast at the Spittal Pond. They can even be found inland, such as in the road cuttings on Berry Hill Road, close to the hospital.

Figure 1 A and B: Solution pipes are normally covered with soil, so the exposures are typically limited to the coasts. Solution pipes are usually exposed as either vertical finger-like structures extending through multiple layers of rock (B) or as bowl-like structures that often trap sediment (A and B). The bowl-shape structures are often referred to as palmetto stumps.

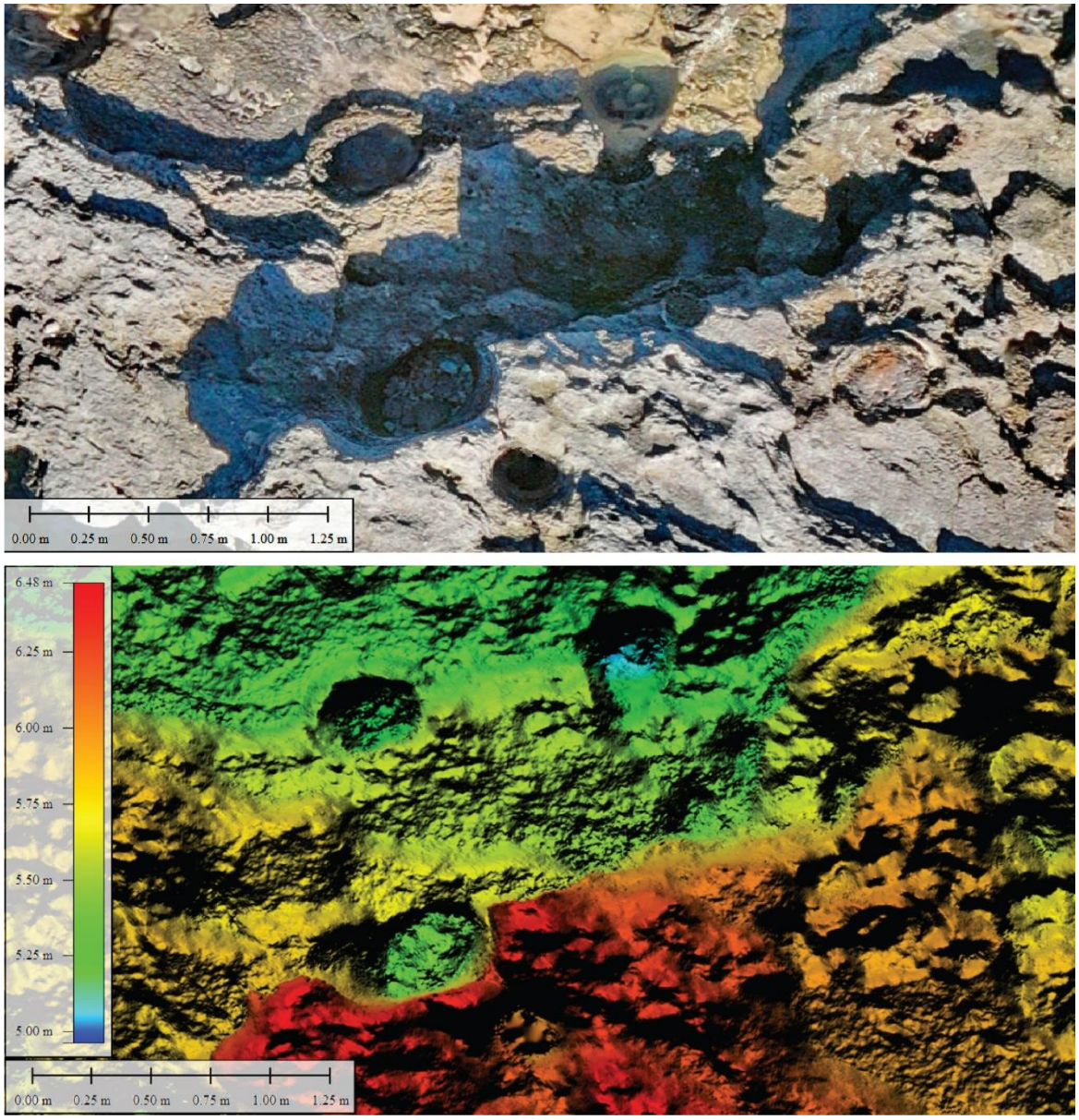
Solution pipes form in young carbonate rocks with high permeability and intergranular porosity (such as Bermuda eolianites) by dissolution caused by the focused vertical flow of water. Whilst there is a consensus that focused water flow is responsible for solution pipe formation, there is no agreement as to the initial triggers of the focused flow; several proposals have been made based on evidence from various climatic settings around the world.

In general, localised differences in rock types, surface irregularities (e.g. surface hollows, cracks in the rock etc) or animal activity (e.g., burrows) may provide the starting point of focused flow. Most of the studies to date, however, suggest that vegetation may have focussed vertical water flow. For example, water intercepted by the leaves and branches of a tree flows downwards towards the trunk, and then down the trunk and into the ground (a process known as stemflow) as a focussed stream of water (Herwitz, 1993). Water flow may also be increased along living roots, which will ultimately die and decay, leaving open channels in the soil that focus water flow. Similarly, buried tree trunk casts can create conduits for water, and Bermuda was the type locality where this theory was introduced, identifying solution pipes as fossilised palmetto stumps. This theory is however likely to be incorrect.
Although fossilised palmetto stumps have been discovered along the coastline of Bermuda (Hearty and Olson, 2011), they differ from solution pipes in many ways. In particular, solution pipes often occur very close together, in some cases almost touching each other, which is unlikely for palmettos. Furthermore, if the pipes were the result of palmetto growth the "beginning" of the pipes would expected to be at similar depths and within a paleosol layer, because soils are required to support plant growth (it is unlikely that sand dunes alone could support wide-spread palmetto growth). The maximum depths the pipes reach, however, varies considerably and there is little or no evidence for the pipes extending upwards from a paleosol layer.

Irrespective of the cause of the focussed flow, what is clear is that the focused flow of water was followed by dissolution of the eolianite (Lipar *et al.*, 2021). This would initially have produced small conduits, further focussing the flow and enhancing dissolution until the small conduits developed into the larger pipes we see today. Solution pipes are thus prime examples of the positive feedback between focused flow and dissolution. In such feedback-driven processes, over time the shapes (morphology) of the emerging structures (i.e. the conduits and pipes) often become independent of the initial conditions and depend just on global parameters, such as the rainfall amount, temperature, and porosity of the rock matrix. This opens up an attractive possibility of linking the morphology of

the observed pipes with the geology and hydrology of the area at the moment of their formation and, most importantly, with past climatic conditions.

We believe that understanding solution pipe occurrence (e.g. shapes and density of occurrence) and formation over time could therefore supply us with the tools necessary to predict the climatic conditions prevailing at the moment of their creation. To enable us to understand these parameters, we undertook a detailed field data collection project in Bermuda during the Spring of 2022. We will use this data to inform our laboratory based experiments and test our models of solution pipe growth. We used a terrestrial laser imaging, detection, and ranging (LiDAR) scanner and an aerial drone, which provided photographs (e.g. Fig 2 A) to produce highly detailed 3D maps of the study areas and solution pipes (e.g. Fig 2B). These assessments of solution pipe occurrence and geometry was undertaken at Church Bay and Devonshire Bay by Dr Mateja Ferk and Dr Matej Lipar (Anton Melik Geographical Institute, Research Centre of the Slvoenian Academy of Sciences and Arts). In addition, rock, calcrete and fossil shells samples were collected, which we will analyse and date using sophisticated laboratory techniques (e.g. uranium/thorium isotopic dating). Knowing the date of formation of such samples will enable us to predict how long it takes to form a pipe because the rock would have been deposited



before pipe formation and the calcrete would have formed at the final stages of pipe formation. The field work and sampling was performed by Dr Matej Lipar and Prof. Andrej Šmuc of the Faculty of Natural Sciences and Engineering, University of Ljubljana, Slovenia under the supervision of Dr Struan Smith (Bermuda Natural History Museum) and Dr Shaun Lavis (Department of Environment and Natural Resources).

Figure 2: Photograph (upper photograph) and LiDAR image (lower photograph) of the same exposure of solution pipes. We are able to construct a detail digital elevation model from LiDAR data, which will enable us to determine how solution pipes influence the overall topography of an area.

We are currently analysing the field data and samples and we are eagerly waiting for what the results will show. In the meantime, let us once again remind us that solution pipes with their distinct, almost unnaturally perfect circular shape are an important part of the character of Bermuda's geodiversity and a valuable part of Bermuda's landscape.

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2022 CAHOW RECOVERY PROGRAM UPDATE – A RECORD YEAR FOR BERMUDA'S NATIONAL BIRD

Fig. 1: Adult Cahow at sea offshore from Nonsuch Island

The Bermuda Petrel (Cahow) *Pterodroma cahow* is a pelagic seabird not often seen by the public on Bermuda, despite being officially declared as the island's National Bird in 2003. It is endemic to the Islands of Bermuda, nesting no-where else on Earth. In contrast to the well-known Longtail, or Tropicbird, which is highly visible during daylight hours around Bermuda's coastlines during the Spring and Summer months, the Cahow only approaches land at night, nesting during the Winter and Spring on a few offshore islands in the Castle Harbour area.

Originally abundant, the Cahow numbered as many as half a million pairs at the time of Bermuda's discovery in the early 1500s, but was catastrophically impacted by the introduction of mammal predators such as rats, cats, dogs and hogs. By the 1620s the Cahow was thought to be extinct, a belief that persisted for 330 years until the rediscovery in 1951 of a tiny remnant population on four small, rocky half-acre offshore islets.

The Bermuda Petrel (Cahow) Recovery Program is a long-term management, research and recovery program that has been in place since 1960, with a primary objective being the recovery of the Cahow's breeding population through the following:

a) The control of threats to the species;
b) The construction of artificial concrete nesting burrows, to compensate for a lack of suitable natural burrows on the tiny soilless nesting islands;
c) The establishment of entirely new nesting colonies on larger islands less vulnerable to hurricane erosion and flooding and sea-level rise.

Other primary objectives of the program include the following:

1) to promote public education and understanding of the importance of the Cahow to the natural heritage and unique natural environment of Bermuda, as well as the cultural significance of the species.
2) to use new technology and techniques to determine the oceanic range and significant foraging areas for the species, and to determine if there are threats such as offshore oil and gas exploration and extraction, that may overlap with the Cahow's oceanic range.

The Cahow Recovery Program has been successful in addressing most of the threats affecting the Cahow on the breeding islands in Bermuda, enabling the population to increase from only 18 breeding pairs producing a combined total of 7 to 8 chicks annually in the early 1960s, to a record number of 156 breeding pairs in 2022, producing a record total of 77 successfully fledged chicks. This is up from 143 pairs producing 71 fledged chicks in 2021.

One of the main concerns for the future survival and continued recovery of the Cahow is the effect of climate change and global warming on the tiny original offshore nesting islets on Bermuda. This is primarily due to the impacts of sea-level rise on the islands, most of which are of very low elevation, and of stronger, more frequent hurricane events, which have caused massive erosion and flooding from huge waves and storm surge on these exposed islands.

To address the threats caused by climate change, new Cahow nesting colonies have been established on the nearby larger, more elevated Nonsuch Island Nature Reserve. Nonsuch is seven times larger than the combined area of all four original nesting islands, and has been restored since 1964 as a "Living Museum" with the original endemic and native forest cover and animal communities that used to cover the main islands of Bermuda, but have been almost completely replaced by introduced invasive species.

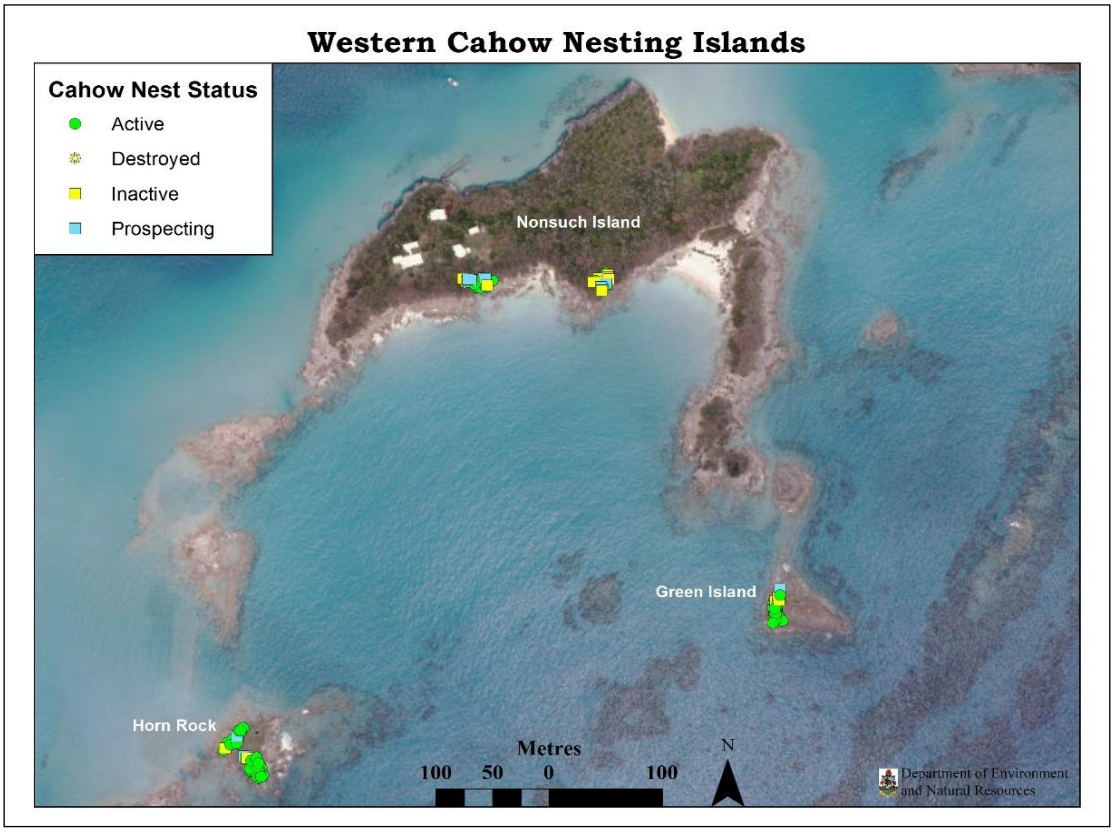

Fig. 2: Location of newly established Cahow nesting colonies on Nonsuch Island

Two nesting colonies of Cahows were established in separate projects by the Terrestrial Conservation Officer in 2004-2008 and 2013-2017 through the translocation of near-fledged chicks from the original

islands to artificial concrete nest burrows constructed on Nonsuch *(Fig. 2). Chicks are monitored through their development and moved to the new nests about 21 days before fledging. They are then hand-fed fresh Squid and Anchovies every day, until they fledge to sea, not returning for 3 to 5 years. The two translocation projects have been successful with a 49 % return rate of fledged chicks, leading to the first nesting pairs and hatched chicks by 2009 to be recorded on Nonsuch Island since the 1620s. These nesting colonies have rapidly grown by 2022 to become the second-largest sub-population of all the nesting islands at 35 breeding pairs, and continue to grow and attract even non-translocated Cahows from the original islands. This is largely due to the fact that the new colonies are located at a much higher elevation on Nonsuch than on any of the other islands, and have not been disrupted or damaged by hurricane waves, storm surge and erosion.

During the 2022 breeding season, work was carried out retrieving Geolocator (GLS) tags that were fitted to the legs of adult Cahows 1 to 2 years before, enabling tracking of their movements at sea and identifying important feeding areas, which include the grand banks east of Nova Scotia and cooler, more productive waters well north of the Gulf Stream. In May and June, 37 GLS tags were fitted for the first time to fledglings just about to leave the nests, which will gather data for 3 years, archiving it until the tags can be recovered when the young birds return to nest. This will fill an important gap in knowledge, as nothing is presently known about where young Cahows go during the years when they are exploring and learning to survive on the open ocean.
Work was also carried out upgrading the highly successful live-stream “CahowCam” infrared video system on the island, the result of our partnership with J.P. Rouja and the Cornell Bird Laboratory. These videos enable a local and international audience to observe the nesting activities and chick rearing of Cahows in their underground burrows.
Despite the continuing recovery of the Cahow, it is still critically endangered and one of the rarest seabirds on Earth. Continued management, to control both old and new, emerging threats, will be essential to enable the continued recovery of Bermuda’s beautiful National Bird.

Report compiled by: Jeremy L. Madeiros, Principle Terrestrial Conservation Officer

Fig. 3: fitting of GLS tracking tag to Cahow fledgling on Nonsuch Island, late May, 2022

Fig. 4: Downy 15-day old Cahow chick removed from nest for weighing & measurement

Fig. 5: Ten-week old Cahow chick with principle Conservation Officer on Nonsuch Island.

Indigenous plant spotlight: Bermuda sedge (*Carex bermudiana*)

This endemic plant is a tufted, evergreen perennial which grows in attractive olive-green clumps. Although it looks like a grass it actually belongs to the sedge family. It can be difficult to distinguish between grasses and sedges at a glance. The best way is to look at the stem; grass stems are hollow and cylindrical in cross-section while sedge stems are solid and triangular in cross-section.

The thin leaves of the Bermuda sedge rarely grow longer than 24 inches and are found in the wild mainly as singular clumps, but if one cluster is found often others will be in the vicinity. During the spring, spikes which can be up to 40 inches in length bearing small, hairy looking flowers at their ends appear which ripen into numerous brown seeds during the summer months. Unfortunately, rats and mice will readily eat the ripening seeds, which has resulted in very low natural germination. These plants also grow from rhizomes and can therefore be divided and replanted.

This exceedingly rare plant is only found in a few locations, occurring mostly as plantings. Wild specimens have been found in both upper woodland forests and in marshes where soils remain saturated and where nutrients are high. It prefers relatively sheltered, shaded locations where it won't get buried by falling leaves or be exposed to full sun or salt spray. Specimens growing well in the wild are often found beneath Bermuda Olivewood, Bermuda Palmetto Palm, Allspice and Pittosporum trees. It has been re-introduced to Nonsuch Island Nature Reserve, where it grows and self-propagates well under the restored native/endemic forest canopy. Nonsuch now supports the largest known remaining wild population. Over the last 25 years it has disappeared from several locations where it formally grew, including Abbott's Cliff, the Butterfield Nature Reserve and Magnolia Hall woodlands. It is thought this is primarily due to aggressive invasive introduced plant species, which have become increasingly dominant in these areas.

The Bermuda sedge can be grown for garden use in place of ornamental grasses. It also does relatively well as a potted plant. Because this sedge looks so much like a grass it is highly vulnerable to harm caused by landscapers, strimmers, and from errant weeding. If you use it in the garden make sure it is out of reach from lawn mowers, strimmers, and foot traffic and that landscape gardeners are aware this is a rare and showcase planting.

The Department of Environment and Natural Resources currently has a limited number of seeds. Individuals who are interested in propagating them are encouraged to email environment@gov.bm

News & Notices

Spearfishing statistics reminder

Recreational spear fishers are reminded that spearfishing statistics should be submitted monthly using the online portal at www.fisheries.gov.bm. There should be an entry for each date / location that you fished, and a "No fishing" entry for the final day of any month in which you did not fish. 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, and a report of "No fishing" should be submitted for any month in which there was no lobster diving activity.

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.

Seasonally closed protected areas

The extended closure areas, known as the 'grouper boxes', within the North Eastern and South Western Seasonally Closed Areas are currently closed to fishing, and will remain closed through the 30th of November 2021. The coordinates for these areas can be found at: https://www.gov.bm/bermudas-no-fishing-areas

New '*FishTips*' hotline

Members of the public are encouraged to contact DENR's Marine Management team with any questions or concerns about the marine environment and the regulations that are in place to help protect it. Urgent enquiries or reports of suspected illegal activity may be directed to the Coney Island offices on **293-5600** during the work day, or to the new **'*Fish Tips*' hotline**, **705-3474** (705-FISH), outside of working hours. Enquiries that are not urgent may be emailed to the **fisheries@gov.bm**

What should you do if you accidentally catch a shark?

Recently passed legislation prohibits the take of most sharks and, if you happen to catch a shark by accident, then you will need to release it. The following suggestions will help you release a shark safely:

- Keep the shark in the water if possible, and try to avoid dragging it backwards by the tail.
- If the shark is agitated, cover its eyes to calm it. This is important for deepwater species with sensitive eyes.
- Work quickly. A long period without water moving over the gills may reduce the shark's chance of survival.
- If possible, remove the hook using pliers to back the hook out the way it went in.

- Otherwise, cut the hook using bolt cutters, or cut the line as close to the hook as possible.
- If a shark is lethargic, it may be revived by forwards motion to push water through the gills.

Planting Calendar – What to plant in the autumn…

VEGETABLES

September
Beans, Broccoli, Brussels Sprouts, Cabbage, Carrots, Cauliflower, Celery, Chard, Cucumber, Eggplant, Kale, Leeks, Mustard Greens, Parsley, Pepper, Potatoes, Radish, Rutabaga, Tomato, Turnip.

October
Beans, Beets, Broccoli, Brussels Sprouts, Cabbage, Carrots, Cauliflower, Celery, Chard, Chives, Cucumber, Eggplant, Endive, Kale, Leeks, Lettuce, Mustard Greens, Onions, Parsley, Pepper, Potatoes, Radish, Rutabaga, Spinach, Squash, Strawberries, Thyme, Tomatoes, Turnip.

November
Beans, Beets, Broccoli, Brussels Sprouts, Cabbage, Carrots, Cauliflower, Celery, Chard, Chives, Kale, Leeks, Mustard Greens, Onions, Parsley, Potatoes, Radish, Rutabaga, Spinach, Squash, Strawberries, Thyme, Tomatoes, Turnip.

FLOWERS

September
Celosia, cosmos, gazania, globe amaranth, impatiens, marigold, salvia, snow-on-the-mountain, vinca and zinnia.

October
Ageratum, antirrhinum, 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.

November
Ageratum, antirrhinum, aster, aubrieta, begonia, bells of Ireland, candytuft, carnation, centuarea, 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.

GOVERNMENT OF BERMUDA

Department of Environment and Natural Resources

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