Envirotalk

GOVERNMENT OF BERMUDA
Department of Environment and Natural Resources

Autumn 2026
VOLUME 90 No. 3

TO PROTECT BERMUDA'S ENVIRONMENT AND RESPONSIBLY MANAGE ITS NATURAL RESOURCES

WELCOME

to our Autumn edition of Envirotalk.

In this issue –

- Read how DENR is strengthening local **marine resources management**
- Dr Sarah Manuel provides part 4 of the **carbon credits and blue economy**
- Dr Mark Outerbridge introduces us to the **ram's horn squid**
- Ronald Burchall shines the plant spotlight on **Joeseph's coat**
- Learn about the power of citizen science by **using iNaturalist**

Also See:

- Our **News & Notices** section
  - Librarian's update
  - Spearfishing statistics reminder
  - Lobster diving reminder
  - Seasonal fisheries protected areas reminder
- The **Planting Calendar** to get a head start on what to plant this Autumn

Electronic copies of previously published editions and an online bibliography dating back to 2009 can be found by visiting https://environment.bm/envirotalk and, as always, please contact the Envirotalk mailing list envirotalk@gov.bm if you would like to be added to it or if you wish to make suggestions for a future article.

Mark Outerbridge - Editor

DATA, SCIENCE, AND ENFORCEMENT: HOW DENR IS STRENGTHENING MARINE RESOURCES MANAGEMENT IN BERMUDA

Bermuda's marine resources are managed by the Department of Environment and Natural Resources' (DENR) Marine Management Section using science-based decision-making informed by ongoing monitoring, data collection, research and enforcement. The data collected and international best practices form the basis for the rules, limits, and protections that apply in Bermuda's waters.

Three recent projects show what this work looks like in practice: a new data management and digital reporting tool for fishers, updated fish stock assessments, and a stronger approach to enforcement. This and other ongoing work also addresses recommendations from the 2024 Independent Review Panel report on the Marine Spatial Plan. Of the Panel's 22 recommendations, 10 have been completed and 12 are in active progress.

Modernising Catch Reporting

Since 1975, commercial fisheries catch landings have been recorded and analysed to inform management. DENR has now partnered with Shellcatch, a cloud-based application built for fisheries data management, to modernise how commercial fishers report catch and effort, streamline licensing, and more. The platform is able to replace paper logbooks with a real-time digital system, streamlining a process that has long relied on manual data entry and providing DENR with more timely, accurate data to inform fisheries management and decision-making. The partnership also responds to long-standing calls for improved reporting tools and better data to support management of Bermuda's fisheries resources. A voluntary recreational reporting module is now in development for hook and line fishing. It will give recreational fishers an electronic catch log, expand the range of data available to DENR, and lay the groundwork for a possible future recreational licensing system. Catch and effort reporting is only one part of the picture. DENR also conducts independent monitoring and collects biological data to inform assessments of Bermuda's fisheries.

Monitoring Species and Ecosystem Health

Species-specific stock assessments on red hind and spiny lobster have been conducted in recent years, and these have provided detailed information on these stocks, adding to the broader scientific evidence for understanding the health of these fisheries and guiding management decisions. The red hind assessment, conducted last year, found that the population has improved and is now stable and being harvested at sustainable levels. Landings are generally below the estimated maximum sustainable yield. While the stock appears to be remaining steady under current fishing pressure, the assessment could not tell us if the population has fully recovered to historic levels. The paper is currently in peer review and will be made publicly available when complete.

The last spiny lobster assessment (in 2023) indicated that the fishery was not experiencing overfishing at that time, though declining catch rates indicated that the stock had been reduced in recent years. Additional management measures for both the commercial and recreational fisheries were therefore put in place to assist the lobster population. DENR intends to regularly reassess and to continue adaptive management of this fishery.

These assessments reflect DENR's commitment to basing management decisions on independent, up-to-date science, including results that signal a need for adaptive management as well as those that confirm effective management.

Species-by-species snapshots like these are useful, but only tell part of the story. The catch rate of a single species can appear steady while the overall population remains depleted or the habitat it depends on is under strain. This is why DENR pairs these assessments with broader, ecosystem-level monitoring. This wider view also helps DENR respond to pressures, like habitat loss or shifting climate conditions, that affect the whole ecosystem rather than any single species.

With support from the UK, DENR is also expanding its monitoring efforts through Baited Remote Underwater Video (BRUV) surveys that measure fish diversity and abundance across Bermuda's waters. BRUV surveys are particularly effective at detecting large mobile predators. Data collection is underway in areas proposed for marine protection, including North Rock, Coot Pond, and the North Shore Protected Area. BRUVs provide a fishery-independent view of fish diversity and abundance in these areas, one that isn't shaped by what's being caught in the fisheries.

Together, species-specific assessments and ecosystem-level monitoring are providing DENR with a more comprehensive understanding of Bermuda's marine environment, informing both individual fishing rules and the wider Marine Spatial Plan.

Strengthening Enforcement

Science provides the foundation for effective rules and regulations, while enforcement ensures those measures are being followed on the water. In February, the Government tabled its Marine Resources Enforcement Strategy in Parliament, building on the findings of a comprehensive Monitoring, Compliance and Surveillance Assessment. The Strategy sets out priorities for strengthening Bermuda's marine compliance system, informed by consultation with the Marine Resources Board, the Commercial Fisheries Council and the public. Bermuda is already seeing the results of stronger marine enforcement, including more successful prosecutions for illegal fishing, higher penalties, and a growing number of cases progressing through the courts. Coordination between enforcement agencies has also improved, and DENR's outreach with the Department of Public

Prosecutions has helped build greater awareness of the implications of illegal fishing activity. DENR is developing an Enforcement and Compliance Implementation Roadmap to turn the Strategy's priorities into practical, operational actions. This includes updates to bring legislation up to international standards, a proposed ticketing system for fisheries violations and planned training for prosecutors on fishing offences, all aimed at making enforcement more consistent and effective going forward.

A Coordinated Approach

Taken together, the above initiatives show how Bermuda manages its marine resources using a combination of science, monitoring, stakeholder reporting, and enforcement. By drawing on multiple sources of information, management decisions are based on the best available evidence.

Marine Management Section, DENR

CARBON CREDITS AND THE BLUE ECONOMY (PART 4)

Beyond carbon: Biodiversity offsets and credits

In addition to carbon credits, some countries are developing and testing biodiversity offset schemes and biodiversity credit markets. Both aim to support conservation, but they work in different ways.

What are biodiversity offset schemes?

A biodiversity offset scheme is a mandatory requirement used to compensate for environmental damage. It is usually part of a government's environmental regulations. Under these rules, if a developer or an industry damages or destroys a natural area, such as a marsh, forest or coral habitat, they are legally required to offset that loss. This means they must restore, protect or create habitat elsewhere that provides equal or greater ecological value to compensate for biodiversity loss caused by their activities.

The goal is to achieve "no net loss" of biodiversity, and ideally a net gain. Offsetting is considered a last resort. Developers must first avoid environmental harm, then minimize it, and only offset impacts that truly cannot be avoided. Because these offsets are written into law, they ensure that environmental damage is balanced by equivalent ecological improvements. Such schemes are already in place in the UK, Australia and parts of the US.

What is a biodiversity credit scheme?

A biodiversity credit scheme is different. It is a voluntary market, similar to voluntary carbon markets. Instead of paying for carbon reduction, buyers invest in measurable improvements in nature.

A project might earn biodiversity credits by:

- restoring a wetland,
- expanding a mangrove forest,
- improving habitat for endangered species or
- removing invasive plants.

Each biodiversity credit represents a scientifically verified gain in ecosystem health, species abundance, or habitat quality.

Participation is not legally required. Buyers, such as companies, organizations, or individuals, typically purchase credits to meet sustainability commitments, support conservation, or demonstrate environmental leadership.

Importantly, biodiversity credits do not compensate for harm elsewhere. They are investments in nature-positive action, not a way to balance out environmental damage.

It is recognized that biodiversity is highly complex and locally specific, therefore, unlike carbon, there is no single global unit of measurement. The International Advisory Panel on Biodiversity Credits (IAPB) has developed a "Framework for high integrity biodiversity credit markets" to help standardize approaches to support the development of biodiversity markets without oversimplifying nature's complexity.

Biodiversity credit projects follow processes similar to carbon credit projects: conservation gains must be measured, verified by an independent third party, and confirmed to be additional, meaning they would not have happened without the project. Credits are then issued through a registry, sold to buyers, and eventually "retired" to ensure transparency and avoid double counting.

For small islands like Bermuda, biodiversity credits may offer more promise than carbon credits. This does not imply that biodiversity credits are a guaranteed funding solution, but rather that they may align more closely with the broader ecosystem services provided by small island habitats. Although ecosystems such as mangroves, seagrass, coral reefs and wetlands, are limited in size, they provide immense value: shoreline protection, fisheries support, water quality improvement, tourism benefits and habitat for unique species. Biodiversity credit schemes are designed to recognize and reward these broader benefits, not just carbon storage.

As with carbon markets, biodiversity credit systems are evolving globally and their long-term financial performance and demand remain uncertain. It is not yet clear whether such a market could bring significant new funding for conservation in Bermuda. Developing a clear local framework and governance structure would be an essential first step.

No matter the funding model, one message is clear: Protecting and restoring the natural ecosystems we already have is one of the most important things we can do for our climate, our wildlife, and our future.

Dr Sarah Manual
Senior Marine Conservation Officer, DENR

THE RAM'S HORN SHELL

I recently found this delicate and interesting shell on a local beach. Its common name is very fitting because it does indeed look like a miniature ram's horn, however it is not a shell in the sense of belonging to a gastropod (snail) or bivalve (seashell). It is, in fact, the internal buoyancy control mechanism of a diminutive, ocean dwelling creature – the ram's horn squid *Spirula spirula*.

Ram's horn shell
Credit: M. Outerbridge

This whorled shell, which rarely exceeds 25 mm in diameter, is located inside the squid's body and contains numerous chambers connected by a thin tube through which passes a small amount of gas. The volume of gas in each chamber can be adjusted allowing the squid to rise or descend through the water column. This species is found in tropical and subtropical oceanic waters worldwide, inhabiting depths between 600 and 700 m (approx. 2,000 ft) during the day and less than 300 m (1,000 ft) at night. The body of an adult squid grows to about the size of a large medjool date (ca. 45 mm in length) and the life span is estimated to be 18 - 20 months[1].

After the squid dies and decomposes, its white chambered shell remains floating on the surface and drifts around on the ocean currents. Some occasionally wash ashore for the lucky beachcomber to find.

Photograph of a live ram's horn squid in the wild
Credit: Schmidt Ocean Institute[2]

References:

[1]Reid, A., Jereb, P. & Roper, C.F.E. 2005. Family Sepiidae. *In:* P. Jereb & C.F.E. Roper (eds.) Cephalopods of the world. An annotated and illustrated catalogue of species known to date. Volume 1. Chambered nautiluses and sepioids. FAO Species Catalogue for Fishery Purposes. No. 4, Vol. 1. pp. 57–152.

[2]https://www.smithsonianmag.com/smart-news/strange-squid-filmed-wild-first-time-180976192/

Dr Mark Outerbridge
Senior Biodiversity Officer, DENR

INDIGENOUS PLANT SPOTLIGHT: JOSEPH'S COAT (EUPHORBIA HETEROPHYLLA)

Native to Bermuda, this evergreen perennial is a widespread but sadly underrated plant. Its wide soil preferences and drought tolerance enable it to easily recolonize disturbed areas - especially garden beds. This herb is not the most favorable among avid garden enthusiasts. Indeed, some even consider it tenacious and unruly. Stark and exposed sunny gardens are capable of harboring a mixture of unwanted weeds, in addition to Joseph's Coat. Like several of our other native wild herbs, Joseph's Coat is not recognized as an important plant to integrate into localized natural settings. Reaching heights of up to 3 ft (when left unmanaged), individuals often form numerous scattered stands along open spaces and woodland belts.

Not as showy as the traditional Christmas Poinsettia, Joseph's Coat is similar in appearance with the red central highlights which contrast against the solid green leaves and seed pods. Seeds are numerous and found in the central nodes. They turn dark green with a white hue at the base and once mature, they explode with a 'snap' sound and shoot their seeds outward as far as 3 feet away. When not flowering, the bracts (leaves closest to the flowers) are usually all green in colour. The roots are shallow and the texture of the overall plant appears somewhat fleshy. If the stem is broken a white sap will be expelled causing contact dermatitis in some sensitive gardeners. Caution is advised because this plant is toxic if ingested.

This native herb readily takes to wild hedge lines and should be used when restoring natural woodlands throughout Bermuda. Natural stands

Joseph's Coat or Wild Poinsettia
Credit: R. Burchall

of Joseph's Coat can be found thriving in several of the Bermuda National Trust nature reserves, especially in Sherwin (south) just off the railway trail behind Warwick Pond as well as Scaur Lodge in Sandy's Parish. Joseph's Coat is popular with honeybees and butterflies and is a host to the caterpillar of the Ello Sphinx moth. This plant is highly tolerant of natural disturbances - in fact, further research could indicate whether this species should be considered a likely candidate during the early stages of ecological succession. Gradual changes in woodland ecosystems invite new species to colonize the area following sudden environmental change that altered the former state. Joseph's Coat is a potential pioneer species, one that establishes early and gradually thins out overtime as other types of flora begin to dominate the area. This herb is an important component in woodland management and further helps to diversify our natural landscape.

Ronald Burchall
Conservation Officer, Bermuda National Trust

THE POWER OF CITIZEN SCIENCE: USING iNATURALIST

Stories like this happen all the time on iNaturalist:

Reporting Lazarus species

In 2024, a Swedish tourist in New Zealand spotted a moth, and accidentally rediscovered a species scientists had considered extinct for over 50 years! The Frosted Phoenix has since been documented on iNaturalist almost 20 times.

Discovering new-to-science species

A woman walking her neighborhood in Australia photographed a mantis, and it turned out to be a species new to science, now named *Inimia nat*.

Tracking invasive species

A London commuter noticed a tiny insect, the Eastern Sycamore lace bug, and shared it on iNaturalist — an invasive bug not recorded in the UK for 18 years.

Protecting local ecosystems

Local volunteers in California used iNaturalist to coordinate protection for amphibians migrating across a busy road.

This is community science: millions of people noticing, documenting, and helping to protect the nature around them. Every observation shared becomes part of the global scientific record.

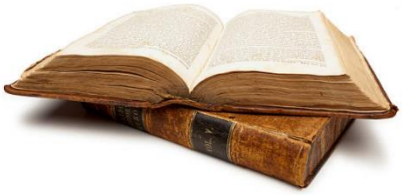
Using iNaturalist also helps train the identification tool which makes it useful for everyone. Our mission is to connect people to nature and advance biodiversity science and conservation. iNaturalist is free, nonprofit, and community-powered — by people like you.

Have fun exploring and identifying your local biodiversity with iNaturalist!

For more support: Visit our Getting Started page.

The iNaturalist Team

Librarian's Update



Successful reintroduction of the land snail *Poecilozonites bermudensis* on the Bermuda archipelago. Published online in Oryx, July 2026 (https://doi.org/10.1017/S003060532510255X)

Thick Underplating and Buoyancy of the Bermuda Swell. Published online in Geophysical Research Letters, November 2025 (https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2025GL118279)

Watch Will Frazer's Bermuda seismic lecture on YouTube: https://www.youtube.com/watch?v=gEq66zbte9k

Zinc isotope constraints on the cycling of carbon in the Bermuda mantle source. Published online in GeoScienceWorld, September 2025. (https://pubs.geoscienceworld.org/gsa/geology/article/53/12/1001/661230/Zinc-isotope-constraints-on-the-cycling-of-carbon)

Spearfishing statistics reminder

Recreational spear fishers are reminded that spearfishing statistics should be submitted monthly using the Shellcatch e-reporting platform / app. 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. Your catch statistics must be up to date through at least the end of July if you are applying for a spearfishing licence for the upcoming season, which starts on September 1st. Applications can be submitted to DENR starting in August. Please call 293-5600 or email fisheries@gov.bm if you are having difficulties accessing the reporting platform.

Lobster diving reminder

Now that lobster season has begun, 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 www.shellcatch.com 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 send an email to 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 Northeastern and Southwestern Seasonally Closed Areas are currently closed to fishing, and will remain closed through the 30th of November. The coordinates for these areas can be found at: https://www.gov.bm/bermudas-no-fishing-areas

PLANTING CALENDAR – WHAT TO PLANT IN THE AUTUMN

VEGETABLES, HERBS, & FRUIT

September
Beans, broccoli, Brussels sprout, 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 sprout, 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 & November
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, star-of-the-veldt, stock, sweet william, verbena and viola.