



## WELCOME

to our autumn edition of Envirotalk.

In this issue –

- Dr. Mark Outerbridge introduces us to a new resident species - the cownose ray.
- Alison Copeland identifies the burrs you might find on yourself after a day exploring Bermuda.
- The Marine Conservation team updates us on a project listening for whales and dolphins off South Shore.
- Drs. Joanna Pitt and Tammy Warren discuss trends and spatial patterns in both the recreational and commercial spiny lobster fisheries.
  
- Also, See:
  - Our **News & Notices** for reminders and upcoming events
  - The **Planting Calendar** to get a head start on what to plant this autumn.

Please contact:

Envirotalk mailing list: [envirotalk@gov.bm](mailto:envirotalk@gov.bm) to be placed on the mailing list or for suggestions for future articles.

## A NEW ADDITION TO BERMUDA'S MARINE WILDLIFE: THE COWNOSE RAY

Until recently, Bermuda had two species of resident rays; the spotted eagle ray *Aetobatus narinari* (locally known as the whip moray), which is typically encountered inshore, and the much larger manta ray *Manta birostris*, which lives in the open ocean. However, in the spring of 2015, a member of the public reported seeing a number of unusual looking rays in Mill's Creek. They were not spotted eagle rays but rather something smaller and lacking the white dorsal spots. Another member of the public subsequently managed to photograph two individuals on the surface of Mill's Creek, at which point the Department of Environment and Natural Resources (DENR) was able to positively identify them as cownose rays *Rhinoptera bonasus*.



Two cownose rays photographed in Mill's Creek. (Photo: Matthew Jones)



The distinctive face of a cownose ray (Photo: Mark Outerbridge)

Cownose rays belong to a group of fishes that includes the eagle rays and the manta rays. They have a broad, lumpy head which, when viewed from above, somewhat resembles the nose of a cow. They are typically a uniform brown or olive green in colouration with a pale belly. They have barbed spines where the long thin tail meets the body, and these spines are capable of delivering a 'sting' if the ray feels threatened. Adult females normally attain a wing-span of about three feet and weigh up to 50 pounds

(versus spotted eagle rays, which are twice that size and at least three times the weight). Sexual maturity is reached at the age of 4-5 years. Females normally produce only one pup at a time, and the pup is born live with a wingspan of 11-18 inches.

Cownose rays are native to the western Atlantic Basin and usually live in shallow marine coastal waters. They are known to swim in large schools (sometimes numbering thousands of individuals) and migrate long distances throughout their range. A migratory school originating from the eastern seaboard of the USA likely took a wrong turn somewhere and ended up bumping into Bermuda. Anecdotal evidence suggests that it was a small school that arrived in 2014



**Mouth and underside of a cownose ray (Photo: Mark Outerbridge)**

or 2015. It appears that the founding rays decided to remain here rather than take the risk of returning the way they came. By May 2016, there were rumours of 25-30 individuals being seen within the Great Sound, and in November of that year, a cownose ray was seen attempting to swim against the tidal current of Flatt's Inlet into Harrington Sound.

Cownose rays are fond of eating clams, oysters, and large marine snails. In some areas of the USA, large populations of cownose rays are thought to have contributed to the decimation of local shellfish populations (e.g. bay scallops and oyster beds). Some fisheries scientists believe that this may have happened because of the significant decline in shark populations. Decades of fishing has led to an alarming depletion of shark species worldwide. Sharks prey on rays and thus control their number and influence behaviour (such as foraging). The loss of the sharks has enabled some ray populations to grow in size and feed in an unregulated manner. The very same dynamic may be happening locally with green sea turtles and our declining seagrass meadows (see the autumn 2020 edition of Envirotalk Vol. 84 No. 3).

It looks as if the cownose rays are here to stay. Residents are sighting them more and more, and DENR has received at least one report of a birthing event, so it is expected that the local sub-population will grow over time in abundance and distribution. It remains to be seen how this new species of inshore ray will affect Bermuda's mussels, oysters, calico clams, and conch. One thing is certain, the local scarcity of sharks will give the cownose rays a good chance to become firmly established here.



Young female cownose ray in the North Rock tank at BAMZ (Photo: Mark Outerbridge)

For those of you who have not yet seen a cownose ray, the Bermuda Aquarium Museum and Zoo acquired a young female this past March and has put her on display in the North Rock Tank, where I hear she is doing well.

***Dr Mark Outerbridge,  
Senior Biodiversity Officer***



## BURRS – THE HITCHHIKERS IN YOUR SOCKS

A burr is the seed of a plant with spines, hooks or teeth. Plants that produce burrs take advantage of passers-by to spread their seeds. The burrs catch on the fur of passing animals, the feathers of birds, or the clothing of people and hitch a ride to a new location. Burrs can even attach to the tires of vehicles or aircraft to hitch a really long ride. It should come as no surprise that many of Bermuda's pest plants and weeds are burr-producing species.

White Beggar's Tick (*Bidens pilosa*), is a common garden, field and roadside weed in Bermuda with white flowers. Its burrs are thin spikes with 2-4 barbed spines. Another roadside weed, Queen Anne's Lace (*Daucus carota*), is a member of the wild carrot family and produces hundreds of oval seeds with hooked spines. Anyone who has tangled with it knows how numerous and difficult the burrs are to remove. They can even survive the washing machine and tumble drier.



**Results of an encounter with Creeping Beggarweed (*Desmodium incanum*)**

Another burr you are very likely to find in your socks is the flattened, D-shaped seed of *Desmodium incanum*. This plant is variously known as Creeping Beggarweed, Spanish Clover or Tick Trefoil. It grows in waste spaces and lawns and produces a small pink flower, followed by a jointed seed pod that breaks up into several sticky burrs.

A few of Bermuda's native plants are also burr producers, having travelled to the island with migrant birds. Anyone who has walked barefoot in the sand dunes between Horseshoe Bay and Warwick Long Bay will likely have (painfully!) encountered the native Burr Grass (*Cenchrus tribuloides*). Burr Grass sheds wickedly sharp, spiky, round burrs about half an inch long in summer and autumn. The yellow-flowered shrub *Triumfetta semitriloba*, or Burr Bush, is another native plant with large, spiky, round burrs. It is often found on path edges, such as at Spittal Pond, where it has been deposited and spread by visitors.

The only way to avoid burrs in your shoes and clothes is to avoid brushing up against these plants when they are seeding. For those of us that spend lots of time outside – this is easier said than done! Therefore, it is important to check for burrs and remove them into the trashcan when you get home to avoid spreading these pesky plants. For the staff members of the DENR who work in sensitive nature reserves, cleaning our clothes, shoes and equipment to remove hitchhikers is part of a days work.

***Alison Copeland,***  
***Biodiversity Officer***

White Beggar's Tick



Burr Bush



Creeping Beggarweed



Queen Anne's Lace

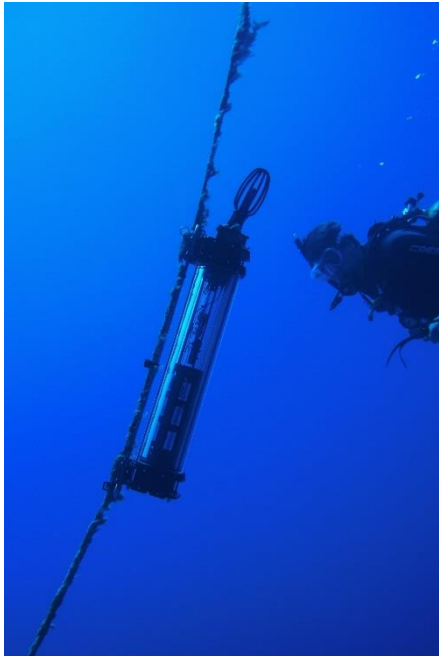


The common burrs found in Bermuda (Graphic: DENR)

[\*editors note: This article was inspired by a member of the public who contacted the Department after finding what she believed was a tick on her dog. If you think you have found a tick, safely remove and contain it. Photos can be emailed to [environment@gov.bm](mailto:environment@gov.bm)].

## LISTENING FOR WHALES

Apart from humpback whales, we do not know much about other whale species that inhabit or swim through Bermuda's waters. To learn more, the Department of Environment and Natural Resources has joined islands in the wider Caribbean region to deploy underwater microphones, known as hydrophones, to help detect and identify any cetacean species that produce sounds within their range. In February 2021, twenty islands deployed hydrophones as part of the Caribbean Marine Mammal's Passive Acoustic Observatory. The study will continue for a year.

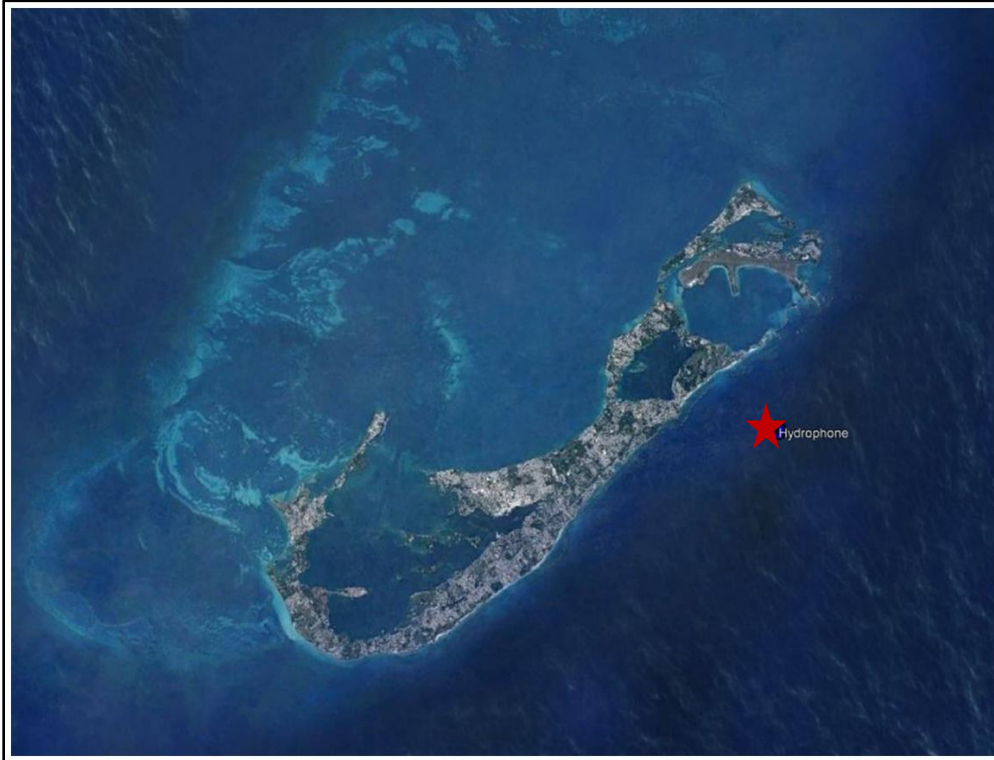


The hydrophones for this project were designed by the University of Toulon in France. They are optimised to record sounds produced by cetacean species across the Caribbean over a wide range of frequencies. Examples are the fin whale (*Balaenoptera physalus*), which produces very low frequency noises that travel long distances, to the high frequency sounds of the pygmy sperm whales (*Kogia* sp.), used for communicating over short distances, as well as man-made noises. The University of Toulon later analyses the recordings. The data will tell us the time of year and type of species detected in Bermuda's waters. It will hopefully also provide information on abundance estimates for each species and seasonal movement patterns. The size of sperm whales (*Physeter macrocephalus*) can also be estimated, thereby allowing us to identify specific individuals.

The Bermuda hydrophone is moored off South Shore in an area where the water depth is approximately 120 feet deep. It sits about 40 feet above the seabed to minimise interference noises generated by snapping shrimp. We chose a relatively easy site to access because the hydrophone batteries and memory card need to be replaced every six weeks. Furthermore, the device had to be as close as possible to the edge of Bermuda's Platform. The data gathered between February and now has yet to be analysed. Still, we do know the hydrophone has recorded humpback whale song because we could hear a humpback singing the very first time we deployed the hydrophone.

The Agoa Sanctuary for Marine Mammals leads the Caribbean Marine Mammal's Passive Acoustic Observatory Project. Its goal is to strengthen the network of marine protected areas dedicated to marine mammals in the wider Caribbean and beyond. Bermuda's entire Economic Exclusive Zone (the area of ocean that extends 200 nautical miles in all directions from our coastline) was declared a Marine Mammal Sanctuary in 2012. Therefore, all marine mammals in our waters are protected, and Bermuda was asked to participate in the study. Many of the marine mammal populations in the Atlantic are shared between countries and need protection. The project aims to develop common management and assessment tools across the region to conserve and manage these shared populations.





The location of Bermuda's hydrophone (Map: DENR Marine Conservation Section)

*Marine Conservation Section, DENR*



## BALANCING THE RECREATIONAL LOBSTER DIVER FISHERY WITH THE SMALL SCALE COMMERCIAL LOBSTER TRAP FISHERY IN BERMUDA

In Bermuda, the Caribbean spiny lobster *Panulirus argus* has traditionally been targeted by a small scale commercial trap fishery and also by recreational free-divers. Historically, the commercial fishery utilised arrowhead traps, which were used to trap finfish outside of the lobster season, while divers used a noose or a spear. As with many fisheries, conflict often arises between the two groups utilising the same resource.

In 1972, the Fisheries Act formalised a number of customary stewardship practices, legislating a fishery closure during the reproductive season and setting a minimum size of 92 mm carapace length (or 3 5/8 inch). Initially, the recreational lobster diver fishery remained loosely regulated, although divers were restricted to using a noose for capturing lobsters, and the use of SCUBA was officially prohibited. A daily bag limit was also imposed, although it varied somewhat over time. Additionally, certain inshore areas were also placed off-limits to all forms of lobster fishing (Fig. 1).

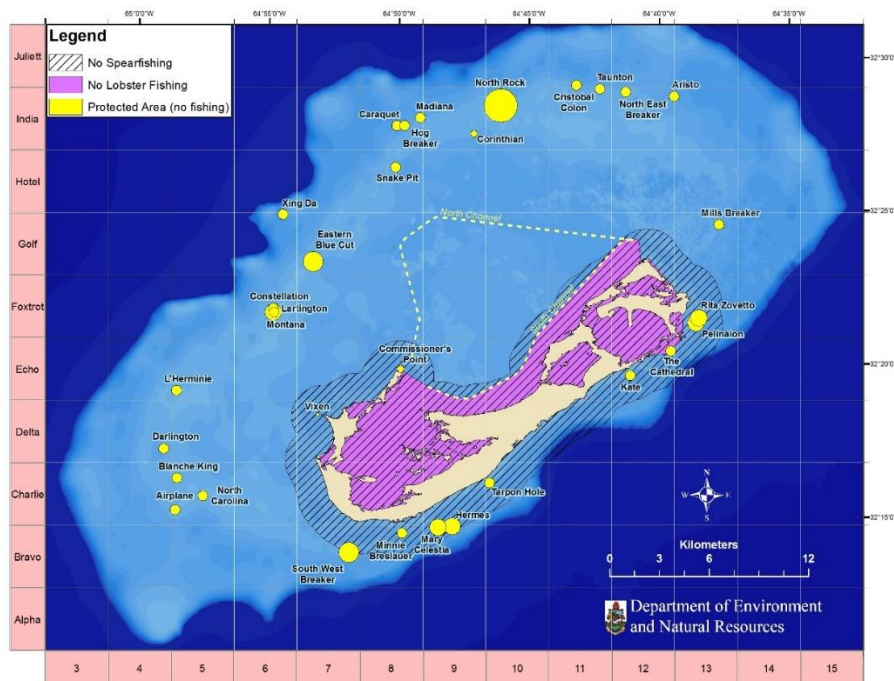


Figure 1. Lobster diving areas, with the area where all lobster harvest is prohibited shown in pink.

Amidst declining catches of finfish in the 1980s, the 1984 Fisheries Management Plan sought to eliminate the diver fishery and reserve the available lobsters for the trap fishery to help maintain the profitability of the commercial sector. However, diving for lobsters fits the definition of a 'specialised' fishing activity (*sensu* Loomis and Holland, 1997) and is highly valued by those who participate. Therefore, in response, the Bermuda Amateur Lobster Catchers' Association was formed to lobby against the closure of the recreational lobster fishery (Government of Bermuda, 2000).

After some negotiations, the Fisheries Regulations were amended to create a recreational lobster diver licensing programme. Licenses cost \$10 and came with additional terms and conditions, including a daily bag limit of 2 lobsters per licence holder and the requirement to report fishing activity - this facilitated tracking of diver numbers and their catches.

From the 1980s through 2016, recreational lobster diving licences issued each season rose from approximately 400 to just over 500, although numbers fluctuated throughout this period. The total reported catch from the recreational fishery was also highly variable, ranging from a minimum of 929 to a maximum of 5,181 lobsters in a given season. However, it is believed that the minimum value represented severe under-reporting. The reported catch was affected by obvious factors such as diver numbers, experience levels, the weather and prevailing sea conditions during the lobster season, especially hurricane-prone September. However, it was also greatly affected by concurrent changes in the commercial fishery.

After fish traps were banned in 1990, the commercial lobster fishery transitioned from traditional arrowhead traps to using specifically developed rectangular traps with openings designed to help finfish escape (Ward and Luckhurst, 1996). There was a six-year period of experimental fishing to refine the design of these traps, with trap fishing restricted to areas deeper than 10 m and only a limited number of commercial fishers participating. During this time, the commercial harvest of lobsters fell dramatically, which impacted the supply of lobsters to the local market. As a result, many people took up lobster diving and, with no trapping taking place in shallow waters, recreational catches reached an all-time high. Although there had been incremental increases in the cost of a lobster diving licence in previous years, the price was increased to \$120 in 1990, in an attempt to constrain the number of licences through market forces.

When the commercial trap fishery reopened fully in 1996, some trapping was permitted in areas shallower than 10 m deep for at least part of the season, generally, the latter half, although the portion of the season and the number of traps permitted varied from year to year. Commercial fishers are assigned to eastern and western 'inshore' areas to distribute the fishing effort across the platform. A central 'no trapping' reservoir area to the south of the north shipping channel was carved out to separate trapping and the diver fishery, with the aim of reducing inter-sectoral conflict.

The recreational lobster diver fishery shows patterns typical of recreational fisheries, with many casual participants and a few highly engaged individuals (Government of Bermuda, 2000; Robertson and Pitt, 2013). Lobster diving is concentrated at the start of the season because the water is warmer and sea conditions are better, and usually more than a third of the season's catch is reported from the month of September (Fig. 2). Average seasonal catches are in the range of 8-14 lobsters per licence holder. Many participants only fish on 1-3 days and catch their bag limit of 2 lobsters, but a few very active fishers continue to dive throughout the winter and may catch more than 50 lobsters in a season (Fig 3).

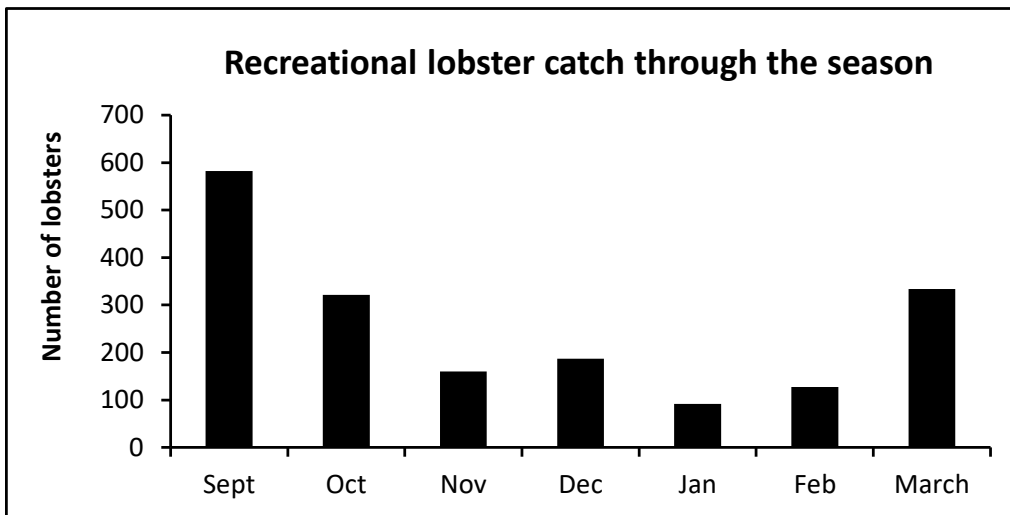


Figure 2. Temporal distribution of lobster catch throughout the 2020-21 season, showing the peak of activity in September.

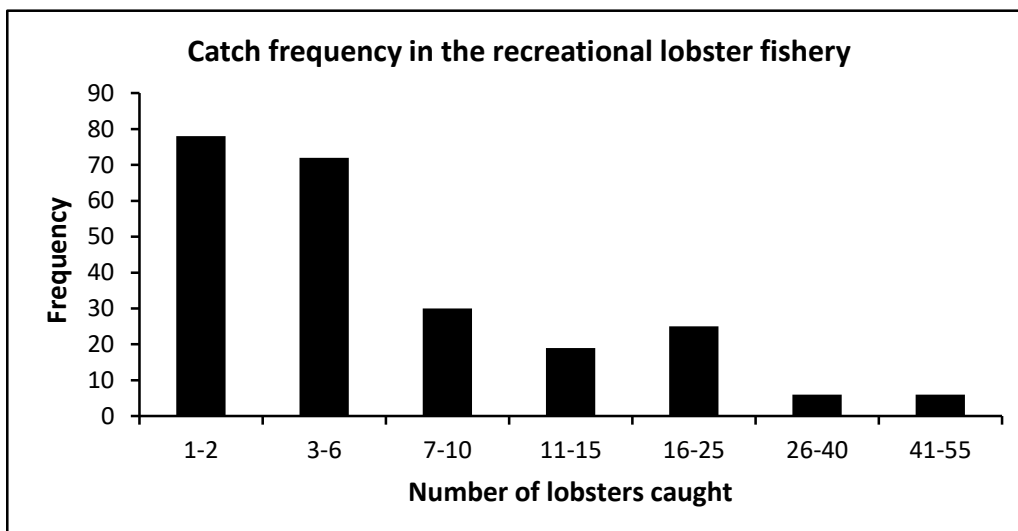


Figure 3. Catch frequency (total number of lobsters caught per licence holder) in the recreational fishery during the 2020-21 season.

It has been noted that, over the years, many divers purchased licences even when they did not fish because they feared that licences might be eliminated or capped in the future and they wanted to maintain their history of participation. However, if they did not fish, they often did not bother to report their effort and catch, or lack thereof. This brought both the true level of fishing activity and the validity of the reported catch levels into question, particularly from the perspective of the commercial fishers. To encourage reporting and improve the accuracy of the catch statistics, lobster divers who did not report in a timely manner had their licences suspended for a season.

Recreational lobster divers have typically caught the equivalent of approximately 10% of the commercial catch (Robertson and Pitt, 2013), although catches were much higher during the early 1990s while the commercial fishery was being restructured and appeared to be lower when catch reporting was less stringently enforced. Yet the limits imposed by free-diving combine with prevailing autumn wind and weather patterns to concentrate the recreational harvest in shallower waters, particularly off the west end of the island (Robertson and Pitt, 2013; Fig. 4), fueling conflict with the commercial fishers in that area.

A decline in the abundance of lobsters over the past five years, manifested as a decrease in the average number of lobsters caught per trap by the commercial trap fishery, particularly in the shallower 'inshore' areas, necessitated harvest controls for the 2017-18 season (Department of Environment and Natural Resources, 2020). Restrictions on the commercial fishery included fewer traps allowed inshore and a reduction in the number of licences issued. Given that both sectors operate in the area showing the greatest declines, commercial fishers called for equivalent restrictions on recreational anglers in the form of a cap on the number of licences.

The Lobster Divers' Association represented their sector in meetings with commercial fishers and agreed that a cap of 500 licences could be set for that season and would only penalise those who had not complied with reporting. Although this was unpopular, the cap was not reached, so numbers were further reduced to 450 and then 375 for subsequent seasons. Only for the 2020-21 season was the cap of 375 reached, with excess demand, because COVID-19 has impacted employment levels, travel and other leisure activities. However, it has been acknowledged that these are exceptional circumstances, and the limit has largely been accepted without too much resistance.

The current status of the lobster population, which may be related to the decline in seagrass beds locally, has also resulted in a shift in the areas where most of the recreational harvest takes place, with the heaviest recreational catches now coming from the lagoon area where there is no commercial trapping (Fig. 4). It would not have been possible to track this change without the licensing and reporting programme.

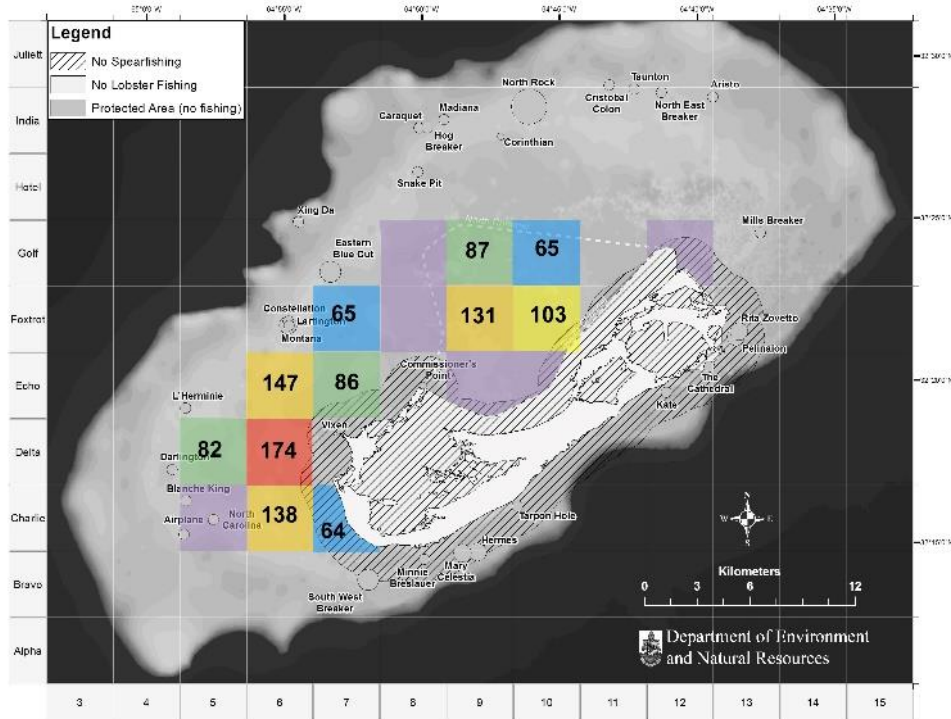
Collaborating more closely with the Lobster Divers' Association has also made it easier for fisheries managers to connect with this sector for research and management purposes. Having the Association as a point of contact has expanded opportunities for biological sampling of lobsters from the recreational sector, including at the annual tournament. Importantly, this has provided access to larger lobsters than are typically harvested by the commercial trap fishery and has facilitated the collection of carapaces to extract ossicles (calcified plates) for an age and growth study because those harvesting lobsters for personal consumption are not bound to the half shell presentation demanded by restaurants. Members of the Lobster Divers' Association have also been active participants in stakeholder working groups that have been convened to assist with the development of marine spatial planning in Bermuda.

These experiences have demonstrated the value in encouraging the formation of stakeholder organisations amongst various groups of marine resource users.

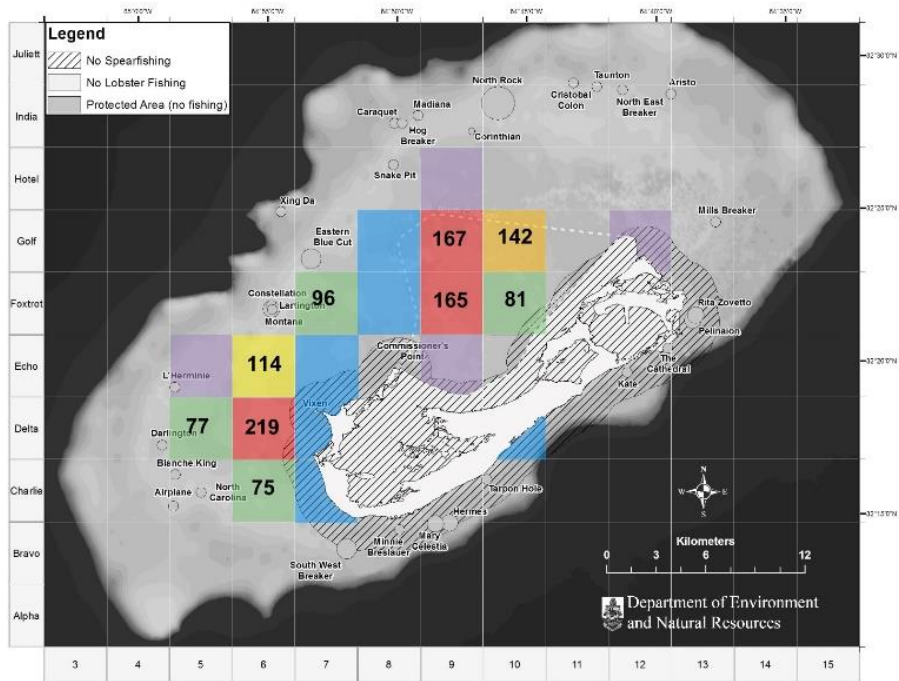


Figure 4. Heat maps showing the distribution of recreational lobster catches around Bermuda in recent seasons, highlighting grid squares where more than 25 lobsters were caught.

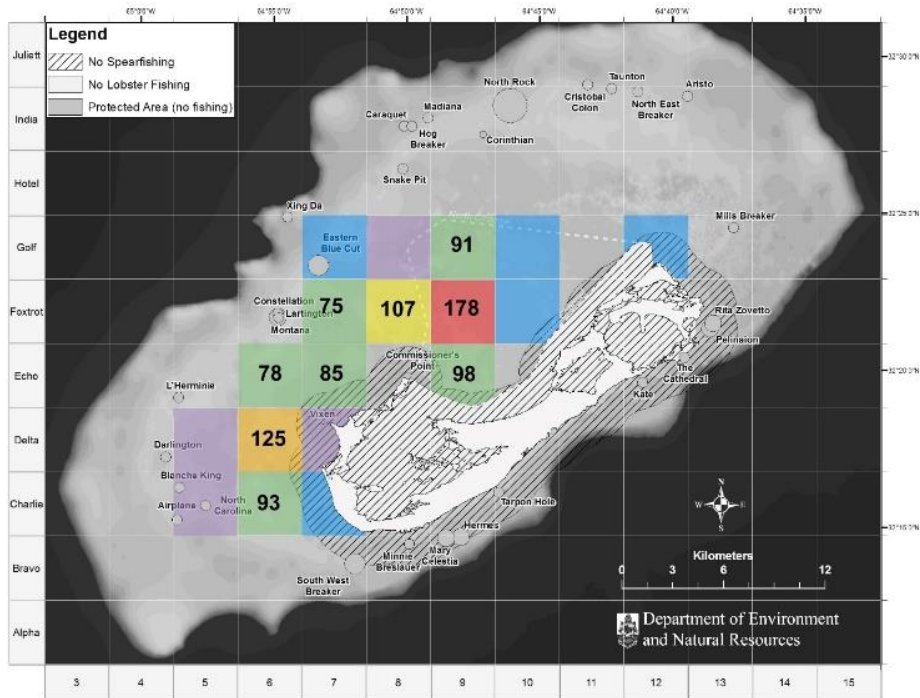
Recreational lobster catches: 2018-19



Recreational lobster catches: 2019-20



### Recreational lobster catches: 2020-21



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***By Joanna Pitt and Tammy Warren,  
Marine Resources Section***

## 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](http://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](mailto: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](http://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 30<sup>th</sup> approaches. Please call 293-5600 or email [fisheries@gov.bm](mailto: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 30<sup>th</sup> of November 2021. The coordinates for these areas can be found at: <https://www.gov.bm/bermudas-no-fishing-areas>

### **Canine Parvovirus Vaccination Clinics**

All owners of unvaccinated dogs, whether legal, illegal, licensed or unlicensed, are urged to bring their dog to be vaccinated. Animal Wardens will not be present at the clinics. Upcoming public vaccination clinics are as follows:

- Sunday September 5<sup>th</sup> : unvaccinated dogs can receive their first shot at the Fairmont Southampton hotel. Follow-up booster offered at the Fairmont Southampton on October 3<sup>rd</sup>.
- Sunday September 19<sup>th</sup> : follow-up boosters will be given at Bull’s Head carpark for dogs who received their first shot at Bull’s Head on August 22<sup>nd</sup>.

Clinics will operate 9:00 am to 1:00pm.



## 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, 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.



**ON HER MAJESTY'S SERVICE**



GOVERNMENT OF BERMUDA  
**Department of Environment and Natural Resources**

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