Envirotalk

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GOVERNMENT OF BERMUDA
Department of Environment and Natural Resources

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

WELCOME

to our autumn edition of Envirotalk.

In this issue –

- Read about the new species recovery plans published over the summer.
- Dr. Jonathan Nisbett explains why the entry requirements for animals and plants differ among countries.
- Dr. Sarah Manuel describes a new project to establish a seagrass sanctuary in the Lagoon at Ireland Island.
- Dr. Geoff Smith provides an update on the air quality issues around BELCO.
- Also see:
    - Our **News & Notices** for reminders and upcoming events.
    - The **Planting Calendar** to get a head start on what to plant this autumn.

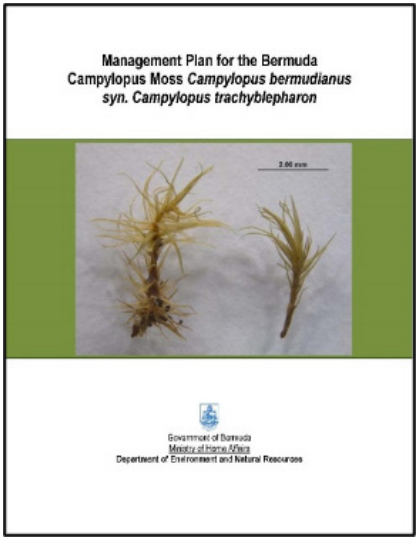
Please contact the Envirotalk mailing list: envirotalk@gov.bm to be placed on the mailing list or for suggestions for future articles.

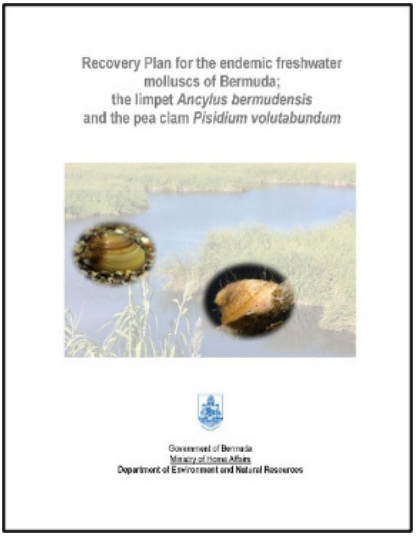
NEW RECOVERY PLANS FOR LITTLE-KNOWN ENDEMIC SPECIES

While all of Bermuda were busy working from home this spring during the COVID-19 shelter-in-place, the Biodiversity Section of the Department of Environment and Natural Resources (DENR) was busy writing a series of recovery and management plans for some of Bermuda's rarest species.

The Bermuda Campylopus Moss *(Campylopus bermudianus)* is listed on the Protected Species Amendment Order 2016 as 'critically endangered'. Recent research indicates that the species of Campylopus found in Bermuda is not in fact an endemic species, but an isolated population of *Campylopus trachyblepharon* which is also found in South America. Locally it is considered endangered because it is only found in one location – Paget Marsh.

Two other little-known endemics are the freshwater limpet *Ferrissia (syn. Ancylus) bermudensis* and the pea clam *Pisidium volutabundum*. Both of these molluscs inhabit freshwater wetlands such as ponds, ditches, canals and marshes; and have only been seen at Pembroke Marsh and Devonshire Marsh. Their populations were reduced by historic draining of wetlands and alteration or loss of habitat; as well as water pollution.





Three more new plans were written for native species. The recovery plan for Bermuda's seahorses covers the Longsnout Seahorse *(Hippocampus reidi)* and the Lined Seahorse *(Hippocampus erectus)*. Both seahorse species are listed as 'vulnerable' on the Protected Species Amendment Order 2016. Their populations have declined locally, probably due to habitat alterations in inshore bays including loss of seagrass. New plans were also written for the native Giant

Land Crab *(Cardisoma guanhumi)* and Land Hermit Crab (*Coenobita clypeatus)*. Additionally, the recovery plan for the two species of endemic killifish, written in 2012, was revised to include new information from recent research and an update on ongoing management activities.

The six new plans, and twelve previously written recovery and management plans can all be read at: https://environment.bm/species-recovery-plans.

The Biodiversity Section, Department of Environment and Natural Resources

WHAT FACTORS CONTRIBUTE TO A COUNTRY'S CONDITIONS OF ENTRY?

When travelling with your pet dog from Bermuda to the USA, you need only a health certificate; to Canada, you need a rabies vaccination certificate or an official 'rabies-free' letter from the Bermuda Government; to the United Kingdom, a rabies vaccination and tapeworm treatment; to South Africa, the dog will be subject to vaccinations and a battery of tests and treatments. As the list of countries grows, so does the variation in required vaccinations, tests and treatments.

Now consider a different species, and the variations in entry requirements continue to grow, perhaps to include outright prohibitions to importation.

So why the differences?

Whenever you move an animal across international borders, the animal must meet the entry requirements prescribed by the importing country (and also the transit requirements of the countries through which the animal will transit). The same is true for any agricultural, horticultural or biological item, and thus includes animal products (i.e. meats, hides, honey, semen, eggs), plants and plant products (i.e. foods, fruits, vegetables, stems, cuttings, leaves, seeds, flowers, wood). Each of these items have the potential to carry bacterial, viral or fungal diseases, or pests in various stages of development. Sometimes the threat is apparent to the naked eye, and other times one will need a microscope or laboratory tests to detect it. Additionally, live items also carry the potential for invasiveness. How a country chooses to deal with these potential threats leads to the differences in the entry requirements.

International Standards

The World Organization for Animal Health (OIE) publishes recommended standards and criteria for the importation of animals, and the Commission on Phytosanitary Measures has adopted International Standards for Phytosanitary Measures for plants. These standards do not seek to have all countries adopt the same entry requirements, but serve as a guide for countries to develop their own legislation and policies given their respective differences in climate, ecologies, pest/disease statuses and economies.

What's in the mix?

Factors which go into identifying risks, evaluating impacts and formulating the entry requirements are found in the answers to a host of questions:

- **What is the form of the commodity?** – Items that have been commercially processed, treated or cooked carry less risk than do items that are living, fresh or raw.
- **What is the purpose of the import?** – Items destined for a slaughterhouse, food processing facility or laboratory would pose a lesser risk than a similar item destined for living freely on a farm or in a garden.
- **Is the pest/disease already present in the recipient country?** – Importation of a pest/disease agent that is already established in the recipient country should have a minimal impact. However, the importing country may still insist on no further imports of infested or infected material as part of its eradication programme, or its desire to avoid a variant of the pest that could require more or stronger pesticides to control. For example, ticks are present, but uncommon, in Bermuda. Ticks may enter Bermuda attached to migratory birds,

and this we cannot control. However, we still mandate that imported domestic animals be treated for ticks, so to minimize the introductions of ticks and tick-borne diseases.

Similarly, our Plant Protection Lab doesn't allow the importation of plants and plant products that are infested with scale or mealybug, even though both pests already exist in Bermuda. Why? Because the scale or mealybug on the imported commodity is not necessarily the same species of scale or mealybug that is already here. A new scale or new mealybug carries the potential for widespread and marked impact on local agriculture and horticulture, and may require new, stronger or larger quantities of pesticide to control.

- **What would be the likely economic, social and environmental impacts of this imported pest/disease?** – This is the huge question. Pests and diseases of plants and food animals cause enormous economic losses, through reduced production, costly treatments or blanket eradications. Disruption in food supply ensues and consumers see higher retail prices.

  Also note that some animal diseases are zoonotic (meaning, it could be shared between humans and animals); so consideration extends beyond animal health to include direct impact on human health and the ramifications thereof.

- **Is the importing country able to mitigate the risks and fall-outs of the pest/disease?** – The importing country may consider what measures could be implemented to minimize the impacts of the new pest/disease, and at what cost.

- **Does the impacted country have the resources (legislation, skilled personnel, equipment, and monies) to survey for the presence of the new pest/disease to control an outbreak?** And what other important matters will be put aside as energies and resources are put into controlling a new threat? – As COVID-19 has demonstrated, the ramifications of a new disease can be extensive and expensive. The same is true for animal and plant diseases. While an animal or plant disease may not shutdown an entire economy, it can certainly close entire industries and disrupt food supplies for extensive periods of time. Depopulating herds or flocks, or destroying hundreds of acres of crops represent enormous losses that threaten the long term sustainability of affected farms and industries.

- **How will the new pest/disease impact exports?** – Once a pest/disease becomes established in a country, its exports will be seen as a potential threat by trading partners. While Bermuda exports few plants and plant products, the Island does export a large number of companion dogs, cats and horses. How these animals are received overseas, and the required tests or treatments will change if we do not diligently guard our borders in terms of the health of our imports. These changes reflect some indirect costs and consequences arising from failing to have effective border control.

Bermuda has a formidable natural barrier to the introduction of pests and diseases by virtue of its isolation in the Atlantic Ocean. However, every imported animal, animal product, plant and plant product carries a risk of bringing a pest, disease agent or potential for invasiveness that will harm the Island. The cedar blight and citrus tristeza virus are clear examples of the negative consequences of these introductions. Canine heartworm disease is a less obvious example. Consider the UK's experience with Foot-and-Mouth Disease, the European and North American experiences with Bovine Spongiform Encephalitis (Mad Cow disease), and the global experiences with avian influenza and African Swine Fever.

Short of barring all importations, we cannot guard against every known risk, however conditions of entry and border inspections attempt to minimize the most prominent risks.

As the US Department of Agriculture and the US Customs and Border Protection rightly preach...

Jonathan Nisbett, DVM
Chief Veterinary Officer

THE LAGOON – A SEAGRASS CONSERVATION PROJECT

The Department of Environment and Natural Resources (DENR) in partnership with the West End Development Corporation (WEDCO), the property owner, have initiated a seagrass conservation project in The Lagoon, Ireland Island.

Anyone swimming or boating around our Island this summer, is likely to have noticed that a lot of the seagrass beds have disappeared, e.g. Admiralty Park, Somerset Long Bay. Where there is seagrass it is very short and no longer providing refuge for juvenile fish, newly settled spiny lobsters and other small animals. This loss of seagrass is likely to negatively impact our commercial fisheries and our coral reefs.

Some of Bermuda's seagrass decline is due to direct human impacts. Shoreline development, dredging, ocean dumping/land creation, concrete and floating docks, boat propellers, anchoring, groundings and moorings have all impacted our inshore seagrass beds over the years. At Bermuda's northern latitude the cooler water temperatures and shorter day lengths in winter limit seagrass growth rates and their ability to recover from any negative impact. More recently green turtle grazing has put unprecedented pressure on these habitats leading to their collapse. The plants struggle to recover from the intensive grazing by the increasing number of juvenile green turtles arriving on the Bermuda Platform. This increase in green turtles is most likely due to conservation successes at nesting beaches to our south.

The link between natural and human causes of seagrass decline is complicated. We have an imbalance in our marine ecosystem where one protected species, the green turtle, is putting grazing pressure on a protected habitat, seagrass beds. Sharks are the natural predator of green turtles. In the northwest Atlantic sharks have been overfished and their scarceness in our waters leads to even the weakest sea turtles surviving. Add this to the human pressures and we can begin to understand the ecosystem imbalance and need for restoration efforts of both seagrass and sharks.

As well as food for green turtles and shelter for juvenile fish and other critters, seagrass beds provide several very important services. The presence of seagrass beds increase the amounts and kinds of food that are available for wildlife. Seagrasses are the basis of a complex food web and are essential for food security to many animals, and humans. Seagrass beds through their filtering processes can reduce coral diseases. They can prevent harmful algal blooms by utilizing nutrients from human pollution and other sources, such as fertilizers, and trapping nutrients in the sediment. Seagrass beds can increase the pH levels of seawater enough to protect adjacent coral reefs from the effects of ocean acidification. They can decrease carbon in the atmosphere by removing carbon dioxide from

seawater and converting it to stored, inactive, organic carbon helping to fight climate change and a byproduct of this process is oxygen. Oxygen is needed by most marine organisms, and without it they cannot survive.

Healthy seagrass in the Lagoon in July, 2017.
(Photo: Annie Glasspool)

Overgrazed seagrass in the Lagoon, September 2020.
(Photo: Sarah Manuel)

The Lagoon, with its mangrove-lined edges, is an ideal area to create a seagrass sanctuary. Both mangroves and seagrass are important nursery habitat for many of our fish species, including some of our commercially important fish, and numerous other organisms. Up until 2017 the Lagoon was full of long seagrass and virtually untouched by turtles. Now the seagrass is so grazed that there are very few shoots remaining.

Aerial photo of the Lagoon at Ireland Island, Sandys.

With only two narrow openings, the bridge on Lagoon Road and a culvert at the northwestern end, the Lagoon was relatively easy to fence off. We are grateful to Crisson Construction for supplying and installing grates over the Lagoon openings that do not restrict water flow or fish movements, but do stop sea turtles from entering the sanctuary. Turtles in the Lagoon were carefully relocated into the Great Sound leaving the Lagoon a turtle-free zone where hopefully the seagrass will recover in time and serve as stock to replenish seagrass habitats around Bermuda.

Seven turtles, in total, were removed from the Lagoon and released in the Great Sound. Five of the seven were underweight, an indication that they are not finding enough food. One of the turtles had a Bermuda Turtle Project (BTP) tag. It was first tagged in 2011 at Cow Ground Flat, then recaptured

by BTP in 2017 at Somerset Long Bay and now in the Lagoon. Normally when juvenile green turtles arrive on the Bermuda Platform they find a seagrass bed and never swim very far from that particular bed. They can stay on their chosen seagrass bed for up to 14 years, and possibly longer (Meylan et al, 2011). It is most likely that this tagged turtle has moved from site to site in search of food.

One of the green turtles removed from the Lagoon. (Photo: Sarah Manuel)

Creating a seagrass sanctuary in the Lagoon offers some hope for the future of seagrass in Bermuda, which in turn benefits a host of marine organisms and ecosystems, as well as us.

Reference

Meylan PA, Meylan AB, Gray JA (2011). The ecology and migrations of sea turtles 8. Tests of the developmental habitat hypothesis. Bull Am Mus Nat Hist 357:1–70

Dr. Sarah Manuel,
Senior Marine Conservation Officer

UPDATE- AIR QUALITY COMPLAINTS IN THE BELCO AREA

The public is aware that there have been numerous complaints directed at the Bermuda Electric Light Company (BELCO) over recent months relating to poor air quality and fallout of soot/ash occurring near to the power station at Serpentine Road, Pembroke. Many of these complaints have coincided with the commissioning and subsequent operation of the four new North Power Station (NPS) engines since February 2020. This article provides an overview of the current issues, remedial actions and monitoring requirements that have been imposed by the statutory board the Environmental Authority, upon advice from the Pollution Control Section of the Department of Environment and Natural Resources (DENR).

With regard to air quality issues, BELCO's activities are regulated under the Clean Air Act 1991. Under this Act, the Environmental Authority issues 'Construction Permits' to build 'Controlled Plants', such as the electrical generators at BELCO, and also approves the 'Operating Licences' to operate such facilities. These permits and licences are approved with conditions that have been recommended by DENR based on local operational policies or on best legislative practice from other developed jurisdictions. BELCO must adhere to the conditions.

Currently BELCO has 21 licenced controlled plants at their Pembroke facility; these includes 16 base-load engines (see table 1 and figure 1), 4 gas turbine engines for system backup, and one oily water treatment plant. From the end of October 2020, the available base-load engines will be reduced from 16 to 8 engines.

Table 1. Description and retirement dates of BELCO base-load engines.

Engine Name	Nameplate Capacity in Mega-Watts (MW)	Fuel Type*	Stack Height	Date due to be Retired	Location Label of Stack/ Chimney on Photo Below
North Power Station (NPS) Engines					
N1, N2, N3, N4	4 x 14 MW	HFO †	214 ft.	+20 years	N1-N4
East Power Station (EPS) Engines					
E5, E6, E7, E8	4 x 14 MW	HFO	180.5 ft.	+10 years	E5-E8
E3, E4	2 x 10.5 MW	HFO	185 ft.	31 Oct 2020	E1-E4
E1, E2	2 x 12.4 MW	HFO	185 ft.	31 Oct 2020	E1-E4
Old Power Station (OPS) Engines					
D3	8 MW	LFO	60 ft.	31 Oct 2020	D3
D8	8 MW	LFO	60 ft.	31 Oct 2020	D8
D10	8 MW	LFO	60 ft.	31 Oct 2020	D10
D14	5.5 MW	LFO	120 ft.	31 Oct 2020	D14

* Fuel type: HFO: Heavy Fuel Oil (<2% sulphur); LFO: Light Fuel Oil (i.e. road diesel <0.5% sulphur).

† NPS engines are dual fuel and can be configured for either HFO or Natural Gas. Note the Integrated Resource Plan (IRP), created by the Regulatory Authority, did not include Liquefied Natural Gas (LNG) as a future energy infrastructure option for Bermuda.

Figure 1. Aerial view of the BELCO power plant from Mount Hill showing all base load engine stacks.

Excessive smoke during NPS commissioning: Complaints were received concerning air quality and visible smoke when the general contractor was commissioning the NPS engines. The commissioning protocols required the new engines to operate at 100% capacity while other supporting engines were operated at a fraction of their normal load. Engines operated well below their stated nameplate maximum load will lead to inefficient combustion of the fuel and increased exhaust smoke.

As a result of the complaints, the Environmental Authority instructed BELCO to ensure without delay that all engines are operated at 80% or above of their nameplate load during the rest of the commissioning phase, as would be normal practise outside of commissioning protocols.

Apparent downdrafting impacting air quality: Since commissioning of the NPS engines, complaints about poor air quality by residents located on the north facing side of Langton Hill (i.e. Ocean Lane and Whitney Avenue) generally coincided with periods when the wind was from the south-southwest (SSW). An association of odours consistent with engine exhaust on the north side of Langton Hill and winds from the SSW has also been witnessed by personnel and from DENR.

However, during this same period, the air quality that is directly measured at the nearby monitoring station located at the top of Langton Hill (i.e. BDA#2), has shown that at this location the air quality is within the standards of the Clean Air Regulations 1993. The fact that these exhaust emissions are present down the back of Langton Hill suggests that the wind direction (SSW) and

topography are causing the exhaust fumes to downdraft and to bring any entrained exhaust emissions towards the ground surface between the north side of Langton Hill and North Shore.

Air flow modelling of emissions from the proposed NPS was carried out during the design of the new power station, but the downdrafting phenomenon was not apparent. However, recent re-modelling of the area using the latest meteorological and topographical data has confirmed the potential for downdrafting to occur, though the expected concentrations at ground level were still predicted by the model to be within the limits provided in the regulations.

Based on DENR's investigations, the Environmental Authority instructed BELCO to complete a number of actions, including:

i. **Air Quality Monitoring.** Purchase, calibrate and operate a state-of-the-art portable trailer-mounted sensor system that could be deployed to the area where this apparent downdrafting is occurring. Delivery of this air monitoring system was delayed by complications arising from the COVID-19 virus, but it arrived in Bermuda on 1st Sept 2020 and is due to be deployed to Ocean Lane during the 3rd week in September after setup and calibration. The data from the monitoring station will be used to determine whether the air quality is compliant with the Clean Air Regulations 1993. It is to be borne in mind that results can only be collected during times when the wind is blowing from the SSW.

ii. **Water Quality.** To measure the water quality in water tanks from the various roof catchments and compare with suitable drinking water quality standards. It is noted that previous water tank monitoring studies (carried out by DENR/BIOS) have shown that pollutants associated with a range of combustion sources (e.g. diesel and gasoline powered road vehicles, BELCO, Tynes Bay Waste to Energy Facility) meet the drinking water quality standards.

    The Environmental Authority's water tank monitoring requirement has since been extended by DENR from the Langton Hill area to include the residents located much closer to BELCO as a result of the recent soot emissions (discussed below). Water quality samples were collected on the 27th August 2020 by a third party, Bermuda Institute of Ocean Sciences (BIOS), and were sent following strict sample handling protocols to state-of-the-art analytical laboratories located in Canada. The pollutants being analysed in the water tanks include those associated with combustion sources: Poly-Aromatic Hydrocarbons (PAH's), dioxins and furans, heavy metals; and other pollutants not associated with soot or engine stack emissions (i.e. pesticides, faecal bacteria, chloride and nitrates).

Furthermore, BELCO will use BIOS and Renew Ltd. to collect sediments from the water tanks for analysis of the concentration of the combustion-related pollutants. Analysis of the sediment will enable identification of chemical signatures that can be used to determine the likely source of the pollutants. The laboratory results will be collated and analysed by experts in Government (DENR and the Department of Health) before being presented to the public. Previous chemical analysis of tank water, tank water sediment and other samples by DENR and BIOS identified a road vehicle chemical signature in the majority of water tank sediments across Bermuda.

iii. Investigate whether a BELCO stack is contributing to the poor air quality via downdrafting.

BELCO took an opportunity in June 2020 to help identify the particular engine stack that was the cause of the verified complaints down the back of Langton Hill. BELCO turned off the four new NPS engines for 10-days while continuing to operate E5-E8 EPS engines. As air quality complaints continued during this time, it can be concluded that the NPS engines are not the sole cause for poor air quality in the area. It is therefore possible that the EPS engines E5-E8 were contributing to complaints of poor air quality, but further work is required to confirm this.

It is not known why the complaints have increased significantly since February 2020, considering these EPS engines were installed in 2000/2005. One theory is that with only 1 or 2 of the EPS E5-E8 engines in operation, the exhaust plume is cooler and is not getting as lofted as before when, typically, 3 or all 4 engines would have been in operation. Consequently, during periods of SSW winds, the entrained stack emissions are not sufficiently elevated in the atmosphere to avoid downdrafting air currents at Langton Hill. Figure 2 provides visual evidence that this theory may be correct: note in the picture how the stack emissions from the 4 NPS engines are lofted straight upwards into the atmosphere, whereas the emissions from the single engine operating at the EPS are "bent" over by the wind. Compared with the NPS emissions, the EPS emissions will reach lower heights in the atmosphere and be prone to downdrafting. Further investigation and air quality measurement will be required to confirm the theory above and to determine if pollutants are present in higher concentrations than the air quality standards allow. Data from the new monitoring station at Ocean Lane collected in September will be invaluable in this regard.

Figure 2. Photograph of the exhaust plumes from the four new NPS (N1-N4) engines compared to one engine operating from the EPS (E5-E8). One theory is that the exhaust from fewer engines may not get as lofted vertically (i.e. EPS) compared to when all four engines are operating in a stack (i.e. NPS) thereby leading to an apparent topographical downdrafting effect over Langton Hill.

iv. BELCO Mitigation. BELCO has complied with directions from the Environmental Authority by ensuring engines are operated at no less than 80% capacity and, when there is a complaint, by providing DENR with the appropriate data, including engine loads, stack opacity data and monitoring data from the stations located on the top of Langton Hill and Cemetery lane. Further directions from the Environmental Authority will be provided as required when the results of the air quality and water quality testing have been analysed by DENR and the Department of Health.

v. **Monthly Progress Reports.** BELCO was instructed to generate monthly progress reports on the above actions and DENR will distribute these to the affected residents to keep them informed. The June and July 2020 reports have been provided to date. If you live in an area that is impacted by BELCO and wish to be kept informed please email your name, address, type and frequency of complaint to PollutionControl@gov.bm.

Soot Emissions from the New NPS Engines. In addition to the above air quality issues, soot particles from the new NPS engine stack have also been falling periodically onto many properties located close to BELCO. A major incident occurred in June after the NPS engines had been shutdown for 10-days, as detailed in (iii) above. Upon startup of the NPS engines, soot was ejected from the stack and onto many nearby properties which is evident by black soot particles, followed a few days later by orange stains that appear to be iron-rust emanating from the soot particles. DENR has instructed BELCO to perform a specific test to determine what pollutants could leach (i.e. wash) out of the soot by water (i.e. rain water). It is further noted that BELCO is working with the NPS engine manufacturer to address the excessive soot emissions that have been occurring. The Environmental Authority will soon instruct BELCO on how these soot emissions are to be addressed going forward.

NPS Engine Noise. It is important to note that as part of the construction permit approval process for the new NPS engines, the Environmental Authority conditioned BELCO to meet the British Standard BS4142:2014 for rating and assessing industrial and commercial sound with respect to residential settings. Based on background noise levels in the community before the NPS engines were operated, BELCO, and subsequently their general contractor, were set maximum noise thresholds which they were not permitted to exceed. DENR can report that the subsequent noise assessment undertaken when all four NPS engines were operating, demonstrated that the new engines with elevated cooling fans, turbo-chargers, exhaust ductwork, etc. were measured typically 2 decibels (dBA) below the maximum permitted threshold. This achievement is significant and should result in fewer noise and vibration complaints from neighbours. This process reflects how setting conditions in the permits and licences by the Environmental Authority can help to improve the environment for the public.

It is clear that BELCO has some significant operational and environmental issues to address as a direct or indirect result of the new NPS engines. DENR (the regulator), the Environmental Authority and the Department of Health are also being challenged to ensure the air we breathe and the water we drink is safe, even during the events discussed above. Once we have the answers to these questions in addition to the monitoring data discussed, the regulator will be able to provide clear instruction to BELCO to ensure that the public's air and water are of an acceptable standard.

Dr. Geoff Smith,
Environmental Engineer, DENR - Pollution Control Section

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, 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.

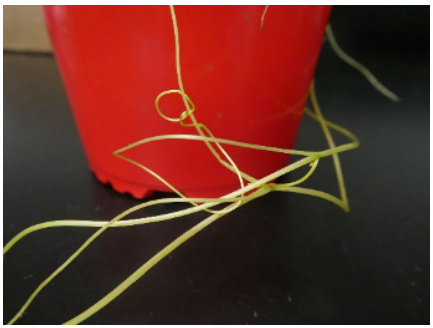
Look Out For Land Crabs

The Department of Environment and Natural Resources (DENR) and Bermuda Aquarium Museum and Zoo (BAMZ) have recently received several calls from members of the public who have encountered Blue or Giant Land Crabs (Cardisoma guanhumi). Giant Land Crabs migrate to the sea to breed and release their eggs in the summer months, then return to their own burrow and territory. If the crab is not trapped, injured or otherwise in danger; please leave it alone to make its journey. Giant Land Crabs are protected by law under the Protected Species Act 2003, so please enjoy them from a distance and do not harm them. If you see a

Giant Land Crab, please let us know by emailing environment@gov.bm. If you encounter a crab that is in immediate danger, you can contact BAMZ and DENR at 293-2727 for help.

Dodder

The DENR is tracking an outbreak of Dodder – a parasitic plant that poses a serious threat to Bermuda's plant life. If you have recently purchased plants, particularly basil seedlings or seeds, please check them for Dodder. Dodder is a leafless plant, with yellowish or lime green tendrils. If you suspect you have Dodder do not remove it or move it around. Immediately report it by emailing plants@gov.bm or calling 239-2322 and an officer will visit to remove it.



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.

ON HER MAJESTY'S SERVICE

GOVERNMENT OF BERMUDA
Department of Environment and Natural Resources

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