Envirotalk

GOVERNMENT OF BERMUDA
Ministry of Environment, Planning and Infrastructure Strategy

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PROMOTING APPRECIATION, ENHANCEMENT AND CONSERVATION OF BERMUDA'S ENVIRONMENT

WELCOME

To our spring edition of Envirotalk. In this issue –

- We have an important notice from the Envirotalk Team which will affect all our print subscribers.
- **Dr. Tammy Trott**, Senior Marine Resources Officer, talks us through plans for the management and monitoring of recreational fishing in Bermuda.
- **Alison Green**, Librarian at the Department of Environmental Protection and Bermuda Aquarium, Museum and Zoo, introduces the new library OPAC (On-line Public Access Catalogue) for library users, which is part of a broader library automation system.
- Calling all budding Environment M.Sc. students! **Alison Copeland**, Biodiversity Action Plan Coordinator, reports on a scholarship being offered to Overseas Territories students.
- **Kimberly Burch**, Technical Assistant in the Plant Protection Laboratory, gives us an over view of the history of Citrus Tristeza Virus and explains what's involved in grafting citrus trees.
- Staying with the citrus theme we have a wonderful recipe for Bermuda citrus salad with avocado.
- As usual, we have our popular Spring planting calendar.
- See page 10 for details of the upcoming Annual Exhibition

Please contact:

Caroldey Douglas (Tel: 239-2307 or e-mail: cdouglas@gov.bm) with ideas for future articles.

Kim Burch (Tel: 239-2322 or e-mail: kmburch@gov.bm) to be added to the subscriber list.

IMPORTANT NOTICE FROM THE ENVIROTALK TEAM

As we strive to become increasingly environmentally friendly and cut costs, we have decided to publish Envirotalk ONLY as an electronic publication.

Envirotalk will no longer be available in hard copy format. This is the last issue to be printed. Please e-mail agreen@gov.bm or write to Alison Green, Librarian, Department of Environmental Protection, P.O. Box HM 834, Hamilton, HM CX and provide e-mail details if you would like to continue your subscription electronically.

We do realize that this may be inconvenient to many of our subscribers and we urge subscribers in libraries, schools etc. to print-off copies for distribution.

We welcome any feedback our valued readers may have with regards to this initiative which is being implemented on a trial basis initially.

Thank you in advance for your understanding and we apologize to our many subscribers who have been receiving the publication in the hard copy format.

Alison Green
Librarian

MANAGING RECREATIONAL FISHING IN BERMUDA

Living on a small island surrounded by water, it is not surprising that Bermuda's residents use the ocean for a variety of recreational activities, including fishing. Many people discover that the sea provides opportunities for relaxation and spending time with family and friends, along with a sense of space not available on land. In fact, the results of a survey[1] conducted by the Department of Conservation Services in 2008 as part of an economic valuation of Bermuda's reefs suggest that a large proportion of recreational fishers fish primarily for leisure and to strengthen bonds with family and friends, rather than for

A local fisherman's wahoo catch. Photo courtesy of Brian Luckhurst

food. It is perhaps because of this that some individuals conclude that recreational fishers do not have much of an impact on marine resources. However, studies conducted in other places show that, while the majority of people fishing for recreation do relatively little fishing and occasionally take home a few fish, a small minority can be responsible for catching a considerable amount. For some species in some places, recreational fish catches have been found to equal or exceed those of commercial catches.

Little is known about the number of people that fish recreationally in Bermuda or the quantity of fish that they catch. However, data collected during the 2008 survey suggest that as many as 16,000 people in Bermuda fish on a recreational basis, and that total annual recreational fishery landings are close to two-thirds of the annual commercial fishery landings. This implies that the collective impact of recreational fishing on Bermuda's marine resources is quite high. Therefore, the Department of Environmental Protection's Marine Resources Section has made it a top priority to gather more data from the recreational fishery sector.

Boats. Photo courtesy of Brian Luckhurst

Gathering data to assess the effect of recreational fishing on marine resources is important for both the reef fisheries and the offshore (pelagic) fisheries. Bermuda is an isolated island and research has shown that our coral reef fish populations must largely sustain themselves, with only occasional inputs of new individuals from elsewhere. This means that if these populations are overfished and cannot produce enough juveniles to maintain themselves, their recovery would most likely be very slow, and some species might not recover at all. Careful management is therefore necessary to prevent overfishing. On the other hand, pelagic fish species, such as tunas and billfish, cannot be managed on a local level as these species migrate throughout the Atlantic Ocean, only stopping off in Bermuda waters for a portion of the year. Tunas and related species in

the Atlantic Ocean are managed by the International Commission for the Conservation of Atlantic Tunas (ICCAT). Bermuda has an obligation to report catches of these highly migratory species to ICCAT to aid in their management. Therefore, it is very important that information on harvested marine resources in Bermuda is obtained from recreational fishers as well as the commercial sector to facilitate proper management of both reef and pelagic fish stocks.

To build on the data collected in 2008, the Marine Resources Section is planning to conduct a comprehensive recreational fishing survey this summer (2011). Interviews will be conducted with people fishing from shore and on the water to gather information about fishing habits (how often, when and where they fish), the fish species targeted and catch levels. Questions to ascertain attitudes towards a licensing scheme, or alternative data gathering scheme, and towards various regulations, such as bag limits, will also be asked. Other elements of the survey could include mail surveys and telephone surveys. In addition, voluntary logbooks are currently available at the Department's Botanical Gardens or Coney Island offices for those who wish to assist in data collection by keeping a record of their catch for the whole year. These logbooks will be collected by Marine Resources staff in early 2012 to copy the data and then the books will be returned if they are not full.

It is expected that a programme for the ongoing reporting of catch from the recreational fishery will be developed based on the information and feedback received from the survey.

News Flash: New Fisheries Regulations Are Now in Force

All fishers (recreational and commercial) are now required to land regulated reef species whole (i.e., lane snapper, yellowtail snapper, red hind, hogfish, monkey rockfish and black grouper). All other fish species must be landed with the skin on for identification purposes.

New minimum size restrictions are now in place for black grouper – 95cm and hogfish – 45cm.

Recreational fishermen are now restricted to the use of cast nets no larger than 8 feet in diameter for catching bait.

Fines for infractions against the Regulations have been increased to $25,000.

Spearfishers will be required to obtain a licence for this sport from 1 September 2011. There will be an option for a combined spearfishing/lobster diver licence.

[1]Samia Sarkis, Pieter J. H. van Beukering and Emily McKenzie (eds.), *Total Economic Value of Bermuda's Coral Reefs: Valuation of Ecosystem Services*, Department of Conservation Services, Government of Bermuda, 2010

Dr. Tammy Trott
Senior Marine Resources Officer

LIBRARIES GO ONLINE

The Department of Environmental Protection Library's collection of books, reports, magazines and journals focuses on environmental sciences, horticulture, agriculture, fisheries and conservation as well as more recent areas of interest such as sustainable development, alternative technologies and feral animals.

The **Bermuda Aquarium, Museum & Zoo** Library's core collection focuses on Bermuda's natural history, terrestrial and marine, but also focuses on zoo animal husbandry and island ecology, as well as some of the broader environmental issues affecting our world. Subjects such as biodiversity, global warming and invasive species have all become areas of interest during the last few years, and we have been building our resources of relevant materials on these subjects.

In an attempt to make our libraries at the Department of Environmental Protection and Bermuda Aquarium, Museum and Zoo more accessible we have implemented a new library automation system. This is a joint inter-ministry venture which provides patrons with web-based access to our OPAC (on-line public access catalogue).

The newly implemented system brings a fully searchable web-based OPAC to library patrons and provides library staff with a fully automated cataloguing, circulation, serials and acquisitions system. The new system was implemented in July 2010 and library staff having been working hard to input the library collection records.

Library patrons can now access the OPAC from any computer with internet access. From the OPAC, patrons can browse our collections and download many electronic resources straight to their desktop or decide to visit the library to view hard copies.

The automation of both libraries is a work in progress and we are working towards having our whole collection available. Resources that will be available through the OPAC will not only include our print collection, but will also make available other media housed in the libraries including

electronic resources, our video/DVD collection and photographic catalogues. Making our Bermuda and rare books collections available has been our first priority and these are now fully searchable on the OPAC. We hope patrons find this new resource a useful educational tool.

The libraries OPAC can be accessed in various ways. There is a link to the OPAC on the Bermuda Government website (www.gov.bm), in the Department of Environmental Protection portal, on the library page. There is also a link to the OPAC from the Department of Conservation Services website (www.conservation.bm) and the Bermuda National Library website (www.bnl.bm) in their web links section. The URL for the OPAC is http://69.63.217.25/B95017Staff/OPAC/index.asp.

Please contact Alison Green with any enquiries relating to the OPAC and its contents.

Alison Green
Librarian
Department of Environmental Protection/Bermuda Aquarium Museum and Zoo
E-mail: agreen@gov.bm • Tel: 299-2329, Ext. 2125 and 239-2310.

ARE YOU INTERESTED IN STUDYING FOR A ONE-YEAR TAUGHT ENVIRONMENTAL M.SC. AT THE UNIVERSITY OF READING, UK COMMENCING OCTOBER 2011?

The Joint Nature Conservation Committee (JNCC) has made a contribution to a scholarship to enable a student from one of the Overseas Territories (OTs) to study an environmental Master of Science at the University of Reading. The scholarship will be administered by the United Kingdom Overseas Territories Association (UKOTA) which was established in 1993 to promote the interests of the United Kingdom Overseas Territories and co-operation between them.

As part of the scholarship, the student's tuition fees will be paid, travel to and from the Territory and monthly allowances to cover accommodation and living expenses. For more details on allowances please see the UKOTA website (www.ukota.org) or contact Mrs. Kedell Worboys, Chair of the UKOTA Environment Working Group via email: shgukrep@sthelenagov.com or Tel: +44 (0) 207 031 0314 Fax: +44 (0) 207 031 0315

Students must be sure they are studying an approved course and meet the University entry requirements for their chosen course before applying. The scholarship award will be dependent on the offer of a place from the University. Application information and a list of approved courses can be found at: http://www.conservation.bm/bsap-news-updates/2011/3/2/

ukota-scholarship-for-environmental-msc-at-the-university-of.html

The application deadline is 15 April 2011.

Alison Copeland
Biodiversity Action Plan Coordinator, Department of Conservation Services

HISTORY OF CITRUS TRISTEZA VIRUS IN BERMUDA AND GRAFTING CITRUS TREES

As agriculture is steadily declining with the loss of agricultural space, many Bermudians are looking to growing their own food with the interest in providing themselves with a more sustainable lifestyle. That being said, fruit and vegetable culture has recently become a leading interest among Bermudian families. Most of us do, however, remember a time when fruit, particularly citrus, was abundant throughout many orchards on the island. Though with the accidental introduction of a plant virus this caused the lost of many valuable fruit trees.

Variegated sweet orange graft (five months old). Photo courtesy of Kimberly Burch.

Citrus Tristeza Virus (CTV) is noted to be one of the most economically damaging diseases facing commercial citrus production. Widely distributed, through aphid vectors (primarily *Toxoptera citricida*) and the grafting of infected material, it is thought to have originated in Asia. CTV varies in pathology, due to its vectors, which cause differentiating degrees of infection resulting in a range of symptoms which can occur throughout the same host group. Symptoms may include: stunting, leaf cupping, vein clearing, chlorosis, stem pitting, reduced fruit size and the general decline of the infected tree.[1]

In 1979, a survey was done to test for CTV and up until 1992 the virus was not known to occur in Bermuda. However, in 1992 the Plant Protection Service, under the directive of Terry Lynn Thompson (Plant Protection Officer), conducted a survey of the declining citrus trees throughout

Bermuda. From the 113 sites sampled, 23 of those, tested positive for CTV. In the resulting tests, 94% of the trees in the positive sites were shown to be infected with the virus. This indicated that if one tree in the orchard tested positive then there was a high probability that the other trees were infected with the virus also.[2]

After this survey was conducted there was a mass removal of declining citrus trees and the Citrus Budwood Registration and Certification Programme was established by the Department of Environmental Protection (previously Agriculture and Fisheries). Using virus-free stock the department assisted in the grafting of various citrus tree varieties and distributed them to the public. Although the department no longer provides this service, it does however provide virus-free citrus seeds, for root stock, and certified virus-free budwood. If any individuals are interested in grafting their own citrus tree they can request seed and budwood from this department. The importation of citrus stock is restricted and it may only be imported by the Plant Protection Service so as to prevent the spread of pests and diseases of citrus.

If you are interested in grafting it is not as intimidating as it looks. However, if you do not wish to graft yourself you can purchase a tree from farmers, landscape gardeners and plant nurseries. There are a number of ways to graft but the one that many find easiest is budding. Budding is a grafting technique where you remove the bud from your preferred stock and transfer it onto your root stock. Root stock is identified as the stock which has the preferred qualities of pest and disease resistance but not the fruit quality desired of the more popular varieties. The most popular rootstock used in Bermuda is Brazilian Sour Orange and (Schaub) Rough Lemon.

To ensure that any graft you produce does take, you must properly prepare the root stock. For budding, it is best to have rootstock which is not too old, large or small. The rule of thumb is the rootstock should be no thicker than your thumb and no thinner than a standard size pencil. Root stock must be watered every day two weeks prior to grafting, so that the bark slips, easily revealing the inner cambium layer. Once the root stock is prepared, cut a T into the site of incision and take a stick of budwood and remove a bud. To do this, make a horizontal cut above the bud (about ¼ through the stick), then holding the knife away from you turn the stick around and cut the bud from the stick at the bottom of the bud. Make sure there is cambium on the back of the bud and insert it into the rootstock incision. Ensure the fit is snug as the cambium layers must touch, then wrap the bud tightly with grafting tape.

After your new graft is wrapped, place it in indirect sunlight and keep the soil moist. Make sure the area is sheltered from the wind as this will cause your graft to dry out. After 3–4 weeks new growth should be seen emerging from the bud (at this time you can also unwrap the bud as the cambium layer should have callused over), if you do not see this but your bud is still green don't fret, just continue to care for it and wait for new growth. If all goes accordingly, you should have a citrus tree of your choosing growing fruit in the next two years.

[1]Cambra, "Mariano, Protocol for the Diagnosis of Quarantine Organism – Citrus Tristeza Virus", <http://www.fera.defra.gov.uk/plants/plantHealth/pestsDiseases/documents/protocols/ctv.pdf>, 24 Feb. 2011.

[2]Thompson, Terry Lyn, "Citrus Tristeza Virus and Psorosis", *Monthly Bulletin*, Department of Agriculture and Fisheries and Parks, Sept. 1992, Vol.63, No.9, pp. 69 -71

Kimberly Burch
Technical Assistant, Plant Protection Laboratory

IN THE KITCHEN

BERMUDA CITRUS SALAD WITH AVOCADO

Bermuda produces excellent navel oranges, seedless grapefruit and delicious avocado pears.

Ingredients:

½ head of lettuce
1 grapefruit
2 oranges
1 avocado pear
1 small onion (sliced to form rings)

Method:

Cut grapefruit and oranges into sections. Cut on either side of dividing membranes. Reserve the juice produced by this procedure. Cut avocado in slices and dip into reserved juice. This prevents avocado from becoming discoloured.

Line a salad bowl with the lettuce leaves. Add grapefruit and orange sections.

Add avocado pear slices. Garnish with onion rings.

Dressing for salad:
¾ cup salad oil
¼ cup vinegar
½ tsp. dry mustard
1 tsp. salt
1 tbs. sugar
¼ tsp. paprika
Shake ingredients in a covered container and serve over salad.

Many thanks to Cecille C. Snaith-Simmons for kindly allowing us to use her recipe from *The Bermuda Cook Book* which is available in bookshops.

PLANTING CALENDAR – WHAT TO PLANT IN SPRING...

Vegetables

March
Beans, Beets, Broccoli, Cabbage, Carrots, Cassava, Cauliflower, Chard, Christophine, Collards, Corn, Cucumber, Eggplant, Kale, Leeks, Lettuce, Muskmelon (Cantaloupe), Mustard Greens, Okra, Pepper, Potatoes, Pumpkin, Radish, Rutabaga, Squash, Sweet Potato, Spinach, Tomato, Turnip, Watermelon.

April
Beans, Beets, Broccoli, Cabbage, Carrots, Cauliflower, Chard, Christophine, Collards, Corn, Cucumber, Eggplant, Kale, Muskmelon (Cantaloupe), Okra, Pepper, Pumpkin, Radish, Rutabaga, Spinach, Squash, Sweet Potato, Tomato, Turnip, Watermelon.

May
Beans, Cucumber, Okra, Pumpkin, Radish, Squash, Sweet Potato, Tomato.

Flowers

March/April
Acrolinium, Ageratum, Alyssum, Antirrhinum, Aster, Aubrieta, Baby Blue Eyes, Bachelor's Buttons, Bird's Eyes, Blanket Flower, Begonia, Bells of Ireland, Calendula, Candytuft, Carnation, Centaurea, Chrysanthemuim, Cineraria, Coreopsis, Dahlia, African Daisy, Dianthus, Forget-Me-Not, Geranium, Gerbera, Globe Amaranth, Globe Gilia, Godeita, Gypsophila, Hollyhock, Impatiens, Larkspur, Lathyrus, Marigold (African), Marigold (French), Nasturtium, Nicotiana, Pansy, Petunia, Phlox, Phlox (Annual),

Red Tassel Flower, Rose Everlasting, Rudbeckia, Salipiglossis, Salvia, Scabiosa, Statice, Snow-On-The-Mountain, Spider Flower (Cleome), Star-Of-The-Veldt, Stock, Sweet Pea, Sweet William, Verbena and Viola.

May
Amaranthus, Balsam, Calendula, Celosia, Coreopsis, Cosmos, Gaillardia, Gazania, Globe Amaranth, Hollyhock, Marigold, Portulaca, Rudbeckia, Vinca and Zinnia.

BERMUDA ANNUAL EXHIBITION

Thursday, Friday and Saturday – 14, 15 and 16 April 2011.

Open Daily:

Grounds: 8.00 a.m. to 6.00 p.m.

Exhibition houses: 9.00 a.m. to 6.00 p.m.

Admission: Adults: $10.00 Children under 16 years: $5.00

Senior Citizens presenting identifications: $5.00

We invite the community to participate in this wonderful event. It is our mission to enlighten students about Bermudian traditions in agriculture, horticulture and animal husbandry.

The theme of this year's annual exhibition is Living Green.

For more details please contact
The Annual Exhibition Office
P.O. Box HM 20, Hamilton HM AX
Botanical Gardens, 169 South Road,
Paget, DV04
Telephone: 236-5902 ext. 2351 Email:
exhibition@logic.bm

ON HER MAJESTY'S SERVICE

GOVERNMENT OF BERMUDA

Ministry of Environment, Planning and Infrastructure Strategy

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