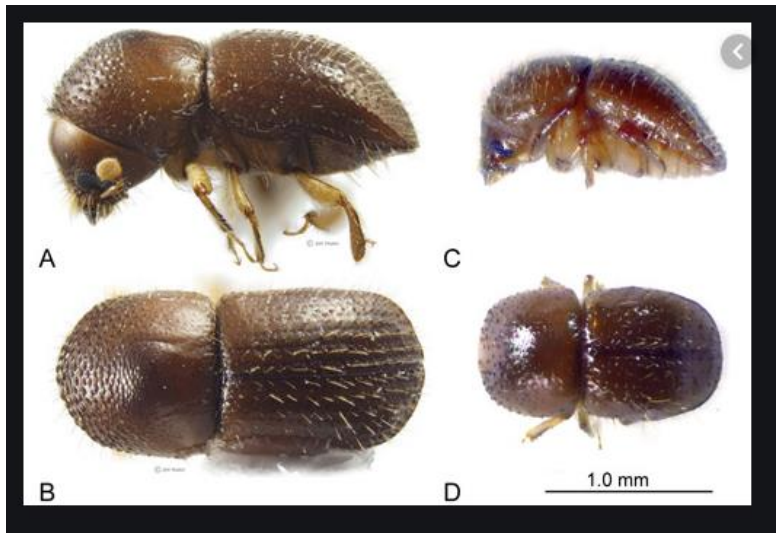
# Polyphagous Shot Borer Beetle (PSHB), its impact on Kensington trees

Presentation by Fleur Honeywill – a resident - to KRRA

Wednesday 6 November 2019

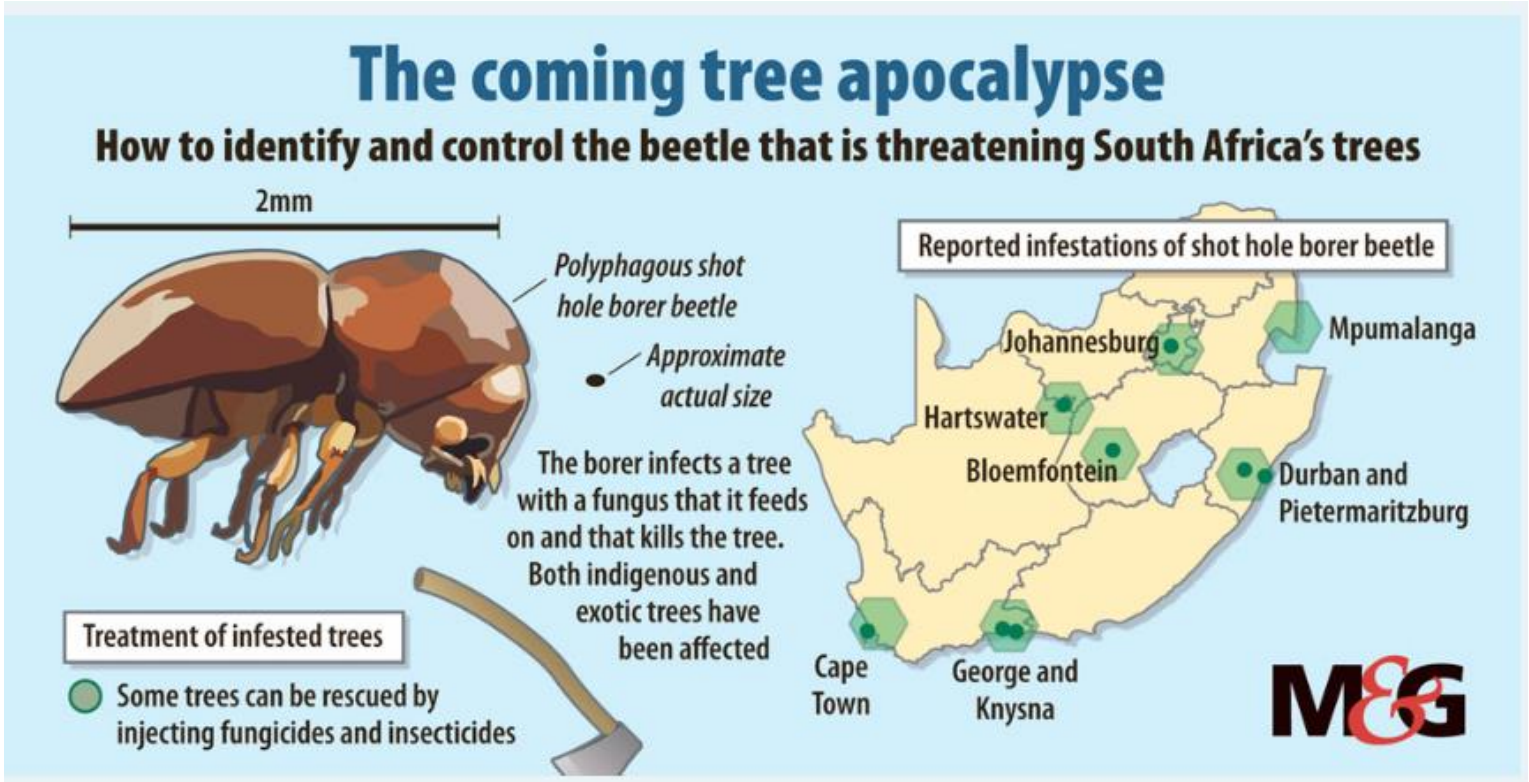



# What is the PSHB Beetle?

- It's a tiny wood borer beetle that is found in Asia, an invasive species with no natural predator.
- The beetle bores tunnels into the tree trunks where it spreads the fungus *Fusarium euwallaceae,* which effectively cuts off the tree's vascular system causing them to die.
- It's an ambrosia beetle, which means it carries a fungus which it feeds to its babies. When it introduces that fungus into trees that have never experienced it before, it threatens the tree with illness or death.
- No one truly knows how the beetle made its way to South Africa, probably through a port.
- Source: Professor Marcus Byrne – Wits University

# How far has PSHB Beetle spread in RSA?

- The beetle has spread across Gauteng to those suburbs with plentiful trees.
- PSHB infestations have been recorded in Mpumalanga among the fruit trees.
- PSHB infestations in Cape Town, George & Knysna, Durban & Pietermaritzburg, Bloemfontein.
- Residents have grouped together to take action and Universities, arborists, researchers & activists have joined forces. Sometimes municipalities are involved.



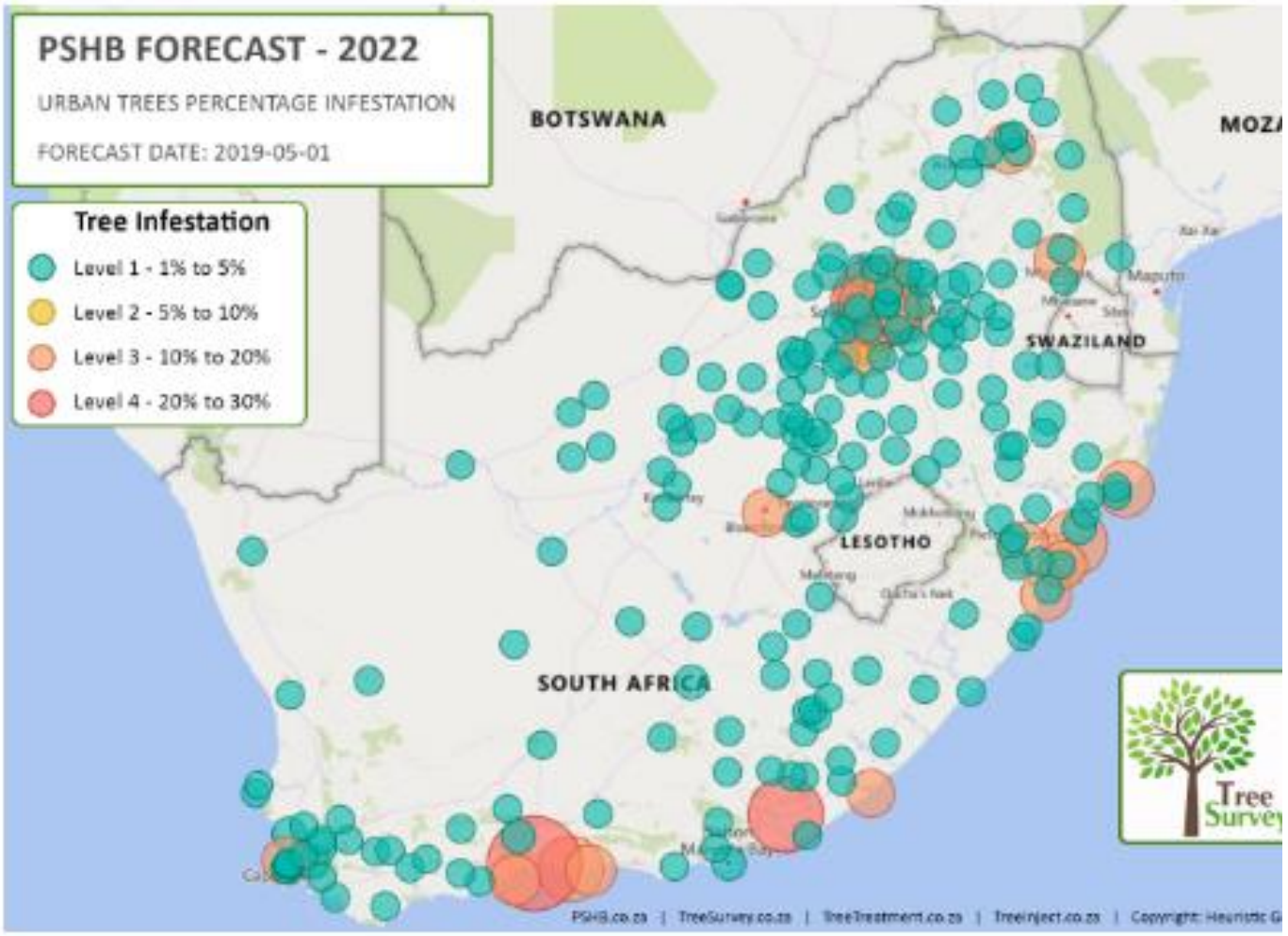

# Signs of infestation

- English Oak trees on pavements and in several tree species in Rhodes Park have been infested.
- Some residents have noticed signs of infestation on trees in their gardens.
- Many English Oaks along many of the roads of Kensington have been infested, some have already died, and some are in the process of dying.
- Box Elders, English Oaks, London Plane trees in Rhodes park have been infested.
- English Oaks along main roads such as Roberts Ave and Kitchener have been logged with Tree Survey.
- Kensington has been recognized as an area of infestation, but this is only the start of a process.


# Pictures of infestation – different trees show different signs so expert input is required

- The tree starts dying at the top of the leaf canopy and this can be seen by wilting & dead leaves. This is a sign that the top branches are not getting nutrients.
- Although the effect of the entry of the PSHB into the bark of the tree may differ according to the tree species, there are clear signs of entry and reaction to the entry.
- The trees in Kensington are old and some may already be affected by diseases such as Dutch Elm Disease and bark diseases, as well as naturally occurring wood termites.
- The advanced age of exotic trees in Kensington make them vulnerable to PSHB.
- Trees have a natural lifespan and ours are nearing their end. In the next 5 years many will die.

PSHB Beetle forecast 2022 based on current research – supplied by Tree Survey



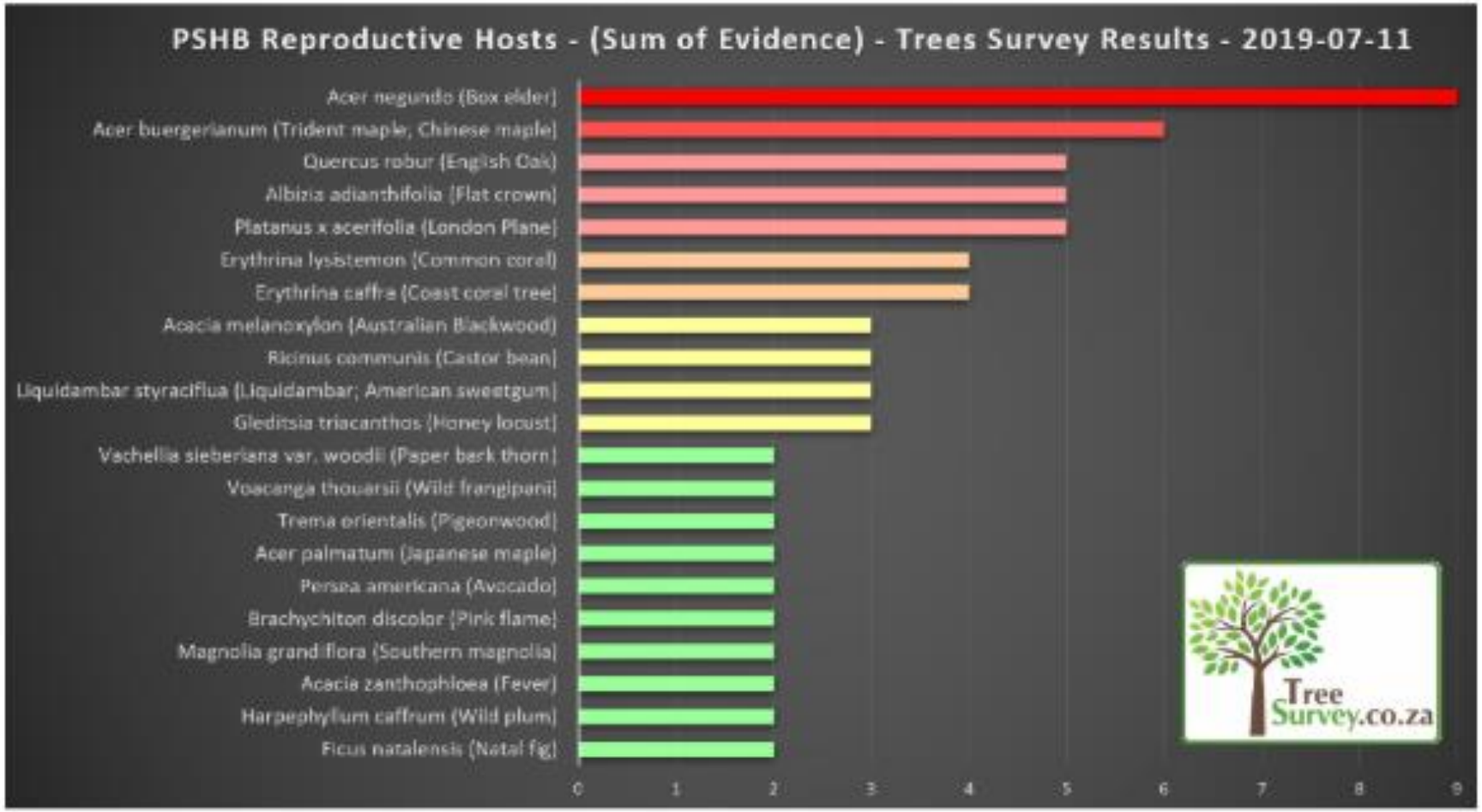

*PSHB Forecast Distribution Map SA – 2022*

# Host Trees – There are Reproductive Trees or Non-Reproductive Host Trees

- Reproductive Host Trees are trees where the PSHB can successfully reproduce and which will eventually die due to the fungus.

- Non-Reproductive Host Trees are attacked by the beetle, but PSHB reproduction is not successful.
- The fungus might or might not disease and eventually kill these trees.
- So far, it appears that Jacaranda trees as Non-Reproductive Host Trees may not die from the infestation.

Tree Survey Results – red shows trees most infested



# Reproductive Host Trees – Exotic & Indigenous (based on Tree Survey & FABI research)

**Exotic:**

- Box Elder (1)
- Trident Maple/Chinese Maple (2)
- English Oak (3)
- London Plane (4)
- Australia Blackwood
- Avocado
- Black Wattle
- Honey Locust
- Japanese Maple
- Liquidamber American Sweet Gum
- Pin Oak
- Pin Frame
- Southern Magnolia
- Castor Bean

**Indigenous:**

- Flat Crown (1)
- Coast Coral (2)
- Common Coral (3)
- Natal Fig
- Wild Plum
- Pigeonwood
- Paper Bark Thorn
- Wild Frangipani
- Fever

| SCIENTIFIC NAME | COMMON NAME | STATUS IN SOUTH AFRICA | ATTACKED BY PSHB SURVEY COUNT | REPRODUCTIVE HOST SURVEY COUNT |
|---|---|---|---|---|
| **Acacia caffra** | Acacia caffra; hook-thorn | Indigenous | 2 | 0 |
| **Acacia melanoxylon** | Australian Blackwood | Exotic | 4 | 3 |
| **Acer buergerianum** | Trident maple; Chinese maple | Exotic | 6 | 6 |
| **Acer negundo** | Box elder | Exotic | 9 | 9 |
| **Acer palmatum** | Japanese maple | Exotic | 4 | 2 |
| **Adansonia digitata** | baobab | Indigenous | 3 | 0 |
| **Ailanthus altissima** | Tree of heaven | Exotic | 3 | 1 |
| **Albizia adianthifolia** | Flat crown | Indigenous | 5 | 5 |
| **Bauhinia purpurea** | Butterfly orchid | Exotic | 2 | 0 |
| **Betula pendula** | Silver birch | Exotic | 2 | 0 |
| **Brachychiton discolor** | Pink flame | Exotic | 3 | 2 |
| **Brachylaena discolor** | Coast Silver-oak | Indigenous | 3 | 1 |
| **Calodendrum capense** | Cape chestnut | Indigenous | 3 | 0 |
| **Calpurnia aurea** | Geelkeurboom | Indigenous | 2 | 0 |
| **Ceiba pentandra** | Kapok | Exotic | 2 | 0 |
| **Celtis africana** | White Stinkwood | Indigenous | 3 | 0 |
| **Cinnamomum camphora** | Camphor | Exotic | 2 | 0 |
| **Combretum erythrophyllum** | River bushwillow | Indigenous | 3 | 0 |
| **Combretum krausii** | Forest bushwillow | Indigenous | 3 | 1 |
| **Dovyalis caffra** | Kei-apple | Indigenous | 3 | 0 |
| **Erythrina caffra** | Coast coral tree | Indigenous | 4 | 4 |
| **Erythrina livingstoniana** | Aloe coral | Exotic | 2 | 0 |
| **Erythrina lysistemon** | Common coral | Indigenous | 5 | 4 |

# Top 10 trees most affected in Gauteng – Tree Survey Results

- Box Elder
- Trident Maple/Chinese Maple
- English Oak
- Flat Crown
- London Plane
- Common Coral
- Coast Coral
- Australian Blackwood
- Castor Bean
- American Sweetgum

# Box Elder & Chinese Maple

# English Oak and Flat Crown

# London Plane and Common Coral

# Coast Coral and Australian Blackwood

# Castor Bean and American Sweetgum

| SCIENTIFIC NAME | COMMON NAME | STATUS IN SOUTH AFRICA | ATTACKED BY PSHB SURVEY COUNT | REPRODUCTIVE HOST SURVEY COUNT |
|---|---|---|---|---|
| Acacia melanoxylon | Australian Blackwood | Exotic | 4 | 3 |
| Acacia zanthophloea | Fever | Indigenous | 2 | 2 |
| Acer buergerianum | Trident maple; Chinese maple | Exotic | 6 | 6 |
| Acer negundo | Box elder | Exotic | 9 | 9 |
| Acer palmatum | Japanese maple | Exotic | 4 | 2 |
| Albizia adianthifolia | Flat crown | Indigenous | 5 | 5 |
| Brachychiton discolor | Pink flame | Exotic | 3 | 2 |
| Erythrina caffra | Coast coral tree | Indigenous | 4 | 4 |
| Erythrina lysistemon | Common coral | Indigenous | 5 | 4 |
| Ficus natalensis | Natal fig | Indigenous | 4 | 2 |
| Gleditsia triacanthos | Honey locust | Exotic | 4 | 3 |
| Harpephyllum caffrum | Wild plum | Indigenous | 3 | 2 |
| Liquidambar styraciflua | Liquidambar; American sweetgum | Exotic | 3 | 3 |
| Magnolia grandiflora | Southern magnolia | Exotic | 2 | 2 |
| Persea americana | Avocado | Exotic | 6 | 2 |
| Platanus x acerifolia | London Plane | Exotic | 5 | 5 |
| Quercus robur | English Oak | Exotic | 5 | 5 |
| Ricinus communis | Castor bean | Exotic | 3 | 3 |
| Trema orientalis | Pigeonwood | Indigenous | 3 | 2 |
| Vachellia sieberiana var. woodi | Paper bark thorn | Indigenous | 6 | 2 |
| Voacanga thouarsii | Wild frangipani | Indigenous | 3 | 2 |

# Reproductive Host Trees in Gauteng

- Box Elder
- Trident Maple/Chinese Maple
- London Plane
- English Oak
- Flat Crown
- Common Coral
- Coast Coral


## TreeSurvey

Report the Shot Hole Borer using the TreeSurvey mobile app

- Early warning allow preventative treatment which has the best outcome for your trees.
- We provide in-app assistance and help with diagnosis.
- Municipalities, City Parks, and Invasive Species Units receive automated notification of infested public trees.
- Arborists are available to assist you in Gauteng, Durban, Garden Route and Cape Town.

# What can be done?

# What can be done?

Stakeholder's requirement for the reporting of PSHB within South Africa vary greatly:

- The Department of Agriculture, Forestry and Fisheries (DAFF) is required to report new locations of known infestation to international trade partners, **laboratory verification is mandated**.
- Scientists and academics use laboratory services to **genetically sequence the beetle and it fungal symbiont**, and thereby address their research data requirements.
- Agricultural stakeholders aim to **track the proximity of PSHB** to their commercial interests. Identifying areas of infestation is important to have sites to evaluate the effect of the beetle and its fungal symbiont on their commercial trees, whilst evaluating efficacy of treatment and control protocols.
- Regional institutions require **early detection of PSHB** such that policy and protocols can be implemented, and local stakeholders be informed.
- Arborists in heavily infested areas quickly develop the capability to **identify PSHB visually**. Note that the value of reporting PSHB infestation in known infested areas shifts from containment to control and treatment.

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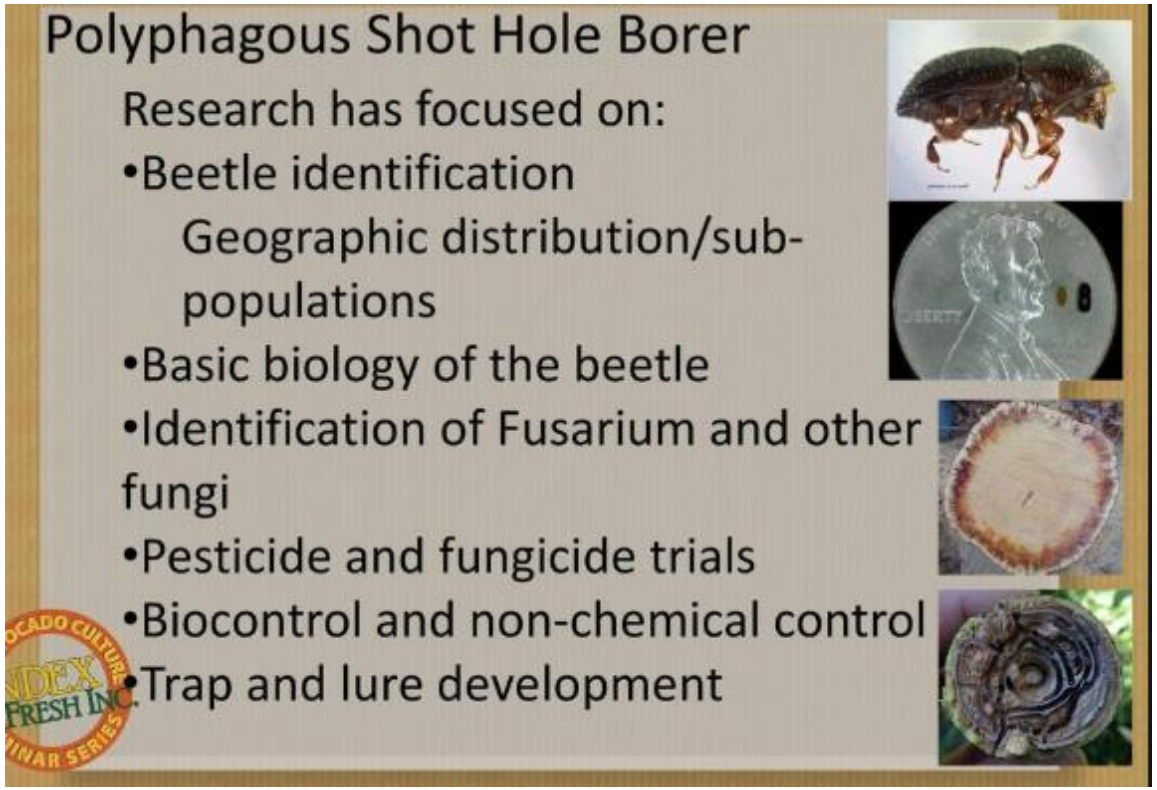
## Municipality and City Parks

How do you evaluate the suitability and appropriateness of action?

- Has your municipality published clear guidelines?
- Have dumping sites for infested wood been established?
- PSHB control - are infested public trees being treated and/or removed?
- Dead trees - are the dead street trees being removed and has a replacement program been initiated?

# Research into PSHB is ongoing – there is no recognized treatment yet

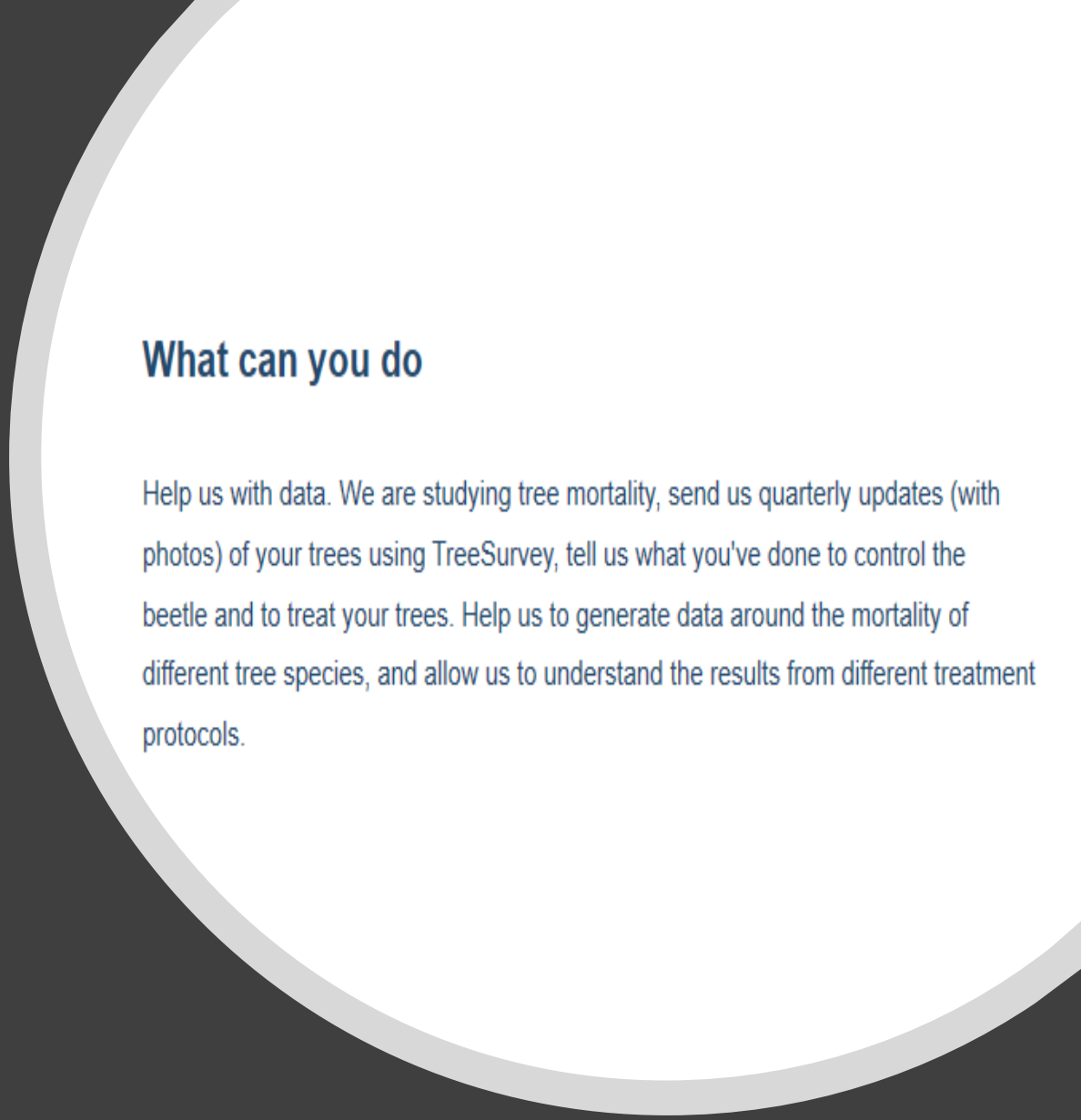



Three PCM laboratories in South Africa are currently involved with verifying PSHB:

- The "FABI Diagnostic Clinic" is an established laboratory, however it has not been conducting PSHB tests on ornamental trees since late 2018 since they do not have funding available for non-forestry and non-agricultural purposes.
- The Stellenbosch University PCM laboratory was recently used to verify the PSHB incidents detected in Somerset West. It has been confirmed that they have capacity to receive (limited) samples for PSHB testing.
- The DAFF Plant Health Diagnostic Services PCM laboratory in Stellenbosch is currently available to receive PSHB samples for PSHB testing.

# What can you do for the trees in your garden?

- Download the Tree Survey App and report your trees on the App, following the given process.
- Consider treating your trees with some of the products available on the market – e.g. “beetle busters” PSHB Fungicide & PSHB Surfactant.
- Remove & dispose of the dead trees in the correct manner.
- Don’t leave dead tree branches on the pavement or store in the garden, the beetle will leave and infest another tree. The tree is dead, but the beetles aren’t.
- Visit Tree Survey, FABI & PSHB websites for protocols.
- Plant new indigenous trees in your garden.
- Talk to your neighbors & encourage them to use Tree Survey App – “an injury to one is an injury to all”.



# What can KRRA & residents do about public spaces?

- WHAT SHOULD KRRA DO?
- We have to take action in our suburb because CoJ & City Parks will not. Let's put together a TASK TEAM.
- A proper survey of the trees in Kensington is undertaken by a team including residents, local experts, City Parks & DAFF inspectors (if possible);
- Trees that are badly infested & dead are marked and City Parks is formally notified to remove;
- Infested trees are marked for monitoring and we work out a monitoring protocol and possible treatment if any;
- Residents can "adopt" the new trees in order to water and take care of during the growing stage;
- When a treatment becomes available then we can take part of a pilot project to test efficacy of treatment and then a roll-out plan.

- WHAT SHOULD CoJ & CITY PARKS DO?
- The Municipality must be involved through City Parks.
- City Parks doesn't support a single treatment yet as insufficient research has been done. Their position is that they will wait until a treatment has been proven to be effective.
- City Parks asks residents "to plant trees as Joburg's tree canopy will reach its full life expectancy in the next half decade".
- CoJ must designate a dump site for disposal of infested wood.
- CoJ to involve DAFF inspectors if possible.
- City Parks to remove dead trees on the pavements and in Rhodes Park.
- City Parks to roll-out replacement programme of indigenous trees for pavements and Rhodes Park.

# Sources of information

- https://treesurvey.co.za
- https://PSHB.co.za
- www.fabinet.up.ac.za
- www.jufa.org.za
- www.randomharvest.co.za
- www.panafricanfarms.co.za
- trees@jhbcityparks.com
- pshb@fabi.up.ac.za
- Pictures obtained off Google – thanks to the photographers