

## Nurragingy- A water and bug study



## Nurragingy Reserve Blacktown

## Scope and sequence summary

### Living World

This program includes a fieldwork excursion to Nurragingy Reserve, as well as a series of pre- and post-excursion activities to fulfil outcomes for Science and Technology - Living World. Students learn about how the environment affects the growth, survival and adaptation of living things. As a case study, students conduct fieldwork tests to identify the adaptations of water and land bugs at Nurragingy, and establish whether the local storm-water outlet affects their growth and survival.

*The job of an entomologist is to use science to identify, classify, and study insects and their relationships to plants and animal life. We need some Stage 3 entomologists in training to gather data by collecting and observing insects and their adaptations as well as investigating the role they play in the ecosystem at Nurragingy Reserve.*

### Key inquiry questions

- How do physical conditions affect the survival of living things?
- How do the structural and behavioural features of living things support survival?

### Outcomes

#### Science and Technology K–6

**ST3-1WS-S** plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions

**ST3-4LW-S** examines how the environment affects the growth, survival and adaptation of living things

#### Health and safety issues

As you are working in the field you need to be aware that:

- Ground material can be slippery
- Vines and undergrowth can trip
- Some animals can deliver painful or venomous bites
  - On slopes, rocks can be easily dislodged

## Pre-excursion- Activity 1

### Aboriginal heritage

The name **Nurragingy** commemorates one of the two Aboriginals of the Darug tribe who received the first land grant to natives from Governor of New South Wales, Lachlan Macquarie in 1819. The other title holder was Colebee, whose name has been given to the Centre within the reserve.

Using the link below find out more about the Aboriginal history of the Blacktown area and Nurragingy Reserve.

<https://www.westernsydneyparklands.com.au/about-us/our-story-2/aboriginal-heritage/>

<https://www.blacktown.nsw.gov.au/About-Council/Our-city/Blacktown-Memories/Our-history-and-heritage/Aboriginal-heritage/Aboriginal-Connections>

Why is it important that we acknowledge and understand our Aboriginal history?

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Study the map in the following link and answer the question below.

<https://www.blacktown.nsw.gov.au/files/assets/public/parks/nurragingy-reserve/map-nurragingy.pdf>

How has Nurragingy Reserve acknowledged and celebrated the Aboriginal history of the Blacktown area?

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## Pre-excursion- Activity 2

### Where does the rain go?

Look at the map provided. <https://www.google.com/maps/d/edit?mid=1y35i9D54yL-skCHjWZH6ld6axp0U32iV&usp=sharing>. The red arrows show the direction of the slopes or hills. If you click on the red arrows, you can find additional information. These slopes are quite gentle, so if it rains a little, most of the rainwater would soak into the ground. However, if there is lots of heavy rain and it can't all soak in, it will flow downhill.

Have a close look at the map and discuss with your class where the rainwater might end up if it lands at any particular spot on the map (hint: use the arrows).

Answer the following questions:

1. In addition to water, what do you think might come out of the stormwater outlet and into the pond when it rains, especially the storm water from the roads?
2. What impact do you think this water (and whatever else) from the stormwater outlet might have on the water bugs that live in the pond?
3. What about the creek (Eastern Creek)? Do you think the water (etc.) from the stormwater outlet might impact the creek? If so, more or less than the pond?
4. A hypothesis is an idea or explanation for something that is based on known facts but has not yet been proven. More simply, a hypothesis is an educated prediction. On your excursion, you will be testing the water quality and surveying water bugs at the ponds and creek at Nurragingy Reserve, to see if the stormwater may have an impact on the water bugs. Write a hypothesis for what you expect to find.

You may like to write your own, or use the scaffold below to help.

"The stormwater outlet at Nurragingy Reserve will have a \_\_\_\_\_ effect on the number / types of water bugs living in \_\_\_\_\_ pond/s and a \_\_\_\_\_ effect on the number / types of water bugs living in Eastern Creek at Nurragingy Reserve because

\_\_\_\_\_."

## Water – Physical & Chemical Tests

### *Did you know?*

- The more turbid (dirty) the water, the higher the temperature
- The higher the temperature of the water, the lower the oxygen level

|   | RESULT | RESULT BETWEEN | SCORE | YOUR SCORE |
|---|--------|----------------|-------|------------|
| <b>TEMPERATURE</b>  |        | 0 - 6°         | 2     |            |
|   |        | 7 - 11°        | 4     |            |
|   |        | 12 - 18°       | 10    |            |
|   |        | 19° +          | 2     |            |
| <b>OXYGEN</b><br>Fish need at least<br>2 milligrams / litre<br>to survive |        | 0 - 2          | 0     |            |
|   |        | 3 - 4          | 4     |            |
|   |        | 5 - 8          | 10    |            |
|   |        | 9 +            | 4     |            |
| <b>SALINITY</b>   |        | 0 - 200        | 10    |            |
|   |        | 201 - 300      | 8     |            |
|   |        | 301 - 500      | 4     |            |
|   |        | 501 +          | 2     |            |
| <b>TOTAL SCORE</b>  |        |                |       |            |










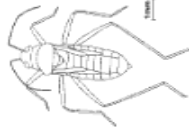
### SCORE RESULTS

|         |                    |
|---------|--------------------|
| 0 - 8   | Unhealthy          |
| 9 - 15  | Moderately Healthy |
| 16 - 30 | Healthy            |

## Water – Biological Tests

### Did you know?

- Water bugs are a food source for fish, frogs and birds
- Water bugs are sensitive to their surroundings

|                         |  | SCORE     |                       |   | SCORE    |
|-------------------------|--|-----------|-----------------------|---|----------|
| <b>Back Swimmer</b>     | 10-15mm<br>   | <b>5</b>  | <b>Water Boatman</b>  | <br>8-10mm   | <b>5</b> |
| <b>Damsel-fly Nymph</b> | <br>15-25mm   | <b>6</b>  | <b>Water Scorpion</b> | <br>25-50mm  | <b>3</b> |
| <b>Dragon-fly Nymph</b> | <br>25-50mm | <b>5</b>  | <b>Water Snail</b>    | <br>5-8mm  | <b>2</b> |
| <b>Tadpole</b>          | <br>10-20mm | <b>10</b> | <b>Water Strider</b>  | <br>5-12mm | <b>4</b> |
| <b>Diving Beetle</b>    | <br>5-45mm  | <b>6</b>  | <b>Water Treader</b>  | <br>5mm    | <b>4</b> |
| <b>TOTAL SCORE</b>      |  |           |                       |   |          |

### SCORE RESULTS

|         |                    |
|---------|--------------------|
| 0 -10   | Unhealthy          |
| 11 – 25 | Moderately Healthy |
| 26 – 50 | Healthy            |

## Soil – Physical and Chemical Tests

***Did you know?***

Soil provides life to plants and a habitat for a range of insects

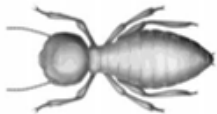









| SOIL               | RESULT | RESULT BETWEEN | SCORE | YOUR SCORE |
|--------------------|--------|----------------|-------|------------|
| Acid / Alkaline    |        | 0 – 4          | 0     |            |
|                    |        | 5 - 8          | 10    |            |
|                    |        | 8 +            | 0     |            |
|                    |        |                |       |            |
| Leaf Litter        |        | 0cm            | 0     |            |
|                    |        | 1 – 2cm        | 5     |            |
|                    |        | 3 – 5cm        | 10    |            |
|                    |        |                |       |            |
| Temperature        |        |                | 0     |            |
|                    |        | 0 - 5          | 5     |            |
|                    |        | 6 +            | 10    |            |
| <b>TOTAL SCORE</b> |        |                |       |            |

| SCORE RESULTS |                    |
|---------------|--------------------|
| 0 -10         | Unhealthy          |
| 11 – 15       | Moderately Healthy |
| 16 - 30       | Healthy            |

## Soil – Biological Tests

### **Did you know?**

- Many insects are scavengers, feeding on dead animals and fallen trees which recycles nutrients back into the soil to feed the plants

|                    |   | SCORE |                  |   | SCORE |
|--------------------|---|-------|------------------|---|-------|
| Termite            |    | 5     | Psyllids         |    | 5     |
| Centipede          |    | 6     | Beetles          |    | 3     |
| Earthworm          |  | 10    | Slugs and Snails |  | 2     |
| Millipede          |  | 10    | Slater           |  | 4     |
| Ant                |  | 6     | Spiders          |  | 4     |
| <b>TOTAL SCORE</b> |   |       |                  |   |       |

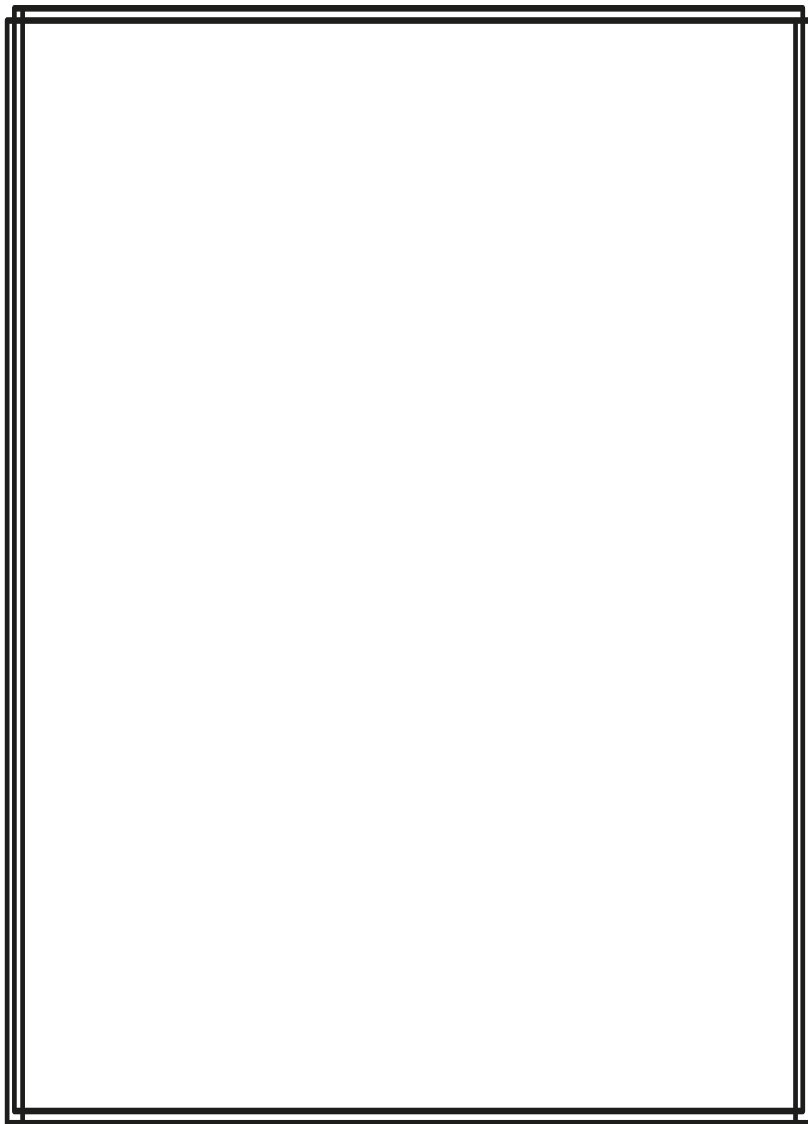
### SCORE RESULTS

|         |                    |
|---------|--------------------|
| 0 -10   | Unhealthy          |
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## Scientific Drawing

Create a scientific drawing of an insect.



### Remember to:

- Use a lead pencil.
- Title the drawing.
- Label all body parts.
- Write all labels clearly and horizontally.
- Label using straight lines.

What structural adaptations are evident on this invertebrate and what is their function?

## Post excursion activity

### Scientific Report

Collate the data from each class group, so you have data from each of the different water sources including the pond where the stormwater outlet is.

Evaluate your data against your hypothesis. Now that you have supporting data, can you accurately address this?

Write a 1-2 page scientific report to present your findings. Use the following headings for paragraphs:

- Title – Your hypothesis
- Abstract (It often helps to write the abstract last. 2-3 sentences outlining what you did and what you found - testing various water bodies to evaluate the impact of the stormwater outlet)
- Introduction (background of the site and the reason for your research)
- Method (explain the surveys you did - how you collected your data)
- Results (tables and graphs of your data. What was your control?)
- Discussion (what your data means - explain what you found. Discuss your results. Were the tests fair?)
- Conclusion (is there anything more you'd like to know about the site? Suggestions for further research)

