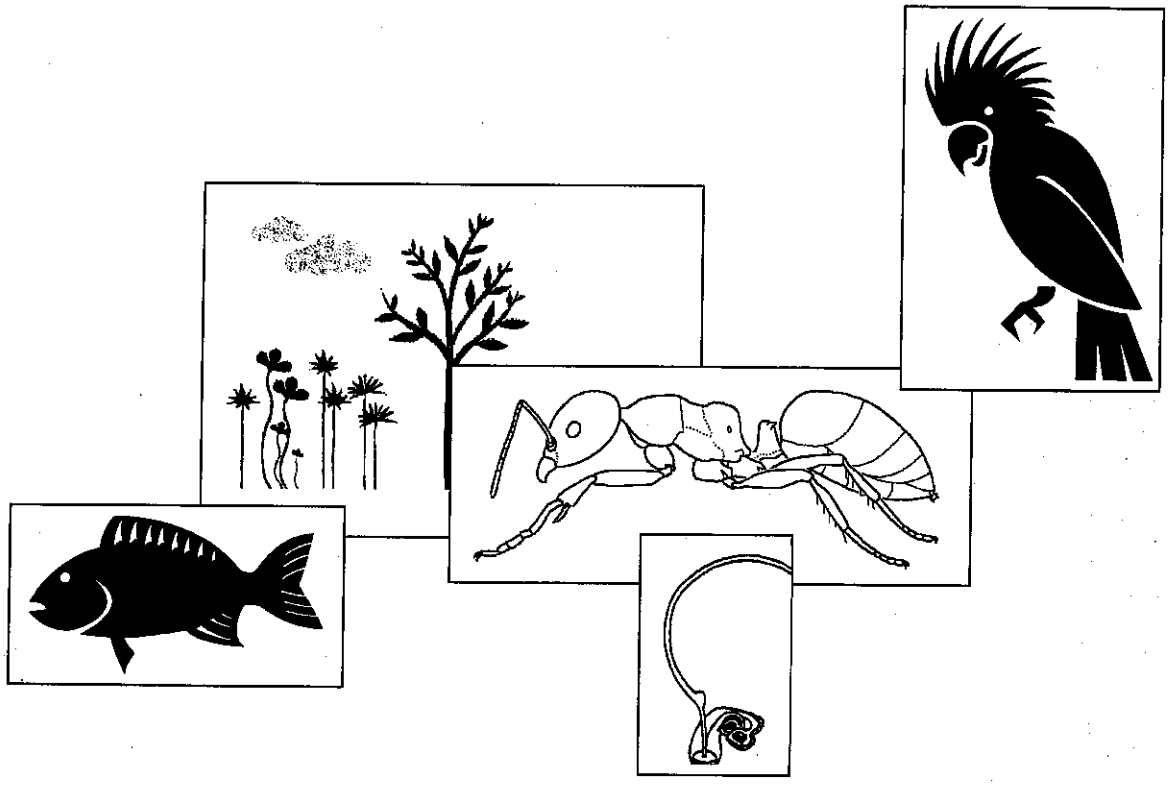
Faculty of Science and Engineering

2010

Biology Work Experience 301



Report

Daniel Panickar

Department of Environment and Agriculture

Curtin
University of Technology

BIOLOGY WORK EXPERIENCE 301

Daniel Suresh Panickar

13980409

Semester 1 - 2010

Contents

Introduction

The Walpole Fire Mosaic project is a research project which has been established by the Department of Environment and Conservation which aims to discover how the biodiversity and abundance of invertebrates, vertebrates and vegetation including lichens and fungi react and change in response to frequent fires in the bush. The overall goal of this project is to establish a fine grain mosaic which will be a result of frequent burns through the bush. This frequent burning will create areas with less fuel (i.e. leaf litter) which reduces the intensity of the overall burn in these areas and subsequently create safe zones for animals to shelter in while other parts of the forest burn. This uneven burning will create an overall patchy appearance of the forest which is where the fire mosaic terminology derives its name from. This uneven burning will be achieved by burning different blocks of the bush and varying intervals. The test site is broken up into three forest blocks (London, Surprise 2 and Surprise (control)), which will be burnt regularly on a two year basis, a five to seven year basis depending on the amount of fuel and viability of a safe, controlled burn, and the control block which will remain unburnt throughout the project. Each block has six sample sites in it which encompass the three main habitats in the sample area (Caldyanup swampland, Casuarina woodland and Jarrah forest). By including these three habitat types in the sample area, we can determine what effects the fire has on species endemic to each habitat and where these species take refuge (if they do) when their "home" site has been burnt. Our part in this project is to assist with the Spring 2009 collection of invertebrates in the Walpole Fire Mosaic sites by hand sampling and light trapping, and then to identify and sort the species collected and enter them into the database for research purposes.

Fig 1. Burned areas of native bushland.

The following pages are a diary record of the work experience project from my perspective. The activities mentioned in the diary are all described in detail in the activities section of this report.

DIARY

PART 1 – FIELD WORK

Monday 7/12/2009

Drove to Manjimup and arrived at 1pm where we met Janet Farr who outlined the work we'd be doing and gave us the overall scope of the project which we were participating in. We received a DEC safety induction and then packed our supplies and drove to our accommodation in the Peaceful bay chalets and got settled in.

Tuesday 8/12/2009

Simon and myself were placed in a team with Allan Wills and set light traps at 6 sites (WFM 4, 5, 6 & 20 and BCRC sites 19 and 20). We also set pitfall traps at each of these sites along a 100m transect at 10m intervals. All of the Caldyanup sites were infested with flies which would have been extremely annoying if I didn't have a fly net. Simon and myself took turns carrying the 15kg battery for the light traps through the bush. Encountered a tiger snake at one site and several Varanid lizards throughout the day. After we finished the tasks for the day, Allan took us to meet Paul Van Heurck who was in charge of the other light trapping team and we went for a drive along the beach at Peaceful Bay.

Wednesday 9/12/2009

Collected the light traps we had set the previous day and counted the number of Helena Gum moths and *Carthea saturnoides* at each site. The specimens in the trap were placed in a paper bag and then sealed in a plastic sandwich bad to keep out moisture. I started to learn which plants to avoid in the bush (the most painful ones being the Hakeas and *Banksia quirkifolia)*. We returned to the chalet and recharged the batteries and then visited the treetop walk.

Thursday 10/12/2009

Set light traps and pitfall traps at 6 more sites. We all met up at one site at lunch time so that a film crew recording the project could film us at work. I figured out how to use the macro mode on my camera and took several pictures of flowers from the Fabaceae family. Simon and myself were attacked by "Jumping Jack" bullants when Simon accidentally crouched on a nest but luckily we were not stung.

Friday 11/12/2009

We collected the light traps set out the previous day. One of the traps had been knocked over by a Varanid lizard and there were several half eaten Helena Gum moths around the area of the trap. Today I had a 3km trek uphill with the battery which was an absolute killer of a walk which I hope never to have to do again. I also had my first experience navigating successfully out of a site. After work we went to Denmark to do some food shopping and I bought a new shirt as I had torn my other one on one of the treacherous Hakeas.

Sunday 13/12/2009

Today we placed light traps at the same sites we used on the first day of field work. The heat was intense today and we had several rehydration stops. Had an encounter with a dugite outside one of the sites. Simon left in the evening due to heatstroke/personal issues. My camera which had broken the day before on our day off somehow miraculously fixed itself and worked fine.

Monday 14/12/2009

Gemma Grigg joined myself and Allan today as part of our light trapping team. We collected the traps set the previous day. Allan spotted an albino peacock but it moved away too quickly for us to take photos. The atmosphere was very hazy today due to the fires burning in the Walpole region a few kilometres from where we were. We also conducted hand sampling at WFM site 14. My role was to sample by beating bushes and trees and collecting what fell out.

Tuesday 15/12/2009

We set light traps at 6 sites and conducted hand sampling at WFM site 13. My role today was to sample by looking under coarse woody debris for invertebrates. We had a tyre puncture leaving one site today and I had my first experience doing a radio call to Paul Van Heurck to let him know about the puncture and that we would be a little late. There was a fire just north of one site so one team was on constant radio alert to monitor any wind changes which could endanger us. Allan showed us some Albany pitcher plants (*Cephalotus follicularis*) at WFM site 9.

Fig 2. Flower from Fabaceae family.

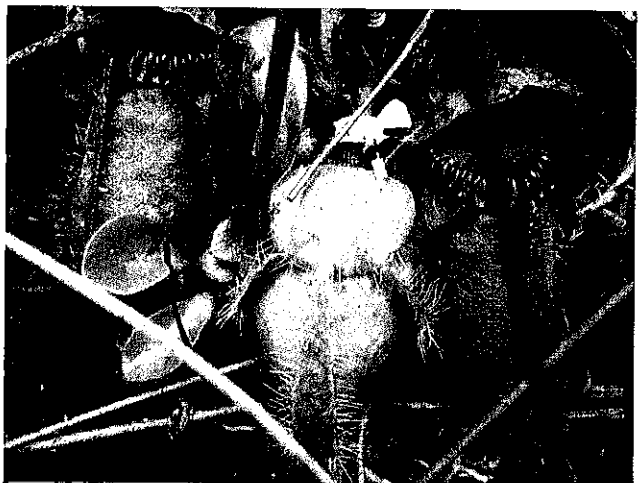


Fig 3. *Cephalotus follicularis* – Albany pitcher plant.

Wednesday 16/12/2009

Today we collected light traps from seven sites (we helped Paul's group because they were running slightly behind schedule). I also finally saw a feral cat in the flesh which narrowly avoided our vehicle along Nornalup road. Back at the chalet we made up the labels which we would be using to label the pitfall trap vials when we collect them tomorrow.

Thursday 17/12/2009

Collected pitfall traps at 6 sites. Some of the traps contained frogs, lizards and the occasional honey possum which were unintentionally captured. Allan emptied the traps into the vials while we assisted with sorting them out and filling in the pitfall trap holes so as not to accidentally trap animals while the traps are not in use. On one of the sites, we managed to sneak up on one of the Varanid lizards without it noticing until we were about a meter away...then it ran.

Saturday 18/12/2009

Today we collected pitfall traps at six more sites. These sites had less vertebrates inside them then the sites we visited the previous day. Back at the chalet we started packing up our things to make leaving tomorrow much less of a hassle.

Sunday 19/12/2009

Today we packed all the gear into the vehicles, packed up our things and left Peaceful Bay to return home.

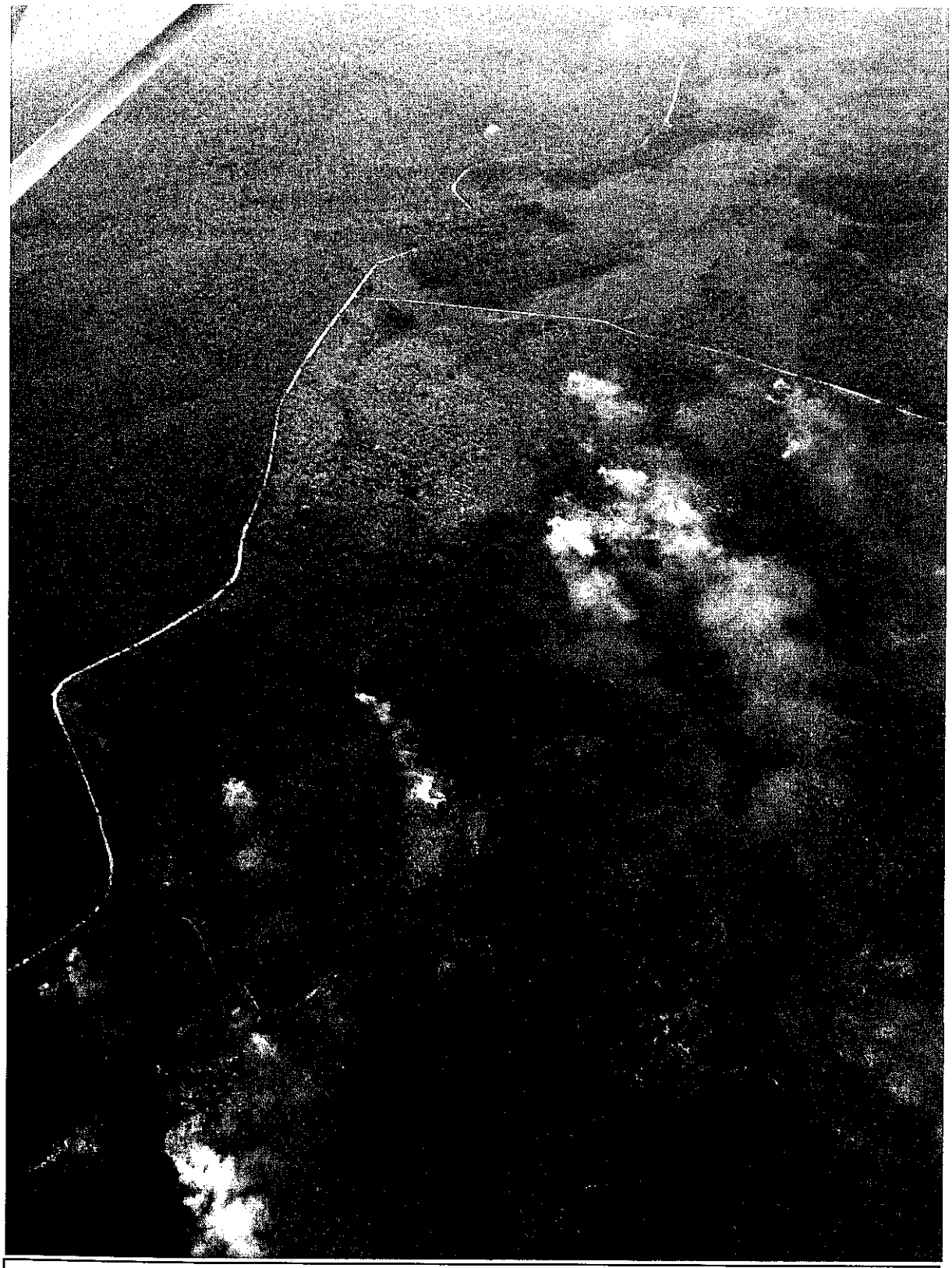


Fig 4. Aerial photograph of controlled burns.

PART 2 – LAB WORK

Monday 1/2/2010

Arrived in Manjimup at 1pm and got acquainted with Kingston House where we would be spending the next two weeks. Had a tour of the insect lab with Dr. Janet Farr where she showed us examples of the invertebrates we would be identifying.

Tuesday 2/2/2010

Started by removing the forest check voucher specimen boxes from the storage room and laying them on the benches for quick access and reference (the boxes we put out contained majority of the Lepidoptera and Coleoptera specimens as these would be the most common invertebrates in the light traps). We then started sorting out the light traps, one trap at a time and only identifying species over 10mm in length. Alan Wills arrived and helped us with the identifying of the specimens. Some of the Lepidoptera specimens were very battered due to the scarab beetles thrashing around as they died in the trap and subsequently knocking the scales off the moths. If the Lepidoptera specimen is too battered or has no distinctive markings or features it is assigned the Unidentifiable Lepidoptera specimen number of 1172. Once all the specimens have been identified and new ones have been pinned they are put back into their paper bag and placed in a dryer at 40°C.

Wednesday 3/2/2010

Sorting through light traps again today. Alan showed us how to get an approximation of the number of hydrophyllid beetles caught in the trap if there are too many to count. This can be achieved by the following process which vastly reduces the time spent sorting through the sample.

COUNTING HYDROPHYLLIDS

- Split sample into two segments, one large and one small.
- Weigh the large segment.
- Weigh and count the small segment (the larger the size of this small segment, the more accurate the approximation will be).
- Use the following equation to approximate the total number of hydrophyllids present:

[Total weight of sample (g)/Weight of small segment (g)] x Number in small segment

We only worked half a day today as I had to head back to Perth for my indoor soccer grand final (We won 5-1 and I won the best on ground trophy too!!!!!).

Thursday 4/2/2010

Spent the morning driving back from Perth to Manjimup and arrived at lunch time. Spent remainder of the day sorting through light traps. I developed a knack for spotting the different types of "humbug – like" Lepidoptera and telling the species apart under the microscope. We have all improved our efficiency at sorting through the traps as we have become more familiar with the common morpho-species present in the light traps. Alan showed us how to tell the difference between two species of Scarabidae which look very similar even under the microscope (the difference lies in the shape of the head).

Friday 5/2/2010

Continued sorting through the light traps and Alan showed us how to identify the wasps in the traps by looking for differences in wing venation under the microscope as well as looking for stigmata on the wings which are different for different species. Alan and Janet had to leave for Mandurah to look at some Gumleaf skeletonisers present on some of the trees in the region. We spent the afternoon working on our reports.

Monday 8/2/2010

Sorted through the final two light traps and started sorting the hand sampling collections (sweep, target & pursuit, coarse woody debris, beating, and leaf litter). Once the specimens are identified and new ones have been removed the remainder are stored in vials filled with 70% ethanol and glycerol mix to prevent dehydration of specimens. New specimens are either pinned or if they are too fragile they are stored in vials with the same ethanol/glycerol mix.

Tuesday 9/2/2010

Continued sorting through the hand sampling collections. I have developed a knack for identifying specimens from the order Odonata (damselflies and dragonflies). I have also become proficient at identifying the different bull ant specimens from the genus *Myrmecinae.*

Wednesday 10/2/2010

Continued with the hand sampling specimens. Found a new species of dragonfly that had not previously been collected and with Alan's help identified it to species level *Procordulia affinis.* Janet also showed us how to take proper photographs of the specimens for archival use and how to create a photomontage of a specimen using an advanced microscope and computer software.

Thursday 10/2/2010

Continued with the hand sampling collections. Discovered a new species of Mantodae which was the largest one that has been recorded in this project, measuring 105mm. Discovered a new species of Syrphidae from one of the Caldyanup swamp sites. Started cleaning the marker pen off the specimen vials with 100% ethanol. One of the specimen vials had a wasp inside of it that smelt very strongly of ozone and made us all light headed so we disposed of it and let the lab air out.

Friday 11/2/2010

Today we started photographing some of the new voucher specimens we found during the sort. We continued until 12pm and then packed up and left for Perth.

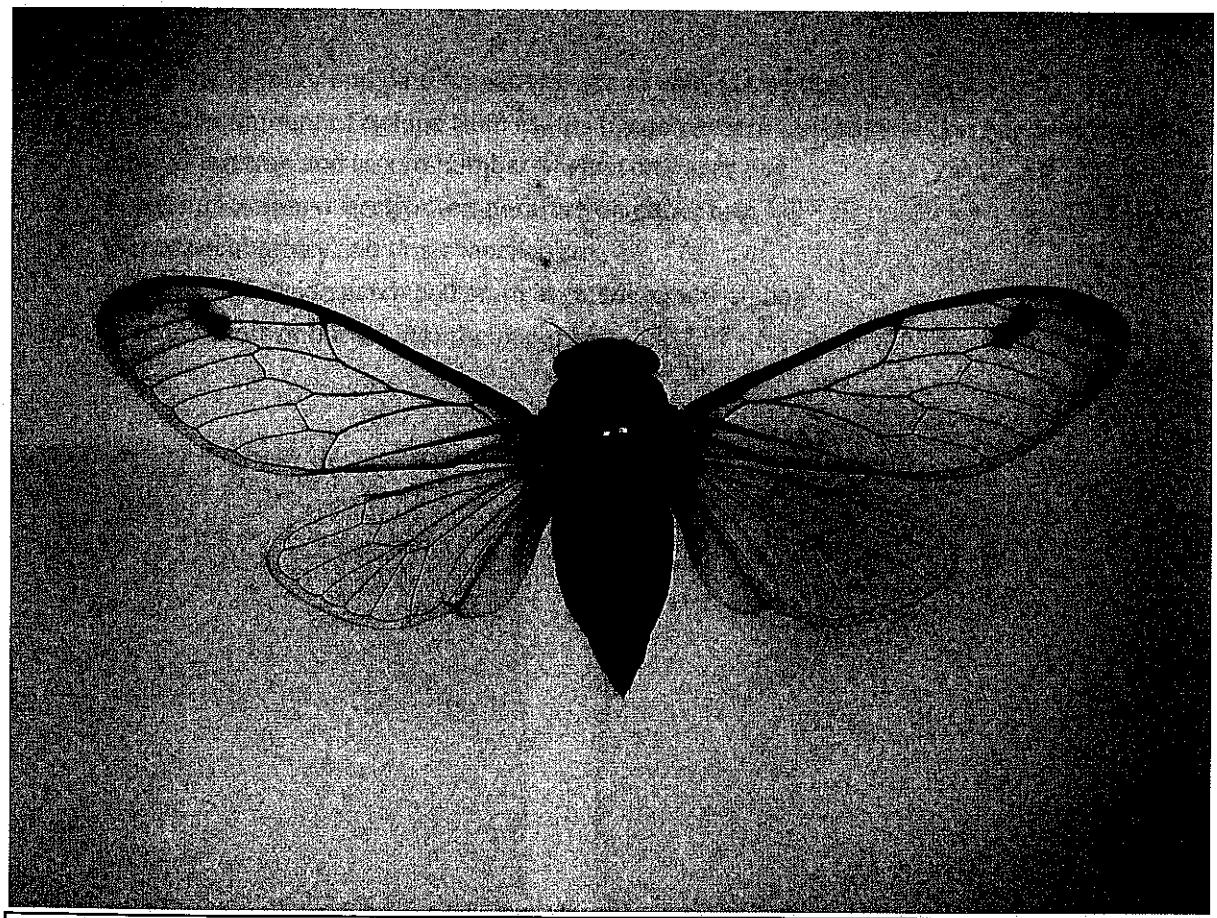


Fig 5. Pinned Cicada specimen.

ACTIVITIES

LIGHT TRAPPING – SETTING UP

- Remove all necessary equipment from the vehicle: 12V lead-acid battery, backpack to carry battery, double funnel bucket (this design allows water to drain from the bucket without touching the trapped invertebrates in case of rainfall), insecticide patches, thermometer, occy straps, fluorescent light and timer mechanism (test these last two before heading into the bush to save a trip back to the vehicle).
- Place insecticide patch inside bucket and replace top funnel.
- Set up fluorescent light on top of funnel and secure with occy straps.
- Connect timer to battery and light and test to make sure connection is correct.
- Set timer to turn on at 630pm and turn off at 6am.
- Reset thermometer so that minimum and maximum temperatures can be recorded and then place in shady, secure spot.

LIGHT TRAPPING – COLLECTING

- Write site number and date on paper bag and walk out to site.
- Count the amount of Helena Gum Moths (*Opodiphthera Helena*) and *Carthea saturnoides* around the trap and record number of each on paper bag.
- Record minimum overnight temperature on paper bag.
- Disconnect battery and timer mechanism.
- Remove insecticide patch and store in plastic sandwich bag
- Pour contents of bucket into the paper bag.

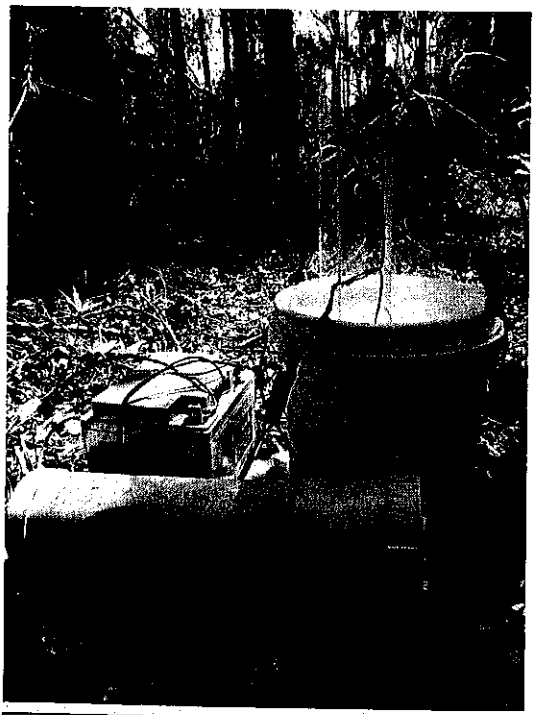


Fig 6. Light trap apparatus.

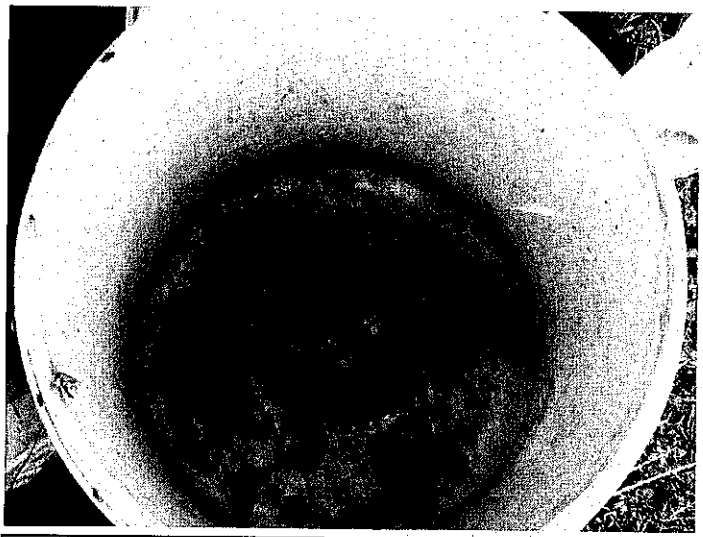


Fig 7. Inside of light trap after trapping period.

PITFALLS – SETTING UP

- Remove all necessary equipment from vehicle: backpack containing propylene glycol and a gun with a hose to disperse it, and 11 plastic cups for the pitfall traps (always carry a spare cup just in case).
- Place plastic cup inside acrylic sleeves which have been set up in a 50m transect line (10 sleeves at 5m intervals) prior to arrival.
- If the site has been burnt prior to arrival it may be necessary to pull out the sleeves and turn them upside down as the top will have been melted by the fire and a cup will not fit inside.
- Pour roughly 50ml of propylene glycol into each trap.

PITFALLS – REMOVING

- Write up labels for each trap prior to heading into the field.
- Remove necessary equipment from vehicle: vials (one for each trap), box for the vials, labels, backpack with propylene glycol, tea strainer, and funnel.
- Remove each cup from the acrylic sleeve and empty contents into tea strainer.
- Remove any vertebrates i.e. lizards, frogs and small marsupials from tea strainer and place in the vial for that trap.
- Place funnel into the vial, turn tea strainer upside down in funnel and use propylene glycol to wash specimens from tea strainer, through the funnel and into the vial.
- Place label inside the vial, seal and place in box.
- Place large sticks in the now empty acrylic sleeve to allow any organism which accidentally falls into it to climb out.

Fig 8. Contents of pitfall trap.

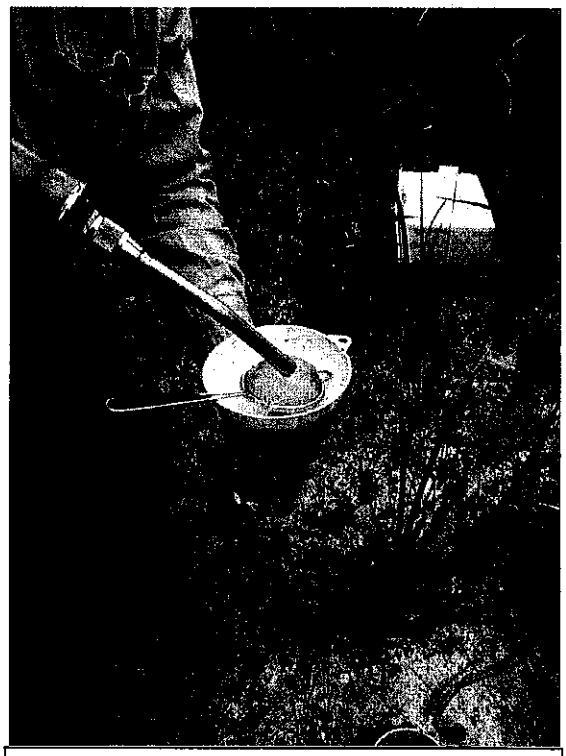


Fig 9. Transferring contents into a vial.

HAND SAMPLING – BEATING

- Place large white canvas sheet attached to a kite-like frame under a large shrub or tree.
- Hit branches and leaves with a few solid strokes.
- Collect any insects that fall onto sheet in specimen vials.
- Continue this process for the duration of one hour.
- Label filled specimen vials with site number, date and collection method (in this case BT).

Fig 10. Hand sampling on Caldyanup site.

HAND SAMPLING – COARSE WOODY DEBRIS

- Look for medium to large pieces of broken wood on the forest floor.
- Turn the piece of wood over and collect any invertebrates present into specimen vials.
- Continue this process for the duration of one hour.
- Label filled specimen vials with site number, date and collection method (in this case CWD).

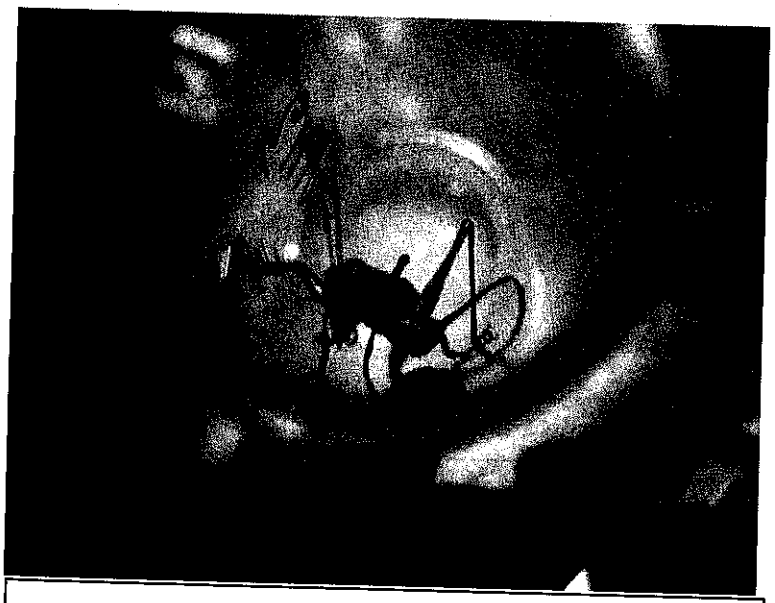


Fig 11. Captured Grasshopper.

SORTING AND IDENTIFYING SAMPLES.

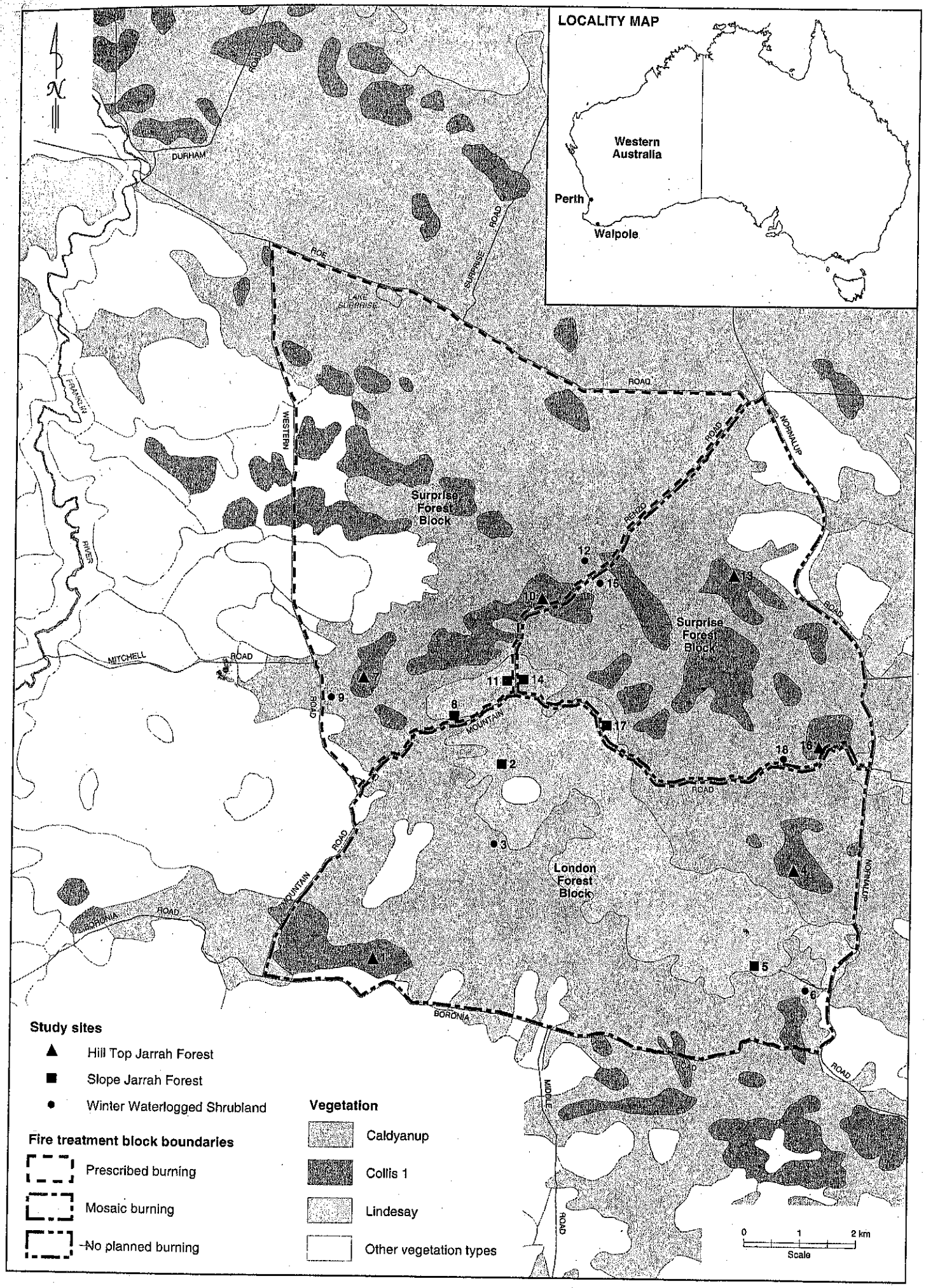
- Select a site and sampling method i.e. light trapping, pitfall or hand sampling (broken up into the different methods of hand sampling).
- Sort the sample into groups of the same or similar morpho-species.
- Remove any specimens which are less than 10mm in size and place them into the bulk pile for that site and sampling method (these smaller specimens are too time-consuming to identify in this project). The bulk pile is made up of specimens which are not of adequate size and those which have been matched to a voucher specimen and recorded. The pile is then stored in the insectory.
- Select a specimen and match it to an already existent voucher specimen.
- If no voucher specimen exists or there are only one or two specimens for that particular morpho-species then pin the specimen, and record it as being pinned and not placed in the bulk pile for that site and sampling method. If it is a new morpho-species, create a new number on the new morpho-species sheet and record the order and where possible family, genus and species of the invertebrate as well as size, colour, site number and date collected. If the specimen cannot be pinned then place it in a vial filled with alcohol for storage. Examples of specimens which must be stored in alcohol are Aranea which do not have a stable exoskeleton, Orthoptera which will rot if they are not place in alcohol, or Phasmatodea which can be too slender and fragile to pin.

Fig 12. Pinned specimen from genus *Myrmecinae.*

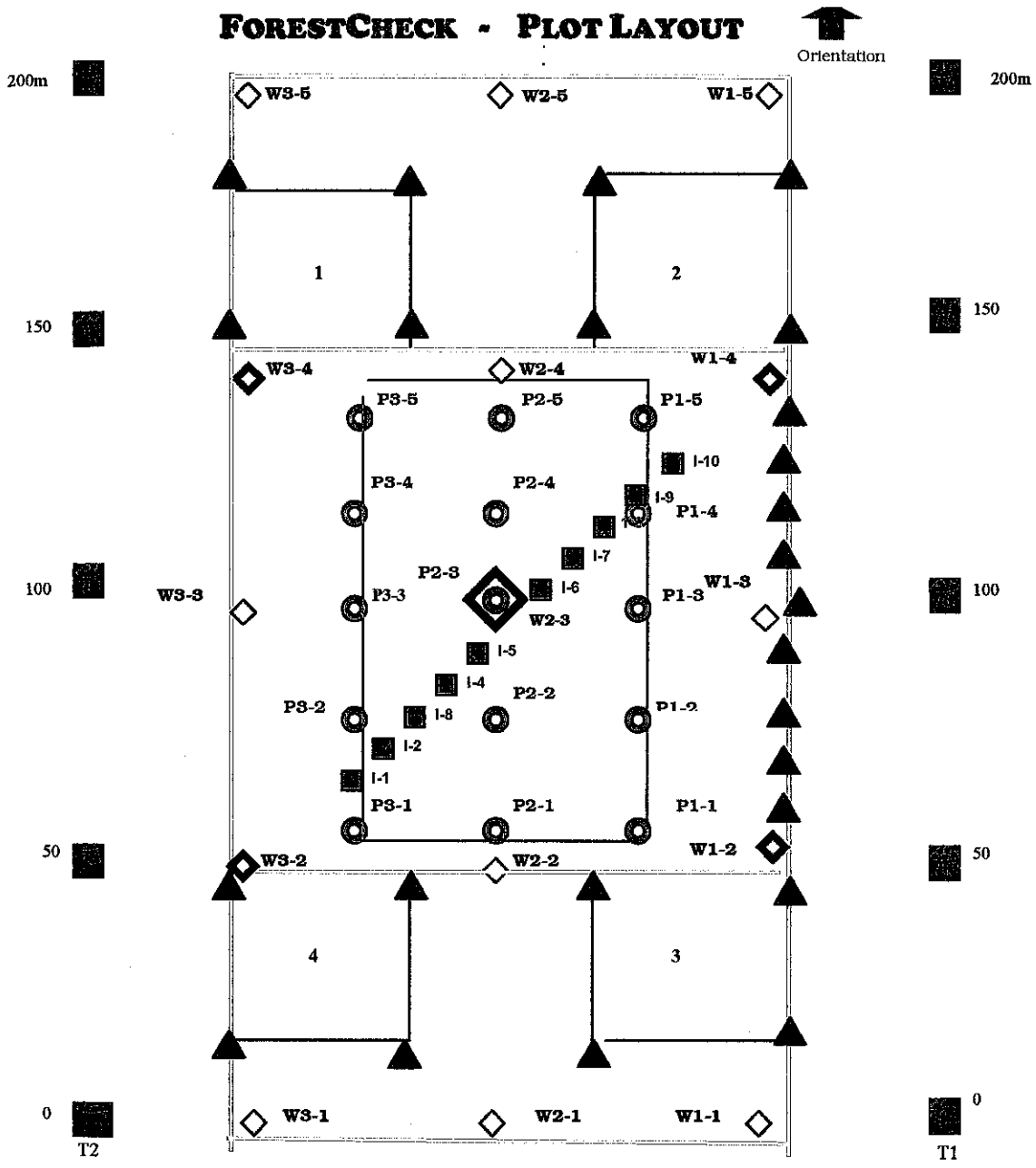
Conclusion

I feel that my involvement in the Walpole Fire Mosaic project has greatly increased my appreciation for invertebrates and their importance in the environment. It has also given me an insight as to how research projects are run and the limitations that are imposed on such projects due to budgetary and time constraints. I believe that this work experience has improved my skills in navigating in the bush and my ability to cope with extreme conditions such as sweltering heat, dangerous animals and bushfires. I feel that my laboratory skills have also vastly improved, both in microscope work and in general laboratory behaviour and work ethics. This project has been an excellent experience for me and I very much appreciate being given the opportunity to participate in it. Thanks must be given to Dr. Janet Farr, Allan Wills and Paul Van Heurck for their patience and education. I would recommend that other students participate in this project as it is a very interesting area of research and will increase their appreciation of invertebrates and the bush.

LOCALITY MAP OF WALPOLE PLOTS.



FORESTCHECK - PLOT LAYOUT



1 Green centre peg - Wire Cage and Pit Trap

4 Green corner pegs, 100m x 100m Wire Cage

10 Dropper - Wire Cage points 50m x 50m

20 Dropper - Vegetation Plots 30m x 30m

10 Dropper – Invertebrate Pit Traps 30m x 30m

14 Dropper – Pit Traps 25m x 20m

10 Dropper - 10 m out from lines W3 and W 1, and 50 m apart