



## Thesis writing

# Methods



UNIVERSITY  
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### BIOLOGY EXAMPLE

#### Example: methods section in a thesis

Qualitative observations of feeding behaviour in gliders have also been carried out (Henry and Craig, 1984; Craig, 1985; Kavanagh and Rohan-Jones, 1982; and Kavanagh, 1987a,b). In these studies each observation is scored equal, regardless of duration, thus these data indicate only the presence or absence of food items in the diet, not their relative use. A study employing the use of timed (ie quantitative) feeding observations is necessary to give a better resolution of the species' dietary requirements. This study was aimed at achieving this by addressing the following question: are different food resources exploited in different proportions throughout the year?

#### 2.2 METHODS

This study was conducted at Waratah Creek (37°01'S, 149°23'E), in the Coolangabra State Forest, approximately 20km southeast of Bombala, New South Wales (see Fig 2-1). The study area contained six species of eucalypt (*Eucalyptus radiata*, *E. viminalis*, *E. fastigata*, *E. obliqua*, *E. ovata*, *E. cypellocarpa*). See Chapters 6 and 7 and Kavanagh (1984) for further details.

Thirteen field trips were conducted at the following times: ... Gliders were trapped in the study area and ear-tagged with coloured reflective tape to enable assessment of the number of individuals observed during each field trip (see Chapter 6). ...

Yellow-bellied gliders were located with a 12V 100W spotlight. Initial location was greatly facilitated by their extraordinary vocal behaviour (Kavanagh & Rohan-Jones 1982). After locating a glider, it was followed for as long as possible (up to 3 hr in 1984 but often for an entire night in 1985 and 1986; see Chapter 4) and observed with a 55W 'red' spotlight and a pair of binoculars. All feeding activities were timed to the nearest 1/2 min and recorded on tape. Observations commenced at dusk (when the gliders left their dens) and continued until approximately 0300h unless followed for an entire night. During each field trip except December 1984, at least one observation period was conducted throughout the night.

##### 2.2.1. Feeding Behaviour

A total of 122.4 hr was spent observing feeding by yellow-bellied gliders. The following feeding behaviours were identified on the basis of the spotlighting observations. Daytime observations of the substrate at which gliders were observed foraging were made in order to confirm the identity of the food types being ingested.

Eucalypt sap feeding:- gliders were observed clinging to the trunks of eucalypts and licking at the 'V'-shaped incisions they had made into the bark. Licking was interspersed with relatively short bouts of bark gouging to extend the incisions or create new ones.

*final paragraph in lit review/introduction*

*outlines objectives of study*

*between rationale and methods*

*locates study site*

*describes site*

*when the study was carried out*

*general comments about how study was conducted*

*first of two sections detailing how study was carried out*

*paragraphs detailing specific observations*

### ACADEMIC LITERACY

Learning, Teaching & Curriculum – Learning Development

## Example: methods section in a thesis

Honeydew feeding:- gliders were presumed to be harvesting honeydew when engaged in branch and leaf-licking activities (Smith 1982a). Honeydew is .... Scale insects were clearly seen with binoculars and were present on the leaves occasionally discarded by gliders when leaf-licking. Trees containing psyllids were uncommon and could be distinguished ...

*observation methods / criteria*

Arthropod feeding:- gliders were observed to harvest arthropods by peeling back eucalypt bark and by searching through (gleaning) clumps of foliage. Bark arthropods were harvested in three ways; by peeling back the bark being shed by the tree and consuming exposed arthropods (Craig 1985, Kavanagh 1987a), by searching through and breaking open the bark ribbons accumulated in the forks of *E. viminalis* and by shredding the rough bark of *E. fastigata* in search of beetle larvae (Kavanagh 1987a).

*behaviours observed and recorded*

Manna feeding:- This behaviour consisted of biting and licking the small branches and leaves of eucalypts (Kavanagh 1987a). Manna is the crystalline sap which forms at sites of insect damage on leaves and branches (Smith 1982a). Leaves and small branches were often discarded during feeding and examination of these showed the remains of manna.

Nectar feeding:- gliders were observed climbing amongst the canopy of eucalypts and drawing clumps of flowers toward the mouth so that these could be licked.

### 2.2.2. Indices of Food Availability.

Owing to the large home range of these gliders (34-88 ha; Chapter 7) and the complexity of the forest habitat, it was only possible to collect indices of food availability at regular intervals. Sap flow measurements were made during each trip, and this forms the basis of Chapter 3.

*details methods used to assess food availability*

Within 100ha of the forest, a grid with 100m intervals had been laid out for a previous study (see Kavanagh 1984). Within this area, 150 tagged trees (out of the 250 used by Kavanagh 1984, 1987a) were visited during each sample period between February 1985 and July 1986, and scored for the number of flowers present and the amount of bark being shed. The invertebrates harvested by gliders at other localities were predominantly those that live beneath the smooth bark of eucalypts (Henry & Craig 1984, Craig 1985, Goldingay pers obs). These arthropods become available to gliders only when the smooth bark is being shed. Gliders also harvest honeydew produced by psyllid nymphs which live under this bark (Henry & Craig 1984, Goldingay pers obs). The availability of this food resource (ie arthropods and honeydew) is therefore determined primarily by the bark-shedding pattern of the eucalypts.

*further observational methods*

*results and rationale for an assessment method*

To assess the change in the abundance of shedding bark, each marked tree was given a score (0 = 0-10%, 1 = 10-30%, 2 = 30-50%, 3 = 50-70%, 4 = 70-100%) based on the proportion of 2m sections of smooth bark on the trunk and branches which had peeling bark present. This index was averaged for each species to give an abundance index. Flower abundance was estimated by counting the number of ...

*details procedure for a particular type of assessment*

The *E. cypellocarpa* producing honeydew could be readily identified because of the blackening of branches caused by a mould growing on the bark in the sugary exudate (see above) ...

*key signs used to identify specific food source*

