Invertebrates and the Kojonup Nature Reserve Fire Management Programme

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Kojonup is on the edge of the Western Australian wheatbelt. The several nature reserves in this Shire are of interest in view of the paucity of undisturbed land within the region. A fire management programme has recently been initiated for these reserves by the Department of Fisheries and Wildlife. The programme objectives include the reduction of wildlife hazards to wildlife, preservation of the aesthetic values of reserves and also the promotion of vigour and diversity of flora and fauna.

In May 1976 staff of the W.A.I.T. Biology Department and BIOSTAS (the Biology Students Association) commenced long-term monitoring of the effects of prescription burning on the flora and fauna of five Kojonup reserves. BIOSTAS has been handling the flora and vertebrate fauna aspects of the study while the author and Rob Emery have been investigating the invertebrate fauna, with particular reference to ants. This aspect of the study has been funded by the W.A.I.T. Environmental Studies Group. The first year of the study has been occupied with documenting baseline data on flora and fauna, since the first prescription burns were not performed until last autumn. These studies will be reported on in the near future although I wish to describe here what information we hope to obtain by studying the invertebrate fauna.

Perhaps our concern with such small animals should first be justified. A recent submission to the Senate Standing Committee on Science and the Environment by the Australian Entomological Society stated that "insects are known to contribute a considerably greater biomass than vertebrates to forest faunas and they include more species, usually by several orders of magnitude". In addition to this high biomass, insects, and other invertebrates, are important agents for decomposition, plant growth limitation, seed dispersal and destruction, the enhancement of soil health and so on. Therefore in view of their predominant importance in ecosystems and their suitability for meaningful quantitative studies; invertebrates should naturally be considered when monitoring mans land-use activities.

Towerlup Creek Reserve No. 17760 Compartment 1 before experimental prescription burn.

Four characteristics of a burn should be considered when monitoring its effects. These are its intensity, its frequency, its timing and the size and patchiness of the burn area. The management programme specifies prescription burning of approximately equal sized compartments in autumn on an eight year cycle. Our monitoring therefore concentrates on the effects of varying fire intensity although the other characteristics will also be considered.

Our first objective was to describe the seasonal variation in invertebrate abundance and activity in order to provide a backdrop against which to consider the effect of an autumn burn. Since this sort of work takes a large time commitment, we have confined our initial observations to Towerlup Nature Reserve No. 17760. Grids and transects of pitfall traps were established in May 1976 in a control compartment and a compartment scheduled for burning in the Autumn of 1977. The traps have now been running for one week periods in every month so we have one full years pre-fire data and are currently gathering our early post-fire recordings. Sorting and identification of the trap catches is time consuming so most invertebrates have only been sorted to family or order level. Since promotion of species diversity is one of the reserve management programme objectives, the ants have been selected for sorting to species level. It is anticipated that the diversity of this representative group will reflect that of the remaining invertebrate fauna. Thirty six ant species have been collected from this reserve and a total of sixty two species have been accumulated from pitfall trap samples and hand collections throughout the five main Kojonup reserves.

Towerlup Creek Reserve during burn.

We intend to establish invertebrate monitoring schedules in other Kojonup reserves. In order to economise on effort, Rob Emery has sampled and made a statistical comparison of the ant faunas in the five major nature reserves at Kojonup, (Mininup, No. 2243; Towerlup, No. 17760; Jowerlup, No. 17759; Mettabinup, No. 15388; Narlingup, No. 8617). His

results reveal that the ant faunas of 17760 and 17759 are similar, that of 8617 and 15388 are similar and not unlike that of the first two reserves mentioned, while that of 2243 is the most distinct. This suggests that the existing sampling programme may provide adequate information on the first four reserves while a separate programme could profitably be initiated in the Mininup Nature Reserve.

The study which I have described forms part of a larger programme of fire ecology monitoring throughout the forests and woodlands of the south-west of this State. It is hoped that the results may be integrated to provide a greater insight into the effects of the various fire management programmes which are currently being practised so that recommendations on the environmentally most desirable approach may be adopted.