

Distribution of Freshwater Fish in the South-Western Corner of Australia



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WATER AND RIVERS COMMISSION REPORT WRT4 1996

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The Distribution of Freshwater Fish in the South-Western Corner of Australia

Report to Water and Rivers Commission

David Morgan, Howard Gill & Ian Potter

Fish Research Group
School of Biological and Environmental Sciences
Murdoch University

Water and Rivers Commission Policy and Planning Division

WATER RESOURCE TECHNICAL SERIES

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STREAMLINE ABSTRACT

This study investigates the distribution of freshwater fishes in the Busselton to Walpole Region. A total of 311 sites in 19 major catchments along the south-west coast from Capel to Walpole, were sampled using a variety of methods. New data was collated with that from previous studies to generate 15 species distribution maps. Habitat and life history notes and recommendations for conservation are made for each species. Changes in fish distribution are also commented upon.

This study contributes to series of documents published for the purposes of water allocation planning in the Busselton to Walpole Region. Other publications focus on the following topics:

- · Recreational Use on Waterbodies in the Busselton Walpole Region
- Report on an Investigation into the Aboriginal Significance of Wetlands and Rivers in the Busselton-Walpole Region.
- · Environmental Significance of Wetlands and Rivers in the Busselton Walpole Region
- Historical Association of Wetlands and Rivers in the Busselton Walpole Region.
- Divertible Water Resources

Key Words

Water Resources Planning, Freshwater Fish Distribution, Wetland and Rivers, Busselton to Walpole, Western Australia.

FOREWORD

The Water and Rivers Commission's Policy and Planning Division is currently undertaking a series of studies aimed at developing a water resources allocation strategy for each of the six regions into which the State has been divided for the purpose. Allocation strategies are to be based on the Commission's aim of promoting a sustainable balance between environmental, economic and social values of the State's water resources. This report contributes directly to that aim.

This current study relates to the Busselton - Walpole Region of the South West. It is the second region to be covered and follows a study of the Perth - Bunbury Region carried out between 1985 and 1991.

As part of the study a consultant was engaged by the Commission to investigate the distribution of the south-west's highly endemic and depauperate fish fauna in the wetlands of the region.

This report by the consultants is being published by the Commission in order to inform the community, and to encourage wide debate on this component of the community's need for water, and on the allocation planning process as a whole. While this report has been prepared consistant with the Commission's resource management aims, many of the opinions expressed are those of the consultant and are not necessarily all endorsed by the Water and Rivers Commission.

The Commission would welcome comments on the report from any interested person or organisation. Comments should be addressed to the undersigned.

Tim McAuliffe

Director, Policy and Planning Division

Water and Rivers Commission

November 1996

ABSTRACT

A total of 311 sites in the 19 major watersheds in the south-western corner of Australia, bounded by Capel in the north-west and Walpole in the south-east, were sampled for freshwater fish using one or more of the following methods: seine netting, dip netting, trapping, electrofishing and light trapping and haul netting for larvae. The fish caught at each site were identified and the number of each species recorded. The water depth and, where appropriate, the approximate size of the water body at each site were recorded. The predominant vegetation type was also noted. These data were then collated with those derived from the studies of Christensen (1982) and Jaensch (1992), and with the records of the Western Australian Museum. comprehensive distributional data sets, compiled for each of the freshwater fish species found in this region, were subsequently used to produce distribution maps for each of those freshwater species endemic to southwestern Australia, namely, Lepidogalaxias salamandroides, Galaxias occidentalis, Galaxiella nigrostriata, Galaxiella munda, Bostockia porosa, Edelia vittata and Nannatherina balstoni. Distribution maps were also produced for the anadromous lamprey Geotria australis, those native species which are commonly found in the freshwaters of the region, but have a recent marine origin, i.e. Leptatherina wallacei and Pseudogobius olorum, and those species introduced into freshwater in the region, i.e. Oncorhynchus mykiss. Salmo trutta, Gambusia holbrooki and Perca fluviatilis.

The most common and widespread native freshwater fishes were *G. occidentalis*, *B. porosa* and *E. vittata*. These species were found in a variety of habitats throughout the entire sampling regime and in all river catchments. These species were also present in the many of the lakes and pools of the region. The freshwater catfish, *Tandanus bostocki*, was caught at only two sites during the present study (Alexander Bridge on the Blackwood River and at Lake Smith), and was recorded at only Lake Wilson by Jaensch (1992), and at Pemberton and Nannup in the Museum Records.

The remaining endemic species, L. salamandroides, G. nigrostriata, G. munda and N. balstoni, were effectively restricted to the region bounded by Margaret River in the west and Albany in the east. However, G. nigrostriata, G. munda and N. balstoni have disjunct distributions, each having an isolated population at

Gingin, which is well to the north of the other populations. While *L. salamandroides* and *G. nigrostriata* were almost always associated with the ephemeral pools of the southern peat flats the latter species was also found in very low numbers in Lakes Doggerup and Samuel. Although *N. balstoni* was most abundant in the pools of the peat flats, it was also present in very low numbers in a number of rivers and lakes. *Galaxiella munda* was also found in a number of pools in the peat flats, but was most common in the headwaters of the major rivers of the area.

Adult *G. australis* were recorded migrating up the Warren, Donnelly and Margaret Rivers during winter and spring. Although the precise locations at which they spawn are unknown, a number of maturing adults were caught both in isolated pools and the main channel of the headwaters of the Warren River in autumn and winter. Ammocoetes were collected from shallow silty banks in the Capel, Margaret, Donnelly, Warren, Gardner, Shannon and Deep Rivers, while downstream migrants were typically associated with the sandy substrates of the deeper and faster-flowing waters of these systems.

The endemic fish with recent marine origins that were frequently caught in the freshwaters of the south-west, namely *L. wallacei*, *P. olorum* and *Afurcagobius suppositus*, were generally associated with coastal water bodies. However, these species were found considerable distances inland, e.g. Blackwood River, and in a number of isolated lakes, e.g. Lake Jasper.

The most common and widespread exotic species in the south-western corner of Australia was *G. holbrooki*, but *P. fluviatilis* was also often locally abundant. Both of these species were generally associated with habitats that had been substantially altered by human activity. For example, these species were often common in reservoirs, e.g. Big Brook Dam, in mined areas, e.g. Collie River South Branch, RGC Mineral Sands, and in those systems subject to enrichment through agricultural run-off, e.g. certain areas of the Blackwood River, Capel River, Lake Unicup. The two trout species, *O. mykiss* and *S. trutta*, were rarely captured in large numbers, and were only captured in those systems where regular stocking had taken place, i.e. predominantly in the streams of the Pemberton area.

Habitat alteration and possibly the introduction of exotic species pose the main threats to the highly endemic fish fauna of this region. Habitat alteration is likely to occur through the construction of water points for fire fighting. road maintenance, mineral sand exploration and mining, the construction of dams, groundwater extraction and also agricultural and forestry practices in the uppermost catchment, causing alterations to inflow, salinisation, siltation and eutrophication. Although three of the endemic species, G. occidentalis, B. porosa and E. vittata, are typically represented by large populations in most types of habitat throughout their extensive ranges, and are thus currently under no threat, local populations may be threatened. In contrast, four of the endemic freshwater species, L. salamandroides, G. nigrostriata, G. munda and N. balstoni, are generally represented by small populations in specific habitats and have a very restricted range. These latter species can therefore be considered to be potentially vulnerable to the continuing

loss or alteration of habitat and to the introduction of non-native species.

From the results of this study, it would appear that the most important actions that should be taken to ensure the conservation of our depauperate but unique freshwater fish fauna is the maintenance of 'natural' flow regimes in rivers and the preservation of the lentic water bodies of the peat flats. To ensure this, buffer zones should be maintained in areas used for farming and/or forestry and the effects of water usage on stream flow should be minimised, and the position of new water points, roads etc. in the peat flats should be carefully located. Furthermore, every effort should be made to ensure that non-endemic species should be introduced only into water bodies designated appropriate by the W.A. Fisheries Department.

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1.0 INTRODUCTION

South-western Australia is defined as the region bounded by Geraldton in the north-west and Esperance in the south-east. This region has a typical Mediterranean climate, with cool wet winters and warm/hot dry summers (Lake, 1971; Allen, 1982). It contains numerous short coastal rivers, lakes and flats, the first of which are thus subjected to large seasonal fluctuations in flow rates. Furthermore, water levels in these water bodies, which are high in winter, as a result of the heavy winter rains, decline markedly in summer, when there is little or no rain.

Geological, palaeoclimatic and palaeobotanical evidence suggests that the biota of the south-western corner of Australia has been separated from other regions of Australia since at least the middle Miocene, i.e. for at least 15 million years (Archer & Fox, 1984). This isolation is believed to have led to the speciation of the biota in situ, thereby accounting for the high endemicity of the flora and fauna that is characteristic of the region today (Archer & Fox, 1984). The unique assemblages of plants and animals in this region would thus alone argue that a high priority should be given to both a description of its biota and the formulation of management plans for its conservation. This priority is particularly relevant since the increasing human exploitation of the water, timber, agricultural and tourist resources of south-western Australia is undoubtedly having an increasing impact on both the aquatic and terrestrial ecosystems of the region. It should be noted that, not only is the flora and fauna of south-western Australia highly endemic, but that the freshwater fauna is also far more depauperate than that of south-eastern Australia (Allen, 1982, 1989; Bunn & Davies, 1990). The latter authors concluded that this low diversity can be attributed to a number of factors, including the insular nature of the southwest, a history of greater aridity, and an extremely low level of primary productivity.

South-western Australia contains only ten species of native freshwater fish, eight of which are endemic to the region (Allen, 1982). These ten species, which belong to seven genera and five families, comprise one species of the Plotosidae (*Tandanus bostocki*), the sole representative of the Lepidogalaxiidae (*Lepidogalaxias salamandroides*), five species of the Galaxiidae (*Galaxias maculatus, Galaxias truttaceus, Galaxias occidentalis, Galaxiella nigrostriata* and *Galaxiella munda*), one species of the Percichthyidae (*Bostockia porosa*) and two representatives of the Nannopercidae (*Edelia vittata* and *Nannatherina balstoni*).

With the exception of the freshwater catfish, *T. bostocki*, none of these endemic species typically exceeds 140 mm in total length and five of these species have maximum total lengths of less than 90 mm (Allen, 1989; Morgan *et al.*, 1995a). Four of these species, *L. salamandroides*, *G. nigrostriata*, *G. munda* and *N. balstoni*, are typically confined to the high rainfall region in the extreme lower south-western corner of Western Australia, although disjunct populations of *G. nigrostriata* do occur at Bunbury and Gingin, while populations of *N. balstoni* and *G. munda* also occur at Gingin (Allen, 1989, pers. comm.). The remaining species, *T. bostocki*, *G. occidentalis*, *B. porosa* and *E. vittata*, are much more widely distributed.

The biology of the eight species endemic to south-western Australia has been studied in recent years. Information is thus now available on the life history and ecology of T. bostocki (Morrison, 1988; Hewitt, 1992), salamandroides (Pusey, 1981, 1983, 1989. 1990: McDowall & Pusey, 1983; Leung, 1988; Allen & Berra, 1989; Berra & Allen, 1989, 1991, 1995; Berra et al., 1989, 1990; Pusey & Stewart, 1989; Martin et al., 1993), G. occidentalis (Pen & Potter, 1991a, b), G. nigrostriata (Pen et al., 1993), G. munda (Pen et al., 1991), B. porosa (Pen & Potter, 1990), E. vittata (Shipway, 1949; Pen & Potter, 1991c), and N. balstoni (Morgan et al., 1995a).

The remaining two freshwater species, G. maculatus and G. truttaceus, are both widely distributed throughout southeastern Australia, possibly reflecting the presence of a marine larval stage in the life cycles of the diadromous forms of these species (McDowall & Frankenberg, 1981; Allen, 1989). While G. maculatus is known to occur in coastal streams and swamps between Denmark and Esperance (Allen, 1982; Jaensch, 1992), G. truttaceus is thought to be the rarest galaxiid in the south-west, having been collected only in low numbers from a small area between Albany and Two Peoples Bay (Allen, 1982). Although the biology of these two species has been extensively studied in eastern Australia (Benzie, 1968a, b, c, d; Pollard, 1971a, b, 1972a, b, 1973, 1974; Chessman & Williams, 1975; Humphries, 1989, 1990), there have been no investigations on the populations of these species in south-western Australia.

The sole representative of the monotypic family Geotriidae, *Geotria australis*, an anadromous species, is also found in south-western Australia, while a number of estuarine species, for example, *Leptatherina wallacei*, *Pseudogobius*

olorum and Afurcagobius suppositus, are also common in the freshwaters of south-western Australia. Detailed accounts of various aspects of the biology of these species are available (Potter et al., 1980, 1983, 1986a, b; Prince et al., 1982a, b; Prince & Potter, 1983; Potter & Hilliard, 1986; Gill & Potter, 1993; Gill & Humphries, 1995).

Four exotic freshwater species, namely Gambusia holbrooki, Oncorhynchus mykiss, Salmo trutta and Perca fluviatilis, are also found throughout south-western Australia, the last three species growing to considerably longer lengths than the native species. These last three species were introduced into south-western Australia in attempts to 'enhance' freshwater fishing in the region, while the first species was introduced in an attempt to control mosquito populations. Although a further two species. namely Carassius auratus and Phalloceros caudimaculatus. have also been introduced into south-western Australia, their distributions are generally restricted to the Swan Coastal Plain (Morgan, unpublished data). The limited information on the impacts of introduced species in southwestern Australia, and studies on the same or comparable species in eastern Australia, demonstrate that care must be taken to ensure that the introductions of fish do not have a deleterious effect on the native fauna of south-western Australia (Lloyd, 1989; Hutchinson, 1991; Pen & Potter, 1991d, 1992; Morgan et al., 1995b).

A number of large freshwater fish species have been translocated from eastern Australia into south-western Australia, in an attempt to 'enhance' freshwater fishing in the region. These species included *Maccullochella peeli* in the 1890s and *Macquaria ambigua* and *Bidyanus bidyanus* in ca 1900, but of these early introductions, only *M. peeli* established a breeding population (Morrissy, 1994). More recently, the Fisheries Department has been considering the proposal that large species should be translocated from eastern Australia, in order to fulfil anglers calls for additional recreational species (see for example Prokop, 1994, and papers therein).

While some data are available for the distributions of freshwater fish in the lower south-west (see McDowall & Frankenberg, 1981; Allen, 1982, 1989; Christensen, 1982; Pusey & Edward, 1990; Jaensch, 1992; Morgan *et al.*, 1995a), these studies were restricted in scope, either concentrating on a particular area, water type or species, or employing just one sampling method, or were aimed only at providing a broad overview.

The aim of the present study was to provide detailed information on the distribution of the different species of freshwater fishes found in the south-western corner of Australia and to give a general account of the habitat types in which they each occur. The collation of data from this study with relevant Museum Records and the records of Christensen (1982) and Jaensch (1992) have provided a reliable account of the distribution of freshwater fishes in the south-western corner of Australia between Capel in the north-west and Walpole in the south-east.

2.0 MATERIALS AND METHODS

Study Area

Between 1994 and 1996, 311 sites were sampled in various permanent rivers, lakes and wetlands, and a considerable number of ephemeral wetlands and roadside pools, located in the south-western corner of Australia, between Capel in the north-west and Walpole in the south-east (Fig. 1, Table 1).

Sampling Methods

Juvenile and adult fish were sampled using seine nets, scoop nets, fish traps and an electrofisher while fish larvae were collected using haul nets, scoop nets and larval light traps. The seine net consisted of two 4 m wings, a 2 m pocket and a 1.5 m drop (all 3 mm mesh), while the scoop nets consisted of 300 mm equilateral triangles of 250, 500 and 1000 µm mesh and the larval haul net comprised a 1 m² pocket of 500 um mesh. The larval light traps, which were constructed of clear perspex and used cyalume sticks for their light source, were placed in pools and streams at dusk and retrieved the following morning. Collapsible fish traps (450 x 250 x 250 mm), consisting of 3 mm woven mesh, and the electrofisher and scoop nets were employed in areas where the seine net could not be used. The electrofisher, a 400 watt battery powered Smith-Root Inc. 12-A model, was also used to establish whether ammocoetes of Geotria australis were present in river beds.

Habitat Type

Approximate site size, water depth and vegetation type were recorded at each site sampled.

Collation of Data

The data collected during the present study were collated with W.A. Museum Records and data recorded by Christensen (1982) and Jaensch (1992). studies, which include information on the distribution of freshwater fish in lower south-western Australia, were omitted if, precise distributional data were not given or if these data were included in the Museum Records e.g. McDowall & Frankenberg (1981) and Allen (1982, 1989) are taken from the Museum Records and the work of Pusey & Edward (1990) does not include geographic co-ordinates. These data were then used in conjunction with published studies to produce a taxonomic description, details of distribution and abundance, habitat associations, brief notes on the biology and ecology, and conservation recommendations for each species. N.B. the characteristics given in the taxonomic

descriptions and the notes on the biology for each species are taken from the following sources, unless otherwise stated:-

All species - Allen (1989).

Endemic species

Plotosidae

Tandanus bostocki - Morrison (1988).

Lepidogalaxiidae

Lepidogalaxias salamandroides - McDowall & Pusey (1983), Pusey (1983), Pusey & Stewart (1989).

Galaxiidae

Galaxias occidentalis - McDowall & Frankenberg (1981), Pen & Potter (1991a, b), Gill & Neira (1994).

Galaxiella nigrostriata - McDowall & Frankenberg (1981), Pen et al. (1993) Gill & Neira (1994).

Galaxiella munda - McDowall & Frankenberg (1981), Pen et al. (1991), Gill & Neira (1994).

Percichthyidae

Bostockia porosa - Pen & Potter (1990).

Nannopercidae

Edelia vittata - Pen & Potter (1991c).

Nannatherina balstoni - Morgan et al. (1995a).

Anadromous species

Geotriidae

Geotria australis - Potter et al. (1980, 1983, 1986a, b), Potter & Hilliard (1986).

Species with recent marine origins

Atheriniidae

Leptatherina wallacei - Prince et al. (1982a, b), Prince & Potter (1983).

Gobiidae

Pseudogobius olorum - Gill et al. (1992, in press), Gill (1994), Gill & Potter (1993).

Afurcagobius suppositus - Gill et al. (1992), Gill (1993, 1994), Gill & Potter (1993).

Introduced species

Poeciliidae

Gambusia holbrooki - Lloyd et al. (1986), Pen & Potter (1991d).

Percidae

Perca fluviatilis - Pen & Potter (1992).

Abbreviations Used in Taxonomic Descriptions

D1 - first dorsal fin.

D2 - second dorsal fin.

A - anal fin.

P - pectoral fin.

V - ventral/pelvic fin.

C - caudal fin.

SL - standard length.

TL - total length.

Roman numerals represent the number of spiny fin rays in a fin.

Arabic numerals represent the number of soft fin rays in a fin.

3.0 RESULTS AND DISCUSSION

3.1 Identification, distribution, abundance, notes on the biology of and conservation recommendations for each of the freshwater fish that are endemic to the south-western corner of Australia

Tandanus bostocki Whitley, 1944 (Plotosidae)

Lepidogalaxias salamandroides Mees, 1961 (Lepidogalaxiidae)

Galaxias occidentalis Ogilby, 1900 (Galaxiidae)

Galaxiella nigrostriata (Shipway, 1953) (Galaxiidae)

Galaxiella munda McDowall, 1978 (Galaxiidae)

Bostockia porosa Castelnau, 1873 (Percicthyidae)

Edelia vittata Castelnau, 1873 (Nannopercidae)

Nannatherina balstoni Regan, 1906 (Nannopercidae)

Tandanus bostocki Whitley, 1944 (Plotosidae)

Common names: Freshwater cobbler, catfish.

Identification: D1 I, 5-6; D2, C and A contiguous, approximately 150 soft rays; gill rakers on first branchial arch 16-21; sharp serrated spine on D1 and P. D1 and D2 separate. Mouth surrounded by four pairs of barbels. Maximum size 400 mm TL. Coloration middark brown, grading to whitish on breast. Fins heavily pigmented.

Distribution: Tandanus bostocki is found in the coastal region between the Moore River in the north and the Frankland River in the south. This species was only captured on two occasions during the present study i.e. Alexander Bridge on the Blackwood River and at Lake Smith (Table 1). Jaensch (1992) caught *T. bostocki* from Lake Wilson and the Museum have only two records for this species in the current study area (Pemberton and Nannup).

Abundance, habitat and ecology: Although the sampling methods used during this study were not ideally suited for capturing large numbers of *T. bostocki*, sampling in the Serpentine area, using the same techniques, yielded a number of this species. It would therefore appear that while this species is locally abundant in some regions, it is probably rare in much of the study area. This species has been recorded from

lakes and slow flowing rivers and streams. Insect larvae, freshwater shrimps, crayfish, molluscs and small fish are reported to be important dietary items. *Tandanus bostocki* can live for at least nine years. This species is by far the largest of the freshwater endemics of south-western Australia and is the one endemic which is sought by recreational anglers.

Reproduction: In Wungong Dam, to the south-east of Perth, the majority of fish did not become sexually mature until the end of their fourth year of life. Breeding occurred between November and January. The mean fecundity and the mean diameter of mature eggs were approximately 5 000 and 1.8 mm, respectively.

Threats: Habitat alteration may pose threats to some populations of this species.

Conservation status and actions: As *T. bostocki* occurs in relatively large numbers in several reservoirs, it would appear that this species does not warrant inclusion on the Australian Society for Fish Biology's list of Australian threatened fishes.

Conservation recommendations: As little is known about this species in the current sampling area, no recommendations for conservation action are given.

Lepidogalaxias salamandroides Mees, 1961 (Lepidogalaxiidae)

Common names: Western Australian or Australian salamanderfish, salamanderfish, Shannon mud minnow, mud minnow.

Identification: D 5-8; A 13-16; P 10-12; V 4; C 12-14; gill rakers on first branchial arch 4-7; vertebrae 43-47; scales absent dorsally and ventrally, thin embedded scales on side, with a mid-lateral line series of about 65; anal fin and surrounding scales modified to form intromittent organ in males. Maximum size 65 mm SL, common to about 40 mm SL. Brown to grey in colour, with a series of dark saddle-like markings dorsally, midlateral series of dark brown blotches forming a pair of longitudinal stripes during the breeding season (most distinct in males), black bar extending from snout through eye and across operculum, ventral surface only lightly pigmented.

Distribution: Although *L. salamandroides* is largely restricted to a small area of coastal peat flats between

Windy Harbour and Walpole, Museum records indicate that in 1976 isolated populations were found as far north as Margaret River and as far east as Albany (Fig. 2, Table 2).

Abundance, habitat and ecology: Lepidogalaxias salamandroides was absent in most habitats within its area of distribution, but was occasionally locally abundant, particularly in the isolated and ephemeral pools of the peat flats within the Doggerup Creek, Gardner River and Shannon River watersheds (e.g. pools/creeks on Windy Harbour, Chesapeake, Deeside and Beardmore Roads) (Table 2). Although L. salamandroides was never caught in any of the rivers or lakes of the south-west, it was found in very low numbers in the floodwaters of Lake Smith. The sites in which this species was caught were almost always located in the peat flats and adjacent forested areas. The appearance of fish in previously dry pools, shortly after the first rains of autumn, and also their appearance within hours of a pool being artificially filled with water, indicate that this species can aestivate or survive in moisture below the substrate surface. Unlike G. nigrostriata, which was often found in pools that were almost completely dry, L. salamandroides was very rarely captured in such pools, indicating that this species buries itself before the water has fallen to this very low level. The water in the shallow isolated pools in which L. salamandroides was typically found, is generally dark and acidic (pH 3.0-6.0) and exhibits marked seasonal temperature fluctuations (11-35 °C). Lepidogalaxias salamandroides has several adaptations which would be of value in these harsh conditions. For example, the eyes are adnate, lacking a circum-orbital sulcus, and are covered by a secondary eyelid, these characters presumably protecting the eyes when burrowing and aestivating. This species also has the ability to 'bend its neck', an adaptation presumably related to searching for food, since the muscles necessary for controlling eye movements in other teleosts are absent in L. salamandroides. Although the adults of this species were often caught close to riparian vegetation, they were also caught in open water. The larvae of this species were typically found feeding in very shallow water (<10 cm) in areas that were not subject to shade. As the larvae increase in size, they gradually move into deeper water. Lepidogalaxias salamandroides is a benthic species, a feature reflected in its diet, which comprises mainly dipteran larvae, trichopterans, cladocerans and ostracods.

Reproduction: Fertilisation is internal. The modified anal fin and associated scale sheaths of the males are used to clasp the female and thus permit direct transfer of sperm. The spermatozoa of *L. salamandroides* are considered to be unique among the teleosts (see Leung, 1988). The breeding season extends from July to September.

Habitat alteration and possibly the Threats: introduction of exotic species pose the main threats to L. salamandroides and also to the three other species restricted to the peat flat region. Habitat alteration is likely to occur through the construction of water points for fire fighting, road maintenance, mineral sand exploration and mining, groundwater extraction and also agricultural and forestry practices in the uppermost catchment (causing alterations to inflow, salinisation, siltation and eutrophication). It should be noted that the introduction of exotic fish species (Oncorhynchus mykiss, Salmo trutta, Gambusia holbrooki and Perca fluviatilis) and those species translocated from eastern Australia (Macquaria ambigua and Bidyanus bidyanus) has already occurred in the major catchments surrounding the peat flats. The introduction of these large and piscivorous eastern Australian species, which are well adapted to similar harsh environments, may pose a serious threat to the small endemic fish of southestern Australia.

Conservation status and actions: Much of the area in which *L. salamandroides* was found is in the D'Entrecasteaux National Park and therefore guarded against development. This species is classed as Restricted in the Australian Society for Fish Biology's list of Australian threatened fishes and is one of only four freshwater fishes in Australia that is believed to have Pangean origins.

Conservation recommendations: The most important conservation actions are the preservation of small pools, and the maintenance of the shallow areas in these pools which are utilised by their larvae, in the peat flats of south-western Australia. To ensure this, the position of new water points, roads etc. should be carefully monitored. For example, many of the roadside pools in which this species aestivates are mistakenly considered to be devoid of aquatic fauna when dry in summer, and, as such, are often drastically altered when either their substrate is used for 'fill', or the pools themselves are filled during routine road maintenance. Furthermore,

non-endemic species should be introduced only into appropriate water bodies.

Galaxias occidentalis Ogilby, 1900 (Galaxiidae)

Common names: Western minnow, Western galaxias.

Identification: D 10-12 (segmented); A 11-14 (segmented); P 12-15; V 7; C 16; vertebrae 50-57. A small freshwater fish with a scaleless, very elongate body and long straight gut, reaching about 65-75% of the body length. Lateral canine teeth present in both jaws and enlarged fangs at middle of lower jaw. Dorsal fin is posteriorly placed and originates above the origin of the anal ray; no adipose fin is present. Maximum size approximately 170 mm TL. Coloration is highly variable (lighter in clear water, almost black in peaty pools), generally olive-green dorso-laterally fading to whitish ventrally. A series of lateral dark bars are often present. Fins lightly pigmented.

Distribution: Galaxias occidentalis, together with Edelia vittata, are the most widespread of the freshwater fishes endemic to the south-western corner of Australia. Galaxias occidentalis has a range that extends from Winchester, about 250 km north of Perth, to Waychinnicup Creek, 80 km east of Albany. From the data collated during the present study (Fig. 3, Table 3), it is evident that G. occidentalis is widely distributed throughout the south-western corner of Australia. Indeed this species was found in all watersheds, except that of Lake Quitjup (Fig. 3, Table 3).

Abundance, habitat and ecology: Galaxias occidentalis was common and abundant in rivers, streams, lakes and in pools that are connected to streams throughout most of its range. Furthermore, this species was abundant in water bodies in both Karri and Jarrah forest (e.g. Donnelly River), the peat flats (e.g. D'Entrecasteaux National Park, see Fig. 2.1) and also in areas used for farming (e.g. Ludlow River, Blackwood River). Although this species was often seen close to riparian vegetation, it was also observed in large schools in open water (e.g. Lake Jasper). During the day, terrestrial fauna form the main component of the diet, although dipteran larvae and pupae, cladocerans and copepods are also important components. However, recent work has shown that this species also feeds at night, when the major food item ingested is the freshwater shrimp Palamonetes australis (Fairhurst unpubl. data). The life cycle of G. occidentalis typically

lasts for two years. The total length of the longest fish caught was 172 mm.

Reproduction: In the Collie River, south of Perth, males and females of this species attain lengths of approximately 70 and 75 mm at the end of their first year of life, and 90 and 100 mm at the end of their second year, respectively, with few fish surviving beyond their second year. Individuals in the Collie River attain sexual maturity at the end of their first year of life, at which time they move into creeks to spawn. Breeding occurs between early June and late September, with a peak in August. The mean fecundity and mean diameter of preserved mature eggs are 905 and 1.3 mm, respectively.

Threats: Since G. occidentalis was common throughout much of its extensive range, and was found in a wide variety of habitats, it is unlikely that the survival of this species is threatened. However, habitat alteration and the introduction of exotic species may pose threats to some populations of this species. For example, while G. occidentalis was absent/rare in the lakes of the RGC Mineral Sands and Muir Watershed, which contained large numbers of the introduced species Gambusia holbrooki, it was abundant in the streams of these areas, and in many of those lakes and streams elsewhere in the south-western corner of Australia which did not contain G. holbrooki, e.g. Lakes Jasper, Wilson, Smith, Maringup, Doggerup, Samuel; Rivers Shannon, Gardner, Donnelly, Margaret (Figs 3, 14). It should also be noted that G. holbrooki has been observed attacking G. occidentalis in the streams of RGC Mineral Sands. and that the majority of G. occidentalis in these streams had a higher degree of fin damage than those in the nearby Ludlow River, where G. holbrooki was far less common (Morgan, unpubl. data). circumstantial evidence collected during the present study suggests that Perca fluviatilis and trout species may have an effect on the native fish during dry years. For example, during summer, when water levels decline markedly, a number of isolated river pools in which these large piscivores were present contained very few native fish, while nearby pools, in which these introduced fish were absent, contained large numbers of natives.

Conservation status and actions: Considering the extensive distribution and large populations of *G. occidentalis* in many water bodies, it would appear that this species does not warrant inclusion on the Australian

Society for Fish Biology's list of Australian threatened fishes.

Conservation recommendations: The most important conservation action is to maintain 'natural' flow regimes which are necessary for successful spawning migrations and to preserve suitable habitat for spawning. To ensure this, buffer zones must be maintained in areas used for farming and/or forestry, while the effects of water usage on stream flow should be minimised. Furthermore, non-endemic species should be introduced only into appropriate water bodies.

Galaxiella nigrostriata (Shipway, 1953)(Galaxiidae)

Common names: Black-stripe minnow.

Identification: D 6-8; A 8-11; P 11-14; V 5-6; C 12-15; vertebrae 38-43; myomeres 38-42. A small freshwater fish with a scaleless, elongate body and long straight gut, reaching about 60-65% of the body length. Dorsal fin is posteriorly placed and originates anterior to the vertical that passes through the fifth anal ray; no adipose fin is present. Maximum size 48 mm TL. Between June and September, both the larvae and adults of this species are characterised by their striking coloration, which consists of two black longitudinal bands separated by a vivid yellow to red stripe. This brightly coloured lateral stripe gradually disappears after September and by December/January most fish have a relatively uniform brown to blackish colour. The larvae of G. nigrostriata are heavily pigmented and characterised by a very bright yellow to red stripe between the dorso-lateral and ventro-lateral black bands. The smallest preflexion larvae recorded was 4.12 mm TL.

Distribution: Galaxiella nigrostriata is restricted to the small area of coastal peat flats found in the southwestern corner of Australia that extends from Augusta in the west to Albany in the east, while disjunct populations have recently been discovered in a small pool at Bunbury and Gingin, approximately 200 and 400 km to the north, respectively (Allen, pers. comm.). It seems likely that this discontinuity in distribution represents the loss of suitable habitat caused by widespread urban and rural development in this region. From the results of this study, it is evident that the centre of the distribution of *G. nigrostriata* is in the peat flats

surrounding Windy Harbour (i.e. D'Entrecasteaux National Park) (Fig. 4, Table 4).

Abundance, habitat and ecology: Galaxiella nigrostriata was absent in most habitats within its area of distribution. However, this species was occasionally locally abundant, particularly in the isolated and ephemeral pools of the peat flats within the Doggerup Creek and Gardner River watersheds (e.g. pools/creeks on Windy Harbour and Chesapeake Roads) (Table 4). Although G. nigrostriata was never caught in any of the rivers of the south-west, it was found in very low numbers in Lakes Samuel and Doggerup and in the floodwaters of Lake Smith. The sites in which this species was caught were almost always located in the peat flats and adjacent forested areas. The water in the shallow isolated pools in which G. nigrostriata was typically found, was generally dark and acidic (pH 3.0-6.0) and exhibits marked seasonal temperature fluctuations (11-35°C). The appearance of fish in previously dry pools, shortly after the first rains of autumn, and also their appearance within hours of a pool being artificially filled with water, indicate that this species may aestivate or survive in moisture below the substrate surface. The ability of G. nigrostriata to survive in little water is clearly demonstrated by the occurrence of fish living in a shallow pool, approximately 30 cm in diameter. Although the adults of this species were often caught close to inundated riparian vegetation, they were also caught in open water. The larvae of this species were typically found feeding in very shallow water (<10 cm) amongst flooded riparian vegetation in areas that were not subject to shade. As the larvae increase in size they gradually move into deeper water. This species was often found contained Lepidogalaxias that also salamandroides, but was rarely abundant in those pools that contained the percicthyid Bostockia porosa or the nannopercid Nannatherina balstoni. Both of the latter two larger fish may prey on G. nigrostriata. Calanoid copepods and terrestrial fauna (flying ants and dipterans) are the main prey items ingested in all seasons, while other prey items are important seasonally, e.g. collembolans (winter), dipteran larvae and pupae (summer and autumn) and diatoms (autumn). The life cycle of this species typically lasts for just over one year, the longest male and female caught measuring 44 mm (0.22 g) and 48 mm (0.73 g), respectively.

Reproduction: At the end of their first year of life, males and females reach total lengths of 33 and 37 mm, respectively, and attain sexual maturity, developing a bright breeding livery comprising two black longitudinal bands separated by a vivid yellow to red stripe. This species is a multiple spawner and breeds between early June and September with a peak in activity between late June/early July, a period when water temperatures and day length are at their minimum.

Habitat alteration and possibly Threats: introduction of exotic species pose the main threats to G. nigrostriata. Habitat alteration is likely to occur through the construction of water points for fire fighting, road maintenance, mineral sand exploration and mining, groundwater extraction and also agricultural and forestry in the uppermost catchment (causing alterations to inflow, salinisation, siltation and eutrophication). It should be noted that the introduction of exotic fish species (Oncorhynchus mykiss, Salmo trutta. Gambusia holbrooki and Perca fluviatilis), and those species translocated from eastern Australia (Macquaria ambigua and Bidyanus bidyanus) has already occurred in the major catchments surrounding the peat flats. The introduction of the latter two large and piscivorous eastern Australian species, which are well adapted to similar harsh environments, may pose a serious threat to the small endemic fish of south-western Australia.

Conservation status and actions: Much of the area in which *G. nigrostriata* is found is listed as National Park. This species has been listed as restricted by the Australian Society for Fish Biology.

Conservation recommendations: The most important conservation action is preservating the small pools in the peat flats of south-western Australia, and inparticular, the shallow areas and riparian vegetation in these pools, which are utilised by their larvae. To ensure this, the position of new water points, roads etc. should be carefully monitored. For example, many of the roadside pools in which this species 'aestivates' are mistakenly considered to be devoid of aquatic fauna when dry in summer and, as such, are often drastically altered when their substrate is used for 'fill', or the pools themselves during routine road maintenance. filled Furthermore, non-endemic species should be introduced only into appropriate water bodies.

Galaxiella munda McDowall, 1978 (Galaxiidae)

Common names: Western mud minnow.

Identification: D 6-8; A 9-12; P 9-12; V 5-7; C 13-15; vertebrae 38-43; myomeres 41-43. A small freshwater fish with a scaleless, elongate body and long straight gut, reaching about 65-70% of the body length. Dorsal fin is posteriorly placed and originates posterior to the vertical that passes through the fifth anal ray; no adipose fin is present. Maximum size 58 mm TL. Between June and October, the adults of this species develop two olive-brown longitudinal bands that are separated by an orange stripe and a silver belly. The coloured lateral stripe gradually disappears to become a thin silver-white line after October and by January most fish have a relatively uniform light olive-brown colour. Larvae of *G. munda* are moderately to heavily pigmented. The smallest preflexion larvae recorded was 5.0 mm TL.

Distribution: Galaxiella munda is restricted to a small area in the south-western corner of Australia, that extends from Margaret River in the west to Albany in the east, with an isolated population approximately 100 km north of Perth at Gingin. The discontinuity in the distribution of this species may represent the loss of suitable habitat caused by widespread urban and rural development in the intervening region. During this study, G. munda was collected from the following watersheds; Margaret River, Warren River, Lake Muir, Doggerup Creek, Gardner River, Shannon River, Broke Inlet, Deep River, Frankland River, Kent River and Hay River (Fig. 5, Table 5). Other studies also found this species in the Blackwood River and Donnelly River watersheds (Fig. 5, Table 5).

Abundance, habitat and ecology: Galaxiella munda was rare throughout most of its distribution, but was occasionally abundant in the headwaters and tributaries of rivers, and in a number of shallow pools connected to streams. This species was most abundant in creeks and streams of the Gardner River and Shannon River watersheds (Table 5). For example, in Boorara Brook, a tributary of the Gardener River, over one hundred fish were caught in a small pool (3 m by 1 m), while one fish was found in a nearby 'pool', approximately 2 cm in diameter. Although the sites in which this species were caught were often located in the peat flats and adjacent forested areas, this species penetrated further into the forested areas than N. balstoni, G. nigrostriata and L. salamandroides. The water in the pools and streams in

which G. munda was typically found, was generally dark and acidic (pH 3.0-6.0) and exhibits marked seasonal temperature fluctuations (11-35 °C). Although the adults of this species were often caught close to the riparian vegetation of streams they were also caught in the open water of pools. The larvae of this species were typically found feeding in the very shallow water of pools (<10 cm) amongst flooded riparian vegetation in areas that were not subject to shade. As the larvae increase in size, they gradually move into the deeper water of the pools and then into the streams to which these pools are connected. Terrestrial fauna (dipterans) and dipteran larvae and pupae are the main component of the diet in winter, spring and summer, while cladocerans and copepods form the most important component in autumn. The life cycle of G. munda typically lasts for one year, the longest fish caught measuring 58 mm and weighing 0.98 g.

Reproduction: At the end of their first year of life, females and males reach total lengths of 47 and 43 mm, respectively, and attain sexual maturity, developing a breeding livery of two olive-brown longitudinal bands separated by an orange stripe. This species breeds between July and October, with spawning activity peaking in late August, when water temperatures and day length have begun to rise.

Habitat alteration and possibly the Threats: introduction of exotic species pose the main threats to G. munda and also to the three other species restricted to the peat flat region. Habitat alteration is likely to occur through the construction of dams, groundwater extraction and also agricultural and forestry practices in the uppermost catchment (causing alterations to inflow, salinisation, siltation and eutrophication). It should be noted that the introduction of exotic fish species (Oncorhynchus mykiss, Salmo trutta, Gambusia holbrooki and Perca fluviatilis) and those species translocated from eastern Australia (Macquaria ambigua and Bidyanus bidyanus) has already occurred in many of the major catchments in the region. The combined effects of habitat alteration and introductions may explain the apparent loss of G. munda from the headwaters of Lefroy Brook. Thus, whereas Pen et al. (1991) reported viable populations of this species in these waters, this study has found very few G. munda in these streams, and none above Big Brook Dam. It is therefore pertinent that during several recent dry years the reservoir immediately above Big Brook Dam (Fig. 5.1b) was the only upstream section of Lefroy Brook to

retain water during summer and autumn. Furthermore, during these dry years, the piscivorous *P. fluviatilis* was introduced to the reservoir and is now well established in this reservoir and in the headwater streams.

Conservation status and actions: Galaxiella munda is listed as restricted by the Australian Society for Fish Biology.

Conservation recommendations: The most important conservation action is the preservation of 'natural' flow regimes and suitable habitat, for all life cycle stages, in the small streams of south-western Australia. To ensure this, buffer zones must be maintained in areas used for both farming and forestry, and further introductions of non-endemic species should be made only into appropriate water bodies.

Bostockia porosa Castelnau, 1873 (Percicthyidae)

Common names: Nightfish.

Identification: D1 VII-VIII; D2 16-17; A III, 11-12; P 13-15; gill rakers on first branchial arch 11-12; tubed lateral-line scales 43-47. Greatest body depth 3.1-3.6 of SL. Deep notch between D1 and D2. Mouth large, extending to middle of eye. A series of large pores are present on the snout and around the eyes. Maximum size 160 mm TL. Coloration, mottled olive-brown to dark purplish-brown dorso-laterally (occasionally black in peat stained waters), grading to pinkish-white on breast and belly. Fins lightly to moderately pigmented, D1, D2, A and C spotted.

Distribution: Bostockia porosa is one of the most widespread of the freshwater fishes endemic to the south-western Australia, with a range that extends from Moore River in the north to Albany in the east. Our studies show that this species is found in the majority of watersheds sampled (Fig. 6, Table 6).

Abundance, habitat and ecology: Bostockia porosa was common and abundant throughout most of its range and is found in rivers, streams, lakes and pools. This species was typically found under ledges, rocks, logs and amongst inundated vegetation and was only found in open water when water levels had receded to such a point that no cover was available (Fig. 6.1). The very few small larvae of this species that have been collected were caught in the relatively deep open water of a pool that is connected to a stream and in the shallow floodwaters of a large pool. While, ostracods and

dipteran larvae are important dietary items in all seasons and for all size classes, larger prey types, such as odonatan larvae, decapods and gastropods become increasingly important as these fish increase in size. Although Pen & Potter (1990) considered that *B. porosa* was active mainly at night, recent work showed that juveniles fed predominantly during the day (Morgan, unpubl. data). The life cycle of *B. porosa* typically lasts for two years, although a male of six years has been recorded.

Reproduction: In the Collie River, south of Perth, the males and females of this species both attain lengths of ca 56 mm at the end of their first year of life, and reached 76 and 79 mm at the end of their second year and 85 and 91 mm by the end of their third year of life, respectively. Very few fish survive beyond their third year. In the Collie River, the majority of males attain sexual maturity at the end of their first year of life, while the majority of females do not attain maturity until the end of their second year. On attaining sexual maturity, fish move into flooded creeks to spawn. Breeding occurs between late August and early September. The mean fecundity and mean diameter of preserved mature eggs are 608 and approximately 1.5 mm, respectively.

Threats: Since B. porosa was common throughout much of its extensive range and found in a wide variety of habitats, it is unlikely that this species is threatened. However, habitat alteration and the introduction of exotic species may pose threats to some populations of For example, while B. porosa was this species. absent/rare in the lakes of the Unicup area, which contained large numbers of the introduced species Gambusia holbrooki, it was abundant in the streams of this area and in Lakes Wilson and Smith, water bodies which do not contain G. holbrooki. Furthermore, in the lakes and streams of RGC Mineral Sands at Capel, which contain large numbers of G. holbrooki and have little cover, B. porosa was only abundant in a stream which contained few G. holbrooki and had large amounts of cover in the form of aquatic macrophytes and boulders. Gambusia holbrooki has been observed attacking E. vittata in the RGC system and the majority of native fish, including B. porosa, in this system had a high degree of fin damage (Morgan, unpubl. data).

Conservation status and actions: Considering the extensive distribution of *B. porosa*, and its high abundance in some water bodies, this species does not

warrant inclusion in the Australian Society for Fish Biology's list of Australian threatened fishes.

Conservation recommendations: The most important conservation actions are to maintain 'natural' flow regimes which are necessary for successful spawning migrations, to preserve suitable habitat for spawning and the areas of riparian vegetation, rocks and submerged logs etc. with which the juveniles and adults of this species are usually associated. To ensure this, buffer zones must be maintained in areas used for farming and/or forestry, while the effects of water usage on stream flow should be minimised. Furthermore, nonendemic species should be introduced only into appropriate water bodies.

Edelia vittata Castelnau, 1873 (Nannopercidae)

Common names: Western pygmy perch, pygmy perch.

Identification: D1 VII-IX; D2 8-9; A III, 6-8; P 11-13; gill rakers on first branchial arch 11-13; tubed lateral-line scales interspersed with normal scales. Greatest body depth 2.9-3.3 of SL. Deep notch between D1 and D2. Mouth small, not extending to eye. Maximum size 68 mm TL. Coloration mid-dark brown, grading to whitish on breast and belly, often with brown mid-lateral stripe bordered by broad yellow-white stripes. Fins lightly to moderately pigmented. During the breeding season, females often become bluish dorsally, while males become darker and the whitish lateral stripes and belly become orange

Distribution: Edelia vittata, together with Galaxias occidentalis, are the most widespread of the freshwater fishes endemic to the south-western corner of Australia. Edelia vittata has a range which extends from the Moore River, north of Perth, to the Philipps River, east of Albany. During the present study, E. vittata was found in all watersheds (Fig. 7, Table 7).

Abundance, habitat and ecology: Edelia vittata was widespread and abundant in rivers, streams, lakes and pools. Furthermore, this species was abundant in water bodies in both Karri and Jarrah forest (e.g. Donnelly River), the peat flats (e.g. D'Entrecasteaux National Park) and areas used for farming (e.g. Ludlow River). This species was generally associated with riparian vegetation or other forms of cover (submerged macrophytes, algae, snags etc) and was rarely caught in open or deep water. While cladocerans, copepods and dipteran larvae are always important dietary items, this

species ingests a wide range of small prey types in all seasons. The life cycle of *E. vittata* typically lasts for just over two years, the longest fish caught measuring 68 mm and weighing 4.6 g.

Reproduction: In the Collie River, south of Perth, males and females of this species attain lengths of approximately 42 and 43 mm at the end of their first year of life and 51 and 53 mm at the end of their second year, respectively, with few fish surviving beyond the second year. Sexual maturity is attained at the end of their first year of life, at which time fish move into flood waters of the main river and associated creeks to spawn. Breeding occurs between late July and November with a peak in late September/early October. This species spawns more than once in a breeding season, with the mean diameter of mature eggs being 0.9 mm.

Threats: Since E. vittata was common throughout much of its extensive range, and was found in a wide variety of habitats, it is unlikely that this species is under any threat. However, habitat alteration and the introduction of exotic species may pose threats to some populations of this species. For example, while E. vittata was absent/rare in the lakes of the Swan Coastal Plain, which contain large numbers of the introduced species Gambusia holbrooki, it was abundant in streams of the lower south-west and in Lakes Wilson, Smith, Maringup etc. (Table 7), which do not contain G. holbrooki. Furthermore, the only lake of the RGC Mineral Sands at Capel that contains both large numbers of G. holbrooki and large amounts of cover in the form of aquatic macrophytes and algae, was the only one in which E. vittata was abundant. It should also be noted that G. holbrooki has been observed attacking pygmy perch in this pool, and that the majority of E. vittata in this lake had a higher degree of fin damage than those in the nearby Ludlow River, where G. holbrooki was far less common (Morgan, unpubl. data). This absence of this species from our samples in the upper Blackwood River may be attributed to both the high numbers of G. holbrooki and the salinity of the catchment.

Conservation status and actions: Considering the extensive distribution and large populations of *E. vittata* found in many water bodies, it would appear that this species does not warrant inclusion on the Australian Society for Fish Biology's list of Australian threatened fishes.

Conservation recommendations: The most important conservation action is to maintain 'natural' flow regimes

which are necessary for successful spawning migrations and to preserve suitable habitat for spawning. To ensure this, buffer zones must be maintained in areas used for farming and/or forestry, while the effects of water usage on stream flow should be minimised. Furthermore, to maintain local populations, further introductions of nonendemic species should be made only into appropriate water bodies.

Nannatherina balstoni Regan, 1906 (Nannopercidae)

Common names: Balston's Pygmy Perch or Perchlet, King River Perchlet.

Identification: D1 VII-VIII; D2 9-11; A III, 8-10; P 12-13; gill rakers on first branchial arch 6-15, very poorly developed; tubed lateral-line scales 2-17, interspersed with normal scales. Greatest body depth 3.4-4.0 of SL. Deep notch between D1 and D2. Mouth relatively large, extending to well under the eye. Maximum size 90 mm TL. Coloration mid to dark brown, grading to whitish on breast and belly, often with darker brown mid-lateral stripe bordered by broad yellow-white blotches or stripes. Fins lightly to moderately pigmented; D2, caudal, and anal fins variegated.

Distribution: Nannatherina balstoni is restricted to the small area of coastal peat flats in the south-western corner of Australia that extends from Margaret River in the west to Albany in the east, with an isolated population approximately 100 km north of Perth at Gingin (Fig. 8, Table 8). The discontinuity in the distribution of this species may represent the loss of suitable habitat caused by widespread urban and rural development in the intervening region. The centre of the distribution of N. balstoni is in the peat flats of the Doggerup, Gardner and Shannon River watersheds (Figs 2.1, 8, Table 8).

Abundance, habitat and ecology: This species is the rarest of all the endemic freshwater fishes of southwestern Australia. However, *Nannatherina balstoni* was moderately abundant in a number of shallow pools and creeks that often dry up in summer (e.g. pools/creeks on Windy Harbour, Chesapeake, Deeside and Beardmore Roads). It was only ever captured in very low numbers in the major rivers (e.g. Margaret, Scott, Donnelly, Shannon, Gardner and Deep Rivers) and lakes of the lower south-west (Lakes Quitjup, Smith, Doggerup and Maringup). The sites in which this species were caught

were almost always located in the peat flats and adjacent forested areas. The water in the shallow isolated pools in which N. balstoni was typically found, was generally dark and acidic (pH 3.0-6.0) and exhibits marked seasonal temperature fluctuations (11-35 °C). In winter and spring this species was typically found amongst inundated riparian vegetation, habitat which it presumably uses as both feeding and spawning grounds. Although the adults of this species were often caught close to this riparian vegetation, they were also caught in open water. The larvae of this species were typically found feeding in very shallow water (<10 cm) amongst flooded riparian vegetation in areas that were not subject to shade. As the larvae increase in size, they gradually move into deeper water. Larval (<15 mm) and small (15-25 mm) N. balstoni feed predominantly on cladocerans, while terrestrial fauna (arachnids and adults of hymenopterans, coleopterans and dipterans) are the main prey items ingested by N. balstoni >25 mm. The life cycle of this species typically lasts for one year. The total lengths of the longest male and female were 82 mm (5.6 g) and 90 mm (7.3 g), respectively.

Reproduction: When males and females attain sexual maturity, at the end of their first year of life, their total lengths are on average 60 and 63 mm, respectively. *Nannatherina balstoni* spawns once in the breeding season (June to September), which peaks in mid-July to early August, when water levels are at their maximum. Fecundity ranges from 550 in a 61 mm fish to 1600 in an 82 mm fish.

Threats: Habitat alteration and possibly the introduction of exotic species pose the main threats to N. balstoni and also to the three other species restricted to the peat flat region. Habitat alteration is likely to occur through the construction of water points for fire fighting, road maintenance, mineral sand exploration and mining, groundwater extraction and also agricultural and forestry practices in the uppermost catchment (causing salinisation, siltation alterations to inflow, eutrophication). Exotic fish species (Oncorhynchus mykiss, Salmo trutta, Gambusia holbrooki and Perca fluviatilis) and those species translocated from eastern Australia (Macquaria ambigua and Bidyanus bidyanus) are present in the major catchments surrounding the peat The introduction of the two latter large and piscivorous eastern Australian species, which are well adapted to similar harsh environments, may pose a threat to the small endemic fish of south-western Australia.

Conservation status and actions: Much of the area occupied by *N. balstoni* is in nature reserves, particularly the D'Entrecasteaux and Shannon National Parks. This species has recently been proposed for inclusion in the vulnerable category in the Australian Society for Fish Biology's list of Australian threatened fishes.

Conservation recommendations: The most important conservation actions are to ensure that the small pools in the peat flats of south-western Australia, and the shallow areas and riparian vegetation in these pools used by the larvae, are conserved. To ensure this the position of new water points, roads etc. should be carefully monitored. Furthermore, non-endemic species should be introduced only into appropriate water bodies.

3.2 Identification, distribution, abundance, notes on the biology of and conservation recommendations for the anadromous fish of the south-western corner of Australia

Geotria australis Gray, 1851 (Geotriidae)

Geotria australis Gray, 1851 (Geotriidae)

Common names: Pouched lamprey.

Identification: Jawless eel-like fish. Two posteriorly placed dorsal fins, no paired fins. Seven separate gill openings. Juveniles (ammocoetes) with no external eyes. Maximum size about 650 mm TL. Ammocoetes brown in colour. Downstream migrants and newly returned adults are blue dorsally and silver ventrally, the adults bearing a dorso-lateral blue-green stripe. As the adults move upstream to their spawning grounds, the bright coloration is lost and they become dull brown in colour. During this upstream migration, the males develop a large pouch below the mouth.

Distribution: In Western Australia *G. australis* is common in the rivers south of Margaret River, however, this species has been recorded as far north as the Swan River. *Geotria australis* has an extensive range, being found in eastern Australia, Tasmania, New Zealand, Chile and Argentina. During this study, adults were collected from the Margaret, Donnelly and Warren Rivers, while ammocoetes were collected from the Capel, Margaret, Donnelly, Warren, Gardner, Shannon and Deep Rivers (Figs 9, 10, Tables 9, 10). Museum records show that *G. australis* is also found in the Collie and Blackwood Rivers.

Abundance, habitat and ecology: Ammocoetes were often very abundant in the sheltered areas of river systems, where the substrate was suitable for this burrowing stage, i.e. silty for ammocoetes and sandy for metamorphosed juveniles. During the present study ammocoetes were very abundant in the lower reaches of the Margaret and Gardner Rivers, Lefroy Brook (Warren River) and Fly Brook (Donnelly River), but very few were caught in the Capel River and none in the Boorara Brook (upper Gardner River) or the Blackwood River. The larval phase in the life cycle of G. australis is spent burrowed in the soft substrate, with the larva feeding on diatoms, detritus and micro-organisms that are drawn into the pharynx on a water current from the substrate surface. After an average of 4.3 years, the ammocoete metamorphoses into a young adult with prominent eyes and a suctorial disc. Metamorphosis is completed in 5-6 months, after which the young adult migrates downstream (moving predominantly at night) to the sea in July and August where it feeds parasitically on fish. During its marine trophic phase, which is believed to last two years, G. australis increases from ca 90 to 650 mm. The fully-grown adult ceases feeding and re-enters rivers, embarking on an upstream migration (moving predominantly at night) which, after a further 15-16 months, will culminate in spawning and death. The strength of the upstream migration is highly variable.

Reproduction: Although no mature adults of G. australis have ever been captured and their precise spawning areas are unknown, the pattern of development of lampreys in the laboratory and the time of appearance of small, very young ammocoetes strongly indicate that takes spawning place in October/November. approximately 15-16 months after they first re-entered the rivers. A number of maturing adults were collected from Dombakup Brook (Warren River), the main channel of the Warren River and Lefroy Brook (Warren River), where they were found under rocks and logs and among submerged grass.

Threats: Habitat alteration poses the main threat to *G. australis*. Habitat alteration is likely to occur through, the construction of dams, groundwater extraction and also agricultural and forestry practices in the uppermost catchment. These practises can cause alterations to inflow, salinisation, siltation and eutrophication which may lead to the loss of ammocoete beds. For example, no ammocoete beds were found in the parts of streams running through cleared agricultural land, where it is

believed that agricultural run-off and increased inflow adverseley effect the composition of the substrate (Macey, pers. comm.). Furthermore, although adults are known to move overland around dams, it is likely that on dry nights the large dams found in many catchments will act as barriers to the migrating adults. For example, in late September 1994, approximately 5 000 upstream migrants were observed on and below the Lefroy Dam, but none were using the fish ladder provided, which was dry at the time. On the following morning, large numbers of dead animals were present at the bottom of the dam.

Conservation status and actions: Considering the extensive distribution and generally large populations of *G. australis* it would appear that this species does not warrant inclusion on the Australian Society for Fish Biology's list of Australian threatened fishes. *Geotria australis* is the sole member of the monotypic family Geotriidae and is the only representative of the Petromyzontiformes found in Western Australia.

Conservation recommendations: The most important conservation action is the preservation of 'natural' flow regimes and suitable habitat in the small streams of south-western Australia. To ensure this, buffer zones must be maintained in areas used for both farming and forestry. The construction of large dams must include design elements which readily permit the upstream spawning migration.

3.3 Identification, distribution, abundance, notes on the biology of and conservation recommendations for each of the fish with recent marine origins that are found in freshwater and are endemic to the southwestern corner of Australia

Leptatherina wallacei (Prince, Ivantsoff & Potter, 1981)

Pseudogobius olorum (Sauvage, 1880)

Afurcagobius suppositus (Sauvage, 1880)

Leptatherina wallacei (Prince, Ivantsoff & Potter, 1981)

Common names: Swan River hardyhead, Western hardyhead.

Identification: D1 V-VIII; D2 I, 8-10; A I, 9-12; P 11-15; gill rakers on lower limb of first branchial arch 14-17. Mouth relatively small, extending to front of eye. A large gap is present between the two dorsal fins.

Maximum size about 80 mm TL. Coloration, olive dorsally and silvery laterally and ventrally, a very obvious midlateral copper coloured stripe is often present. Fins pale.

Distribution: The range of this species extends from Moore River in the north to Pallinup in the south-east. During the present study, *L. wallacei* was found in the Abba, Margaret, Blackwood, Scott, Gardner, Shannon, Inlet and Forth Rivers and in Lakes Jasper and Towerrinning as well as being found in a number of roadside pools on Windy Harbour Road (Fig. 11, Table 11).

Abundance, habitat and ecology: Leptatherina wallacei is very abundant, often forming large schools in estuaries, rivers, streams and lakes in the coastal areas throughout its range. It also penetrated considerable distances up the Blackwood River (Figs 11). In the Swan Estuary, planktonic crustaceans, flying insects, polychaetes and unicellular algae are the most important dietary items of this species.

Reproduction: In the Swan Estuary, males and females of this species attain lengths of 45 and 55 mm at the end of their first year of life, respectively, at which age they attain sexual maturity. Very few fish survive beyond their first year. This species has a protracted spawning period that peaks in late spring.

Threats: Since *L. wallacei* was common and abundant throughout much of its extensive range, it is unlikely that this species is threatened.

Conservation status and actions: Considering the extensive distribution of *L. wallacei*, it would appear that this species does not warrant inclusion on the Australian Society for Fish Biology's list of Australian threatened fishes.

Conservation recommendations: Due to the extensive distribution and wide range of habitats in which this species is abundant, no specific conservation recommendations are made.

Pseudogobius olorum (Sauvage, 1880)

Common names: Swan River goby, blue spot goby.

Identification: D1 VI; D2 I, 7-8; A I, 7-8; P 15-16; V I, 5 (pelvic fins form distinct disc); gill rakers on first branchial arch 8-9; operculum lightly scaled; cheek naked; cephalic lateral-line system longitudinal; cephalic lateral-lines short. Mouth small and sub-terminal, extending to front of eye. Maximum size about 60 mm

TL. Coloration, light brown and pale ventrally. Lateral series of seven to nine dark blotches. Dorsal and caudal fins with a series of brown or black reticulating lines; D1 bearing prominent blue or black spot posteriorly. Pectoral fin transparent. Pelvic and anal fins pale, becoming dark blue to black during the breeding season. Pigmentation varies with site of capture, sex, reproductive status, and preservation, and is usually strongest in breeding males which are often almost completely black.

Distribution: The range of this species extends from Moore River in the north to Esperance in the south-east. N.B. *Pseudogobius olorum* and related species and genera are currently under revision and the placing of fish from eastern Australia into this taxon is no longer valid (Larson pers. comm.). The results of this study show that *P. olorum* is generally associated with the coastal water bodies between Capel and Albany, but does penetrate considerable distances inland in certain rivers e.g. the Blackwood River (Fig. 12), as well as being found in a number of pools and isolated lakes e.g. Lake Jasper, Lake Maringup and Lake Towerrinning (Fig. 12, Table 12).

Abundance, habitat and ecology: Pseudogobius olorum was common and very abundant throughout most of its range and was found in estuaries, rivers, streams and both freshwater and hypersaline lakes (Halse, 1981). In the Swan Estuary, algae and mats of bacteria and fungi are the major dietary components in spring, summer and winter, while a considerable amount of animal material is only ever consumed in winter. However, in the lakes of the Swan Coastal Plain, this species feeds predominantly on animal taxa in all seasons (Fairhurst, 1993). This species can tolerate extreme salinities and temperatures and is one of the few native species found in highly eutrophic systems (Halse, 1981; Fairhurst, 1993). The life cycle of P. olorum typically lasts for less than a year.

Reproduction: Pseudogobius olorum spawns in both spring and autumn and at best to only a limited extent in summer. Length-frequency and gonadal data show that the progeny of the spring-spawning group frequently spawn in the following autumn, when they are approximately five months old, and that those of the autumn-spawning group frequently spawn in the following spring, when they are approximately seven months old. Some representatives of these two

spawning groups survive through the winter and summer, respectively, to breed in a second season.

Threats: Since *P. olorum* was common and abundant throughout much of its extensive range it is unlikely to be threatened.

Conservation status and actions: Considering the extensive distribution and abundance of *P. olorum*, this species does not warrant inclusion on the Australian Society for Fish Biology's list of Australian threatened fishes.

Conservation recommendations: Due to the extensive distribution and wide range of habitats in which this species is abundant no specific conservation recommendations are made.

Afurcagobius suppositus (Sauvage, 1880)

Common names: Big headed goby.

Identification: D1 VI; D2 I, 8; A I, 7; P 15-16; V I, 5 (pelvic fins form distinct disc); gill rakers on first branchial arch 6-11; vertebrae 27; scales in lateral row 30-38; transverse scale count 10-13+1; predorsal scales 0-4; prepelvic area naked; cheek and operculum naked; truncate; cephalic lateral-line tongue system longitudinal; cephalic lateral-line row al short. Greatest body depth 5.0-6.5 in SL. Mouth large, extending to rear of eye. Maximum size about 110 mm TL. Coloration, light brown to black dorsally and pale ventrally. Lateral series of six or seven dark blotches. Head usually heavily pigmented. Dorsal and caudal fins with a series of brown or black reticulating lines; D1 bearing prominent dark spot posteriorly. Pectoral fin transparent. Pelvic and anal fins pale, darker during breeding season. Pigmentation varies with site of capture, sex, reproductive status and preservation, and is usually strongest in breeding males.

Distribution: The range of this species extends from Moore River in the north to Esperance in the south-east. This species penetrates inland waters, e.g. Warren, Scott and Blackwood Rivers, and is also found in Lake Jasper (Table 1).

Abundance, habitat and ecology: Afurcagobius suppositus is common and occasionally locally abundant throughout most of its range and is found in estuaries, rivers, streams and coastal lakes. This species has a strong preference for heavy cover (Gill & Humphries, 1995). Hemipterans and dipteran larvae are important dietary components in all seasons, while bivalves,

terrestrial insects, ephemopterans, trichopterans and teleosts are important in some seasons (Young, 1994). The duration of the life cycle of *A. suppositus* is unknown, but probably lasts for at least two years.

Reproduction: Although the breeding biology of this species has not been documented, it is likely that this species breeds at the end of its first year of life. Males guard a nest under stones or among aquatic macrophytes where several females have laid their eggs. Breeding probably occurs between late spring and early summer (Gill, unpubl. data).

Threats: Since A. suppositus is common throughout much of its extensive range, it is unlikely that this species is under any real threat. However, the loss of habitat through urban and agricultural development and agricultural and forestry practices, causing alterations to inflow and the deposition of silt, may pose threats to some populations of this species. N.B. A related species (Favonigobius lateralis) has been shown to be intolerant of a substrate that contains fine particles.

Conservation status and actions: Considering the extensive distribution and abundance in some water bodies occupied by *A. suppositus*, it would appear that this species does not warrant inclusion on the Australian Society for Fish Biology's list of Australian threatened fishes.

Conservation recommendations: The most important conservation actions are the preservation of suitable habitats, and the careful monitoring of any activities which may result in the deposition of silt. While the taxonomy of this species has received much recent attention, little is known about its general biology, a situation which should be addressed before further recommendations can be made.

3.4 Identification, distribution, abundance and notes on the biology of the freshwater fish that have been introduced to the south-western corner of Australia

Oncorhynchus mykiss (Wilbaum) (Salmonidae)

Salmo trutta Linnaeus (Salmonidae)

Gambusia holbrooki Girard (Poeciliidae)

Perca fluviatilis Linnaeus (Percidae)

Oncorhynchus mykiss (Wilbaum) (Salmonidae)

Salmo trutta Linnaeus (Salmonidae)

Common names: Rainbow trout.

Brown trout.

Identification: Trout can be recognised by the presence of an adipose fin between the dorsal and caudal fins. Mouth relatively large, extending to rear of eye. Maximum size about 700 mm TL. Coloration blueblack (rainbows) to olive (browns) dorsally and silver to bronze ventrally, a very obvious midlateral pink stripe is often present in rainbows. The body and tail are covered in small black spots in rainbows, whereas in brown trout these spots are large, and black and red (often with white surrounds), and are absent on the tail.

Distribution: During this study, these species were found in rivers, streams, lakes and dams in the Margaret, Donnelly, Warren and Gardner River catchments (Fig. 13, Table 13), however, stocking of trout, particularly O. mykiss, into dams and rivers has occurred on a wide scale throughout much of the south-west, and includes: Big Brook Dam, Cowan Dam, Drakesbrook Dam, Glen Mervyn Dam, Harvey Weir, Lake Leshenaultia, Logue Brook Dam, Nornilup Dam, Pemberton Swimming Pool, Samson Dam, Stirling Dam, Waroona Dam, Albany area, Blackwood River, Brunswick River, Collie Gorge, Dirk Brook, Donnelly River, Harvey River, Hesters Brook, Lefroy Brook, Marrinup Brook, McKnows Brook, Murray River, Samson Brook, Serpentine River, Warren River, Wokalup Brook and Wooroloo/Jane Brook (Morrissy pers. comm.). Of the 1 965 500 trout stocked into public waters in the south-west of Australia between 1985 and 1994, 28 and 70 % were released into dams and rivers, respectively, while it is not clear where the remainder were released (Table 14). The majority of trout that were stocked into either dams or rivers in the south-west were fry or yearling O. mykiss i.e. of the 1

606 000 trout fry and 168 800 yearlings released, 98.8 % were *O. mykiss* (Table 14).

Abundance, habitat and ecology: These species are locally abundant in those waters which have been subject to continued stocking and where they form an important recreational fishery.

Reproduction: Although there is probably some limited reproductive success in the south-west, trout populations are maintained by the stocking of water bodies with hatchery reared fry and yearlings, although some fertilised eggs and ex-brood stock are also released (Table 14).

Threats: Not applicable.

Conservation status and actions: Not applicable.

Conservation recommendations: Not applicable.

Gambusia holbrooki (Girard) (Poeciliidae)

Common names: Gambusia, mosquitofish.

Identification: One soft dorsal fin and moderately deep body. Mouth small. Maximum size about 60 mm TL. Coloration, olive-brown dorsally and silver to light bronze laterally and ventrally. Fins lightly pigmented. Mature females with large ventro-lateral blotch. Mature males have elongate anal fin rays, which are modified to form an intromittent organ.

Distribution: This species is widespread and is found in the Collie, Capel, Ludlow, Abba, Carbanup, Margaret, Blackwood, Scott, Donnelly, Warren, Gardner, Shannon, Frankland and Lake Muir catchments (Figs 14, Table 15).

Abundance, habitat and ecology: When present, this species is typically very abundant. In the Collie River and the wetlands of the Swan Coastal Plain G. holbrooki fed at the water surface and throughout the water column on a wide range of prey types (Pen & Potter 1991d; Fairhurst, 1993). While Pen & Potter (1991d) found no evidence of fin nipping or agonistic behaviour by this species in lotic waters, recent work in the RGC Wetlands demonstrated that G. holbrooki displayed agnostic behaviour towards the native species in that lentic system. Furthermore, the majority of natives in that system had extensive damage to their fins, presumably the result of fin nipping by G. holbrooki. This species was introduced to Western Australia in 1934 to control mosquitos. Fertilisation is internal, with the female bearing live young rather than eggs and sexual maturity is reached in a short time. Because of these latter characteristics, it is now considered a pest in many areas of the world.

Reproduction: Fertilisation and development are internal in this species. In the Collie River, *G. holbrooki* breeds when the water temperature is greater than about 15 $^{\rm O}$ C. The larger progeny of the spring recruits breed in late summer and early autumn, while the smaller individuals overwinter and breed in the following spring. The autumn spawned fish overwinter and breed in the following spring and summer.

Threats: Not applicable.

Conservation status and actions: Not applicable.

Conservation recommendations: Not applicable.

Perca fluviatilis Linnaeus (Percidae)

Common names: Redfin perch, European perch, perch, redfin.

Identification: Spiny first dorsal, soft second dorsal fin and moderately deep body. Mouth relatively large, extending to rear of eye. Maximum size about 500 mm TL. Coloration, olive dorsally and silvery ventrally, a series of vertical bars dorso-laterally. Paired and anal fins orange to red in colour.

Distribution: These species are found in the Collie, Capel, Margaret, Blackwood, Donnelly and Warren River catchments (Figs 15, Table 16).

Abundance, habitat and ecology: When present, this species was typically abundant. In the Collie River, small *P. fluviatilis* feed predominantly on planktonic crustaceans while larger fish feed predominantly on benthic invertebrates. Fish of all sizes prey on endemic teleosts. This species forms an important recreational fishery in some areas of south-western Australia.

Reproduction: The large numbers of very small *P. fluviatilis* caught in November and December, in the Collie River, suggests that this species spawns in spring.

Threats: Not applicable.

Conservation status and actions: Not applicable.

Conservation recommendations: Not applicable.

4.0 SUMMARY & RECOMMENDATIONS

Distribution, abundance and habitat requirements

Freshwater fish that are endemic to the southwestern corner of Australia

Based on their distribution patterns, abundance and habitat requirements, the seven small freshwater fish endemic to the south-western corner of Australia, located between Geraldton in the north-west and Esperance in the south-east, can be divided into two main groups. Three species, namely *G. occidentalis*, *B. porosa* and *E. vittata*, are abundant in rivers, streams, lakes and pools throughout the entire south-western corner of Australia. Furthermore, these three species are common in water bodies within forested areas, the peat flats and agricultural areas. Indeed, the only habitat type in which these species were rare or absent were those water bodies that were devoid of cover, i.e. did not possess riparian vegetation, boulders, submerged snags etc.

The other four small endemic species, L. salamandroides, G. nigrostriata, G. munda and N. balstoni, are restricted to the region bounded by Margaret River in the west and Albany in the east, except for a small number of disjunct populations of the last three species. i.e. Nannatherina balstoni has disjunct populations in Gingin and in the Collie River, while G. nigrostriata has disjunct populations at Gingin and Bunbury and G. munda has been found at Gingin. These species were only present in certain habitat types in which they were sometimes abundant. Thus, L. salamandroides, G. nigrostriata and N. balstoni were almost always associated with the ephemeral pools of the southern peat flats and adjacent forested areas. While G. munda was also found in a number of pools in the peat flats, it was most abundant in the headwaters and streams of the major rivers in the peat flats and adjacent forested areas. The range of this species extended further into the forested areas than those of L. salamandroides, G. nigrostriata and N. balstoni. None of these four species was ever caught in cleared agricultural areas.

All of the above seven species utilise flooded areas for spawning, either within flooded creeks or amongst the inundated vegetation of pools and lakes (Pen & Potter 1990, 1991a, c; Pen et al., 1991, 1993; Morgan et al.,

1995a, unpubl. data) The larvae of *L. salamandroides*, *G. nigrostriata*, *G. munda* and *N. balstoni* utilise very shallow waters (<10 cm deep), particularly amongst inundated vegetation, for feeding, gradually moving into deeper waters as they increase in size (Gill, unpubl. data).

The freshwater catfish, *T. bostocki*, was caught at only two sites during the present study (Alexander Bridge on the Blackwood River and at Lake Smith), and was recorded only at Lake Wilson by Jaensch (1992), and at Pemberton and Nannup in the Museum Records. However, the studies of Morrison (1988), Hewitt (1992) and Morgan & Gill (unpubl. data) suggest that this species inhabits the deeper areas of lakes and slow flowing rivers and is more susceptible to capture by sunken gill nets and large seine nets than by the methods employed in this study.

Anadromous fish of the south-western corner of Australia

Adult *G. australis* have been caught migrating up the Warren, Donnelly and Margaret Rivers during winter and spring, the strength of these upstream migrations varying greatly amongst years (Morgan and Potter, pers. observation). Although the precise locations at which they spawn are unknown, a number of maturing adults have been caught in isolated pools and the main channel of the headwaters of the Warren River in autumn and winter, where they were found under rocks, logs and amongst submerged bankside grass. Ammocoetes were collected from shallow, silty banks in the Capel, Margaret, Donnelly, Warren, Gardner, Shannon, and Deep Rivers, while downstream migrants were typically associated with the sandy substrates of the deeper and faster-flowing waters of these systems.

Fish with recent marine origins that are found in freshwater and are endemic to the south-western corner of Australia

The endemic fish species with recent marine origins that were most frequently caught in the freshwaters of the south-west, namely *L. wallacei*, *P. olorum* and *A. suppositus*, were generally associated with coastal water bodies. However, these species penetrated rivers to a considerable distance inland e.g. Blackwood River, and were also found in a number of isolated lakes e.g. Lake

Jasper. Leptatherina wallacei and P. olorum were often caught in open water and in large numbers. However, A. suppositus was only captured in small numbers during the present study, probably reflecting a preference for very heavy cover (Gill & Humphries, 1995).

Freshwater fish that have been introduced to the south-western corner of Australia

Although the most common and widespread exotic species in the south-western corner of Australia was G. holbrooki, P. fluviatilis was also often locally abundant. Both of these species were generally associated with habitats that had been substantially altered by human activity. For example, these species were often common in reservoirs (e.g. Big Brook Dam), in mined areas (e.g. Collie River South Branch, RGC Mineral Sands) and in those systems subject to enrichment through agricultural run-off (e.g. certain areas of the Collie River, Capel River, Blackwood River and Lake Unicup). The two trout species, O. mykiss and S. trutta, were rarely captured in large numbers, and were only captured in those systems where regular stocking had taken place, i.e. predominantly in the streams of the Pemberton area. The eastern Australian species Macquaria ambigua and Bidyanus bidyanus have been recently translocated into the major catchments surrounding the peat flats (see Prokop, 1994, and papers therein).

Threats and conservation recommendations

Although three of the endemic species, G. occidentalis, B. porosa and E. vittata, were typically represented by large populations in most types of habitat throughout their extensive ranges, and are thus currently under no threat, local populations of these species may be vulnerable to loss of suitable habitat and the introduction of exotic species. For example, recent work in the lakes and pools of the Perth Metropolitan Area has shown that, while all three of these species are abundant in at least some of the few remaining 'coloured' water bodies of the region, they are absent or greatly reduced in number in the eutrophic water bodies that are common in the region (Fairhurst, 1993). Furthermore, while these species were absent/rare in the lakes of the south-west which contain large numbers of the introduced species G. holbrooki, they were abundant in the nearby streams and lakes which do not contain this species. The only pools, lakes and streams of the RGC Mineral Sands complex in which the endemic species were abundant contained large amounts of cover

and contained few *G. holbrooki*. It should also be noted that the endemic species in the RGC complex had a higher degree of fin damage than those in the nearby Ludlow River, where *G. holbrooki* was far less common.

In contrast to G. occidentalis, B. porosa and E. vittata, the other endemic species, namely L. salamandroides, G. nigrostriata, G. munda and N. balstoni, are generally represented by small populations in specific habitats and have a restricted range. These latter species can therefore be considered to be particularly vulnerable to the continuing loss or alteration of habitat and, under certain conditions, to the introduction of non-native species. For example, the effects of habitat alteration and possibly predation by introduced fish may explain the apparent loss of G. munda from the headwaters of Lefroy Brook above Big Brook Dam. Thus, whereas Pen et al. (1991) found this species in these waters, the present study has failed to record any G. munda in these streams. It is therefore pertinent that, during several recent dry years, the reservoir immediately above Big Brook Dam was the only upstream section of Lefroy Brook to retain water during summer and autumn. Furthermore, during these dry years, the piscivorous P. fluviatilis was introduced to the reservoir and is now well established in both the reservoir and the headwater streams.

In the case of both L. salamandroides and G. nigrostriata, many of the roadside pools in which these species aestivate are mistakenly considered by CALM authorities to be devoid of aquatic fauna when they become dry in summer. Their substrate is thus used for 'fill' or the pools themselves are filled during routine road maintenance, which often drastically alters or destroys the pools and thus removes fish habitat. should also be noted that G. nigrostriata, G. munda and N. balstoni are each represented by an isolated population well to the north of the peat flats. The disjunct distributions of these three species suggest that these species once had ranges extending to the northernmost part of the region. It is therefore likely that the contraction of their ranges to essentially the relatively pristine area of the peat flats has occurred through habitat degradation due to urban and agricultural development. For example, almost 80% of the wetlands on the Swan Coastal Plain (Moore River to Vasse River) are believed to have been totally destroyed and the majority of the remainder have been drastically modified (EPA, 1991). Furthermore, in the southern section of the Swan Coastal Plain, between Harvey and

Dunsborough, more than 95% of the wetlands have been drained for agricultural purposes (Fisheries & Wildlife, 1978).

Much of the evidence that implicates introduced species in the decline of native fish populations in Australia is However, evidence circumstantial or anecdotal. collected during the present study suggests that P. fluviatilis and trout species may have an effect on the native fish during dry years. For example, during summer, when water levels decline markedly, a number of isolated river pools in which these large piscivores were present contained very few native fish, while nearby pools, in which these introduced fish were absent, contained large numbers of native fish. addition, Lloyd et al. (1986) state that G. affinis (G. holbrooki) may be responsible for the loss of populations of endemic species in eastern Australia and cite several references implicating the introduction of this species as the major cause in the loss of native species in many localities. In addition to the three introduced species caught during the present study, M. ambigua and B. bidyanus have been translocated from eastern Australia into dams in several of the major catchments surrounding the peat flats. As these species are adapted to environments similar to those found in Western Australia, and as they are piscivorous, their introduction into the few pristine habitats remaining in the south-west could pose a threat to the small endemic species in these areas.

Although adults and ammocoetes of *G. australis* were often both very abundant, habitat alteration may pose a threat to this species in some of the rivers in which it is currently found. For example, any changes that lead to the removal of soft substrate will reduce the habitat available for ammocoetes. In the case of adults, it is critical that there are no impediments to their upstream migration to spawning areas further upriver.

From the results of this study, it appears that habitat alteration and possibly the introduction of exotic species pose the main threats to the highly endemic fish fauna of this region. Habitat alteration is likely to occur through the construction of water points for fire fighting, road maintenance, mineral sand exploration and mining, the construction of dams, groundwater extraction and those agricultural and forestry practices in the uppermost catchments that produce alterations to inflow, salinisation, siltation and eutrophication. Non-native

species, i.e. *G. holbrooki*, continue to be introduced by local councils for mosquito control.

Thus, it is apparent that the most important actions that should be taken to ensure the conservation of our depauperate but unique freshwater fish fauna are as follows:

- The maintenance of 'natural' flow regimes in rivers and the preservation of the lentic water bodies of the peat flats. To ensure this, buffer zones should be maintained in areas used for farming and/or forestry and the effects of water usage on stream flow should be minimised, while the positions of new water points, roads etc. in the peat flats should be carefully established.
- 2. Every effort should be made to ensure that in the future non-endemic species should be introduced only into appropriate water bodies. Thus, it is important to have strict criteria and regulations governing the introduction of fish into water bodies in Western Australia. Furthermore, the Fisheries Department of Western Australia has developed a comprehensive policy for translocations of, particularly, exotic species, including those from the new Freshwater states, while the eastern Management Act now provides for regional discrimination in freshwater (see Prokop, 1994, and papers therein).

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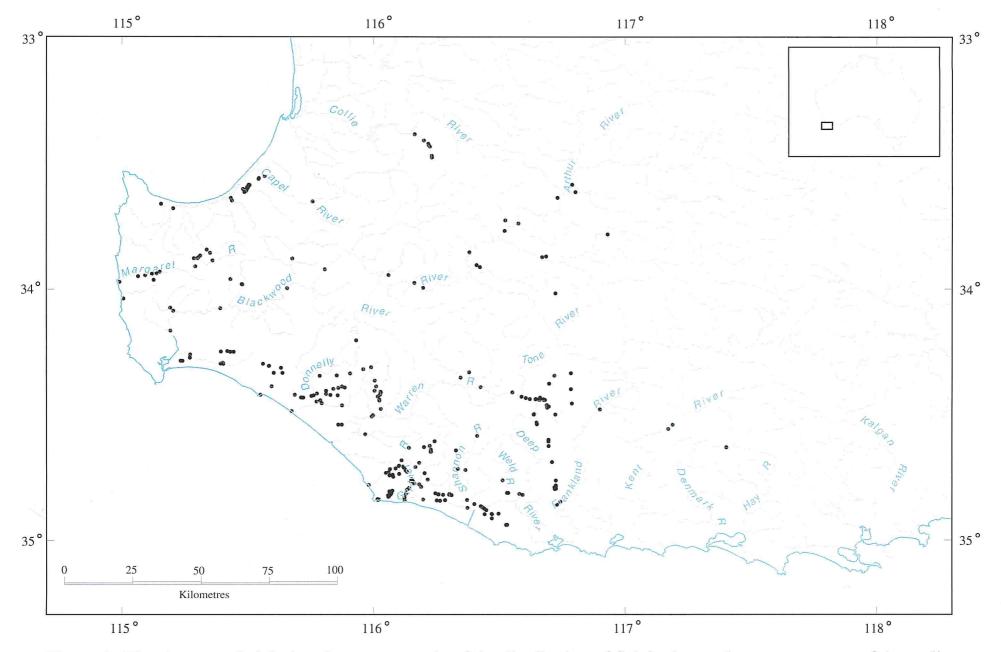
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 $Figure \ 1\ . The \ sites \ sampled \ during \ the \ present \ study \ of \ the \ distribution \ of \ fish \ in \ the \ south-western \ corner \ of \ Australia.$

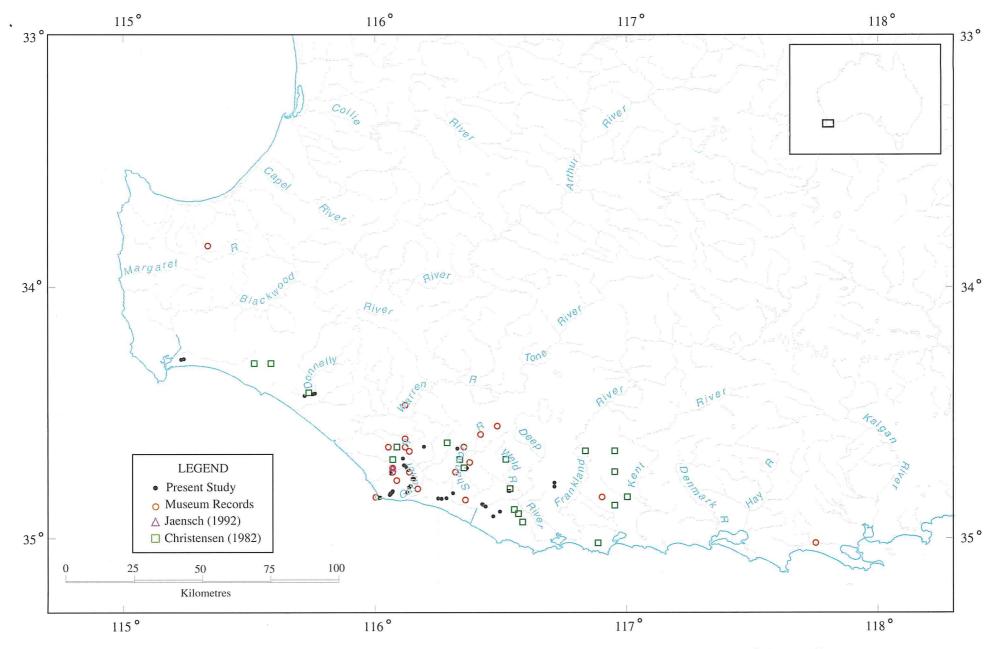


Figure 2. The distribution of Lepidogalaxias salamandroides in the south-western corner of Australia.

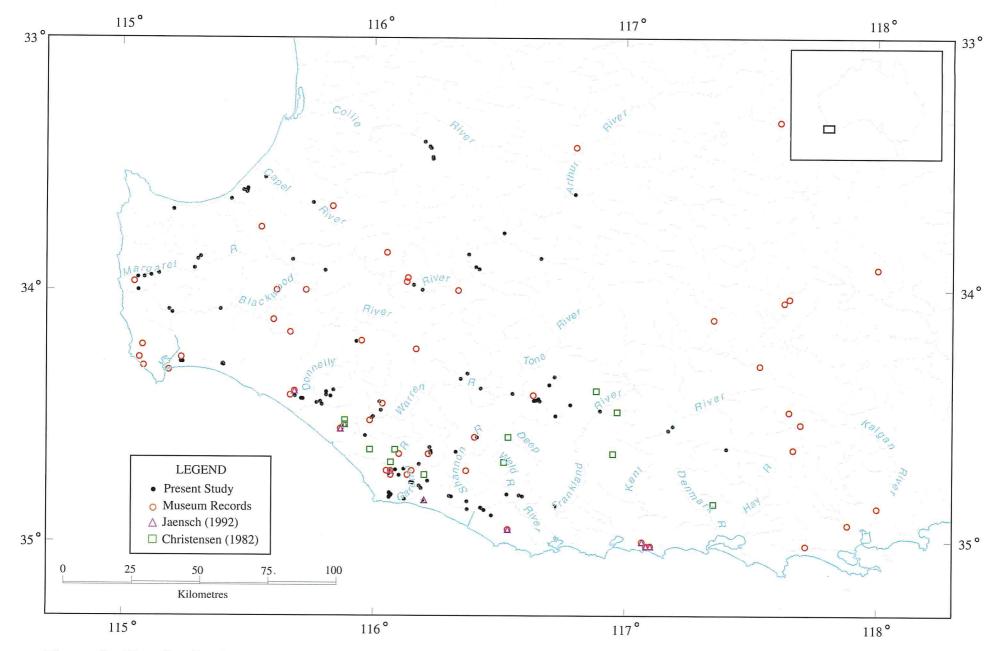


Figure 3. The distribution of Galaxias occidentalis in the south-western corner of Australia

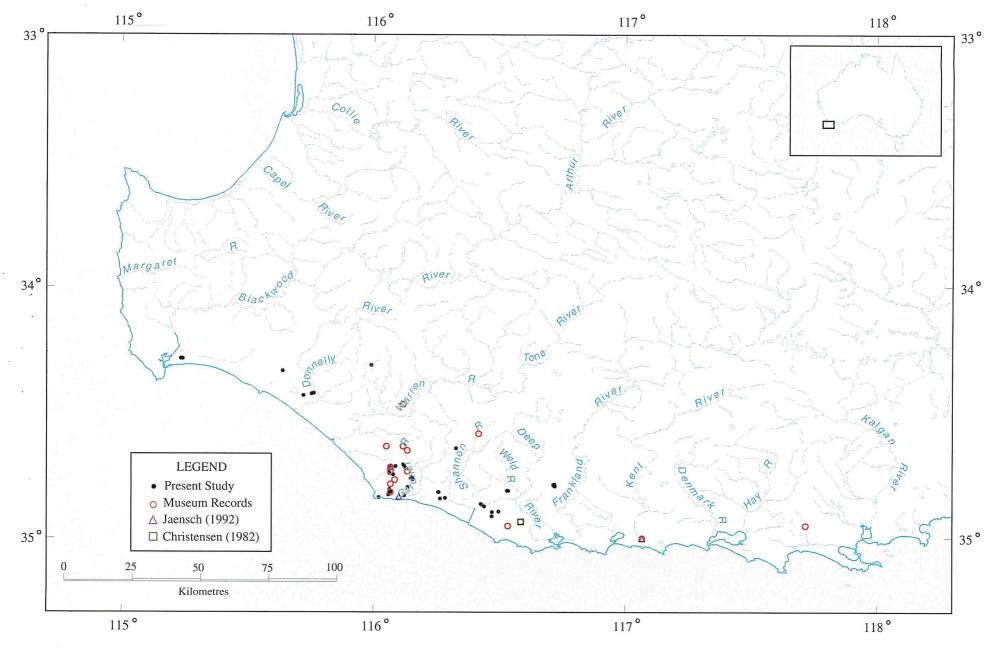


Figure 4. The distibution of Galaxiella nigrostriata in the south-western corner of Australia

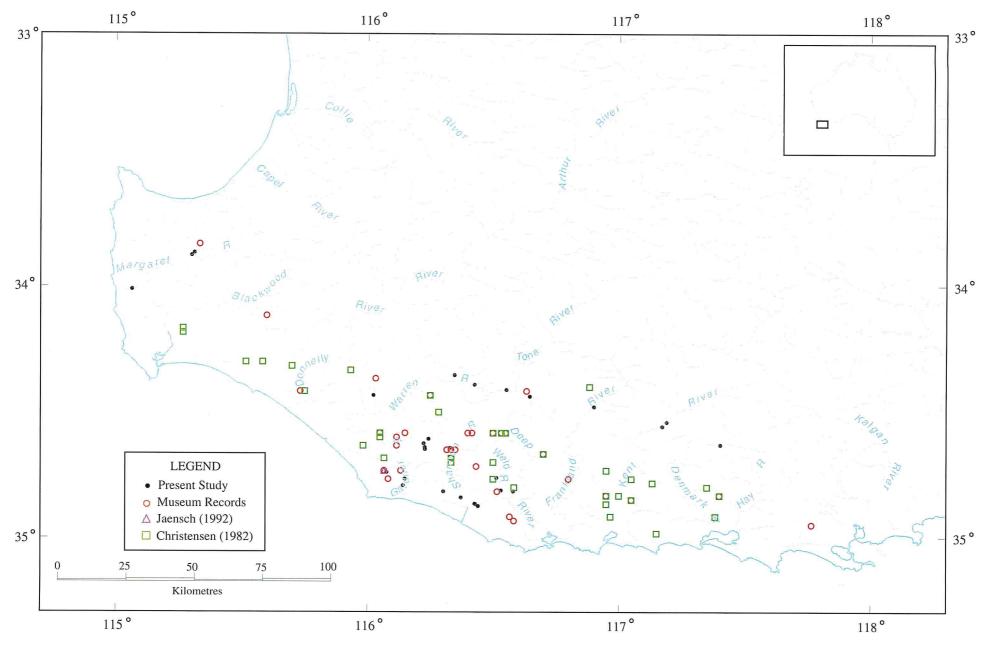


Figure 5. The distribution of Galaxiella munda in the south-western corner of Australia.

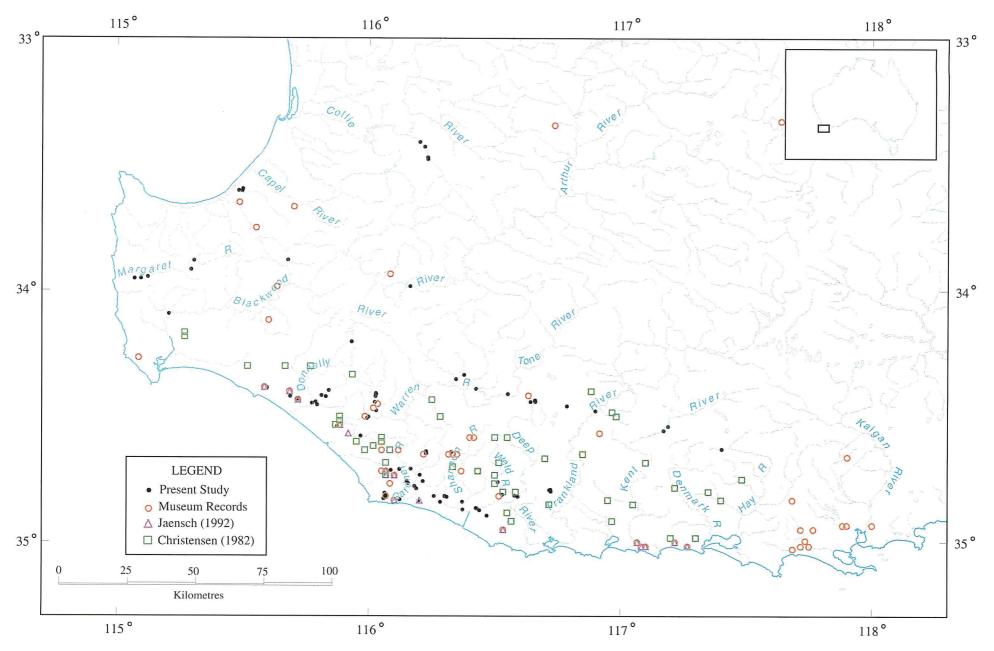


Figure 6. The distribution of Bostockia porosa in the south-western corner of Australia

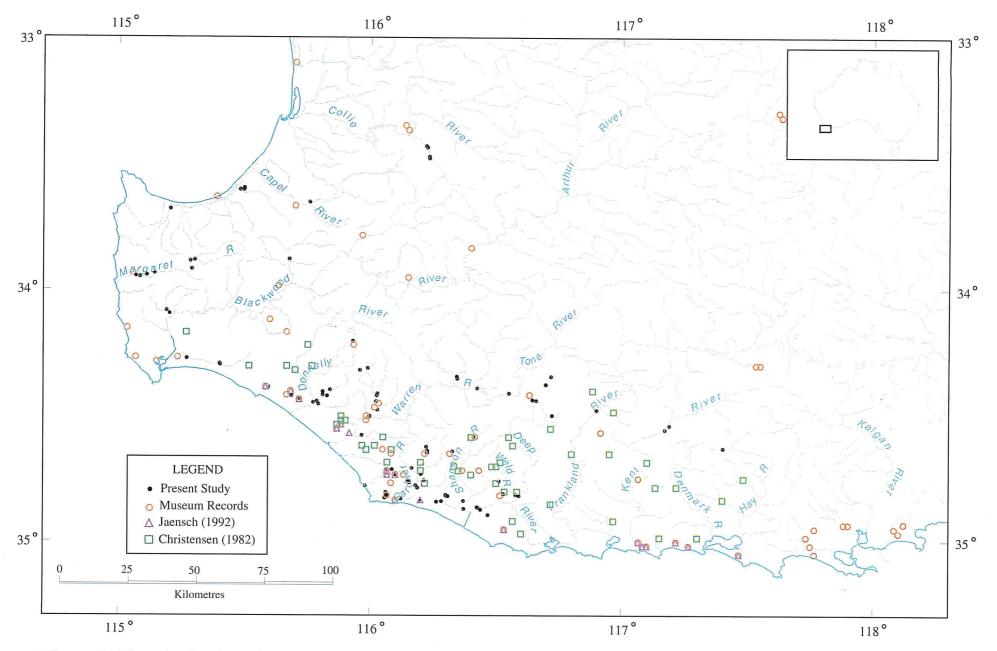


Figure 7. The distribution of Edelia vittata in the south-western corner of Australia

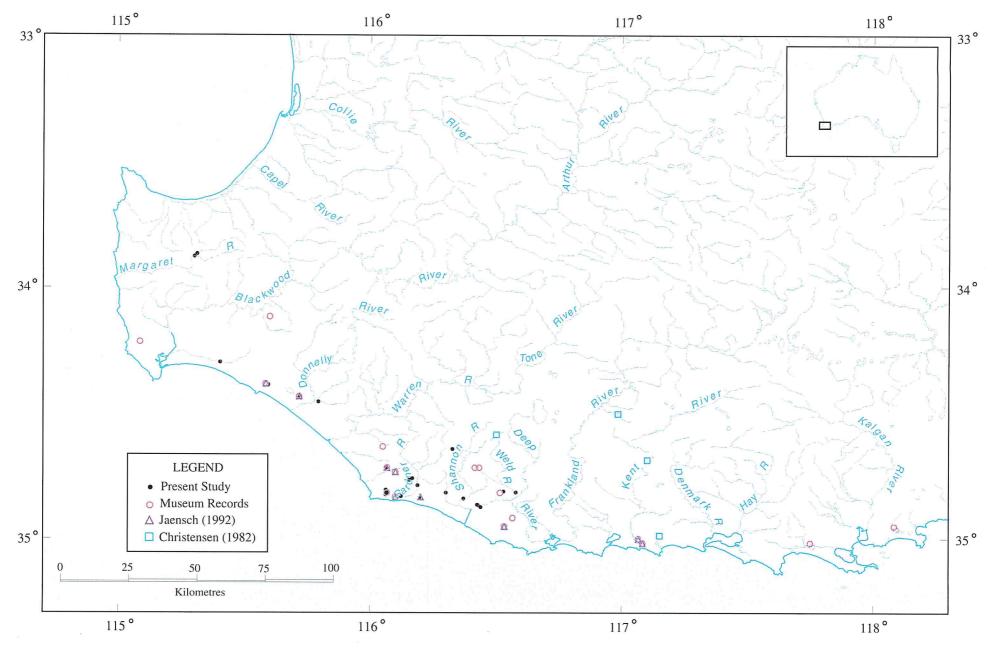


Figure 8. The distribution of Nannatherina balstoni in the south-western corner of Australia.

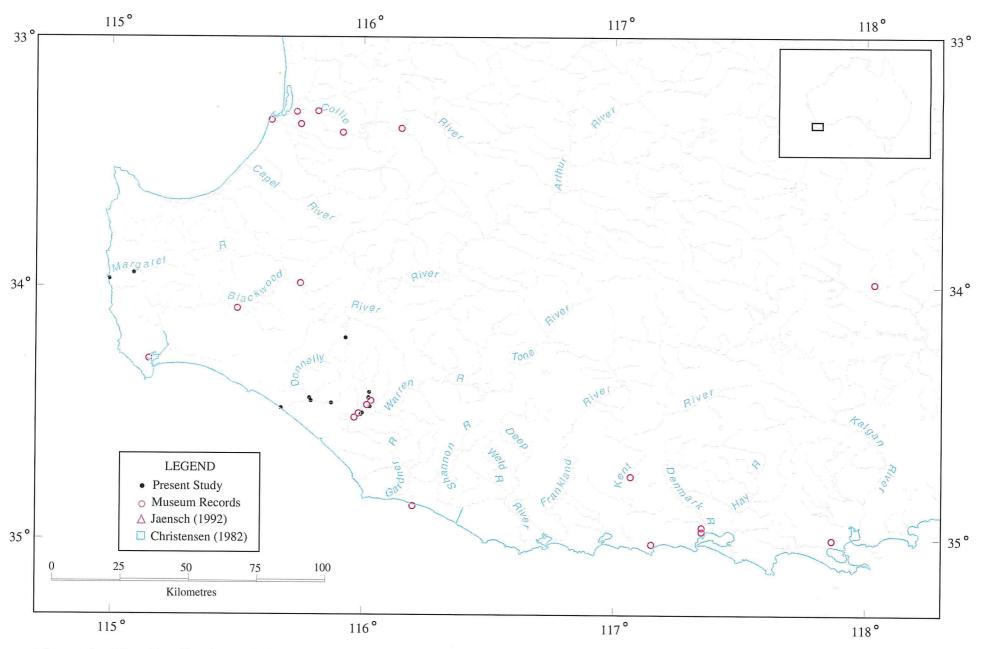


Figure 9. The distribution of Geotria australis (adults) in the south-western corner of Australia

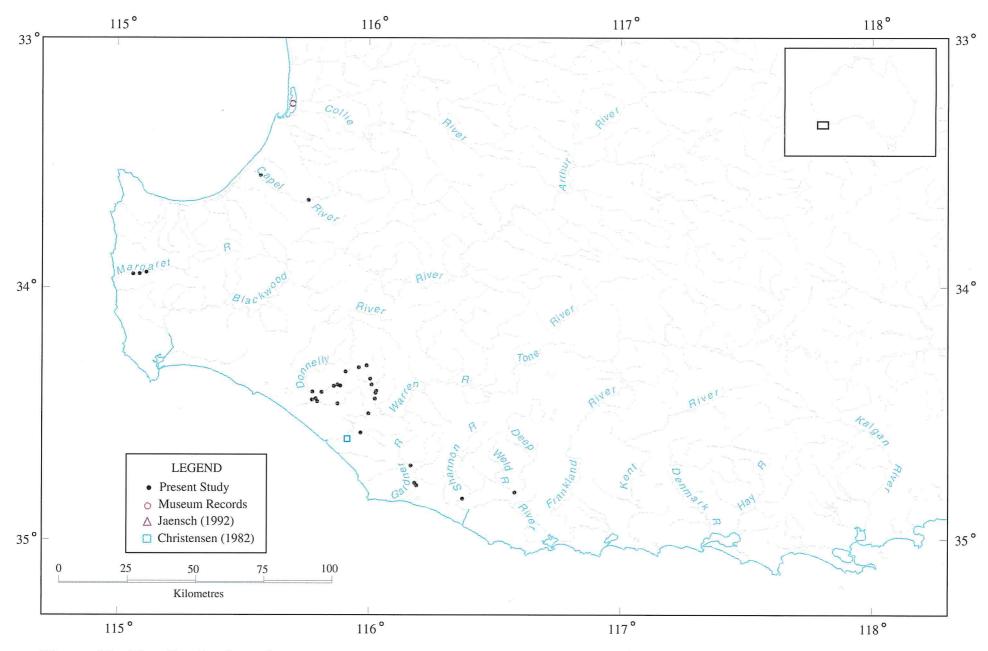


Figure 10. The distribution of Geotria australis (ammocoetes) in the south-western corner of Australia.

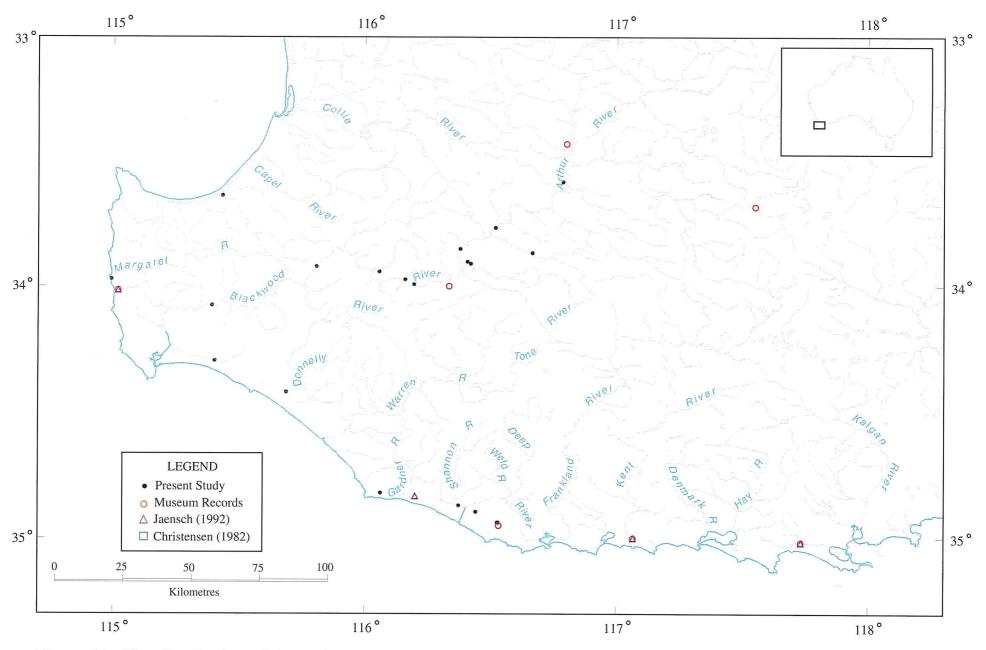


Figure 11. The distribution of Leptatherina wallacei in the south-western corner of Australia.

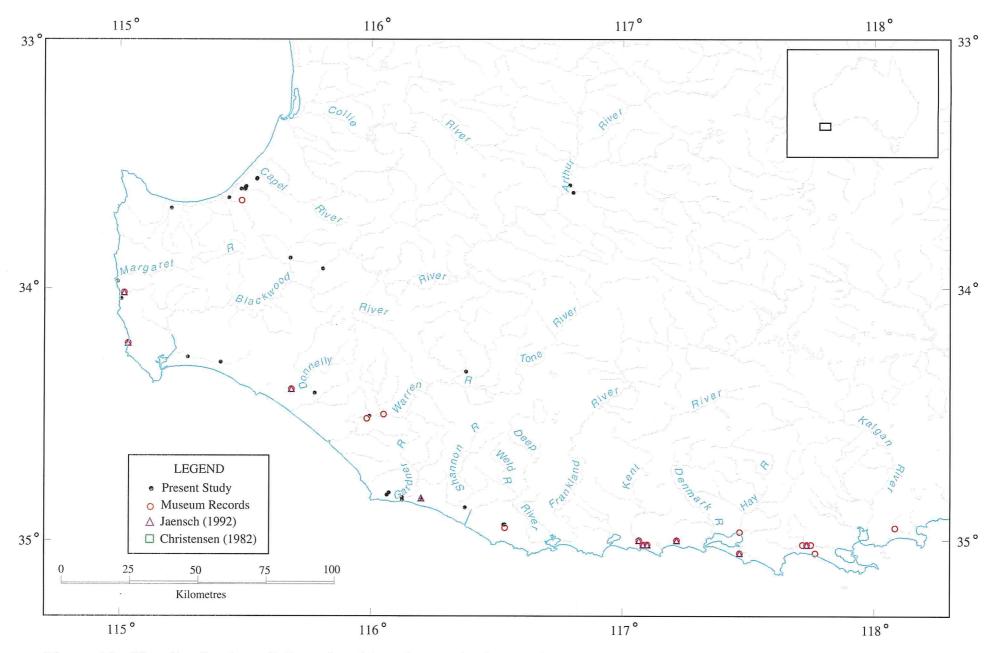


Figure 12. The distribution of *Pseudogobius olorum* in the south-western corner of Australia.

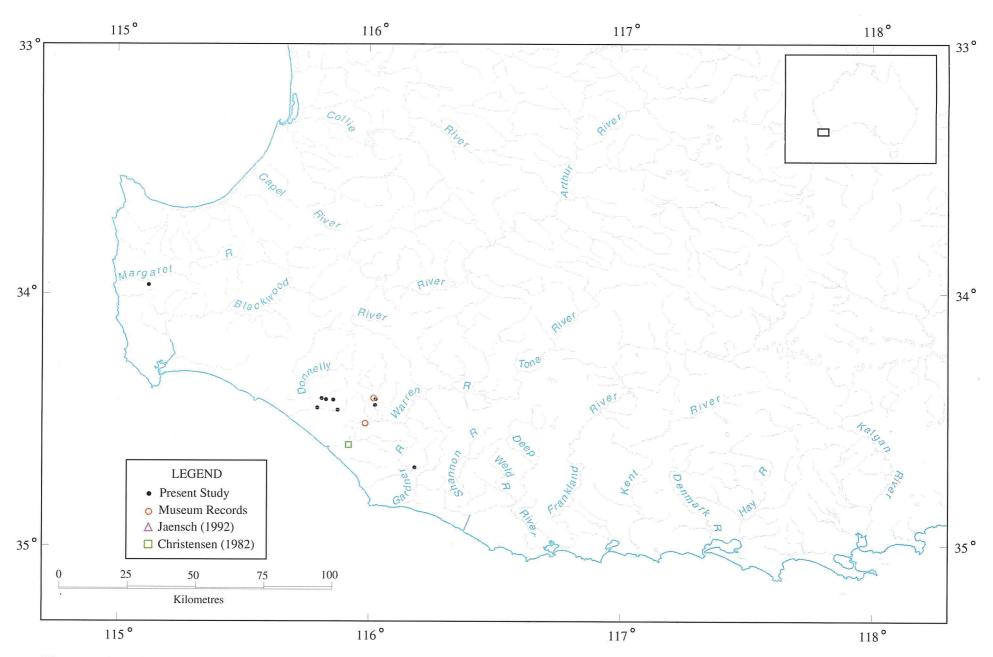


Figure 13. The distribution of Oncorhynchus mykiss and Salmo trutta in the south-western corner of Australia.

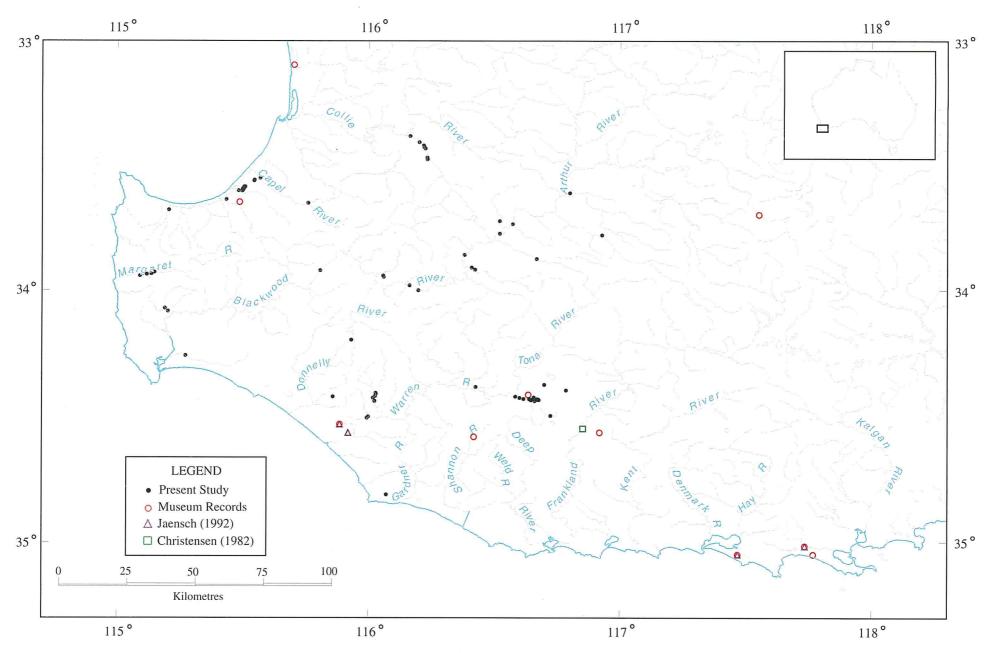


Figure 14. The distribution of Gambusia holbrooki in the south-western corner of Australia.

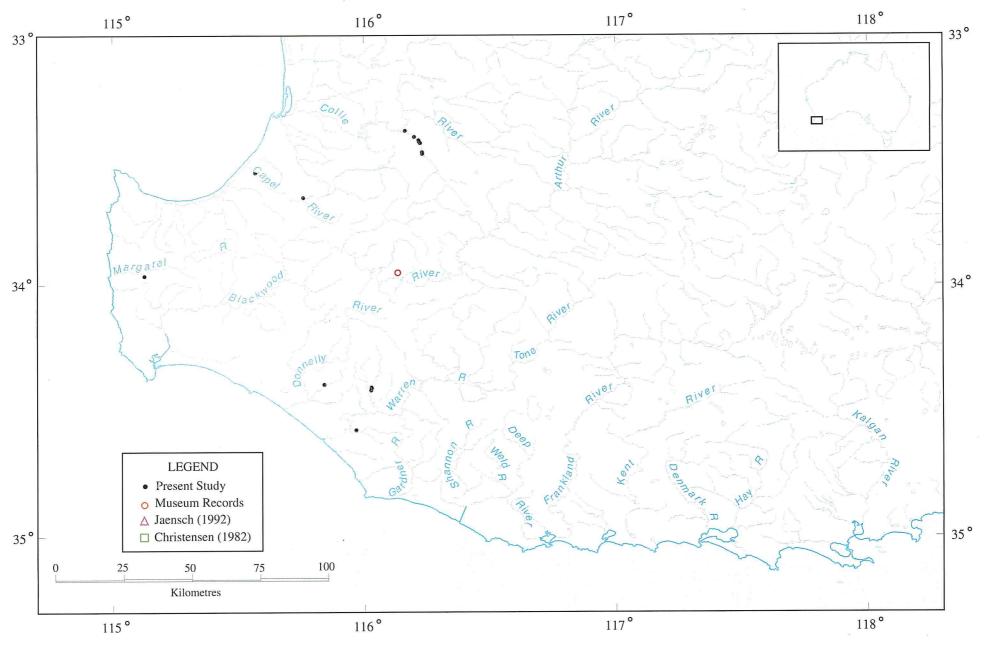


Figure 15. The distribution of Perca fluviatilis in the south-western corner of Australia

Table 1: Those sites sampled for freshwater fish in the lower south-western corner of Australia and the species present at each site. N.B. Tb refers to Tandanus bostocki, and similarly, Ls - Lepidogalaxias salamandroides,

Go - Galaxias occidentalis, Gn - Galaxiella nigrostriata, Gm - Galaxiella munda, Bp - Bostockia porosa, Ev - Edelia vittata, Nb - Nannatherina balstoni, Ga(Ad) - Adult Geotria australis, Ga(am) - ammocoete Geotria australis,

Lw - Leptatherina wallacei, Po - Pseudogobius olorum, As - Afurcagobius suppositus, Trout sp. - Oncorhynchus mykiss and Salmo trutta, Gh - Gambusia holbrooki and Pf - Perca fluviatilis.

Site Number	General Location	Latitude	Longitude	Tb	Ls	Go	Gn	Gm	Вр	Eν	Nb	Ga(Ad)	Ga(am)	Lw	Po	As	Trout sp.	Gh	Pf
	CAPEL WATERSHED																•		
Al	Capel River-under railway bridge	33 ⁰ 33.18'	115 ^o 34.01'			X							х						
A2	Capel River-south	33 ⁰ 39.16'	115 ⁰ 45.43'			x				x			X					x x	X X
	ABBA/LUDLOW DRAINAGE																		
B1	Lake 9-RGC	33 ⁰ 33.66'	115 ^o 32.62'																
B2	Lake 10	33 ⁰ 33.74'	115 ^o 32.58'												x			х	
B3	Lake 11	33°33.82'	115 ^o 32.54'												X			х	
B4	Swamphen Lake	33°35.27'	115°30.39'												Х			х	
B5	Island Lake	33°35.28'	115 ⁰ 30.38'															Х	
B6	Peninsula Lake	33 ^o 35.30'	115 ^o 30.35'																
B7	Paperbark Lake	33°35.31'	115°30.20'															х	
B8	Wet Woodland	33 ⁰ 35.21'	115°30.20'																
B9	Crinea Creek	33 ⁰ 35.28'	115°30.20																
B10	Cadieput Pool	33 ⁰ 35.50'	115 30.15 115 ⁰ 30.10'															X	
B11	Taylor's Lake	33 ⁰ 35.70'	115°30.10 115°30.05'															X	
B12	Boulder Lake	33 ⁰ 35.80'	115°30.03'															X	
B12		33°35.60'																X	
	Tigersnake Lake		115 ⁰ 30.00'												X			X	
B14	Priessiana Pool	33 ⁰ 35.75'	115 ^o 29.90'															x	
B15	Plover Lakes	33 ⁰ 36.00'	115 ⁰ 29.80'							X					X			x	
B16	Pobblebonk Swamp	33°36.15'	115 ⁰ 29.80'												х			x	
B17	Gravel Pool	33 ⁰ 36.20'	115 ⁰ 29.70'			X									х			x	
B18	Stream south of above	33°36.25'	115 ⁰ 29.65'			X			х	X					x			x	
B19	Ludlow Swamp	33 ^o 35.80'	115 ⁰ 29.80'			x			x	x					x			x	
B20	Ludlow River-Bridge on Bypass	33°36.20'	115 ⁰ 28.82'			X			х	x					x			x	
B21	Ludlow River-on RGC	33 ⁰ 36.64'	115 ⁰ 29.59'			х			220						Α.			Α.	
B22	Ludlow River-Bussell Hwy	33 ⁰ 36.92'	115 ⁰ 29.17'			4.57													
B23	Abba River-Bussell Hwy	33 ⁰ 38.95'	115 ^o 26.20'																
B24	Abba River-Bridge on Bypass	33 ⁰ 38.30'	115 ⁰ 25.91'			x													
B25	Carbanup River	33 ⁰ 40.78'	115 ^o 12.19'			x				x				x	x			x	
B26	Station Gully Drain-Quindalup Rd	33°39.72'	115 ⁰ 09.30'			^				X					х			x	
B27	Brake Creek-Molloy Rd(off Sabina)	33°50.59'	115 ^o 20.19'																
	The second of the desire could be the second																		
Cl	MARGARET RIVER WATERSHED Margaret River-Great North Rd(Rapids)	33 ^o 52.60'	115 ⁰ 18.01'					92	92										
C2	Margaret R-1.3km from Cane Break Rd	33 ⁰ 51.99'	115 ⁰ 18.64'			х		X	X	X	х								
C3	Margaret R-Molloy Rd(North Branch)	33 ⁰ 51.36'	115 ⁰ 20.98'			х		X			X								
C4	Margaret River-Molloy Rd (Main R)	33°53.18'	115 20.98 115 ⁰ 21.55'																
C5	Margaret River-1st Weir	33 ⁰ 56.92'	115 21.33 115 ⁰ 03.83'																
C6	Margaret R-Mouth	33°58.24'				X			X	X		х	X					X	
C7		33°56.89°	114 ⁰ 59.38'											X	x				
C8	Margaret R-2nd Weir		115 ⁰ 05.35'			х			X	X		X	X					x	
	Margaret R-Margaret R Rd	33 ⁰ 56.53'	115 ⁰ 06.98'			X			x	X			X					х	
C9	Margaret R-Margaret R Rd	33 ⁰ 56.42'	115 ⁰ 08.07'															x	
C10	Margaret R-Margaret R Rd	33°56.03'	115 ^o 08.82'			X				X		6						x	
C11	Margaret R-Margaret R Rd	33 ⁰ 54.77'	115 ⁰ 17.31'			x			x	X									
C12	Margaret R-Cranebreak Picnic Area	33 ^o 52.84'	115 ⁰ 16.97'		4					x									
C13	Margaret R-small stream behind Leeuwin	33 ^o 59.95'	115 ^o 03.92'		E.	x		х											
C14	Margaret R-Ten Mile Brook Dam	33 ⁰ 57.98'	115 ⁰ 07.38'														x		Х
C15	Calgardup Brook, mouth-Redgate Rd	34 ⁰ 02.40'	115 ⁰ 00.16'																- 1

Table I (cont...)

Table I (cont)				1000						*								
Site Number	General Location	Latitude	Longitude	Th	Ls	Go	Gn	Gm	Вр	Ev	Nb	Ga(Ad) Ga(am)	Lw	Po	As	Trout sp.	Gh	Pf
	BLACKWOOD RIVER WATERSHED																	
D1	Track off Great West Rd-	33 ⁰ 57.60'	115 ^o 25.84'															
D2	Another track off above	33 ⁰ 58.80'	115 ^o 28.55'															
D3	Rosa Brook	33 ⁰ 58.86	115 ^o 28.68'															
D4	Blackwood R-north of Nannup	33 ⁰ 55.27'	115 ⁰ 48.35'			x							Y	х			x	
D5	Blackwood R-Sues Bridge	34 ⁰ 04.54'	115°23.42'			x							X	x	х		Α.	
D6	Blackwood R-Alexander Bridge	34 ^o 09.86	115 ⁰ 11.53	x		^							^	X	^			
D7	St John Brook (Blackwood River)	33 ⁰ 52.70'	115 ⁰ 40.59	^		x			х	х				X				
D8	Blackwood R-Walter Willis Rd	34 ⁰ 56.84'	116 ⁰ 03.38'			^			^	^			x	^			х	
D8	Blackwood R-Tweed Rd	33 ⁰ 58.72	116 ⁰ 09.54						v				X				~	
D10	Blackwood R	33 ⁰ 59.89'	116 ⁰ 11.63'			v			X				X				~	
DII	Blackwood R-Aegers Bridge Rd	33 ⁰ 54.95'	116 ⁰ 25.17'			X							X				λ.	
10000 00 00		33 ⁰ 54.47'	116°24.38'			X							2.5				χ	
D12	Blackwood R-Terry Rd	33 ⁰ 51.43'	116°22.66′			х							х				X	
D13	Blackwood R-Terry Rd	33 31.43 33 ⁰ 44.57'	116 22.00 116 ⁰ 34.34'			Х							х				х	
D14	Blackwood R-Arthur River Rd																х	
D15	Blackwood R-Gibb Rd	33 ⁰ 43.84'	116 ^o 31.23'														Х	
D16	Blackwood R-Condinup Crossing Rd	33 ⁰ 46.35'	116 ^o 31.07'			X							X				Х	
D17	Blackwood R-Arthur River Rd	33 ⁰ 38.49'	116 ⁰ 43.68′															
D18	Towerrinning Lake	33 ⁰ 35.37'	116 ⁰ 47.17'										X	X				
D19	Arthur R-Moodiarup Rd	33 ⁰ 37.13'	116 ⁰ 47.96'			Х								X			Х	
D20	Balgarup R	33 ⁰ 47.18'	116 ^o 55.63'														х	
D21	Lower Bridgetown Rd	33 ^o 52.41'	116 ⁰ 40.97'															
D22	Blackwood R-Kulikup Rd & Lower	33 ^o 52.39'	116 ⁰ 39.88′			х							х				x	
D23	Chapman Brook	34 ⁰ 04.61'	115 ⁰ 11.31'			x				X							х	
D24	Chapman Brook	34 ⁰ 05.33'	115 ⁰ 12.04'			Х			х	х							х	
	SCOTT RIVER WATERSHED																	
E1	Scott River-Brennan Bridge	34 ⁰ 15.58'	115 ⁰ 16.23'														x	
E2	Scott R-Bridge on Milyeannup Rd (1)	34 ^o 17.56'	115 ⁰ 24.02'			х				X				х				
E3	Scott R- " " " (2)	34 ⁰ 17.70'	115 ⁰ 24.10′			X				х			х	х	х			
E4	Scott R- " " " (3)	34 ^o 17.80	115 ⁰ 24.15'			X				х	x			х	х			
E5	Pool 200m south of above	34 ⁰ 17.68'	115 ^o 23.87'			x												
E6	Pool 500m south of above	34 ⁰ 17.76'	115 ^o 23.50'															
E7	Pool on Scott R Rd-power pole43	34 ⁰ 17.05	115 ^o 13.96'		х	X	х											
E8	Pool (1) on Govenor Broome Rd	34 ⁰ 14.94'	115 ^o 26.60'			**												
E9	Pool (2) " " " "	34 ⁰ 14.94'	115 ^o 25.80'															
E10	Pool (3) " " "	34 ⁰ 14.77'	115 ^o 25.10'															
E10	Pool (4) " " " "	34 ^o 14.88	115 ^o 23 56'															
E11	Pool (1) on Fouracres Rd	34 ⁰ 18.28'	115 ⁰ 35.05'															
	Pool (2) " " "	34 ^o 18.32'	115 ⁰ 35.00'															
E13		34°17.80'	115 ^o 33.60'															
E14	1 001 (3)		115 ⁰ 14.40'															
E15	Pool on Scott R Rd-power pole 38	34 ⁰ 17.08'			Х	Х	х											
E16	" " -power pole 10	34 ⁰ 16.33'	115 ⁰ 16.17'							х				х				
200 0	LAKE QUITJUP WATERSHED	2 (022 12)	115025 (6)															
F1	Lake Quitjup	34 ⁰ 23.17'	115 ⁰ 35.66'						Х	Х	Х							
F2	Bolghinup Lake	34 ⁰ 25.22'	115 ⁰ 33.00'															
F3	Pool (1) on Black Point Rd	34 ⁰ 19.98'	115 ⁰ 36.16'															
F4	Pool (2) " " " "	34 ⁰ 18.77'	115 ⁰ 37.89'															
F5	Pool at end of Black Point Rd	34 ⁰ 20.00'	115 ⁰ 38.25'				х											
	LAKE JASPER WATERSHED	2 (02 5 2 -:																
G.I	Lake Jasper	34 ⁰ 25.22'	115 ⁰ 41.19'			X			Х	X			X	X	X			

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Site Number	General Location	Latitude	Longitude	Th	Ls	Go	Gn	Gm	Вр	Ev	Nb	Ga(Ad) <i>Ga</i> (am)	Lw	Po	As	Trout sp.	Gh	Pf
	DONNELLY RIVER WATERSHED								-				-				sp.	-	
H 1	Lake Wilson	34 ⁰ 25.86'	115 ⁰ 42.68'			X			X	X									
H2	Lake Smith	34 ⁰ 25.89'	115 ⁰ 43.05'	х		x			X	x	x								
Н3	Swamp adjacent to Lake Smith	34 ⁰ 25.89'	115 ⁰ 43.20		x		x			x									
H4	Pool (1) on Scott Rd	34 ^o 25.50'	115 ⁰ 45.16'		X		X			Δ									
H5	Pool (2) " "	34 ⁰ 25,35'	115 ⁰ 45.67'		X		X												
H6	Donnelly River Mouth	34 ⁰ 29.11'	115040.42		Α,		X												
H7	Donnelly River-Boat Ramp	34 ⁰ 26.84'	115°46.38'									Х	****						
		34 ⁰ 24.93'	115°46.46'			X			X	X			х						
Н8	Donnelly River-Bridge on Scott Rd												X		X				
Н9	Donnelly River-One Tree Bridge	34 ⁰ 12.19'	115 ⁰ 55.82'			X			X	X		X						X	
H10	Fly Brook-Charlie Rd	34 ⁰ 27.24'	115 ⁰ 47.61'			X			X	X	X	X	x				X		
HII	Fly Brook-Fly Brook Rd	34 ⁰ 27.76'	115 ^o 52.45'									X	X				X		
H12	Carey Brook-Bridge on Cleave Rd	34°26.54°	115 ⁰ 47.25'			X			X	X		X	X						
H13	Carey Brook-Bridge on Vasse Hwy	34 ⁰ 25.01'	115 ⁰ 48.65'			X			X	X			x				x		
H14	Beedelup Brook-Karri Valley	34 ^o 25.35'	115 ⁰ 51.41'														х	X	
H15	Beedelup Brook-Opposite Tobruk Rd	34 ⁰ 25.27'	115 ⁰ 49.68'			x			x	х							X		
H16	Carey Brook-Staircase Rd	34 ^o 23.81'	115°50.39'			x			x	x									х
H17	Carey Brook-Steep Rd	34 ^o 23.56'	115 ^o 51.58'			**			100	**			v						A
H18	Carey Brook-Stirling Track and Pile Rd	34 ⁰ 23.24'	115 ⁰ 52.45'										×						
H19	Carey Brook- " " and Beedelup Rd	34 ^o 23.49'	115 ⁰ 53.10'										^ v						
H20	Carey Brook-Thornhill & Seven Day Rds	34 ⁰ 20.11'	115°54.37'										Χ						
		34°24.27'	115°48.65'										x						
H21	Carey Brook-Sandy Hill Rd	34°20.68'	115°47.13'			X				X									
H22	Water sign-200m past Boot Rd(on 7day)	No. 10 Tourse on contract																	
H23	Water sign on Seven Day Rd	34 ⁰ 20.60'	115 ⁰ 51.20'																
	WARREN RIVER WATERSHED																		
I1	Warren R-Dombakup Brk-Plantation Rd	34 ⁰ 34.66'	115 ⁰ 57.98'			x			X	X		X	X						X
12	Yeagerup Lake	34 ⁰ 32.35'	115°52.39'			X			X	X									
13	Neanup Swamp-Pool at Yeagerup Dunes	34 ⁰ 32.35'	115 ^o 51.55'																
I4	Warren River-Bridge on Pemb/North Rd	34 ^o 30.42'	115 ^o 59.54'			x			x	x		х			x	x		x	
15	Warren River-King Trout Farm	34 ^o 30.10'	115 ^o 59.85'			X			X	X		x	x					x	
16	Lefroy Brook-The Cascades	34 ^o 28.60'	116 ⁰ 01.71'			x			X	x		X	25)					**	
17	Lefroy Brook-Downstream of trout hatch	34 ^o 26.60'	116 ^o 01.36'			x			X	X		X	v				v		
18	Lefroy Dam-Immediately downstream	34 ⁰ 26.41'	116 ^o 01.36'			Α.			Α.	^			x				X		
19	Lefroy Dam- " upstream	34 ⁰ 26.35'	116°01.35'									Х						х	
		34 ^o 25.65'	116 ^o 01.00'															х	
110	Middle Weir-Lefroy Brook	34 25.05 34 ⁰ 25.19'	116 01.00 116 ⁰ 01.53'															X	
I11	Lefroy Brook-Broken Bridge							X	X	Х		X	X				X	X	X
112	Big Brook Dam-Under downstream bridge	34 ⁰ 24.73'	116 ⁰ 01.71'						X	X			X					х	Х
I13	Big Brook Dam-Pool at bottom of dam	34 ⁰ 24.68'	116 ^o 01.71'															X	
I14	Big Brook Dam-Actual	34 ⁰ 24.49'	116 ⁰ 01.64'						х									X	х
115	Bridge Upstream of Big Brook Dam	34 ⁰ 24.26'	116°00.22'																
116	Bridge south of Jn of 4 & 5 Mile Brooks	34°23.22'	116 ^o 00.58'										x						
117	Four Mile Brook-Channybearup Rd	34 ⁰ 21.84'	116 ^o 00.26'										x						
118	" " " -Seven Day Rd	34 ⁰ 18.65'	115 ⁰ 59.39'				x		9	х			х						
I19	Channybearup Brook-Seven Day Rd	34 ⁰ 19.11'	115°57.52'							x			x						
120	Wilgarup River-Bridge on Cormint Rd	34 ^o 21.11'	116 ^o 20.73'			x		x	x	x			•						
I21	Peerup River-Bridge on Muirs Hwy	34 ^o 23.41'	116 ^o 25.52'			x		x	x	X								x	
121	Tone River-Bridge on Muirs Hwy	34 ⁰ 24.65'	116°33.10'			x		X	x	X								.^	
I22 I23	Unicup Lake	34 ^o 20.65'	116°43.13'			x x		Λ	Λ.	35.5									
123 124	Kulunilup Lake	34°20.03'	116°43.13 116°47.06′			Х				X									
		34 ^o 26.24'	116°47.06 116°36.96'															-	
125	Tone River-Two Mile	34°26.24 34°26.00'	116°36.96'															x	
126	Tone River-Two Mile																	X	
127	Tone River-Wingarup Gully	34 ⁰ 25.68'	116 ^o 35.00'															X	
128	Wilgarup River-Muirs Hwy	34 ⁰ 19.86'	116 ⁰ 22.45'			X			X	X					х	X			

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Table 1 (cont...)

Site Number	General Location	Latitude	Longitude	Tb	Ls	Go	Gn	Gm	Вр	Ev	Nb G	(Ad) Ga(am) Lw	Po	As	Trout sp.	Gh	Pf
	LAKE MUIR WATERSHED		*															
J1	Lake Muir	34 ^o 26.41'	116 ^o 39.58'			x				х							x	
J2	Noobijup lake	34 ^o 23.89'	116 ⁰ 47.06'														^	
J3	Byenup Lagoon	34 ⁰ 29.95'	116 ⁰ 43.36'			x				x							x	
J4	Lake at Jn of Lake Unicup & Pindicup Rds	34 ^o 22.57'	116 ⁰ 41.87'			X			2	X							x	
J5	Cowerup Swamp (Surrounding Pools)	34 ⁰ 26.22'	116 ^o 38.68'			x		x		X							^	
J6	Stream of Lake Muir	34 ^o 27.30'	116 ⁰ 47.00'			x		^	x	^								
J7	Red Lake	34 ^o 26.30'	116 ⁰ 38.33'			X			X									
J8	Drain fom Red Lake	34 ^o 26.25'	116 ^o 39.47'			X			X								X	
J9	Red Lake	34 ⁰ 26.20'	116 ⁰ 39.40'			X											X	
J10	Red Lake	34 ⁰ 25.90'	116 ⁰ 39.40'			X			x								Х	
J10	Drain-connect Red Lake/Lake	34 ⁰ 26.35'	116 ⁰ 39.07'			Х			X								Х	
		34 ^o 28.30'	116°39.07 116°41.10'														Х	
J12	Lake Muir-Hanekamp Rd	34 28.30 34 ⁰ 27.68'	116°41.10'															
J13	Lake Muir- " "																	
J14	Pool adjacent toLake Muir-Hanekamp Rd	34 ⁰ 27.89'	116 ⁰ 41.10'															
J15	Pool adjacent toLake Muir- " "	34 ⁰ 27.97'	116 ⁰ 41.16'															
J16	Pool adjacent toLake Muir- " "	34 ⁰ 28.10'	116 ⁰ 41.29'															
J17	Pool adjacent toLake Muir- " "	34 ⁰ 28.03'	116 ⁰ 41.49'															
J18	Stream adjacent toLake Muir-Muirs Hwy	34 ⁰ 26.41'	116 ⁰ 41.50'								¥						X	
J19	Stream adjacent toLake Muir- " "	34 ^o 26.49'	116 ⁰ 41.58'														x	
J20	Pool adjacent toLake Muir- " "	34 ⁰ 26.46'	116 ⁰ 40.32'														х	
J21	Pool adjacent toLake Muir- " "	34 ⁰ 26.46'	116 ⁰ 40.29'														x	
J22	Pool adjacent toLake Muir- " "	34 ^o 26.30'	116 ⁰ 40.20'														x	
J23	Pool adjacent toLake Muir-Thomson Rd	34 ^o 29.85'	116 ^o 38.00'															
J24	Pool adjacent toLake Muir- " "	34 ⁰ 29.95'	116 ⁰ 37.90'															
J25	Pool adjacent toLake Muir- " "	34 ^o 31.84'	116 ^o 38.60'															
J26	Pool adjacent toLake Muir- " "	34 ⁰ 32.16'	116 ^o 38.65'															
	DOGGERUP CREEK WATERSHED																	
K1	Doggerup Creek-Mouth	34 ⁰ 46.75'	115 ^o 58.82'							х								
K2	Lake Doggerup	34 ⁰ 42.99'	116 ^o 03.88'			х	х			x	х							
K3	Lake Samuel	34 ⁰ 43.77'	116 ^o 03.58'			Y Y	x		x	X	A							
K4	Pool on Malimup Rd (Summertime Track)	34 ⁰ 43.90'	116 ^o 02.92'						•									
K5	Dam on McGeachin's Property	34 ⁰ 42.82'	116 ⁰ 05.22'			х	х		x	х								
K6	Pool (1) on Windy Harbour Rd	34 ⁰ 42.17'	116 ^o 06.05'			Λ.	Α.		^	Α.								
K7	Pool (1)-Doggerup Creek Track	34 ⁰ 44.79'	116 ⁰ 04.65'				v											
K8	Pool (2)- " " " "	34 ⁰ 44.32'	116 ⁰ 04.53'				X											
K9	Pool (3)- " " " "	34 ⁰ 44.46'	116 ⁰ 03.78'				1207	x										
K10	Pool (2) on Windy Harbour Rd	34 ⁰ 42.25'	116°05.78		х		X											
K11	Pool (3) on Windy Harbour Rd	34°48.13'	116°04.46'															
	GARDNER RIVER WATERSHED																	
LI	Gardner River Mouth	34 ⁰ 50.43'	116 ⁰ 07.40'															
L2	Blackwater-Pool 1	34 ⁰ 49.82'	116 07.40 116 ⁰ 07.29'			-			\$10°	-				X				
L2 L3		34°49.82'	116 07.29 116 ⁰ 07.34'			X	X		X	X	X			Х				
	Blackwater-Pool 2	34°49.82'	116 07.34 116 ⁰ 00.97'		green.	Х			X	X	х			Х				
L4	Large Swamp on Salmon Beach Rd				X													
L5	Pool oppostie L4	34 ⁰ 50.16'	116 ⁰ 00.90'															
L6	Pool adjacent L5	34 ⁰ 50.20'	116 ⁰ 01.05'															
L7	Pool at southern end of Windy Harbour Rd	34 ⁰ 50.24'	116 ⁰ 01.22'		х		X											
L8	Pool 100m south of L9	34 ⁰ 49.60'	116 ^o 03.50'		х		X		X	X								
L9	Pool 200m south of L10	34 ⁰ 49.40'	116 ^o 03.70'		X	X	X		X	X	X							
L10	Swamp west of L11	34 ⁰ 49.25'	116 ⁰ 03.44'															
L11	Small Lake west of L12	34 ⁰ 49.25'	116 ⁰ 03.66'		x													

Table 1 (----)

Site Number	General Location	Latitude	Longitude	Tb	Ls	Go	Gn	Gm	Вр	Εν	Nb	Ga(Ad) Ga(am)	Lw	Po	10	Trout	Gh	D/
							on.	Om.	υĮ	LV	110	Ou(Au) Ou(dill)	LW	FU	As	Trout sp.	Gn	Pf
L12 L13	Pool opposite L13	34 ⁰ 49.23'	116 ⁰ 03.72'		х	х	х		х	х	х		х	х		ъ <u>р.</u>		
	Pool 450m south of L14	34 ⁰ 49.17'	116 ⁰ 03.82		X	X	X		x	X	X							
L14	Pool 50m south of L15	34 ⁰ 48.98'	116 ⁰ 04.05'		X	X	X		X	x	x							
L15	Narrow stream on Windy Harbour Rd	34 ⁰ 48.88'	116 ⁰ 04.12'		X	X	Х		X	X	X							
L16	Pool on Windy Harbour Rd	34 ⁰ 48.70'	116 ⁰ 04.20'		X	X	X		X	х	X			X			х	
L17	Meandering Stream-off Windy Harbour Rd	34 ⁰ 48.41'	116 ^o 03.77'			X			X	х	X					•		
L18	Summer pool at western end of L17	34 ⁰ 48.29'	116 ⁰ 03.75'			X	X		X	х	X							
L19	Small Lake 200m north of L17	34 ⁰ 48.47'	116 ^o 03.86'				x		X	x								
L20	Pool on Windy Hr Rd-400m N of Chapke	34 ⁰ 40.88'	116 ^o 06.64'		X													
L21	1st pool on Chesapeake Rd	34 ⁰ 42.36'	116 ⁰ 07.06'		X		x		X									
L22	Pool near Lake Florence entrance	34 ⁰ 42.63'	116 ⁰ 07.19'		X	X	x											
L23	43.1km from east end of Chesapeake Rd	34°43.18′	116 ^o 07.59'		X		X											
L24	42.6km " " " " " " "	34 ⁰ 43.37'	116 ^o 07.82'		x		х											
L25	42.4km " " " " " " "	34 ⁰ 43.43'	116 ⁰ 07.85'		X													
L26	42.3km " " " " " "	34 ⁰ 43.50'	116 ⁰ 07.88'		x													
L27	42.2km " " " " " "	34 ⁰ 43.55'	116 ⁰ 07.92'		x													
L28	42.1km " " " " " "	34 ⁰ 43.60'	116 ⁰ 07.95'		x													
L29	Pool 38.2km " " " " " "	34 ⁰ 45.40'	116 ⁰ 09.02'		X		x		x	х								
L30	Pool opposite L29	34 ⁰ 45.38'	116 ⁰ 09.00'		X		x		*									
L31	Lake Florence	34 ⁰ 44.12'	116 ^o 06.06'			x				x								
L32	1st pool on Lower Gardner River Rd	34 ⁰ 45.64'	116 ^o 09.03'		x	x	x			x	x							
L33	Pool 37.6km from east end of Chesapeake	34 ⁰ 45.66'	116 ⁰ 09.18'		x	Α.	X			Α.	Α.							
L34	Large pool on Chesapeake Rd	34 ⁰ 45.92'	116 ⁰ 09.36'		x	x	x		x	x	v							
L35	Pool 500m south of L34	34 ⁰ 46.13'	116 ^o 09.48'		Λ.	Λ.	^		Α.	X	X							
L36	Pool 35.8km from east end of Chesapeake	34 ^o 46.46'	116 ⁰ 09.67'															
L37	Gardner River-South of bridge	34 ⁰ 47.21'	116 ⁰ 11.32'			x				**		200						
L38	Gardner River-Bridge	34 ⁰ 46.62'	116 ⁰ 10.87'			X			X	X	X	x						
L39	Buldania Creek-Gardner River Rd	34 ^o 45.46'	116 ^o 12.87'			x			X	х		X						
L40	Una Brook- " " " "	34 ⁰ 43.95'	116 ⁰ 12.14'			Λ.			X	X								
L41	Gardner River-Laws Track	34 ⁰ 42.49'	116 ^o 09.96'						X	х								
L42	Boorara Brook-Bettink's	34 ⁰ 41.46'	116 ⁰ 10.85'			.,			X	X		X						
L43	" " -Muirillup Rd	34 ⁰ 38.84'	116 ^o 13.60'			X			1001	407						X		
L44	" " -Daubney's (1)	34 ⁰ 38.78'	116°13.69'			X			X	X								
L45	" " - " (2)	34 ⁰ 38.33'	116°13.63'			X		х	X	х								
L46	" " - " " (3)	34 ⁰ 37.42'	116°13.37'			X		х	X	X								
L47	" " -Jane Block	34 ⁰ 36.35'	116°14.53'			X		х		Х								
L48	Lake Maringup	34 ^o 50.22'	116°11.81'					X										
L49	Gravel Pool on Moore's Hut Track	34 ⁰ 50.45'	116 ⁰ 15.05'		20	X			X	х	Х			X				
L50	Pool on Moore's Hut Track	34 ⁰ 50.54'	116°15.84'		х													
L51	Pool 4.9km west of Deeside/Chspke Jn	34 ⁰ 49.00'	116°15.51'		X		х			х								
L52	Pool 50m west of L51	34°49.00'	116 15.31 116 ⁰ 15.45'				х		Х									
L53	Pool 50m west of L52	34°49.00'																
L54	Pool on Chapke Rd(43.2km from east end)	34°43.25'	116 ⁰ 15.38' 116 ⁰ 07.64				х											
L55	Pool on Chapke Rd(43.2km from east end)	34°43.23 34°48.76'	116°07.64 116°14.72'				X											
L56		34°48.76 34°48.99'													Si .			
L50 L57	Small Lake on Lower Gardner River Rd		116 ⁰ 07.70'		х													
		34 ⁰ 47.98'	116 ⁰ 07.90'															
L58	1 001 011	34 ⁰ 47.90'	116 ⁰ 08.02'															
L59	Pool on " " " " " " " " " " " " " " " " " "	34 ⁰ 47.82'	116 ⁰ 08.09'		X		X											
L60	r ooi oii	34 ⁰ 47.48'	116 ⁰ 08.46'		x			x										
L61	F 001 011	34 ⁰ 45.88'	116 ⁰ 08.90'		X			x										
L62 L63	Swamp east Gardner R-Taylor Property Northcliffe Weir	34 ⁰ 37.93' 34 ⁰ 38.08'	116 ⁰ 11.84' 116 ⁰ 08.23'		X													

Table I (cont...)

ite Number	General Location	Latitude	Longitude	Tb	Ls	Go	Gn	Gm	Вр	Ev	Nh	Ga(Ad) G	a(am)	Lw	Po	As	Trout	Gh	P_{\cdot}
																	sp.		
	SHANNON RIVER WATERSHED		-																
Ml	Pool on Moore's Hut Track	34 ^o 50.40'	116 ⁰ 17.03'		X		X		х	X									
M2	Pool " " " "	34 ⁰ 49.11'	116 ⁰ 16.55'																
M3	Pool on Chesapeake Rd-9.6km west Broke	34 ^o 51.32'	116 ^o 24.01'																
M4	Shannon River-Bridge on Cheaspeake Rd	34 ^o 50.36'	116 ^o 22.27'			х		х	х	х	X		X						
M5	" " -Springbreak Rd	34 ⁰ 52.23'	116 ^o 22.37'			х			X	x				X	X				
M6	Upper Shannon R-NE of Dam	34 ^o 35.05'	116 ⁰ 24.69'			x				x									
M7	Pool on Chesapeake Rd-19.4km west Broke	34 ⁰ 49.20'	116 ⁰ 18.57'		х	x			x	х									
M8	Pool at Jn of Deeside & Chesapeake Rds	34 ⁰ 49.07'	116 ⁰ 17.99'						182										
M9	Chesapeake Brook (1)-20.05km W Broke	34 ⁰ 49.07'	116 ⁰ 18.09'			х			Y	х									
M10	" " (2)-" " "	34 ⁰ 48.96	116°18.08'			^			Y	x	x								
	" " " (3)- " " "	34 ⁰ 48.90'	116 ⁰ 18.07'					х	^	x									
M11		34 ⁰ 49.09'	116°18.06'					Α.		^									
M12	Pool on Chesapeake Rd-20.2km " "	34 ⁰ 42.92'	116 ⁰ 20.05'																
M13	Pool on Deeside Coast Rd		116°20.03 116°19.63'																
M14	Pools at Jn of Deeside Coast & Preston Rds	34 ⁰ 38.52'			Х	Х	х	Х	Х	Х	х								
M15	Shannon River-Nelson Rd	34 ⁰ 43.19'	116 ⁰ 21.88'															*	
	BROKE INLET WATERSHED	0.051.051																	
N1	Forth River	34 ⁰ 51.85'	116 ^o 25.55'		X	X	Х	X	X	Х	Х								
N2	Small stream 6.6km west of Broke Inlet Rd	34 ⁰ 51.94'	116 ⁰ 25.72'		X	X	Х	X	X	Х	х								
N3	Pool 6.0km " " " " " "	34 ⁰ 52.12'	116 ⁰ 26.00'																
N4	Pool/small stream 5.2km " "	34 ⁰ 52.40'	116 ^o 26.37'		X	х	х	X	X	X	х								
N5	Pool on Chesapeake Rd 4.2km " "	34 ⁰ 52.77'	116 ⁰ 26.85'																
N6	Small stream on Chesapeake Rd 1.6km "	34 ^o 53.68'	116 ⁰ 28.14′			X			X	х									
N7	Pool on Chesapeake Rd 1.3km " "	34 ⁰ 53.76'	116 ⁰ 28.23'				х												
N8	Pool on Broke Inlet Rd 1.9km N Chspke Rd	34 ^o 53.62'	116 ⁰ 29.78′		X		X												
N9	Pool " " " 1.6km S " "	34 ⁰ 54.75'	116 ^o 28.18'		х		х												
N10	Inlet River-Ålkm upstream of mouth	34°56.28'	116 ^o 31.84'											х	X				
NII	Inlet River-near mouth	34 ^o 56.31'	116 ^o 31.60'											х	x				
N12	Small stream running into Broke Inlet	34 ^o 53.75'	116 ^o 26.48'											х	х	х			
1112	Small stream fulling into broke mice																		
	DEEP RIVER WATERSHED	. 0	0																
O1	Deep River-Bridge on Beardmore Rd	34 ⁰ 49.14'	116 ^o 35.52'			X			Х	X									
O2	Weld River- " " " "	34 ⁰ 48.89'	116 ⁰ 34.75'			X		Х	Х	X	X		X						
O3	Weld river-Wye Rd	34 ⁰ 45.65'	116 ⁰ 30.75'					Х	х	X									
O4	Jn Beardmore & South West Hwy	34 ⁰ 48.66'	116 ⁰ 31.82'		X	х	X	X	X	х	X								
O5	Small pools along Beardmore Rd	34 ⁰ 48.67'	116 ⁰ 32.12		х		X												
06	Pool on Thomson Rd	34 ^o 36.00'	116 ⁰ 41.41'																
07	Pool on Thomson Rd	34 ^o 36.41'	116 ⁰ 41.40'																
08	Pool on Thomson Rd	34 ⁰ 37.46'	116 ⁰ 41.45°																
09	Pool on Thomson Rd	34 ^o 41.30'	116 ⁰ 42.26'																
010	Pool on Thomson Rd	34 ⁰ 46.57'	116 ⁰ 42.97		х		х												
OII	Pool on Thomson Rd	34 ⁰ 46.73'	116 ⁰ 43.07																
012	Pool on Thomson Rd	34 ⁰ 47.73'	116 ⁰ 42.91																
~																			
	FRANKLAND RIVER WATERSHED	34 ^o 28.73'	116 ⁰ 54.00'																
. PI	Frankland River-Muirs Bridge	34°28.73 34°45.70'	116°54.00 116°43.17			Х	2.0	Х	Х	Х									
P2	Pool on Thomson Rd						х												
P3	Pool on Thomson Rd	34 ⁰ 46.89'	116 ⁰ 43.17'																
P4	Pool on Thomson Rd	34 ⁰ 47.03'	116 ⁰ 43.20'																
P5	Pool on Thomson Rd	34 ⁰ 47.22'	116043.12				X		X										
P6	Pool on Thomson Rd	34 ⁰ 47.32'	116 ⁰ 42.84																
P7	Pool on Thomson Rd	34 ⁰ 47.49'	116°42.97		X		X												
P8	Pool on Thomson Rd	34 ⁰ 47.65'	116 ⁰ 43,20°				X		X										_

Table 1 (cont...)

Site Number		Latitude	Longitude	Tb	Ls	Go	Gn	C	n	-	177		(A 1)	0 ()	-					
		Dantage	Dongitude	10	LS	Go	Gn	Gm	Bp	Ev	Nb	Ga	(Ad)	Ga(am)	Lw	Po	As	Trout	Gh	Pf
P9	Pool on Thomson Rd	34 ⁰ 47.32'	116 ⁰ 42.84'															sp.		
P10	Wedding Brook	34 ^o 50.78'	116°42.84°				X		x											
P11	Elsie Brook	34 ⁰ 51.46'	116°43.43°				X		Х											
1	Side Stock	51 51.10	110 45.45			Х	X		х											
	KENT RIVER WATERSHED																			
Q1	Kent River-Pools on Muirs Hwy	34 ⁰ 33.41'	117 ⁰ 10.29'																	
O2	Camballup Pool	34 ⁰ 32.38'	117 ⁰ 11.33'			X		X	х	X										,
-		0.02.00	117 11.55			х		х	Х	X										
	HAY RIVER WATERSHED																			
R1	Hay River-Pools on Muirs Hwy	34 ⁰ 37.81'	117 ⁰ 24.15'						9000	490										
		5. 57.01	117 27.15			X		х	x	X										
	COLLIE RIVER WATERSHED																			
S1	Collie River-Schultz's Weir	33 ⁰ 23.19'	116 ⁰ 09.78'																	
S2	" " -Collieburn Pool	33 ⁰ 24.66'	116 ⁰ 11.97'			х													X	х
S3	" " -Townsend's Pool	33 ⁰ 25.45'	116 ^o 13.00'			Α.			x										X	х
S4	" " -Cox's Pool	33°25.80'	116 ⁰ 13.13'			v			-										X	х
S5	" " -Round Pool	33 ⁰ 26.16'	116 ^o 13.40'			X X			x	х									X	х
S6	" " -Western Collieries	33 ⁰ 28.34'	116 ^o 13.86'			Λ V				X									X	х
S7	" " -Davies' Pool	33 ⁰ 28.75'	116 ⁰ 13.90'			Χ			х	х									x	х
		10 20.75	110 15.70			X			X	X									X	x

Table 2: The sites at which *Lepidogalaxias salamandroides* was captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Jaensch (1992) and Christensen (1982).

Site Number	General Location	Latitude	Longitude
	SCOTT RIVER WATERSHED		
F.5		34 ⁰ 17.05'	115 ⁰ 13.96'
E7	Pool on Scott R Rd-power pole43	34°17.03'	115°14.40'
E15	Pool on Scott R Rd-power pole 38	34 17.06	115 14.40
	DONNELLY RIVER WATERSHED		
Н3	Swamp adjacent to Lake Smith	34 ⁰ 25.89'	115 ⁰ 43.20'
H4	Pool (1) on Scott Rd	34 ⁰ 25.50'	115 ⁰ 45.16′
H5	Pool (2) " "	34 ^o 25.35'	115 ⁰ 45.67'
	DOGGERUP CREEK WATERSHED		
К9	Pool (3)-Doggerup Creek Track	34 ⁰ 44.46'	116 ^o 03.78'
	GARDNER RIVER WATERSHED		
		34 ⁰ 50.32'	116 ⁰ 00.97'
L4	Large Swamp on Salmon Beach Rd	34 ⁰ 50.24'	116°01.22'
L7	Pool at southern end of Windy Harbour Rd	34°49.60'	116°03.50'
L8	Pool 100m south of L9 Pool 200m south of L10	34°49.40'	116°03.70'
L9		34 ⁰ 49.25'	116°03.66'
L11 L12	Small Lake west of L12	34°49.23'	116°03.00°
	Pool opposite L13	34°49.17'	116°03.82'
L13 L14	Pool 450m south of L14 Pool 50m south of L15	34 49.17 34 ⁰ 48.98'	116 03.82 116 ⁰ 04.05'
L14 L15	Narrow stream on Windy Harbour Rd	34 ⁰ 48.88'	116°04.12'
		34 ⁰ 48.70'	116 ⁰ 04.20'
L16	Pool on Windy Harbour Rd Pool on Windy Hr Rd-400m N of Chspke	34°40.88'	116°04.20
L20 L21	1st pool on Chesapeake Rd	34 ⁰ 42.36'	116 ⁰ 07.06'
	Pool near Lake Florence entrance	34 ⁰ 42.63'	116°07.19'
L22	The State Court Court of the State Court of the Sta	34 ⁰ 43.18'	116°07.59'
L23	43.1km from east end of Chesapeake Rd	34 ⁰ 43.37'	116 07.32
L24	42.6km " " " " " " " " 42.4km " " " " " " " " "	34°43.43'	116°07.85'
L25	42.4KIII	34°43.50'	116°07.88'
L26	42.3km " " " " " " " 42.2km " " " " " " "	34°43.55'	116°07.92'
L27	42.1km " " " " " "	34°43.60'	116°07.95'
L28	Pool 38.2km " " " " "	34°45.40'	116°09.02'
L29	F001 36.2KIII	34 ⁰ 45.38'	116°09.02'
L30	Pool opposite L29	34°45.64'	116°09.03'
L32	1st pool on Lower Gardner River Rd	34°45.66'	116 ⁰ 09.18'
L33	Pool 37.6km from east end of Chesapeake	34°45.92'	116°09.36'
L34	Large pool on Chesapeake Rd Gravel Pool on Moore's Hut Track	34 ^o 50.45'	116°05.55'
L49	Pool on Moore's Hut Track	34°50.54'	116 ⁰ 15.84'
L50 L56	Small Lake on Lower Gardner River Rd	34°48.99'	116 ⁰ 07.70'
	Pool on " " " " " " "	34°47.82'	116°08.09'
L59	Pool on " " " " " "	34°47.48'	116 ⁰ 08.46'
L60	Pool on " " " " " "	34 ^o 45.88'	116 ⁰ 08.90'
L61 L62	Swamp east Gardner R-Taylor Property	34 ⁰ 37.93'	116 ⁰ 11.84'
202			
	SHANNON RIVER WATERSHED	0.4060.401	116017 001
M1	Pool on Moore's Hut Track	34 ⁰ 50.40'	116 ⁰ 17.03'
M7	Pool on Chesapeake Rd-19.4km west Broke	34 ⁰ 49.20'	116 ⁰ 18.57'
M14	Pools at Jn of Deeside Coast & Preston Rds	34 ⁰ 38.52'	116 ⁰ 19.63'
M15	Shannon River-Nelson Rd	34043.19'	116021.88'
	BROKE INLET WATERSHED		~
N1	Forth River	34 ^o 51.85'	116 ⁰ 25.55'
N2	Small stream 6.6km west of Broke Inlet Rd	34 ⁰ 51.94'	116 ⁰ 25.72'
N4	Pool/small stream 5.2km " " "	34 ⁰ 52.40'	116 ^o 26.37'
N8	Pool on Broke Inlet Rd 1.9km N Chspke Rd	34 ^o 53.62'	116 ⁰ 29.78'
N9	Pool " " " 1.6km S " "	34 ⁰ 54.75'	116 ⁰ 28.18′

Table 2 (cont...)

Site Number	General Location	Latitude	Longitud
	DEEP RIVER WATERSHED		
O4	Jn Beardmore & South West Hwy	34 ⁰ 48.66'	116 ⁰ 31.8
O5	Small pools along Beardmore Rd	34 ⁰ 48.67'	116 ⁻³ 1.8
O10	Pool on Thomson Rd	34°46.57'	116°32.1
P7	Pool on Thomson Rd	34°47.49'	116°42.9 116°42.9
	MUSEUM RECORDS		
1	Northcliffe1988	34 ⁰ 38'	116 ⁰ 07'
2	1959	34 ⁰ 33'	116 ⁰ 29'
3	1961	34 ⁰ 51'	116 ⁰ 21'
4	1961	34 ⁰ 42'	116 ⁰ 22'
5	Northcliffe1961	34 ⁰ 36'	116 ⁰ 07'
6	1964	34 ⁰ 35'	116 ⁰ 25'
7	Windy Harbour1962	34 ⁰ 50'	116 ⁰ 00'
8	Albany1976	35 ⁰ 01'	117 ⁰ 45'
9	Cane Brake Creek1976	33 ⁰ 50'	115 ⁰ 20'
10	Northcliffe1982	34 ⁰ 38'	116 ⁰ 21'
11	WAlpole1975	34 ⁰ 50'	116 ⁰ 54'
12	Northcliffe1986	34 ⁰ 44'	116 ⁰ 08'
13		34 ⁰ 39'	116 ⁰ 08'
14	II II II II	34048	116 ⁰ 10'
15	и и и	34 ⁰ 38'	116 ⁰ 03'
16	Doggerup Creek1986	34 ⁰ 44'	116 ⁰ 04'
17	Lake Samuel1985	34 ⁰ 43'	116 ⁰ 04'
18	Northcliffe1986	34 ⁰ 44'	116 ⁰ 19'
19	и и и и	34 ⁰ 46'	116 ⁰ 05'
20	и и и и	34 ⁰ 39'	116 ⁰ 08'
21	" " 1988	34 ⁰ 28'	116 ⁰ 07'
	R. JAENSCH (1992)		
12	Lake Doggerup	34 ⁰ 43'	116 ⁰ 04'
	P. CHRISTENSEN (1982)		
	•		
4	Nelson Rd	34 ⁰ 43'	116 ⁰ 21'
5		34 ⁰ 41'	116 ⁰ 31'
15	Deeside Coast Rd	34 ⁰ 41'	116 ⁰ 20'
18	South West Hwy	34 ⁰ 56'	116 ⁰ 35'
21		34 ⁰ 54'	116 ⁰ 34'
22		34 ⁰ 53'	116 ⁰ 33'
23		34 ⁰ 48'	116 ⁰ 32'
34	East Brook-Boorara Rd	34 ⁰ 37'	116 ⁰ 17'
48	Richardson Rd	34 ⁰ 38'	116 ⁰ 05'
64	Meerup River-Gurnsey Rd	34 ⁰ 41'	116 ⁰ 04'
74	Pneumonia Rd	34 ⁰ 25'	115044'
79	Boronia Rd	34 ⁰ 39'	116 ⁰ 50'
82	Middle Rd	34 ⁰ 52'	116 ⁰ 57'
89	Fouracres Rd	34 ⁰ 18'	115 ⁰ 35'
90	й и п	34 ⁰ 18'	115 ⁰ 31'
99	Nornalup Rd	34 ⁰ 39'	116 ⁰ 57'
100	11 II II	34 ⁰ 44'	116 ⁰ 57'
101	и и и	34 ⁰ 44'	116 ⁰ 57'
103	u u u	34 ⁰ 50'	117 ⁰ 00'
108	South West Hwy	35 ⁰ 01'	116 ⁰ 53'

Table 3: The sites at which *Galaxias occidentalis* was captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Jaensch (1992) and Christensen (1982).

Site Number	General Location	Latitude	Longitude
	CAPEL WATERSHED		
	Capel River-under railway bridge	33 ⁰ 33.18'	115 ⁰ 34.01'
A1		33 ⁰ 39.16'	115 ⁰ 45.43'
A2	Capel River-south	33 37.10	
	ABBA/LUDLOW DRAINAGE	33 ⁰ 36.20'	115 ⁰ 29.70'
B17	Gravel Pool	33°36.25'	115°29.65'
B18	Stream south of above	33°35.23 33°35.80'	115°29.80'
B19	Ludlow Swamp	33°35.80 33°36.20'	115°29.80'
B20	Ludlow River-Bridge on Bypass		115°28.82 115°29.59'
B21	Ludlow River-on RGC	33 ⁰ 36.64'	115°25.91'
B24	Abba River-Bridge on Bypass	33 ⁰ 38.30'	115°23.91 115°12.19'
B25	Carbanup River	33 ⁰ 40.78'	113-12.19
	MARGARET RIVER WATERSHED	0.55	115010 011
C1	Margaret River-Great North Rd(Rapids)	33 ⁰ 52.60'	115 ⁰ 18.01'
C2	Margaret R-1.3km from Cane Break Rd	33 ⁰ 51.99'	115 ⁰ 18.64'
C5	Margaret River-1st Weir	33 ⁰ 56.92'	115 ⁰ 03.83'
C7	Margaret R-2nd Weir	33°56.89°	115 ⁰ 05.35'
C8	Margaret R-Margaret R Rd	33 ^o 56.53'	115 ⁰ 06.98'
C10	Margaret R-Margaret R Rd	33 ⁰ 56.03'	115 ⁰ 08.82'
C11	Margaret R-Margaret R Rd	33 ⁰ 54.77'	115 ⁰ 17.31'
C13	Margaret R-small stream behind Leeuwin Estate	33 ⁰ 59.95'	115 ⁰ 03.92'
	BLACKWOOD RIVER WATERSHED		2
D4	Blackwood R-north of Nannup	33 ^o 55.27'	115 ⁰ 48.35'
D5	Blackwood R-Sues Bridge	34 ⁰ 04.54'	115 ^o 23.42'
D7	St John Brook (Blackwood River)	33 ^o 52.70'	115 ⁰ 40.59'
D9	Blackwood R-Tweed Rd	33 ^o 58.72'	116 ⁰ 09.54'
D10	Blackwood R	33 ^o 59.89'	116 ⁰ 11.63'
D11	Blackwood R-Aegers Bridge Rd	33 ^o 54.95'	116 ⁰ 25.17'
D12	Blackwood R-Terry Rd	33 ^o 54.47'	116 ⁰ 24.38'
D13	Blackwood R-Terry Rd	33 ⁰ 51.43'	116 ^o 22.66'
D16	Blackwood R-Condinup Crossing Rd	33 ⁰ 46.35'	116 ⁰ 31.07'
D17	Blackwood R-Arthur River Rd	33 ⁰ 38.49'	116 ⁰ 43.68'
D19	Arthur R-Moodiarup Rd	33 ⁰ 37.13'	116 ⁰ 47.96'
D22	Blackwood R-Kulikup Rd & Lower Bridgetown	33 ⁰ 52.39'	116 ⁰ 39.88'
D23	Chapman Brook	34 ⁰ 04.61'	115 ⁰ 11.31'
D24	Chapman Brook	34 ^o 05.33'	115 ⁰ 12.04'
	SCOTT RIVER WATERSHED		
E2	Scott R-Bridge on Milyeannup Rd (1)	34 ⁰ 17.56'	115 ⁰ 24.02'
E3	Scott R-" " " (2)	34 ⁰ 17.70'	115 ^o 24.10'
E4	Scott R- " " " (3)	34 ⁰ 17.80'	115 ⁰ 24.15'
E5	Pool 200m south of above	34 ⁰ 17.68'	115 ^o 23.87'
E7	Pool on Scott R Rd-power pole43	34 ⁰ 17.05'	115 ⁰ 13.96'
E15	Pool on Scott R Rd-power pole 38	34 ⁰ 17.08'	115 ⁰ 14.40'
1	LAKE JASPER WATERSHED		
GI	Lake Jasper	34 ^o 25.22'	115 ⁰ 41.19'
	DONNELLY RIVER WATERSHED		~
ні	Lake Wilson	34 ^o 25.86'	115 ^o 42.68'
H2	Lake Smith	34 ^o 25.89'	115 ^o 43.05'
H7	Donnelly River-Boat Ramp	34 ^o 26.84'	115 ^o 46.38'
Н9	Donnelly River-One Tree Bridge	34 ^o 12.19'	115 ^o 55.82'
H10	Fly Brook-Charlie Rd	34 ^o 27.24'	115 ⁰ 47.61'
H12	Carey Brook-Bridge on Cleave Rd	34 ^o 26.54'	115 ⁰ 47.25'
H13	Carey Brook-Bridge on Vasse Hwy	34 ^o 25.01'	115 ⁰ 48.65'
H15	Beedelup Brook-Opposite Tobruk Rd	34 ^o 25.27'	115 ⁰ 49.68'
H16	Carey Brook-Staircase Rd	34 ^o 23.81'	115 ⁰ 50.39'
H21	Carey Brook-Sandy Hill Rd	34 ^o 24.27'	115 ⁰ 48.65'
	WARREN RIVER WATERSHED		
I1	Warren R-Dombakup Brk-Plantation Rd	34 ⁰ 34.66'	115 ⁰ 57.98'
12	Yeagerup Lake	34 ⁰ 32.35'	115 ^o 52.39'
14	Warren River-Bridge on Pemb/North Rd	34 ⁰ 30.42'	115 ⁰ 59.54'
15	Warren River-King Trout Farm	34 ⁰ 30.10'	115 ⁰ 59.85'
16	Lefroy Brook-The Cascades	34 ⁰ 28.60'	116 ⁰ 01.71'

Table 3 (cont...)

Table 3 (cont)			
Site Number	General Location	Latitude	Longitude
17	Lefroy Brook-Downstream of trout hatch	34 ^o 26.60'	116 ⁰ 01.36'
I20	Wilgarup River-Bridge on Cormint Rd	34 ^o 21.11'	116 ^o 20.73'
I21 .	Peerup River-Bridge on Muirs Hwy	34 ^o 23.41'	116 ⁰ 25.52'
1		34°24.65'	116°23.32'
122	Tone River-Bridge on Muirs Hwy		
I23	Unicup Lake	34 ^o 20.65'	116 ⁰ 43.13'
I28	Wilgarup River-Muirs Hwy	34 ⁰ 19.86'	116 ^o 22.45'
			*
	LAKE MUIR WATERSHED		
JI	Lake Muir	34 ⁰ 26.41'	116 ^o 39.58'
J3	Byenup Lagoon	34 ⁰ 29.95'	116 ⁰ 43.36'
J4	Lake at Jn of Lake Unicup & Pindicup Rds	34 ⁰ 22.57'	116 ⁰ 41.87'
1	Cowerup Swamp (Surrounding Pools)	34°26.22'	116 ⁰ 38.68'
J5		34°20.22 34°27.30'	116 38.08 116 ⁰ 47.00'
Ј6	Stream of Lake Muir	9 / -/	
J7	Red Lake	34 ^o 26.30'	116 ⁰ 38.33'
J8	Drain fom Red Lake	34 ^o 26.25'	116 ⁰ 39.47'
J9	Red Lake	34 ^o 26.20'	116 ⁰ 39.40'
J10	Red Lake	34 ^o 25.90'	116 ⁰ 39.40'
	DOGGERUP CREEK WATERSHED		
K2		34 ⁰ 42.99'	116 ⁰ 03.88'
100,000	Lake Doggerup	34°42.99 34°43.77'	116°03.88'
K3	Lake Samuel	The second secon	
K5	Dam on McGeachin's Property	34 ⁰ 42.82'	116 ⁰ 05.22'
	GARDNER RIVER WATERSHED		
L2	Blackwater-Pool 1	34 ⁰ 49.82'	116 ⁰ 07.29'
L3	Blackwater-Pool 2	34 ⁰ 49.82'	116 ^o 07.34'
L9	Pool 200m south of L10	34 ⁰ 49.40'	116 ⁰ 03.70'
L12	Pool opposite L13	34049.23'	116 ⁰ 03.72'
L13	Pool 450m south of L14	34 ⁰ 49.17'	116°03.72'
		34 49.17 34 ⁰ 48.98'	116 03.82 116 ⁰ 04.05'
L14	Pool 50m south of L15		
L15	Narrow stream on Windy Harbour Rd	34048.88'	116 ⁰ 04.12'
L16	Pool on Windy Harbour Rd	34 ⁰ 48.70'	116 ^o 04.20'
L17	Meandering Stream-off Windy Harbour Rd	34 ⁰ 48.41'	116 ^o 03.77'
L18	Summer pool at western end of L17	34 ⁰ 48.29'	116 ^o 03.75'
L22	Pool near Lake Florence entrance	34 ⁰ 42.63'	116 ⁰ 07.19'
L31	Lake Florence	34 ⁰ 44.12'	116 ^o 06.06'
L31 L32		34 ⁰ 45.64'	116°00.00'
	1st pool on Lower Gardner River Rd		
L34	Large pool on Chesapeake Rd	34 ⁰ 45.92'	116 ⁰ 09.36'
L37	Gardner River-South of bridge	34 ⁰ 47.21'	116 ⁰ 11.32'
L38	Gardner River-Bridge	34 ⁰ 46.62'	116 ⁰ 10.87'
L39	Buldania Creek-Gardner River Rd	34 ⁰ 45.46'	116 ⁰ 12.87'
L42	Boorara Brook-Bettink's	34 ⁰ 41.46'	116 ⁰ 10.85'
L43	" " -Muirillup Rd	34 ^o 38.84'	116 ^o 13.60'
L44	" " -Daubney's (1)	34 ⁰ 38.78'	116 ⁰ 13.69'
		34 ⁰ 38.33'	116 ⁰ 13.63'
L45	- (2)	34°37.42'	116 13.03 116 13.37'
L46	- (3)		
L48	Lake Maringup	34 ^o 50.22'	116 ⁰ 11.81'
1			
1	SHANNON RIVER WATERSHED		
M4	Shannon River-Bridge on Cheaspeake Rd	34 ^o 50.36'	116 ⁰ 22.27'
M5	" " -Springbreak Rd	34 ^o 52.23'	116 ^o 22.37'
M6	Upper Shannon R-NE of Dam	34 ⁰ 35.05'	116 ⁰ 24.69'
M7	Pool on Chesapeake Rd-19.4km west Broke	34 ⁰ 49.20'	116 ⁰ 18.57'
M9	Chesapeake Brook (1)-20.05km W Broke	34 ⁰ 49.07'	116°18.09'
1	1	34°49.07 34°38.52'	116°18.09
M14	Pools at Jn of Deeside Coast & Preston Rds	34~38.32	110-19.03
1	BROKE INLET WATERSHED		
NI	Forth River	34 ^o 51.85'	116 ^o 25.55'
N2	Small stream 6.6km west of Broke Inlet Rd	34 ⁰ 51.94'	116 ^o 25.72'
N4	Pool/small stream 5.2km " "	34 ^o 52.40'	116 ^o 26.37'
N6	Small stream on Chesapeake Rd 1.6km "	34 ⁰ 53.68'	116 ^o 28.14'
140	Small sucam on Chesapeake Ru 1.0km	51 55.00	20.17
	DEED DIVED WATERGUED		
20.9	DEEP RIVER WATERSHED	2.0.2	110000 501
01	Deep River-Bridge on Beardmore Rd	34 ⁰ 49.14'	116 ^o 35.52'
O2	Weld River- " " " "	34 ⁰ 48.89'	116 ^o 34.75'
O4	Jn Beardmore & South West Hwy	34 ⁰ 48.66'	116 ^o 31.82'
	•		
	FRANKLAND RIVER WATERSHED		
P1	Frankland River-Muirs Bridge	34 ⁰ 28.73'	116 ⁰ 54.00'
		34°51.46'	116°43.43°
P11	Elsie Brook	J4 J1.40	110 43.43

Table 3 (cont...)

Table 3 (cont)	-		
Site Number	General Location	Latitude	Longitude
	KENT RIVER WATERSHED		
Q1		34 ⁰ 33.41'	117 ⁰ 10.29'
Q1 Q2	Kent River-Pools on Muirs Hwy	34°33.41° 34°32.38′	117°10.29° 117°11.33'
Q2	Camballup Pool	34°32.38	11/611.33
	HAY RIVER WATERSHED		
RI		24027.011	115004151
KI	Hay River-Pools on Muirs Hwy	34 ⁰ 37.81'	117 ^o 24.15'
	COLLIE RIVER WATERSHED		
S2	Collie River-Colliebum Pool	33 ^o 24.66'	116 ⁰ 11.97'
S4	" " -Cox's Pool	33°25.80′	116°11.97 116°13.13'
S5	" " -Round Pool	33°26.16'	116 13.13 116 ⁰ 13.40'
S6	" " -Western Collieries	33°28.34'	116°13.40′
S7	" " -Davies' Pool	33°28.75'	116°13.80'
	2 2 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	33 20.73	110 15.50
	MUSEUM RECORDS (Go)		
	Messelli Records (G0)		
I.	Manjimup	34 ⁰ 14'	116 ⁰ 10'
2	Tambellup	34 ⁰ 02'	117 ⁰ 39'
3	Karridale1931	34 ⁰ 18'	115 ⁰ 05'
4	Pemberton1936	34 ⁰ 27'	116 ⁰ 02'
5	1937	34 ⁰ 07'	117 ⁰ 21'
6	1944	34 ⁰ 25'	115 ⁰ 40'
7	1944	34 ^o 19'	115 ⁰ 11'
8	Bridgetown1946	33 ⁰ 57'	116 ⁰ 08'
9	Gnowangerup1947	33 ⁰ 55'	118 ⁰ 00'
10	Tambellup1947	34 ⁰ 02'	117 ⁰ 39'
11	Dumbleyung1947	33°19′	117 ⁰ 38'
12	Mount Barker	34 ^o 38'	117 ⁰ 40'
13		34 ⁰ 18'	117 ⁰ 32'
14		33 ⁰ 26'	116 ⁰ 48'
15	Bridgetown1954	33 ⁰ 57'	116 ⁰ 09'
16	1955	34 ⁰ 31'	117 ⁰ 43'
17	Deepdene1957	34 ⁰ 16'	115 ⁰ 04'
18	Karridale1959	34 ⁰ 12'	115 ^o 06'
19	Nannup1961	33 ⁰ 59'	115 ⁰ 45'
20	Margaret River Area1961	33 ⁰ 57'	115 ⁰ 04'
21	Greenbushes1964	33 ⁰ 51'	116 ⁰ 03'
22	1962	34 ⁰ 16'	115 ⁰ 14'
23	Kendenup1965	34 ⁰ 29'	117 ⁰ 39'
24	Nannup1974	33 ⁰ 59'	115 ⁰ 38'
25	Pemberton1974	34 ⁰ 27'	116 ⁰ 02′
26	Albany1976	35 ⁰ 01'	117 ⁰ 43'
27	1976	34010'	115 ⁰ 40′
28	Mayanup1979	34 ⁰ 00'	116 ^o 20'
29	1981	34 ⁰ 56'	117 ⁰ 53'
30	1981	34 ⁰ 52'	118 ^o 00'
31	Warren R1981	34 ⁰ 25'	116 ⁰ 38'
32	Capel R1978	33 ⁰ 40'	115 ⁰ 50'
33 34	Ludlow1982	33 ⁰ 45'	115 ⁰ 33'
34 35	Northcliffe1986-Gardner R	34 ⁰ 39'	116 ⁰ 13'
35 36		34 ⁰ 39'	116 ⁰ 06'
36 37		34 ⁰ 44'	116 ⁰ 08'
38	- WALLELL K	34 ⁰ 31'	115 ⁰ 59'
38	Blackwood R1986 Donnelly R1986	34 ⁰ 07' 34 ⁰ 12'	115 ⁰ 36'
40	Donnelly K1986 Doggerup Ck1986	34°12' 34°44'	115 ⁰ 57' 116 ⁰ 04'
41	Lake Samuel1986	34°44' 34°43'	116°04'
42	Lake Samuel1986	34°43' 34°43'	116°04' 116°03'
43	Shannon R1986	34°43' 34°43'	116°03'
44	" " " "	34°43'	116°22'
45	Doggerup Lake1986	34°33' 34°44'	116°24' 116°04'
46	1988	34°44' 34°43'	116°04'
46 47	Denmark1992	35°00'	116 ⁰ 09'
48	Denmark1992	35°00' 35°01'	117°04' 117°05'
49	и и и ,	35 ⁰ 01'	117°05' 117°06'
50	Broke Inlet1992	35°01' 34°57'	11/°06' 116°32'
51	Manjimup1992	34 ⁰ 33'	116°32' 115°52'
52	Manjimup1992	34 ⁰ 32'	115°52'
53		34°32' 34°24'	115°53' 115°41'
33	Nannup1992	34°24	115~41

Table 3 (cont...)

Site Number	Denoted December 1		Longitude	
	R. JAENSCH (Go)			
6	Lake Jasper	34 ⁰ 24'	115 ⁰ 41'	
9	Yeagerup Lake	34 ⁰ 32'	115 ⁰ 53'	
11	Un-named Lake (near 9)	34 ⁰ 33'	115°52'	
12	Doggerup Lake	34 ⁰ 43'	116 ⁰ 04'	
16	Maringup Lake	34 ⁰ 50'	·116°12'	
17	Lake East of Broke Inlet	34 ⁰ 57'	116 ⁰ 32'	
19	Owingup Swamp	35 ⁰ 00'	117 ⁰ 04'	
20	Boat Harbour Lake 1	35 ⁰ 01'	117 ⁰ 05'	
22	" " " 3	35 ⁰ 01'	117 ⁰ 06'	
	P. CHRISTENSEN (Go)			
26	Weld R-Soth West Hwy	34041'	116 ⁰ 31'	
31	Una Brook-Gardener River Rd	34 ⁰ 44'	116 ⁰ 12'	
40	Lake Yeagerup	34 ⁰ 32'	115 ⁰ 53'	
41	Lake Rd	34 ⁰ 31'	115 ⁰ 53'	
47	Richardson Rd	34 ⁰ 38'	115 ⁰ 59'	
48	и и	34 ⁰ 38'	116 ⁰ 05'	
54	Bevan Rd	34 ⁰ 35'	116 ⁰ 32'	
56	Tone River-Muir Hwy	34 ⁰ 24'	116 ⁰ 53'	
64	Meerup River-Gurnsey Rd	34 ⁰ 41'	116 ⁰ 04'	
99	Nornalup Rd	34 ⁰ 39'	116 ⁰ 57'	
111	Muir Hwy	34 ⁰ 29'	116 ⁰ 58'	
118	Stan Rd	34 ⁰ 51'	117 ⁰ 21'	

Table 4: The sites at which *Galaxiella nigrostriata* was captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Jaensch (1992) and Christensen (1982).

Site Number	General Location	Latitude	Longitude
	SCOTT RIVER WATERSHED		0
E7	Pool on Scott R Rd-power pole43	34 ⁰ 17.05'	115 ⁰ 13.96'
E15	Pool on Scott R Rd - power pole 38	34 ⁰ 17.08'	115 ⁰ 14.40'
	A TAKE OF MEATING AT A MEDICATED		
	LAKE QUITJUP WATERSHED	34 ^o 20.00'	115 ^o 38.25'
F5	Pool at end of Black Point Rd	34~20.00	115-38.25
	DONNELL V DIVED WATERCHED		
***	DONNELLY RIVER WATERSHED	34 ^o 25.89'	115 ⁰ 43.20'
H3	Swamp adjacent to Lake Smith	34°25.50'	115 45.20 115 ⁰ 45.16'
H4	Pool (1) on Scott Rd	34°25.35'	115°45.10 115°45.67'
H5	Pool (2) " "	34 23.33	115 45.07
	WARREN RIVER WATERSHED		
118	Four Mile Brook-Seven Day Rd	34 ^o 18.65'	115 ⁰ 59.39'
116	I out wife blook-beven buy Rd	31 10.03	
	DOGGERUP CREEK WATERSHED		
K2	Lake Doggerup	34 ⁰ 42.99'	116 ⁰ 03.88'
K3	Lake Samuel	34 ⁰ 43.77'	116 ⁰ 03.58'
K5	Dam on McGeachin's Property	34 ⁰ 42.82'	116 ⁰ 05.22'
K7	Pool (1)-Doggerup Creek Track	34 ⁰ 44.79'	116 ⁰ 04.65'
K9	Pool (3)- " " " "	34 ⁰ 44.46'	116 ⁰ 03.78'
112	1 001 (5)		
	GARDNER RIVER WATERSHED		
L2	Blackwater-Pool 1	34°49.82'	116 ^o 07.29'
L7	Pool at southern end of Windy Harbour Rd	34 ^o 50.24'	116 ^o 01.22'
L8	Pool 100m south of L9	34 ⁰ 49.60'	116 ^o 03.50'
L9	Pool 200m south of L10	34 ⁰ 49.40'	116 ^o 03.70'
L12	Pool opposite L13	34 ⁰ 49.23'	116 ^o 03.72'
L13	Pool 450m south of L14	34 ⁰ 49.17'	116 ^o 03.82'
L14	Pool 50m south of L15	34 ⁰ 48.98'	116 ^o 04.05'
L15	Narrow stream on Windy Harbour Rd	34 ⁰ 48.88'	116 ⁰ 04.12'
L16	Pool on Windy Harbour Rd	34 ⁰ 48.70'	116 ⁰ 04.20'
L18	Summer pool at western end of L17	34 ⁰ 48.29'	116 ^o 03.75'
L19	Small Lake 200m north of L17	34 ⁰ 48.47'	116 ^o 03.86'
L21	1st pool on Chesapeake Rd	34 ⁰ 42.36'	116 ⁰ 07.06'
L22	Pool near Lake Florence entrance	34 ⁰ 42.63'	116 ⁰ 07.19'
L23	43.1km from east end of Chesapeake Rd	34 ⁰ 43.18'	116 ⁰ 07.59'
L24	42.6km " " " " " " "	34 ⁰ 43.37'	116 ⁰ 07.82'
L29	Pool 38.2km " " " " "	34 ⁰ 45.40'	116 ⁰ 09.02'
L30	Pool opposite L29	34 ⁰ 45.38'	116 ⁰ 09.00'
L32	1st pool on Lower Gardner River Rd	34 ⁰ 45.64'	116 ⁰ 09.03'
L33	Pool 37.6km from east end of Chesapeake	34 ⁰ 45.66'	116 ⁰ 09.18'
L34	Large pool on Chesapeake Rd	34 ⁰ 45.92'	116 ⁰ 09.36'
L50	Pool on Moore's Hut Track	34 ^o 50.54'	116 ⁰ 15.84'
L51	Pool 4.9km west of Deeside/Chspke Jn	34 ⁰ 49.00'	116 ⁰ 15.51'
L53	Pool 50m west of L52	34 ⁰ 49.00'	116 ⁰ 15.38'
L54	Pool on Chspke Rd(43.2km from east end)	34 ⁰ 43.25'	116 ⁰ 07.64
L59	Pool on Lower Gardner River Rd	34 ^o 47.82'	116 ^o 08.09'
	Married & B. (State-Stat		
	SHANNON RIVER WATERSHED	SEC SECOND CONTRA	
MI	Pool on Moore's Hut Track	34 ^o 50.40'	116 ⁰ 17.03'
M14	Pools at Jn of Deeside Coast & Preston Rds	34 ^o 38.52'	116 ⁰ 19.63'
	BROKE INLET WATERSHED	2104. 24	110000 551
NI	Forth River	34 ⁰ 51.85'	116 ⁰ 25.55'
N2	Small stream 6.6km west of Broke Inlet Rd	34 ⁰ 51.94'	116 ⁰ 25.72'
N4	Pool/small stream 5.2km " " "	34 ⁰ 52.40'	116 ⁰ 26.37'
N7	Pool on Chesapeake Rd 1.3km " "	34 ⁰ 53.76'	116 ⁰ 28.23' 116 ⁰ 29.78'
N8	Pool on Broke Inlet Rd 1.9km N Chspke Rd	34 ^o 53.62'	
N9	Pool " " " 1.6km S " "	34 ⁰ 54.75'	116 ⁰ 28.18'
	DEED DIVED WATERGIED		
	DEEP RIVER WATERSHED	34 ⁰ 48.66'	116 ⁰ 31.82'
04	Jn Beardmore & South West Hwy	34°48.66 34°48.67'	116°31.82 116°32.12
O5	Small pools along Beardmore Rd	34°48.67' 34°46.57'	116°32.12 116°42.97'
O10	Pool on Thomson Rd	34~40.37	110 42.97
	FRANKLAND RIVER WATERSHED		
D2		34 ⁰ 45.70'	116 ^o 43.17'
P2	Pool on Thomson Rd	34°43.70 34°47.22'	116°43.17′ 116°43.12′
P5	Pool on Thomson Rd	34°47.22 34°47.32'	116°43.12 116°42.84'
P6	Pool on Thomson Rd	34°47.32 34°47.49'	116°42.84° 116°42.97°
P7	Pool on Thomson Rd	34°47.49 34°47.65'	116 42.97 116 ⁰ 43.20'
P8	Pool on Thomson Rd	34 47.03	110 43.20

Table 4 (cont...)

Site Number	General Location	Latitude	Longitude	
	MUSEUM RECORDS		0.3	
1	1964	34 ⁰ 35'	116 ⁰ 25'	
2	North Rd1964	34 ⁰ 35'	116 ⁰ 25'	
3	Albany1976	34 ⁰ 57'	117 ⁰ 43'	
4	Gardner River1977	34 ⁰ 46'	116 ⁰ 05'	
5	" " 1982	34 ⁰ 47'	116 ⁰ 04'	
6	и и и и	34 ⁰ 38'	116 ⁰ 07'	
7	" " 1986	34 ⁰ 44'	116 ⁰ 08'	
8		34 ⁰ 39'	116 ⁰ 08'	
9	Warren River1986	34 ⁰ 38'	116 ⁰ 03'	
10	Lake Samuel1985	34 ⁰ 43'	116 ⁰ 04'	
11	Northcliffe1986	34 ⁰ 46'	116 ⁰ 05'	
12	Mt Chudalup1986	34 ⁰ 49'	116 ⁰ 04'	
13	Lake Doggerup1986	34 ⁰ 44'	116 ⁰ 04'	
14	Crystal Springs1977	34 ⁰ 56'	116 ⁰ 35'	
15	Gardner River1988	34 ⁰ 28'	116 ⁰ 07'	
16	Denmark1992	35 ⁰ 00'	117 ⁰ 04'	
17	Broke Inlet	34 ⁰ 57'	116 ⁰ 32'	
	R. JAENSCH (1992)			
12	Lake Doggerup	34 ⁰ 43'	116 ⁰ 04'	
15	Gardner River Lake	34 ⁰ 50'	116 ⁰ 06'	
19	Owingup Swamp	35 ^o 00'	117 ⁰ 04'	
	P. CHRISTENSEN (1982)	· · · · · · · · · · · · · · · · · · ·		
18	Caral Wast II			
	South West Hwy	34 ⁰ 56'	116 ⁰ 35'	
19	South West Hwy	34 ⁰ 56'	116 ⁰ 35'	

Table 5: The sites at which *Galaxiella munda* was captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Jaensch (1992) and Christensen (1982).

Site Number	General Location	Latitude	Longitude
	MARGARET RIVER WATERSHED		
C1	Margaret River-Great North Rd(Rapids)	33°52.60'	115 ⁰ 18.01'
	Margaret River-Great North Rd(Rapids) Margaret R-1.3km from Cane Break Rd	33 ⁰ 51.99'	115°18.64'
C2		33 ⁰ 59.95'	115°03.92'
C13	Margaret R-small stream behind Leeuwin Estate	33 37.73	113 03.92
	WARREN RIVER WATERSHED	2 (025 10)	110001 501
I11	Lefroy Brook-Broken Bridge	34 ⁰ 25.19'	116 ⁰ 01.53' 116 ⁰ 20.73'
120	Wilgarup River-Bridge on Cormint Rd	34°21.11'	116°20.73
I21	Peerup River-Bridge on Muirs Hwy	34 ^o 23.41'	116 ^o 25.52'
122	Tone River-Bridge on Muirs Hwy	34 ^o 24.65'	116 ⁰ 33.10'
J5	LAKE MUIR WATERSHED Cowerup Swamp (Surrounding Pools)	34 ^o 26.22'	116 ⁰ 38.68'
K8	DOGGERUP CREEK WATERSHED Pool (2)-Doggerup Creek Track	34 ^o 44.32'	116 ⁰ 04.53'
	GARDNER RIVER WATERSHED		
L44	Boorara Brook-Daubney's (1)	34 ^o 38.78'	116 ^o 13.69'
L45	" " - " (2)	34°38.33'	116 ^o 13.63'
	" " - " " (3)	34 ^o 37.42'	116°13.37'
L46	(3)	34 ^o 36.35'	116°14.53'
L47	-Jaile Block	34°47.48'	116 ⁰ 08.46'
L60 L61	Pool on Lower Gardner River Rd Pool on " " " " " " "	34°45.88'	116°08.40'
20.			
M4	SHANNON RIVER WATERSHED Shannon River-Bridge on Cheaspeake Rd	34°50.36′	116 ^o 22.27'
M11	Chesapeake Brook (3)-20.05km W Broke	34 ⁰ 48.90'	116 ⁰ 18.07'
M14	Pools at Jn of Deeside Coast & Preston Rds	34 ⁰ 38.52'	116°19.63'
	BROKE INLET WATERSHED		
NI1	Forth River	34 ^o 51.85'	116 ^o 25.55'
N1		34 ⁰ 51.94'	116°25.72'
N2 N4	Small stream 6.6km west of Broke Inlet Rd Pool/small stream 5.2km " " "	34°51.94 34°52.40'	116°25.72 116°26.37'
0A(3)		# # 	
O2	DEEP RIVER WATERSHED Weld River-Bridge on Beardmore Rd	34 ⁰ 48.89'	116 ^o 34.75'
		34°45.65'	116°30.75'
O3 O4	Weld river-Wye Rd Jn Beardmore & South West Hwy	34°48.66'	116 ⁰ 31.82'
٠,	FRANKLAND RIVER WATERSHED	over or additional control	
P1	Frankland River-Muirs Bridge	34 ^o 28.73'	116 ⁰ 54.00'
01	KENT RIVER WATERSHED	34 ⁰ 33.41'	117 ⁰ 10.29'
Q1 Q2	Kent River-Pools on Muirs Hwy Camballup Pool	34°33.41° 34°32.38′	117 ⁰ 11.33'
~	HAY RIVER WATERSHED		
R1	Hay River-Pools on Muirs Hwy	34 ⁰ 37.81'	117 ⁰ 24.15'
	MUSEUM RECORDS		
1	Northcliffe1960	34 ⁰ 36'	116 ⁰ 07'
	Northcliffe1960 1962	34 ^o 40'	115 ⁰ 14'
2		34 ⁰ 40' 34 ⁰ 35'	115 ⁰ 14' 116 ⁰ 25'
2 3	1962 Fish Creek Pool1964	34 ⁰ 40' 34 ⁰ 35' 34 ⁰ 35'	115 ⁰ 14' 116 ⁰ 25' 116 ⁰ 24'
2 3 4	1962 Fish Creek Pool1964 1961	34 ⁰ 40' 34 ⁰ 35' 34 ⁰ 35'	115 ⁰ 14' 116 ⁰ 25' 116 ⁰ 24' 116 ⁰ 02'
2 3 4 5	1962 Fish Creek Pool1964 1961 Pemberton1958	34 ⁰ 40' 34 ⁰ 35' 34 ⁰ 35' 34 ⁰ 22' 34 ⁰ 46'	115 ⁰ 14' 116 ⁰ 25' 116 ⁰ 24' 116 ⁰ 02' 116 ⁰ 05'
2 3 4 5	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977	34 ⁰ 40' 34 ⁰ 35' 34 ⁰ 35' 34 ⁰ 22' 34 ⁰ 46' 34 ⁰ 46'	115 ⁰ 14' 116 ⁰ 25' 116 ⁰ 24' 116 ⁰ 02' 116 ⁰ 48'
2 3 4 5 6 7	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977	34 ⁰ 40' 34 ⁰ 35' 34 ⁰ 35' 34 ⁰ 22' 34 ⁰ 46' 34 ⁰ 46'	115 ⁰ 14' 116 ⁰ 25' 116 ⁰ 24' 116 ⁰ 02' 116 ⁰ 48'
2 3 4 5 6 7 8	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976	34 ⁰ 40' 34 ⁰ 35' 34 ⁰ 35' 34 ⁰ 22' 34 ⁰ 46' 33 ⁰ 50'	115°14' 116°25' 116°24' 116°02' 116°48' 115°20' 116°38'
2 3 4 5 6 7 8	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981	34 ⁰ 40' 34 ⁰ 35' 34 ⁰ 35' 34 ⁰ 22' 34 ⁰ 46' 33 ⁰ 50' 34 ⁰ 25'	115°14' 116°25' 116°24' 116°02' 116°48' 115°20' 116°38'
2 3 4 5 6 7 8 9	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°29'	115°14' 116°25' 116°24' 116°02' 116°48' 115°20' 116°38'
2 3 4 5 6 7 8 9 10	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39'	115°14' 116°25' 116°02' 116°05' 116°05' 116°48' 115°20' 116°38' 116°21'
2 3 4 5 6 7 8 9 10 11 12	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°38'	115°14' 116°25' 116°024' 116°025' 116°05' 116°48' 115°20' 116°38' 116°21' 116°07'
2 3 4 5 6 7 8 9 10 11 12 13	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986	34°40' 34°35' 34°35' 34°22' 34°46' 33°50' 34°25' 34°39' 34°38' 34°444'	115°14' 116°25' 116°024' 116°05' 116°48' 115°20' 116°38' 116°21' 116°07' 116°07'
2 3 4 5 6 7 8 9 10 11 12 13	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986	34°40' 34°35' 34°35' 34°22' 34°46' 33°50' 34°25' 34°39' 34°39' 34°38' 34°44' 34°07'	115°14' 116°25' 116°02' 116°02' 116°05' 116°48' 115°20' 116°38' 116°21' 116°20' 116°07' 116°08' 115°36'
2 3 4 5 6 7 8 9 10 11 12 13 14 15	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°38' 34°44' 34°07'	115°14' 116°25' 116°02' 116°05' 116°05' 116°48' 115°20' 116°21' 116°20' 116°07' 116°08' 115°36' 116°04'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°38' 34°44' 34°44' 34°44'	115°14' 116°25' 116°02' 116°05' 116°05' 116°48' 115°20' 116°21' 116°20' 116°07' 116°08' 115°36' 116°04'
2 3 4 5 6 7 8 9 10 11 12 13 14	1962 Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°38' 34°41' 34°41' 34°43' 34°43'	115°14' 116°25' 116°02' 116°05' 116°08' 115°20' 116°38' 116°21' 116°20' 116°08' 115°36' 116°04' 116°06' 116°06' 116°06'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986	34°40' 34°35' 34°35' 34°22' 34°46' 33°50' 34°25' 34°39' 34°38' 34°44' 34°07' 34°44' 34°49'	115°14' 116°25' 116°024' 116°02' 116°05' 116°48' 115°20' 116°38' 116°21' 116°07' 116°08' 115°36' 116°04' 116°26' 116°19' 116°31'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986	34°40' 34°35' 34°22' 34°46' 34°46' 34°25' 34°39' 34°39' 34°38' 34°44' 34°07' 34°44' 34°47' 34°49' 34°49'	115°14' 116°25' 116°02' 116°05' 116°05' 116°48' 115°20' 116°31' 116°21' 116°07' 116°08' 115°36' 116°04' 116°26' 116°11' 116°31' 116°31'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°38' 34°44' 34°07' 34°44' 34°43' 34°55' 34°55'	115°14' 116°25' 116°24' 116°05' 116°05' 116°48' 115°20' 116°38' 116°21' 116°07' 116°08' 115°36' 116°04' 116°26' 116°19' 116°31' 116°34' 117°46'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°44' 34°47' 34°44' 34°47' 34°45' 34°55' 34°57'	115°14' 116°25' 116°02' 116°05' 116°08' 115°20' 116°38' 116°21' 116°07' 116°07' 116°08' 115°36' 116°04' 116°19' 116°31' 116°34' 117°46' 116°15'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Lake Powell1986	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°38' 34°44' 34°07' 34°44' 34°45' 34°55' 34°55' 34°56' 34°40'	115°14' 116°25' 116°02' 116°05' 116°08' 115°20' 116°38' 116°21' 116°20' 116°08' 115°36' 116°06' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Lake Powell1986 Quinnup1978	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°38' 34°44' 34°07' 34°44' 34°49' 34°55' 34°55' 34°55' 34°26' 34°40'	115°14' 116°25' 116°22' 116°02' 116°05' 116°48' 115°20' 116°38' 116°21' 116°02' 116°07' 116°08' 115°36' 116°04' 116°31' 116°31' 116°31' 116°31' 116°31' 116°32' 116°32'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Lake Powell1986 Quinnup1978 Northcliffe1978	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°38' 34°44' 34°47' 34°44' 34°47' 34°55' 34°57' 34°26' 34°40' 34°41'	115°14' 116°25' 116°24' 116°05' 116°05' 116°48' 115°20' 116°38' 116°21' 116°07' 116°07' 116°04' 116°26' 116°19' 116°31' 116°31' 116°34' 116°4' 116°32' 116°4' 116°32' 116°4' 116°32' 116°32' 116°32'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Lake Powell1986 Quinnup1978 Northcliffe1978 "" Shannon1977	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°38' 34°44' 34°47' 34°44' 34°47' 34°55' 34°57' 34°26' 34°40' 34°41'	115°14' 116°25' 116°24' 116°05' 116°05' 116°48' 115°20' 116°38' 116°21' 116°07' 116°08' 115°36' 116°04' 116°31' 116°31' 116°31' 116°31' 116°31' 116°32' 116°42' 116°42' 116°32'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Lake Powell1986 Quinnup1978 Northcliffe1978 " " " " " " " " " " Shannon1977 Crystal Springs1977	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°44' 34°47' 34°44' 34°55' 34°57' 34°57' 34°46' 34°46' 34°46' 34°46'	115°14' 116°25' 116°24' 116°05' 116°05' 116°48' 115°20' 116°38' 116°21' 116°07' 116°08' 115°36' 116°04' 116°31' 116°31' 116°31' 116°31' 116°31' 116°32' 116°42' 116°42' 116°32'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Lake Powell1986 Quinnup1978 Northcliffe1978 "" Shannon1977	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°44' 34°47' 34°44' 34°45' 34°55' 34°57' 34°26' 34°40' 34°35'	115°14' 116°25' 116°02' 116°05' 116°08' 116°38' 116°20' 116°38' 116°20' 116°07' 116°08' 115°36' 116°04' 116°31' 116°31' 116°31' 116°32' 116°32' 116°32' 116°30' 116°30'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Inlet River1986 Lake Powell1986 Quinnup1978 Northcliffe1978 """ Shannon1977 Crystal Springs1977 Shannon1978	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°44' 34°47' 34°43' 34°45' 34°55' 34°55' 34°55' 34°55' 34°40' 34°35' 34°41'	115°14' 116°25' 116°24' 116°05' 116°48' 115°20' 116°38' 116°21' 116°07' 116°08' 115°36' 116°04' 116°34' 116°34' 116°34' 116°34' 116°35' 116°35' 116°35' 116°30' 116°35' 116°30' 116°35' 116°30' 116°31' 116°31' 116°31' 116°32'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Lake Powell1986 Quinnup1978 Northcliffe1978 """ Shannon1977 Crystal Springs1977 Shannon1978	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°38' 34°44' 34°47' 34°44' 34°43' 34°55' 34°46' 34°56' 34°35' 34°35'	115°14' 116°25' 116°24' 116°05' 116°08' 116°08' 116°38' 116°21' 116°07' 116°08' 115°36' 116°04' 116°31' 116°31' 116°31' 116°31' 116°31' 116°35' 116°35' 116°35' 116°30' 116°33' 116°33' 116°30' 116°33' 116°30' 116°30' 116°30'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Inlet River1986 Lake Powell1986 Quinnup1978 Northcliffe1978 " " " " " " " " " " " " " " " " " " "	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°44' 34°07' 34°44' 34°43' 34°55' 34°55' 34°57' 34°46' 34°35' 34°40' 34°35' 34°35' 34°35' 34°35'	115°14' 116°25' 116°24' 116°05' 116°05' 116°48' 115°20' 116°38' 116°21' 116°07' 116°08' 115°36' 116°04' 116°31' 116°31' 116°31' 116°33' 116°35' 116°35' 116°30' 116°30' 116°30' 116°30' 116°31' 116°30' 116°31' 116°31'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Inlet River1986 Lake Powell1986 Quinnup1978 Northcliffe1978 """ Shannon1977 Crystal Springs1977 Shannon1978 Northcliffe1978 """ Denmark1978 Northcliffe1978 """ Mt Frankland1978	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°44' 34°07' 34°44' 34°43' 34°55' 34°55' 34°55' 34°56' 34°35' 34°35' 34°35' 34°35' 34°35' 34°35'	115°14' 116°25' 116°02' 116°05' 116°08' 116°08' 116°20' 116°20' 116°07' 116°07' 116°04' 116°31' 116°31' 116°31' 116°31' 116°32' 116°32' 116°30' 116°30' 116°30' 116°30' 116°30' 116°30' 116°31' 116°31' 116°31' 116°31' 116°32' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31' 116°31'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	Fish Creek Pool1964 1961 Pemberton1958 Mount Chudalup1977 Walpole1977 Cane Break Creek1976 Warren1981 Jeffrey Rd1981 Shannon1982 Gardner R1982 Gardner R1986 Blackwood R1986 Doggerup Creek1986 Shannon R-Nelson Rd1986 Shannon R1986 Weld River1986 Inlet River1986 Inlet River1986 Lake Powell1986 Quinnup1978 Northcliffe1978 " " " " " " " " " " " " " " " " " " "	34°40' 34°35' 34°35' 34°22' 34°46' 34°46' 33°50' 34°25' 34°39' 34°39' 34°44' 34°07' 34°44' 34°43' 34°55' 34°55' 34°57' 34°46' 34°35' 34°40' 34°35' 34°35' 34°35' 34°35'	115°14' 116°25' 116°24' 116°05' 116°05' 116°48' 115°20' 116°38' 116°21' 116°07' 116°08' 115°36' 116°04' 116°31' 116°31' 116°31' 116°33' 116°35' 116°35' 116°30' 116°30' 116°30' 116°30' 116°31' 116°30' 116°31' 116°31'

Table 5 (cont...)

Site Number	General Location	Latitude	Longitude
	R. JAENSCH (1992)		
13	Lake Samuel	34 ⁰ 44'	116 ⁰ 04'
	P. CHRISTENSEN (1982)		
6 14 15	Nelson Rd Deeside Coast Rd	34 ⁰ 42' 34 ⁰ 42' 34 ⁰ 41'	116 ⁰ 30' 116 ⁰ 20' 116 ⁰ 20'
24	South West Hwy	34°46'	116 ⁰ 30'
28	Quininup Brook-Cripple Rd	34°30'	116 ⁰ 17'
29	Wheatley Coast Rd	34 ^o 26'	116 ⁰ 15'
47	Richardson Rd	34 ⁰ 38'	115 ⁰ 59'
49	Thompson Rd	34 ⁰ 40'	116 ⁰ 42'
53	Deep River-Bevan Rd	34 ⁰ 35'	116 ⁰ 33'
54	Bevan Rd	34 ^o 35'	116 ⁰ 32'
55	и и	34 ^o 35'	116 ⁰ 30'
56	Tone River-Muir Hwy	34 ⁰ 24'	116 ⁰ 53'
61	Mitchell River-Denbarker Rd	34 ^o 50'	117 ⁰ 24'
62	Denbarker Rd	34 ⁰ 55'	117 ⁰ 23'
64	Meerup River-Gurnsey Rd	34 ⁰ 41'	116 ⁰ 04'
67	Rifle Range Rd	34 ⁰ 36'	116 ⁰ 03'
68	u u u	34 ⁰ 35'	116 ⁰ 03'
74	Pnuemonia Rd	34 ⁰ 25'	115 ⁰ 45'
77	Deep River-Beardmore Rd	34 ⁰ 48'	116 ⁰ 35'
81	Middle Rd	34 ^o 50'	116 ⁰ 57'
82	2 2	34 ⁰ 52'	116 ⁰ 57'
83	Bow River-Middle Rd	34 ⁰ 55'	116°58'
84	Break Rd	34 ⁰ 51'	117 ⁰ 03'
86	Stewart Rd	34 ⁰ 19'	115 ⁰ 42'
88	Fouracres Rd	34 ⁰ 18'	115°35'
89	<u>u</u> <u>u</u> <u>u</u>	34 ⁰ 18'	115 ⁰ 35'
90	и и п	34 ⁰ 18'	115°31'
92	Scott Rd	34 ⁰ 11'	115 ⁰ 16'
93	й п	34 ⁰ 10'	115 ⁰ 16'
100	Nornalup Rd	34 ⁰ 44'	116 ⁰ 57'
102	Kent River-Basin Rd	34 ⁰ 46'	117°03'
103	Nornalup Rd	34 ⁰ 50'	117°03'
105	Kordabup Rd/South West Hwy	34 ⁰ 59'	117°00'
114	Kockelup Rd	34 ⁰ 47'	117 09 117 ⁰ 08'
117	Stan Rd	34 ⁰ 48'	117°08 117°21'
119	Court Rd	34 ⁰ 20'	117 21 115 ⁰ 56'

Table 6: The sites at which *Bostockia porosa* was captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Jaensch (1992) and Christensen (1982).

Site Number	General Location	Latitude	Longitude
Site Number			
D10	ABBA/LUDLOW DRAINAGE Stream south of above	33 ⁰ 36.25'	115 ⁰ 29.65'
B18 B19	Ludlow Swamp	33 ⁰ 35.80'	115 ⁰ 29.80' 115 ⁰ 28.82'
B20	Ludlow River-Bridge on Bypass	33 ⁰ 36.20'	115-26.62
	MARGARET RIVER WATERSHED	0	
C1	Margaret River- Great North Rd(Rapids)	33 ⁰ 52.60' 33 ⁰ 56.92'	115 ⁰ 18.01' 115 ⁰ 03.83'
C5 C7	Margaret River-1st Weir Margaret R-2nd Weir	33°56.89'	115 ⁰ 05.35'
C8	Margaret R-2nd Wen Margaret R- Margaret R Rd	33 ⁰ 56.53'	115 ⁰ 06.98' 115 ⁰ 17.31'
C11	Margaret R- Margaret R Rd	33 ⁰ 54.77'	115-17.31
	BLACKWOOD RIVER WATERSHED	0	115040 501
D7	St John Brook (Blackwood River)	33 ⁰ 52.70' 33 ⁰ 58.72'	115 ⁰ 40.59' 116 ⁰ 09.54'
D9 D24	Blackwood R-Tweed Rd Chapman Brook	34°05.33'	115°12.04'
DZŦ			
F1	LAKE QUITJUP WATERSHED Lake Quitjup	34 ^o 23.17'	115 ^o 35.66'
r.i.			
	LAKE JASPER WATERSHED	34 ^o 25.22'	115 ⁰ 41.19'
G1	Lake Jasper	J- 23.22	
	DONNELLY RIVER WATERSHED	0.400 = 0.51	115042 601
H1	Lake Wilson	34 ⁰ 25.86' 34 ⁰ 25.89'	115 ⁰ 42.68' 115 ⁰ 43.05'
H2 H7	Lake Smith Donnelly River-Boat Ramp	34 ^o 26.84'	115°46.38'
Н9	Donnelly River-One Tree Bridge	34 ⁰ 12.19' 34 ⁰ 27.24'	115 ⁰ 55.82' 115 ⁰ 47.61'
H10	Fly Brook-Charlie Rd Carey Brook-Bridge on Cleave Rd	34 ^o 26.54'	115 ⁰ 47.25'
H12 H13	Carey Brook-Bridge on Vasse Hwy	34 ^o 25.01'	115 ⁰ 48.65' 115 ⁰ 49.68'
H15	Beedelup Brook-Opposite Tobruk Rd	34 ⁰ 25.27' 34 ⁰ 23.81'	115°49.68 115°50.39'
H16	Carey Brook-Staircase Rd	JT 25.01	outs south
	WARREN RIVER WATERSHED	24024 (()	115°57.98'
11	Warren R-Dombakup Brk-Plantation Rd	34 ⁰ 34.66' 34 ⁰ 32.35'	115°57.98 115°52.39'
I2 I4	Yeagerup Lake Warren River-Bridge on Pemb/North Rd	34 ^o 30.42'	115°59.54'
15	Warren River-King Trout Farm	34 ⁰ 30.10' 34 ⁰ 28.60'	115 ⁰ 59.85' 116 ⁰ 01.71'
16 17	Lefroy Brook-The Cascades Lefroy Brook-Downstream of trout hatch	34 ^o 26.60'	116 ^o 01.36'
111	Lefroy Brook-Broken Bridge	34 ^o 25.19'	116 ⁰ 01.53' 116 ⁰ 01.71'
112	Big Brook Dam-Under downstream bridge	34 ⁰ 24.73' 34 ⁰ 24.49'	116°01.71 116°01.64'
I14 I20	Big Brook Dam-Actual Wilgarup River-Bridge on Cormint Rd	34 ⁰ 21.11'	116 ^o 20.73'
I21	Peerup River-Bridge on Muirs Hwy	34 ^o 23.41' 34 ^o 24.65'	116 ⁰ 25.52' 116 ⁰ 33.10'
122 128	Tone River-Bridge on Muirs Hwy Wilgarup River-Muirs Hwy	34°19.86'	116 ^o 22.45'
120			
•	LAKE MUIR WATERSHED	34 ⁰ 27.30'	116 ⁰ 47.00'
J6 J7	Stream of Lake Muir Red Lake	34 ^o 26.30'	116 ^o 38.33'
Ј8	Drain from Red Lake	34 ⁰ 26.25' 34 ⁰ 26.20'	116 ⁰ 39.47' 116 ⁰ 39.40'
J9	Red Lake Red Lake	34°25.90'	116 ^o 39.40'
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	DOGGERUP CREEK WATERSHED	34 ⁰ 43.77'	116 ⁰ 03.58'
K3 K5	Lake Samuel Dam on McGeachin's Property	34 ⁰ 42.82'	116 ⁰ 05.22'
L2	GARDNER RIVER WATERSHED Blackwater-Pool 1	34 ⁰ 49.82	116 ^o 07.29'
L2 L3	Blackwater-Pool 2	34 ⁰ 49.82'	116 ⁰ 07.34' 116 ⁰ 03.50'
L8	Pool 100m south of L9	34 ⁰ 49.60' 34 ⁰ 49.40'	116 ⁰ 03.70'
L9 L12	Pool 200m south of L10 Pool opposite L13	34 ⁰ 49.23'	116 ⁰ 03.72'
L13	Pool 450m south of L14	34 ⁰ 49.17' 34 ⁰ 48.98'	116 ⁰ 03.82' 116 ⁰ 04.05'
L14 L15	Pool 50m south of L15 Narrow stream on Windy Harbour Rd	34 ⁰ 48.88'	116 ^o 04.12'
L15	Pool on Windy Harbour Rd	34°48.70′	116 ^o 04.20' 116 ^o 03.77'
L17	Meandering Stream-off Windy Harbour Rd Summer pool at western end of L17	34 ⁰ 48.41' 34 ⁰ 48.29'	116 ⁰ 03.75'
L18 L19	Small Lake 200m north of L17	34 ⁰ 48.47'	116 ^o 03.86'
L21	1st pool on Chesapeake	34 ⁰ 42.36' 34 ⁰ 45.40'	116 ⁰ 07.06' 116 ⁰ 09.02'
L29 L34	Pool 38.2km from east end of Chesapeake Large pool on Chesapeake Rd	34 ⁰ 45.92'	116 ⁰ 09 36'
L34 L37	Gardner River-South of bridge	34 ⁰ 47.21'	116 ⁰ 11.32' 116 ⁰ 10.87'
L38	Gardner River-Bridge	34 ⁰ 46.62' 34 ⁰ 45.46'	116 ⁰ 12.87'
L39 L40	Buldania Creek-Gardner River Rd Una Brook- " " " "	34 ⁰ 43.95'	116 ⁰ 12.14'
· L41	Gardner River-Laws Track	34 ⁰ 42.49' 34 ⁰ 38.84'	116 ⁰ 09.96' 116 ⁰ 13.60'
L43	Boorara Brook-Muirillup Rd " " -Daubney's (1)	34 ^o 38.78'	116 ^o 13.69'
L44 L45	-Daubney's (1)	34 ^o 38.33' 34 ^o 50.22'	116 ⁰ 13.63' 116 ⁰ 11.81'
	Lake Maringup	21050 22	110,11.81.

	# · · · · · · · · · · · · · · · · · · ·		
ble 6 (cont) Site Number	General Location	Latitude	Longitude
	SHANNON RIVER WATERSHED		
Ml	Pool on Moore's Hut Track	34 ^o 50.40'	116 ⁰ 17.03'
M4 ·	Shannon River-Bridge on Cheaspeake Rd	34 ^o 50.36'	116 ⁰ 22.27'
M5	" " -Springbreak Rd	34 ⁰ 52.23'	116 ^o 22.37'
M7 M9	Pool on Chesapeake Rd-19.4km west Broke Chesapeake Brook (1)-20.05km W Broke	34 ⁰ 49.20' 34 ⁰ 49.07'	116 ⁰ 18.57' 116 ⁰ 18.09'
M10	" " " (2)- " " "	34°48.96'	116 18.09 116 18.08'
M14	Pools at Jn of Deeside Coast & Preston Rds	34 ^o 38.52'	116 ⁰ 19.63'
	BROKE INLET WATERSHED		
NI	Forth River	34 ^o 51.85'	116 ^o 25.55'
N2 N4	Small stream 6.6km west of Broke Inlet Rd Pool/small stream 5.2km " " "	34 ^o 51.94' 34 ^o 52.40'	116 ^o 25.72' 116 ^o 26.37'
N6	Small stream on Chesapeake Rd 1.6km "	34°53.68'	116 20.37 116 28.14
	DEEP RIVER WATERSHED		
01	Deep River-Bridge on Beardmore Rd	34 ⁰ 49.14'	116 ⁰ 35.52'
O2	Deep River-Bridge on Beardmore Rd Weld River- " " " "	34 ⁰ 48.89'	116 ^o 34.75'
O3 O4	Weld river-Wye Rd	34 ^o 45.65' 34 ^o 48.66'	116 ⁰ 30.75' 116 ⁰ 31.82'
04	Jn Beardmore & South West Hwy	34°48.66°	116°31.82
	FRANKLAND RIVER WATERSHED		0
P1 P5	Frankland River-Muirs Bridge Pool on Thomson Rd	34 ⁰ 28.73' 34 ⁰ 47.22'	116 ⁰ 54.00' 116 ⁰ 43.12'
P8	Pool on Thomson Rd	34°47.22 34°47.65'	116°43.12 116°43.20'
P9	Pool on Thomson Rd	34°47.32'	116 ⁰ 42.84'
	KENT RIVER WATERSHED		
Q1	Kent River-Pools on Muirs Hwy	34 ⁰ 33.41'	117 ⁰ 10.29'
Q2	Camballup Pool	34 ⁰ 32.38'	117 ⁰ 11.33'
D.I	HAY RIVER WATERSHED	2.02= 2.11	
R1	Hay River-Pools on Muirs Hwy	34 ^o 37.81'	117 ⁰ 24.15'
	COLLIE RIVER WATERSHED	-	-
S2 S4	Collie River-Collieburn Pool " " -Cox's Pool	33 ⁰ 24.66'	116 ⁰ 11.97'
S6	" " -Western Collieries	33 ^o 25.80' 33 ^o 28.34'	116 ⁰ 13.13' 116 ⁰ 13.86'
S7	" " -Davies' Pool	33°28.75'	116 ⁰ 13.90'
	MUSEUM RECORDS		
1	Albany1916	34°56'	117 ^o 54'
3	1935 Pombostor 1927	34 ⁰ 30'	115 ⁰ 59'
4	Pemberton1937 Bridgetown1947	34 ⁰ 27' 33 ⁰ 56'	116 ⁰ 02' 116 ⁰ 05'
5	Dumbleyung 1947	33 ⁰ 19'	117 ^o 38'
6	Grasmere 1947	35 ⁰ 01'	117045
7 8	1948 1951	34 ⁰ 59' 34 ⁰ 50'	117 ⁰ 44' 117 ⁰ 41'
9	1953	34 ⁰ 39'	117 ⁰ 54'
10		34 ⁰ 56'	118 ⁰ 00'
11 12	Fish Creek Pool 1964 Shannon river Dam 1959	34 ^o 35' 34 ^o 35'	116 ⁰ 25' 116 ⁰ 24'
13	Albany 1964	35 ⁰ 01'	117041'
14	Pemberton 1964	34 ⁰ 28'	116 ⁰ 01'
15 16	Boranup1959 Busselton	34 ⁰ 16' 33 ⁰ 39'	115 ⁰ 05' 115 ⁰ 29'
17	Nannup1974	33 ⁰ 59'	115 ⁰ 38'
18	Albany 1976	35°01'	117 ⁰ 45'
19 20	n n n	34 ^o 57' 35 ^o 01'	117 ⁰ 43' 117 ⁰ 43'
21	1981	34 ⁰ 56'	117°43 117°53'
22	1981	34 ⁰ 25'	116 ⁰ 38'
23 24	Jeffrey Rd1981	34 ⁰ 39'	116 ⁰ 21'
25	Shannon1982 Ludlow1982	34 ⁰ 39' 33 ⁰ 45'	116 ^o 20' 115 ^o 33'
26	Northcliffe1986	34 ⁰ 39'	116 ⁰ 13'
27 28	" " " " Nannup1986	34 ⁰ 38' 34 ⁰ 07'	116 ^o 03' 115 ^o 36'
26 29	Lake Samuel1985	34°07 34°43'	116 ⁰ 04'
30	" " 1986	34 ⁰ 43'	116 ⁰ 03'
31 32	Northcliffe1986 Shannon River-Nelson Rd1986	34 ⁰ 43' 34 ⁰ 43'	116 ⁰ 22' 116 ⁰ 26'
33	Northcliffe1986	34 ⁰ 39'	116 ⁰ 19'
34	0 0 0	34 ⁰ 46'	116 ^o 05'
35 36	Mt Chudalup1986 1986	34 ⁰ 49' 34 ⁰ 35'	116 ⁰ 04' 116 ⁰ 24'
37	Weld River1986	34 ⁰ 49'	116 ⁰ 31'
	Elleker1986	34 ^o 57'	117 ⁰ 46'
38	L atas 12 a a a a a a a a a a a a a a a a a a	34 ⁰ 44'	116 ⁰ 04'
39	Lake Doggerup1986		1150421
	Lake Doggerup1966 1978 Northcliffe1988	33°40' 34°38'	115 ⁰ 42' 116 ⁰ 07'
39 40 41 42	1978 Northcliffe1988 Albany1992	33°40' 34°38' 35°01'	115 ⁰ 42' 116 ⁰ 07' 117 ⁰ 16'
39 40 41 42 43	1978 Northcliffe1988	33 ⁰ 40' 34 ⁰ 38' 35 ⁰ 00'	115 ⁰ 42' 116 ⁰ 07' 117 ⁰ 16' 117 ⁰ 13'
39 40 41 42	1978 Northcliffe1988 Albany1992 Denmark1992	33°40' 34°38' 35°01'	115 ⁰ 42' 116 ⁰ 07' 117 ⁰ 16'

e 6 (cont) Site Number	General Location	Latitude	Longitude
47	Broke Inlet1992	34 ⁰ 57'	116 ⁰ 32' 116 ⁰ 06'
48	Manjimup 1992	34 ⁰ 50'	116°06'
49	0 0 0	34 ⁰ 44'	116 ⁰ 06'
50	и и и	34 ^o 34'	116 ⁰ 55'
51	и и и	34 ⁰ 32'	115 ⁰ 53'
52	н н н н	34 ^o 26'	115 ⁰ 43'
53	Nannup1992	34 ^o 24'	115 ⁰ 41'
54	и и и	34 ⁰ 23'	115 ⁰ 35'
55	Darkin	34 ⁰ 20'	116 ⁰ 44'
	R. JAENSCH (1992)		
-	Lake Outsing	34 ⁰ 23'	115°35'
5	Lake Quitjup	34°23' 34°24'	115°41'
6	Lake Jasper	34°26'	115°43'
7 8	Lake Wilson Lake Smith	34 26 34 ⁰ 26'	115°43'
9		34 ⁰ 32'	115°53'
	Yeagerup Lake	34 32 34 ⁰ 34'	115 ⁰ 55'
A4	Warren River Oxbow	34°43'	116 ⁰ 04'
12	Doggerup Lake	34°43' 34°44'	116004
13	Lake Samuel	34°44' 34°44'	116 ⁰ 04' 116 ⁰ 06'
14	Lake Florence		110,000
15	Gardner River Lake	34 ⁰ 50'	116 ⁰ 06'
16	Maringup Lake	34 ⁰ 50'	116 ⁰ 12'
17	Lake East of Broke Inlet	34 ⁰ 57'	116 ^o 32'
19	Oingup Swamp	35 ⁰ 00'	117 ⁰ 04'
20	Boat Harbour Lake 1	35 ⁰ 01'	117 ⁰ 05'
22	" " " 3	35 ⁰ 01'	117 ⁰ 06'
23 24	Reserve 12046 Lake Lake Williams	35 ⁰ 00' 35 ⁰ 01'	117 ⁰ 13' 117 ⁰ 16'
24	P. CHRISTENSEN (1982)		117 10
	F. CHRISTENSEN (1702)		
5	Nelson Rd	34 ⁰ 41'	116 ⁰ 31' 116 ⁰ 26'
8	Off " "	34 ⁰ 43'	116026
14	Deeside Coast Rd	34042	116 ⁰ 20'
20	Inlet River-South West Hwy	34 ⁰ 55'	116 ⁰ 34'
22	South West Hwy	34 ⁰ 53'	116 ⁰ 33'
23	South West Hwy	34 ⁰ 48'	116 ⁰ 32'
24	и и и и	34 ⁰ 46'	116 ⁰ 30'
25	и и и и	34°44'	116 ⁰ 30'
28	Quininup Brook-Cripple Rd	34 ⁰ 30'	116 ⁰ 17'
29	Wheatley Coast Rd	34 ⁰ 26'	116 ⁰ 15'
39	Lake Yeagerup	34°32'	115 ⁰ 52'
41	Lake Rd	34 ⁰ 31'	115 ^o 53'
42	Ritters Rd	34 ^o 30'	115 ⁰ 53'
45	Richardson Rd	34 ⁰ 36'	115 ⁰ 57'
47	и и и	34 ⁰ 38'	115 ⁰ 59'
48	и и и	34°38'	116 ⁰ 05'
49	Thompson Rd	34 ⁰ 40'	116 ⁰ 42'
51	Elsie Brook-Thompson Rd	34 ⁰ 51'	116 ⁰ 43'
53	Deep River-Bevan Rd	34 ⁰ 35'	116 ⁰ 33'
55	Bevan Rd	34 ⁰ 35'	116°30'
56	Tone River-Muir Hwy	34024'	116 ^o 53'
59	Denbarker Rd	34045	117 ⁰ 29'
61	Mitchell River-Denbarker Rd	34°50'	117 ⁰ 24'
63	Summertime Track	34°30 34°44'	116 ⁰ 04'
64	Meerup River-Gurnsey Rd	34°41'	116004
65		34°41	116 ⁰ 04' 116 ⁰ 01'
	Rifle Range Rd	34°37' 34°36'	116°01'
67 68	n n n	34°36' 34°35'	116002
68			116 ⁰ 03' 115 ⁰ 46'
70	Vasse Hwy	34 ⁰ 18'	115~46
77	Deep River-Beardmore Rd	34 ⁰ 48'	116 ^o 35' 116 ^o 51' 116 ^o 57' 116 ^o 58'
80	Boronia Rd	34 ⁰ 39'	110,21
81	Middle Rd	34 ⁰ 50'	116°57
83	Bow River-Middle Rd	34 ⁰ 55'	116058
84	Break Rd	34 ⁰ 51'	117 ⁰ 03' 115 ⁰ 40'
87	Black Pt Rd	34°18′	115°40'
90	Fouracres Rd	34 ⁰ 18'	115 ⁰ 31'
92	Scott Rd	34 ⁰ 11'	115 ⁰ 16'
93	n n	34 ⁰ 10'	115 ⁰ 16' 117 ⁰ 12'
106	South West Hwy	34 ⁰ 59'	117 ⁰ 12'
107	и и и и	34 ⁰ 59'	117 ⁰ 18'
	Muir Hwy	34 ⁰ 29'	117 ⁰ 18' 116 ⁰ 58' 116 ⁰ 59'
111	и и	34 ⁰ 30'	116 ⁰ 59'
111 112			
112	Kent River-Bevan Rd	34 ⁰ 41'	117°06'
112 113	Kent River-Bevan Rd Denmark River-Kockelun Rd	34 ⁰ 41' 34 ⁰ 47'	117 ⁰ 06' 117 ⁰ 13'
112	Kent River-Bevan Rd Denmark River-Kockelup Rd Stan Rd	34 ⁰ 41' 34 ⁰ 47' 34 ⁰ 48'	117 ⁰ 06' 117 ⁰ 13' 117 ⁰ 21'

Table 7: The sites at which *Edelia vittata* was captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Jaensch (1992) and Christensen (1982).

Site Numbe	General Location	Latitude	Longitude
4.2	CAPEL WATERSHED		
A2	Capel River-south	33 ⁰ 39.16'	115 ⁰ 45.43'
B15	ABBA/LUDLOW DRAINAGE Plover Lakes	33 ⁰ 36.00'	115020 001
B18 B19	Stream south of above Ludlow Swamp	33°36.25' 33°35.80'	115 ⁰ 29.80' 115 ⁰ 29.65'
B20	Ludlow River-Bridge on Bypass	33°35.80' 33°36.20'	115 ⁰ 29.80' 115 ⁰ 28.82'
B25	Carbanup River	33°40.78'	115012.19
C1	MARGARET RIVER WATERSHED	****	
C5	Margaret River-Great North Rd(Rapids) Margaret River-1st Weir	33 ⁰ 52.60' 33 ⁰ 56.92'	115 ⁰ 18.01'
C7 C8	Margaret R-2nd Weir Margaret R-Margaret R Rd	33 ⁰ 56.89'	115 ⁰ 03.83' 115 ⁰ 05.35'
C10	Margaret R-Margaret R Rd	33 ⁰ 56.53' 33 ⁰ 56.03'	115 ⁰ 06.98' 115 ⁰ 08.82'
C11 C12	Margaret R-Margaret R Rd Margaret R-Cranebreak Picnic Area	33°56.03' 33°54.77'	115 ⁰ 17.31' 115 ⁰ 16.97'
	BLACKWOOD RIVER WATERSHED	33 ⁰ 52.84'	115°16.97'
D7	St John Brook (Blackwood River)	33 ⁰ 52.70'	115 ⁰ 40.59
D23 D24	Chapman Brook Chapman Brook	34 ⁰ 04.61' 34 ⁰ 05.33'	115 ⁰ 40.59' 115 ⁰ 11.31'
	SCOTT RIVER WATERSHED	34 03.33	115 ⁰ 12.04'
E2	Scott R-Bridge on Milyeannup Rd (1)	34 ^o 17.56'	115 ^o 24.02'
E3 E4	Scott R- " " " (2) Scott R- " " " (3)	34 ⁰ 17.70'	115 ⁰ 24.10' 115 ⁰ 24.15'
E16	Pool on Scott River Rd - power pole 10	34 ⁰ 17.80′ 34 ⁰ 16.33′	115°24.15' 115°16.17'
E	LAKE QUITJUP WATERSHED		
F1	Lake Quitjup	34 ⁰ 23.17'	115 ^o 35.66'
G1	LAKE JASPER WATERSHED Lake Jasper		
51	• 1950:	34 ⁰ 25.22'	115 ⁰ 41.19'
H1	DONNELLY RIVER WATERSHED Lake Wilson	34 ^o 25.86	115 ⁰ 42.68'
H2 H3	Lake Smith Swamp adjacent to Lake Smith	34 ⁰ 25.89'	115 ⁰ 43.05'
H7	Donnelly River-Boat Ramp	34 ⁰ 25.89' 34 ⁰ 26.84'	115 ⁰ 43.20' 115 ⁰ 46.38'
H9 H10	Donnelly River-One Tree Bridge Fly Brook-Charlie Rd	34 ⁰ 12.19'	115 ^o 55.82'
H12	Carey Brook-Bridge on Cleave Rd	34 ⁰ 27.24' 34 ⁰ 26.54'	115 ⁰ 47.61' 115 ⁰ 47.25'
H13 H15	Carey Brook-Bridge on Vasse Hwy Beedelup Brook-Opposite Tobruk Rd	34 ⁰ 25.01'	115 ⁰ 48.65'
H16	Carey Brook-Staircase Rd	34 ⁰ 25.27' 34 ⁰ 23.81'	115 ⁰ 49.68' 115 ⁰ 50.39'
H21	Carey Brook-Sandy Hill Rd	34 ^o 24.27'	115048.65
11	WARREN RIVER WATERSHED Warren R-Dombakup Brk-Plantation Rd	24024 661	
12	Yeagerup Lake	34 ⁰ 34.66' 34 ⁰ 32.35'	115 ⁰ 57.98' 115 ⁰ 52.39'
I4 I5	Warren River-Bridge on Pemb/North Rd Warren River-King Trout Farm	34 ⁰ 30.42'	115 ⁰ 59.54'
I6	Lefroy Brook-The Cascades	34°30.10′ 34°28.60′	115 ⁰ 59.85' 116 ⁰ 01.71'
I7 I11	Lefroy Brook-Downstream of trout hatch Lefroy Brook-Broken Bridge	34°26.60' 34°25.19'	116 ⁰ 01.36'
I12	Big Brook Dam-Under downstream bridge	34 ⁰ 24.73'	116 ⁰ 01.53' 116 ⁰ 01.71'
I18 I19	Four Mile Brook -Seven Day Rd Channybearup Brook-Seven Day Rd	34 ⁰ 18.65' 34 ⁰ 19.11'	115 ⁰ 59.39'
I20 I21	Wilgarup River-Bridge on Cormint Rd	34021 11'	115 ⁰ 57.52' 116 ⁰ 20.73'
I22	Peerup River-Bridge on Muirs Hwy Tone River-Bridge on Muirs Hwy	34 ⁰ 23.41' 34 ⁰ 24.65'	116 ^o 25.52' 116 ^o 33.10'
I23 I28	Unicup Lake	34 ⁰ 20.65'	116°43 13'
120	Wilgarup River-Muirs Hwy	34 ^o 19.86'	116°22.45'
J1	LAKE MUIR WATERSHED Lake Muir	34 ⁰ 26.41'	116 ⁰ 39.58'
J3 J4	Byenup Lagoon Lake at Jn of Lake Unicup & Pindicup Rds	34 ⁰ 29.95'	116 ⁰ 43.36'
J5	Cowerup Swamp (Surrounding Pools)	34 ⁰ 22.57' 34 ⁰ 26.22'	116 ⁰ 41.87' 116 ⁰ 38.68'
	DOGGERUP CREEK WATERSHED	5 7 20.22	110 36.06
K1 K2	Doggerup Creek-Mouth Lake Doggerup	34046.75	115°58.82'
K3	Lake Samuel	34 ⁰ 42.99' 34 ⁰ 43.77'	116 ⁰ 03.88' 116 ⁰ 03.58'
K5	Dam on McGeachin's Property	34°42.82′	116°03.38 116°05.22'
L2	GARDNER RIVER WATERSHED Blackwater-Pool 1	A	22
L3	Blackwater-Pool 2	34 ⁰ 49.82' 34 ⁰ 49.82'	116 ⁰ 07.29'
L8 L9	Pool 100m south of L9 Pool 200m south of L10	34 ⁰ 49.60'	116 ⁰ 07.34' 116 ⁰ 03.50'
L12	Pool opposite L13	34 ⁰ 49.40' 34 ⁰ 49.23'	116 ⁰ 03.70' 116 ⁰ 03.72'
L13 L14	Pool 450m south of L14 Pool 50m south of L15	34 ⁰ 49.23' 34 ⁰ 49.17'	116 ⁰ 03.82' 116 ⁰ 04.05'
L15	Narrow stream on Windy Harbour Rd	34 ⁰ 48.98' 34 ⁰ 48.88'	116 ⁰ 04.05' 116 ⁰ 04-12'
L16 L17	Pool on Windy Harbour Rd Meandering Stream-off Windy Harbour Rd	34 ⁰ 48.70'	116 ⁰ 04.12' 116 ⁰ 04.20'
L18	Summer pool at western end of L17	34 ⁰ 48.41' 34 ⁰ 48.29'	116 ^o 03.77' 116 ^o 03.75'
L19 L29	Small Lake 200m north of L17 Pool 38.2km from east end of Chesapeake	34 ⁰ 48.47'	116 ⁰ 03.86' 116 ⁰ 09.02'
L31	Lake Florence	34 ⁰ 45.40' 34 ⁰ 44.12'	116°09.02' 116°06.06'
L32 L34	lst pool on Lower Gardner River Rd Large pool on Chesapeake Rd	34°45.64' 34°45.92'	116 ⁰ 06.06' 116 ⁰ 09.03'
L37 L38	Gardner River-South of bridge Gardner River-Bridge	34 ⁰ 47 21'	116 ⁰ 09.36' 116 ⁰ 11.32'
		34°46.62'	116 ⁰ 10.87'

Ta	h	0	7	(cont	1

e 7 (cont) Site Number	General Location	Latitude	Longitude
L39	Buldania Creek-Gardner River Rd	34 ⁰ 45.46'	116012.87
L40	Una Brook-	34043.95	116012.14
L41	Gardner River-Laws Track	34 ⁰ 42.49'	116009.96
L43	Boorara Brook-Muirillup Rd	34 ⁰ 38.84' 34 ⁰ 38.78'	116013.60
L44	" " -Daubney's (1)	34°38.78′	116°13.69'
L45	" " - " (2)	34038.33	116 ⁰ 13.63'
L46	" " (3)	34 ⁰ 37.42'	116°13.37'
L48	Lake Maringup	34 ⁰ 50.22' 34 ⁰ 50.54'	116 ⁰ 11.81'
L50	Pool on Moore's Hut Track	34050.54	116 ⁰ 15.84'
	SHANNON RIVER WATERSHED		
M1	Pool on Moore's Hut Track	34o50.40'	116017.03
M4	Shannon River-Bridge on Cheaspeake Rd	34o50.36'	116o22.27'
M5	" " -Springbreak Rd	34o52.23'	116o22.37'
M6	Upper Shannon R-NE of Dam	34o35.05'	116o24.69'
M7	Pool on Chesapeake Rd-19.4km west Broke	34049.20'	116018.57
M9	Chesapeake Brook (1)-20.05km W Broke	34049.07'	116018.09
M10	" " " (2)-" " " "	34048.96	116018.08
M11	" " " (3)- " " " "	34048.90'	116018.07'
M14	Pools at Jn of Deeside Coast & Preston Rds	34o38.52'	116019.63'
	BROKE INLET WATERSHED		ės.
N1	Forth River	34°51.85'	116 ⁰ 25.55'
N2	Small stream 6.6km west of Broke Inlet Rd	34 ⁰ 51.94'	116 ⁰ 25.72' 116 ⁰ 26.37'
N4	Pool/small stream 5.2km " "	34052.40	116°26.37'
N6	Small stream on Chesapeake Rd 1.6km "	34 ^o 53.68'	116 ⁰ 28.14'
	DEEP RIVER WATERSHED		
01	Deep River-Bridge on Beardmore Rd	34°49.14'	116°35.52′
O2	Deep River-Bridge on Beardmore Rd Weld River- " " " " "	34 ⁰ 48.89'	116 ⁰ 34.75'
02	Weld river-Wye Rd	34 ⁰ 45.65'	116 ⁰ 30.75' 116 ⁰ 31.82'
03	Jn Beardmore & South West Hwy	34°48.66'	116 ⁰ 31.82'
~.			
D.	FRANKLAND RIVER WATERSHED	34 ⁰ 28.73'	116 ^o 54.00'
PI	Frankland River-Muirs Bridge	J4 20.13	110 54.00
	KENT RIVER WATERSHED	14 KIRANGARA - X. MA	grand Name and
Q1	Kent River-Pools on Muirs Hwy	34 ⁰ 33.41'	117010.29
Q2	Camballup Pool	34 ⁰ 32.38'	117 ⁰ 11.33'
	HAY RIVER WATERSHED		
R1	HAY RIVER WATERSHED Hay River-Pools on Muirs Hwy	34 ⁰ 37.81'	117 ⁰ 24.15'
KI	They kivel I does on Mand IIII		
	COLLIE RIVER WATERSHED	0000000	11/010 101
S4	Collie River-Cox's Pool	33 ⁰ 25.80'	116 ⁰ 13.13' 116 ⁰ 13.40'
S5	" " -Round Pool	33°26.16' 33°28.34'	116°13.40' 116°13.86'
S6	- Western Contenes	33°28.34 33°28.75'	116°13.80'
S7	" " -Davies' Pool	JJ 20.1J	110 13.70
	MUSEUM RECORDS		
1	Busselton1912	33 ⁰ 39'	115 ⁰ 24'
1 2	Busselton 1912 Albany 1916	34 ⁰ 56'	117 ⁰ 54'
	Busselton 1912 Albany 1916 Pemberton 1935	34 ⁰ 56' 34 ⁰ 30'	117 ⁰ 54' 115 ⁰ 59'
	Albany1916	34 ⁰ 56' 34 ⁰ 30' 34 ⁰ 27'	117 ⁰ 54' 115 ⁰ 59' 116 ⁰ 02'
2 3 4	Albany1916 Pemberton1935	34 ⁰ 56' 34 ⁰ 30' 34 ⁰ 27' 34 ⁰ 25'	117 ⁰ 54' 115 ⁰ 59' 116 ⁰ 02'
2 3 4 5 6	Albany 1916 Pemberton 1935 Pemberton 1936	34 ⁰ 56' 34 ⁰ 30' 34 ⁰ 27' 34 ⁰ 25'	117 ⁰ 54' 115 ⁰ 59' 116 ⁰ 02' 115 ⁰ 40' 116 ⁰ 24'
2 3 4 5 6 7	Albany1916 Pemberton1935 Pemberton1936 1944	34 ⁰ 56' 34 ⁰ 30' 34 ⁰ 27' 34 ⁰ 25' 33 ⁰ 50' 34 ⁰ 45'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04'
2 3 4 5 6 7	Albany1916 Pemberton1935 Pemberton1936 1944 1945	34°56' 34°30' 34°27' 34°25' 33°50' 34°45'	117 ⁰ 54' 115 ⁰ 59' 116 ⁰ 02' 115 ⁰ 40' 116 ⁰ 24' 117 ⁰ 04'
2 3 4 5 6	Albany 1916 Pemberton 1935 Pemberton 1936 1944 1945	34°56' 34°30' 34°27' 34°25' 33°50' 34°45'	117 ⁰ 54' 115 ⁰ 59' 116 ⁰ 02' 115 ⁰ 40' 116 ⁰ 24' 117 ⁰ 04'
2 3 4 5 6 7 8	Albany 1916 Pemberton 1935 Pemberton 1936 1944 1945 1945 Grasmere 1947	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°45' 117°38'
2 3 4 5 6 7 8 9 10	Albany 1916 Pemberton 1935 Pemberton 1936 1944 1945 1945 Grasmere 1947 Dumbleyung 1947 1948	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°45' 117°38'
2 3 4 5 6 7 8 9 10	Albany 1916 Pemberton 1935 Pemberton 1936 1944 1945 1945 Grasmere 1947 Dumbleyung 1947 1947 1948 Cranbrook 1949	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°59' 34°18'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°45' 117°38' 117°32' 117°44'
2 3 4 5 6 7 8 9 10 11 12	Albany 1916 Pemberton 1935 Pemberton 1936 1944 1945 1945 Grasmere 1947 Dumbleyung 1947 1947 1948 Cranbrook 1949	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°59' 34°18'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°38' 117°32' 117°44' 117°33'
2 3 4 5 6 7 8 9 10 11 12 13 14	Albany 1916 Pemberton 1935 Pemberton 1936 1944 1945 1945 Grasmere 1947 Dumbleyung 1947 1948 Cranbrook 1949 1950 1957	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°18' 34°18' 34°16'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°45' 117°32' 117°32' 117°44' 117°33' 115°58' 115°04'
2 3 4 5 6 7 8 9 10 11 12 13 14 15	Albany 1916 Pemberton 1935 Pemberton 1936 1944 1945 1945 Grasmere 1947 Dumbleyung 1947 1948 Cranbrook 1949 1950 1957 Bridgetown 1958	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°18' 34°18' 33°47' 34°16'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°38' 117°32' 117°44' 117°33' 115°58' 115°04' 116°09'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	Albany1916 Pemberton1935 Pemberton1936 1944 1945 1945 Grasmere1947 Dumbleyung1947 1947 1948 Cranbrook1949 1950 1957 Bridgetown1958 1961	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°18' 34°18' 33°47' 34°16'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°38' 117°32' 117°44' 117°33' 115°58' 115°04' 116°09'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	Albany 1916 Pemberton 1935 Pemberton 1936 1944 1945 1945 Grasmere 1947 Dumbleyung 1947 1947 1948 Cranbrook 1949 1950 1957 Bridgetown 1958 1961 Pemberton 1964	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°59' 34°18' 33°47' 34°16' 33°57' 33°22' 34°28'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°38' 117°32' 117°32' 117°33' 115°58' 115°58' 115°04' 116°09' 116°01'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	Albany 1916 Pemberton 1935 Pemberton 1936 1944 1945 1945 Grasmere 1947 Dumbleyung 1947 1948 Cranbrook 1949 1950 1957 Bridgetown 1958 1961 Pemberton 1964 Fish Creek Pool 1964	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°59' 34°18' 33°47' 34°16' 33°57' 33°22' 34°28' 34°35'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°38' 117°32' 117°32' 117°33' 115°58' 115°58' 115°04' 116°09' 116°01'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1916 Pemberton1935 Pemberton1936 1944 1945 1945 Grasmere1947 Dumbleyung1947 1948 Cranbrook1949 1950 1957 Bridgetown1958 1961 Pemberton1964 Fish Creek Pool1964 Shannon River Dam1959	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°59' 34°18' 33°47' 34°16' 33°57' 33°22' 34°28' 34°35'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°38' 117°32' 117°34' 117°33' 115°58' 115°04' 116°09' 116°09' 116°01' 116°25' 116°24'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	Albany1916 Pemberton1935 Pemberton1936 1944 1945 1945 Grasmere1947 Dumbleyung1947 1947 1948 Cranbrook1949 1950 1957 Bridgetown1958 1961 Pemberton1964 Fish Creek Pool1964 Shannon River Dam1959 Margaret River Area1961	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°59' 34°18' 33°47' 34°16' 33°57' 33°22' 34°28' 34°35' 34°35' 33°57'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°38' 117°32' 117°34' 117°33' 115°58' 115°04' 116°09' 116°09' 116°01' 116°25' 116°24'
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2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	Albany1916 Pemberton1935 Pemberton1936 1944 1945 1945 Grasmere1947 Dumbleyung1947 1947 1948 Cranbrook1949 1950 1957 Bridgetown1958 1961 Pemberton1964 Fish Creek Pool1964 Shannon River Dam1959 Margaret River Area1961	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°59' 34°18' 33°47' 34°16' 33°57' 33°22' 34°28' 34°35' 33°57' 33°22' 33°22' 33°57'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°32' 117°32' 117°33' 117°33' 115°58' 115°04' 116°09' 116°09' 116°01' 116°25' 116°25' 116°09' 116°01' 116°25' 116°09' 116°04' 115°04' 115°04' 115°04' 115°04' 115°04'
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2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 22 23	Albany1916 Pemberton1935 Pemberton1936 1944 1945 1945 Grasmere1947 Dumbleyung1947 1947 1948 Cranbrook1949 1950 1957 Bridgetown1958 1961 Pemberton1964 Fish Creek Pool1964 Shannon River Dam1959 Margaret River Area1961 1961 1961 1962 1963 1967	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°59' 34°18' 33°47' 33°47' 33°22' 33°22' 34°28' 34°25' 34°25' 33°27' 33°22' 33°47' 34°16' 34°57' 33°27' 33°21' 33°27' 33°21'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°38' 117°32' 117°34' 117°33' 115°58' 115°04' 116°09' 116°09' 116°25' 116°24' 115°04' 116°25' 116°24' 115°14' 115°14' 115°14' 117°44' 118°08'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	Albany1916 Pemberton1935 Pemberton1936 1944 1945 1945 Grasmere1947 Dumbleyung1947 1947 1948 Cranbrook1949 1950 1957 Bridgetown1958 1961 Pemberton1964 Fish Creek Pool1964 Shannon River Dam1959 Margaret River Area1961 1961 1961 1962 1963 1967 Nannup1974	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°59' 34°18' 33°47' 33°47' 33°22' 33°22' 34°28' 34°25' 34°25' 33°27' 33°22' 33°47' 34°16' 34°57' 33°27' 33°21' 33°21' 33°21' 34°25' 34°35' 34°35' 34°35' 34°35' 34°35' 33°47'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°38' 117°32' 117°33' 115°58' 115°04' 116°09' 116°09' 116°09' 116°09' 116°09' 116°09' 116°09' 115°04' 115°04' 115°04' 115°04' 115°04' 115°04' 115°04' 115°04' 115°04' 115°04' 115°04' 115°04' 115°04'
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	Albany1916 Pemberton1935 Pemberton1936 1944 1945 1945 Grasmere1947 Dumbleyung1947 1948 Cranbrook1949 1950 1957 Bridgetown1958 1961 Pemberton1964 Fish Creek Pool1964 Shannon River Dam1959 Margaret River Area1961 1961 1961 1962 1963 1967 Nannup1974 Hardy Inlet1975	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°59' 34°18' 33°47' 34°16' 33°57' 33°22' 34°28' 34°35' 33°57' 33°22' 33°57' 33°57' 33°57' 33°57' 33°57' 33°57' 33°57' 33°57' 33°57' 33°57' 33°57' 33°57'	117°54' 115°59' 116°02' 115°40' 116°24' 117°04' 117°38' 117°32' 117°33' 115°58' 115°04' 116°09' 116°09' 116°01' 116°25' 116°01' 116°25' 116°09' 116°01' 116°24' 115°42' 115°42' 115°42' 115°42' 115°38' 115°38' 115°38' 115°38'
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2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 41 41 41 41 41 41 41 41 41 41 41 41	Albany1916 Pemberton1935 Pemberton1936 1944 1945 1945 Grasmere1947 Dumbleyung1947 1947 1948 Cranbrook1949 1950 1957 Bridgetown1958 1961 Pemberton1964 Fish Creek Pool1964 Shannon River Dam1959 Margaret River Area1961 1961 1961 1962 1963 1967 Nannup1974 Hardy Inlet1975 Albany1976 1981 1981 Northcliffe1986 Northcliffe1986 Northcliffe1986 Northcliffe1986 Northcliffe1986 Donnelly River1986 Donnelly River1986 Dongerup Creek1986 Lake Samuel1986 Shannon River1986 Shannon River1986 Shannon River1986 Shannon River1986	34°56' 34°30' 34°27' 34°25' 33°50' 34°45' 35°01' 33°19' 34°18' 34°18' 34°16' 33°57' 33°22' 34°28' 34°28' 34°35' 33°57' 33	117°54' 115°59' 116°02' 115°40' 116°024' 117°04' 117°038' 117°32' 117°33' 115°58' 115°04' 116°09' 116°01' 116°24' 115°04' 115°04' 115°04' 115°04' 115°04' 115°14' 117°44' 115°14' 117°44' 118°09' 115°40' 115°41' 117°43' 115°38' 115°09' 117°45' 118°09' 115°59' 115°50' 115°59' 115°59' 115°59' 115°59' 115°56' 116°04' 116°02' 116°04' 116°02' 116°04' 116°02' 116°04' 116°02' 116°04' 116°02' 116°04' 116°02' 116°04' 116°02' 116°04' 116°02' 116°04' 116°02' 116°04'

Table 7 (cont...)

Table 7 (cont)			
Site Number	General Location	Latitude	I anaite 3
49	Elleker-Lake Powell1986	35°03'	Longitude
50		34 ⁰ 57'	117 ⁰ 46' 117 ⁰ 46'
51	Albany 1986	34 ⁰ 58'	117°46 118°06'
52	1978	33 ⁰ 40'	115042
53 54	Boranup1965	34 ⁰ 09'	115002
55	Albany 1992	35 ⁰ 03'	117 ⁰ 28'
56	Albany 1992 Denmark1992	35 ⁰ 01'	117 ⁰ 16'
57	Definial K1992	35000	117 ⁰ 13'
58	п п п	35000	117 ⁰ 04'
59	ii. ii u	35 ⁰ 01' 35 ⁰ 01'	117 ⁰ 05'
60	Broke Inlet1992	35 01	117 ⁰ 06' 116 ⁰ 32'
61	Manjimup1992	34 ⁰ 57' 34 ⁰ 50'	116°32'
62	0 0 0	34044'	116 ⁰ 06' 116 ⁰ 06'
63	0 0 0 0	34044'	116004
64	0	34 ⁰ 43'	116 ⁰ 04' 116 ⁰ 04'
65 66	" " " "	34034	116055
67		34 ⁰ 33'	116 ⁰ 55' 115 ⁰ 52'
68		34032'	115 ⁰ 53' 115 ⁰ 43'
69	Nannup1992	34 ⁰ 26' 34 ⁰ 24'	115 ⁰ 43'
70	" " " " "	34°24'	115 ⁰ 41'
, •		34 ⁰ 23'	115 ⁰ 35'
	D TAENCCH (1002)		
	R. JAENSCH (1992)		
5	Lake Quitjup	0.40004	
6	Lake Jasper	34 ⁰ 23'	115 ⁰ 35'
7	Lake Wilson	34 ⁰ 24'	115 ⁰ 41' 115 ⁰ 43'
8	Lake Smith	34 ^o 26' 34 ^o 26'	115043
9	Yeagerup Lake	34°26'	115 ⁰ 43'
11	Un-named Lake(near 9)	34 ⁰ 32' 34 ⁰ 33'	115053'
A4	Warren River Oxbow	34°33'	115°52' 115°55'
12	Doggerup Lake	34 ⁰ 34' 34 ⁰ 43'	115°55'
13	Lake Samuel	34°43' 34°44'	116004'
14	Lake Florence	34°44' 34°44'	116004
15	Gardner River Lake	34 44	116 ⁰ 06'
16	Maringup Lake	34 ⁰ 50' 34 ⁰ 50'	116°06'
17	Lake East of Broke Inlet	34°57'	116°12'
19	Oingup Swamp	35000	110 32 117 ⁰ 04'
20	Boat Harbour Lake 1	35 ⁰ 01'	117 ⁰ 04' 117 ⁰ 05'
22	" " " 3	35°01'	117006
23	Reserve 12046 Lake	35000	117 ⁰ 06' 117 ⁰ 13'
24 25	Lake Williams	35 ⁰ 01'	117016
23	Lake Saide	35 ⁰ 03'	117 ⁰ 16' 117 ⁰ 28'
	P CHDICTENCEN (1992)		
	P. CHRISTENSEN (1982)		
1	Ant Pool	240	
4	Nelson Rd	34 ⁰ 44' 34 ⁰ 43'	116024'
5	11 11		116 ⁰ 21'
6	и и	34 ⁰ 41' 34 ⁰ 42'	116031'
7	Off " "	34°42'	116 ⁰ 30' 116 ⁰ 29'
14	Deeside Rd	34°42'	116029
17	South West Hwy	34°42 34°58'	116 ⁰ 20' 116 ⁰ 36'
20	Inlet River	34055	116°36' 116°34'
23	South West Hwy	34048	116034
24	Suth West Hwy	34°46'	116030
27	Shannon R	34 ⁰ 35'	116 ⁰ 30' 116 ⁰ 24'
30	Gardner R Rd	34043'	116012
32 33	Buldania Creek	34 ⁰ 46' 34 ⁰ 41'	116°12' 116°13'
38	Boorara Brook	34 ⁰ 41'	116012
39	Barker Rd Lake Yeagerup	34 ⁰ 31'	116°12' 115°54'
41	Lake Regerup Lake Rd	34032	115 ⁰ 52' 115 ⁰ 53'
42	Ritters Rd	34 ⁰ 31' 34 ⁰ 30'	115°53'
46	Off Richardson Rd	34,30	115 ⁰ 53' 115 ⁰ 58'
47	Richardson Rd	34 ⁰ 37' 34 ⁰ 38'	115058'
48			115050
	Richardson Rd	240201	115 55
51	Elsie Brook, Thompson Rd	34°38' 34°38'	115°59' 116°05'
51 53	Elsie Brook, Thompson Rd Deep River, Bevan Rd	34 ⁰ 38' 34 ⁰ 51'	116 ⁰ 05' 116 ⁰ 43'
51 53 56	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy	34 ⁰ 38' 34 ⁰ 51' 34 ⁰ 35' 34 ⁰ 24'	116 ⁰ 43'
51 53 56 59	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd	34 ⁰ 38' 34 ⁰ 51' 34 ⁰ 35' 34 ⁰ 24'	116 ⁰ 43'
51 53 56 59 61	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River	34 ⁰ 38' 34 ⁰ 51' 34 ⁰ 35' 34 ⁰ 24'	116 ⁰ 43' 116 ⁰ 33' 116 ⁰ 53' 117 ⁰ 29'
51 53 56 59 61 64	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River	34 ⁰ 38' 34 ⁰ 35' 34 ⁰ 24' 34 ⁰ 45' 34 ⁰ 45' 34 ⁰ 41'	116 ⁰ 43' 116 ⁰ 33' 116 ⁰ 53' 117 ⁰ 29'
51 53 56 59 61 64 65	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River	34 ⁰ 38' 34 ⁰ 35' 34 ⁰ 24' 34 ⁰ 45' 34 ⁰ 45' 34 ⁰ 41'	116 ⁰ 43' 116 ⁰ 33' 116 ⁰ 53' 117 ⁰ 29' 117 ⁰ 24'
51 53 56 59 61 64 65 66	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd	34 ⁰ 38' 34 ⁰ 35' 34 ⁰ 24' 34 ⁰ 45' 34 ⁰ 45' 34 ⁰ 41'	116 ⁰ 43' 116 ⁰ 33' 116 ⁰ 53' 117 ⁰ 29' 117 ⁰ 24' 116 ⁰ 04' 116 ⁰ 01'
51 53 56 59 61 64 65 66	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd	34 ⁰ 38' 34 ⁰ 51' 34 ⁰ 35' 34 ⁰ 24' 34 ⁰ 45' 34 ⁰ 50' 34 ⁰ 37' 34 ⁰ 37' 34 ⁰ 35'	116 ⁰ 43' 116 ⁰ 33' 116 ⁰ 53' 117 ⁰ 29' 117 ⁰ 24' 116 ⁰ 04' 116 ⁰ 01'
51 53 56 59 61 64 65 66 68	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd """" Barlee Brook	34 ⁰ 38' 34 ⁰ 51' 34 ⁰ 24' 34 ⁰ 45' 34 ⁰ 50' 34 ⁰ 41' 34 ⁰ 37' 34 ⁰ 37' 34 ⁰ 35' 34 ⁰ 13'	116 ⁰ 43' 116 ⁰ 33' 116 ⁰ 53' 117 ⁰ 29' 117 ⁰ 24' 116 ⁰ 01' 116 ⁰ 01' 116 ⁰ 03'
51 53 56 59 61 64 65 66 68 69 70	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy	34 ⁰ 38' 34 ⁰ 35' 34 ⁰ 24' 34 ⁰ 45' 34 ⁰ 50' 34 ⁰ 41' 34 ⁰ 37' 34 ⁰ 37' 34 ⁰ 13'	116 ⁰ 43' 116 ⁰ 33' 116 ⁰ 53' 117 ⁰ 29' 117 ⁰ 24' 116 ⁰ 01' 116 ⁰ 01' 116 ⁰ 03'
51 53 56 59 61 64 65 66 68 69 70 76	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd	34 ⁰ 38' 34 ⁰ 35' 34 ⁰ 24' 34 ⁰ 45' 34 ⁰ 50' 34 ⁰ 41' 34 ⁰ 37' 34 ⁰ 37' 34 ⁰ 13'	116 ⁰ 43' 116 ⁰ 33' 116 ⁰ 53' 117 ⁰ 29' 117 ⁰ 24' 116 ⁰ 04' 116 ⁰ 01' 116 ⁰ 03' 115 ⁰ 45' 115 ⁰ 46'
51 53 56 59 61 64 65 66 68 69 70 76	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " "	34°38' 34°51' 34°35' 34°24' 34°45' 34°50' 34°11' 34°37' 34°35' 34°18' 34°18' 34°18' 34°48'	116°43' 116°53' 117°29' 117°24' 116°04' 116°01' 116°03' 115°45' 115°46' 116°34' 116°35'
51 53 56 59 61 64 65 66 68 69 70 76 77	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range """" Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River-""" Frankland River-Caldyanning Rd	34°38' 34°51' 34°24' 34°45' 34°45' 34°41' 34°37' 34°37' 34°13' 34°18' 34°18' 34°48' 34°39'	116°43' 116°33' 116°53' 117°29' 117°24' 116°01' 116°01' 116°03' 115°45' 115°46' 116°35' 116°35'
51 53 56 59 61 64 65 66 68 69 70 76 77 78	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " " Frankland River-Caldyanning Rd Bow River-Middle Rd	34°38' 34°35' 34°24' 34°45' 34°50' 34°41' 34°37' 34°37' 34°37' 34°37' 34°37' 34°35' 34°18' 34°39' 34°55'	116°43' 116°33' 116°33' 117°29' 117°24' 116°04' 116°01' 116°03' 115°46' 116°34' 116°35' 116°35'
51 53 56 59 61 64 65 66 68 69 70 76 77 78 83	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd	34°38' 34°35' 34°24' 34°45' 34°41' 34°37' 34°37' 34°37' 34°37' 34°37' 34°35' 34°13' 34°18' 34°37' 34°48' 34°48'	116°43' 116°33' 116°33' 117°29' 117°24' 116°04' 116°01' 116°03' 115°46' 116°34' 116°35' 116°38' 116°48' 116°58'
51 53 56 59 61 64 65 66 68 69 70 76 77 78 83 83 85	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd	34°38' 34°51' 34°24' 34°45' 34°45' 34°41' 34°37' 34°37' 34°35' 34°13' 34°18' 34°39' 34°55' 34°19'	116°43' 116°33' 116°53' 117°29' 117°24' 116°01' 116°01' 116°03' 115°45' 115°46' 116°35' 116°35' 116°48' 116°48' 116°48' 115°42' 115°42'
51 53 56 59 61 64 65 66 68 69 70 76 77 78 83 85 85	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd Black Pt Rd	34°38' 34°35' 34°24' 34°45' 34°45' 34°41' 34°37' 34°37' 34°37' 34°13' 34°13' 34°13' 34°19' 34°19' 34°19' 34°19'	116°43' 116°33' 116°53' 117°29' 117°24' 116°04' 116°01' 116°03' 115°45' 115°46' 116°34' 116°34' 116°38' 116°58' 115°42' 115°42' 115°42' 115°40'
51 53 56 59 61 64 65 66 68 69 70 76 77 78 83 85 86	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd Black Pt Rd Fouracres Rd	34°38' 34°35' 34°24' 34°45' 34°45' 34°41' 34°37' 34°37' 34°37' 34°13' 34°13' 34°13' 34°19' 34°19' 34°19' 34°19'	116°43' 116°33' 116°53' 117°29' 117°24' 116°01' 116°01' 116°03' 115°45' 115°46' 116°34' 116°34' 116°38' 116°58' 115°42' 115°42' 115°40' 115°41'
51 53 56 59 61 64 65 66 68 69 70 77 78 83 83 85 86 87	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd Flack Pt Rd Fouracres Rd Scott Rd	34°38' 34°51' 34°24' 34°45' 34°50' 34°41' 34°37' 34°35' 34°13' 34°13' 34°18' 34°19' 34°19' 34°19' 34°18' 34°18'	116°43' 116°33' 116°53' 117°29' 117°24' 116°01' 116°01' 116°03' 115°45' 115°46' 116°34' 116°38' 116°48' 116°58' 115°42' 115°42' 115°42' 115°42' 115°41'
51 53 56 59 61 64 65 66 68 69 70 76 77 78 83 85 86 87 90 93	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd Black Pt Rd Fouracres Rd Scott Rd Myalgelup Rd	34°38' 34°51' 34°35' 34°45' 34°45' 34°41' 34°37' 34°37' 34°37' 34°13' 34°18' 34°18' 34°55' 34°19' 34°18' 34°18' 34°18' 34°18' 34°18'	116°43' 116°33' 116°33' 117°29' 117°24' 116°01' 116°01' 116°03' 115°45' 115°46' 116°35' 116°34' 116°58' 115°42' 115°42' 115°40' 115°31' 115°31' 115°31'
51 53 56 59 61 64 65 66 68 69 70 76 77 78 83 85 86 87 90 93	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd Stewart Rd Fouracres Rd Scott Rd Myalgelup Rd Nornalup Rd	34°38' 34°35' 34°24' 34°45' 34°45' 34°41' 34°37' 34°37' 34°13' 34°13' 34°13' 34°19' 34°19' 34°19' 34°19' 34°10' 34°10' 34°10' 34°10'	116°43' 116°33' 116°33' 117°29' 117°24' 116°01' 116°01' 116°03' 115°45' 115°46' 116°35' 116°34' 116°58' 115°42' 115°42' 115°40' 115°31' 115°31' 115°31'
51 53 56 59 61 64 65 66 68 69 70 76 77 78 83 85 86 87 90 93	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd Black Pt Rd Fouracres Rd Scott Rd Myalgelup Rd Nornalup Rd Kordabup Rd	34°38' 34°35' 34°24' 34°45' 34°45' 34°41' 34°37' 34°37' 34°13' 34°13' 34°13' 34°19' 34°19' 34°19' 34°19' 34°10' 34°10' 34°10' 34°10'	116°43' 116°33' 116°33' 117°29' 117°24' 116°01' 116°01' 116°03' 115°45' 115°46' 116°34' 116°38' 116°58' 115°42' 115°42' 115°42' 115°40' 115°31' 115°16' 116°43' 116°57' 117°09'
51 53 56 59 61 64 65 66 68 69 70 76 77 78 83 85 86 87 90 93 99 105	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd Black Pt Rd Fouracres Rd Scott Rd Myalgelup Rd Nornalup Rd Kordabup Rd Suth West Hwy	34°38' 34°51' 34°24' 34°45' 34°50' 34°41' 34°37' 34°35' 34°13' 34°13' 34°18' 34°39' 34°19' 34°19' 34°19' 34°18' 34°19' 34°18' 34°19' 34°18' 34°39' 34°59' 34°59'	116°43' 116°33' 116°33' 117°29' 117°24' 116°04' 116°01' 116°03' 115°45' 115°46' 116°34' 116°34' 116°38' 116°38' 116°42' 115°42' 115°40' 115°31' 115°16' 115°31' 115°16' 116°57' 117°09' 117°09'
51 53 56 59 61 64 65 66 68 69 70 77 78 83 83 85 86 87 90 93 99 105 107	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd Black Pt Rd Fouracres Rd Scott Rd Myalgelup Rd Nornalup Rd Kordabup Rd Suth West Hwy Muirs Hwy	34°38' 34°51' 34°24' 34°45' 34°45' 34°41' 34°37' 34°37' 34°37' 34°37' 34°13' 34°18' 34°18' 34°55' 34°19' 34°18' 34°19' 34°18' 34°19' 34°18' 34°19' 34°18' 34°19' 34°19' 34°39' 34°39' 34°39' 34°39' 34°39'	116°43' 116°33' 116°33' 117°29' 117°24' 116°01' 116°01' 116°03' 115°45' 115°46' 116°34' 116°35' 116°48' 116°58' 115°42' 115°42' 115°42' 115°41' 115°31' 115°31' 116°57' 116°57' 117°09' 117°08'
51 53 56 59 61 64 65 66 68 69 70 76 77 78 83 85 86 87 90 93 90 93 91 91 105 107 111	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd Black Pt Rd Fouracres Rd Scott Rd Myalgelup Rd Nornalup Rd Kordabup Rd Suth West Hwy Muirs Hwy Kent River-Bevan Rd Kockelup Rd	34°38' 34°35' 34°24' 34°45' 34°45' 34°41' 34°37' 34°37' 34°37' 34°37' 34°13' 34°18' 34°19' 34°19' 34°18'	116°43' 116°33' 116°33' 117°29' 117°24' 116°01' 116°01' 116°03' 115°45' 115°46' 116°34' 116°35' 116°48' 116°58' 115°42' 115°42' 115°42' 115°41' 115°31' 115°31' 116°57' 116°57' 117°09' 117°08'
51 53 56 59 61 64 65 66 68 69 70 76 77 78 83 85 86 87 90 93 94 99 105 107 111	Elsie Brook, Thompson Rd Deep River, Bevan Rd Tone River, Muirs Hwy Denbarker Rd Mitchell River Meerup River Rifle Range Rd " " " " Barlee Brook Vasse Hwy Weld River-Beardmore Rd Deep River- " " " Frankland River-Caldyanning Rd Bow River-Middle Rd Barlee Brook-Stewart Rd Stewart Rd Stewart Rd Fouracres Rd Scott Rd Myalgelup Rd Nornalup Rd Kordabup Rd Suth West Hwy Muirs Hwy Kent River-Bevan Rd	34°38' 34°51' 34°24' 34°45' 34°45' 34°41' 34°37' 34°37' 34°37' 34°37' 34°13' 34°18' 34°18' 34°55' 34°19' 34°18' 34°19' 34°18' 34°19' 34°18' 34°19' 34°18' 34°19' 34°19' 34°39' 34°39' 34°39' 34°39' 34°39'	116°43' 116°33' 116°33' 117°29' 117°24' 116°04' 116°01' 116°03' 115°46' 116°34' 116°34' 116°34' 116°38' 116°48' 116°58' 115°42' 115°40' 115°31' 115°16' 115°31' 115°16' 116°57' 117°09' 117°09'

Table 8: The sites at which Nannatherina balstoni was captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Jaensch (1992) and Christensen (1982).

Site Number	General Location	Latitude	Longitude
Site Number			
1000-000	MARGARET RIVER WATERSHED	33°52.60'	115 ⁰ 18.01'
C1	Margaret River-Great North Rd(Rapids)	33°51.99'	115 ⁰ 18.64'
C2	Margaret R-1.3km from Cane Break Rd	33 31.99	115 16.04
	SCOTT RIVER WATERSHED		
D .		34 ⁰ 17.80'	115 ⁰ 24.15'
E4	Scott R-Bridge on Milyeannup Rd (3)	27 11.00	
	LAKE QUITJUP WATERSHED		
F1	Lake Quitjup	34 ⁰ 23.17'	115 ⁰ 35.66'
1.1			
	DONNELLY RIVER WATERSHED	0	0
H2	Lake Smith	34 ⁰ 25.89	115 ⁰ 43.05'
H10	Fly Brook-Charlie Rd	34 ⁰ 27.24'	115 ⁰ 47.61'
	- a a control on they will men diffe		
No. 2 and Sales	DOGGERUP CREEK WATERSHED	34 ⁰ 42.99'	116 ⁰ 03.88'
K2	Lake Doggerup	34 42.99	110 05.00
	GARDNER RIVER WATERSHED		
L2	Blackwater-Pool 1	34 ⁰ 49.82'	116 ⁰ 07.29'
L3	Blackwater-Pool 2	34 ⁰ 49.82'	116 ⁰ 07.34'
L9	Pool 200m south of L10	34 ⁰ 49.40'	116 ⁰ 03.70'
L12	Pool opposite L13	34 ⁰ 49.23'	116 ⁰ 03.72'
L13	Pool 450m south of L14	34 ⁰ 49.17'	116 ⁰ 03.82'
L14	Pool 50m south of L15	34 ⁰ 48.98'	116 ⁰ 04.05'
L15	Narrow stream on Windy Harbour Rd	34 ⁰ 48.88'	116 ⁰ 04.12'
L16	Pool on Windy Harbour Rd	34 ⁰ 48.70'	116 ⁰ 04.20'
L17	Meandering Stream-off Windy Harbour Rd	34 ⁰ 48.41'	116 ⁰ 03.77' 116 ⁰ 03.75'
L18	Summer pool at western end of L17	34 ⁰ 48.29' 34 ⁰ 45.64'	116 ⁰ 03.75'
L32	1st pool on Lower Gardner River Rd	34°45.64' 34°45.92'	116°09.03'
L34	Large pool on Chesapeake Rd	34°45.92° 34°47.21'	116°09.36 116°11.32'
L37	Gardner River-South of bridge	34°47,21° 34°50,22'	116°11.32 116°11.81'
L48	Lake Maringup	34 30.22	110 11.01
	SHANNON RIVER WATERSHED		
144	Shannon River WATERSHED Shannon River-Bridge on Cheaspeake Rd	34 ^o 50.36'	116 ⁰ 22.27'
M4	Chespeake Brook (2)- 20.05km W Broke Inlet Rd	34 ⁰ 48.96'	116 ⁰ 18.08'
M10 M14	Pools at Jn of Deeside Coast & Preston Rds	34 ⁰ 38.52'	116 ⁰ 19.63'
M14	Fools at 311 of Deciside Coast & Freston Rds		
	BROKE INLET WATERSHED		
NI	Forth River	34 ⁰ 51.85'	116 ⁰ 25.55'
N2	Small stream 6.6km west of Broke Inlet Rd	34 ⁰ 51.94'	116 ⁰ 25.72'
N4	Pool/small stream 5.2km " "	34 ⁰ 52.40'	116 ⁰ 26.37'
	DEEP RIVER WATERSHED	34 ⁰ 48.89'	116 ⁰ 34.75'
O2	Weld River- Bridge on Beardmore Rd	34°48.89° 34°48.66'	116 ⁰ 31.82'
O4	Jn Beardmore & South West Hwy	34 48.00	110 51.02
	MUSEUM RECORDS		
	MUSEUM RECORDS	0	117 ⁰ 45'
1	Grasmere1947	35 ⁰ 01'	117°45' 115°05'
2		34 ⁰ 13'	118 ⁰ 05'
2	1962	2.40cm	
3	Albany1976	34 ⁰ 57'	
	Albany1976 Northcliffe1981	34 ⁰ 43'	116 ⁰ 25'
3 4 5	Albany1976 Northcliffe1981 Northcliffe1986-Warren R	34 ⁰ 43' 34 ⁰ 38'	116 ⁰ 25' 116 ⁰ 03'
3 4 5 6	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36'
3 4 5 6 7	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26'
3 4 5 6 7 8	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43' 34 ⁰ 49'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 04'
3 4 5 6 7 8 9	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 04' 116 ⁰ 31'
3 4 5 6 7 8 9	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 04' 116 ⁰ 31' 116 ⁰ 34' 117 ⁰ 04'
3 4 5 6 7 8 9 10	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43' 34 ⁰ 49'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 31' 116 ⁰ 34' 117 ⁰ 04'
3 4 5 6 7 8 9 10 11	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 24' 116 ⁰ 31' 116 ⁰ 34' 117 ⁰ 04' 117 ⁰ 05'
3 4 5 6 7 8 9 10 11 12 13	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 50'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 04' 116 ⁰ 34' 117 ⁰ 04' 117 ⁰ 05' 116 ⁰ 32'
3 4 5 6 7 8 9 10 11 12 13	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 50' 34 ⁰ 44'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 04' 116 ⁰ 31' 116 ⁰ 34' 117 ⁰ 05' 116 ⁰ 32' 116 ⁰ 06'
3 4 5 6 7 8 9 10 11 12 13 14	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992	34°43' 34°38' 34°07' 34°43' 34°49' 34°49' 34°55' 35°00' 35°01' 34°57' 34°50' 34°44'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 31' 116 ⁰ 34' 117 ⁰ 05' 116 ⁰ 32' 116 ⁰ 06' 116 ⁰ 06'
3 4 5 6 7 8 9 10 11 12 13 14 15	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 50' 34 ⁰ 44' 34 ⁰ 44'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 04' 116 ⁰ 31' 116 ⁰ 34' 117 ⁰ 05' 116 ⁰ 32' 116 ⁰ 06' 116 ⁰ 06' 116 ⁰ 06' 116 ⁰ 04'
3 4 5 6 7 8 9 10 11 12 13 14	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992	34°43' 34°38' 34°07' 34°43' 34°49' 34°49' 34°55' 35°00' 35°01' 34°57' 34°50' 34°44'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 31' 116 ⁰ 34' 117 ⁰ 05' 116 ⁰ 32' 116 ⁰ 06' 116 ⁰ 06'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 Nannup1992	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 50' 34 ⁰ 44' 34 ⁰ 44'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 04' 116 ⁰ 31' 116 ⁰ 34' 117 ⁰ 05' 116 ⁰ 32' 116 ⁰ 06' 116 ⁰ 06' 116 ⁰ 06' 116 ⁰ 04'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 50' 34 ⁰ 44' 34 ⁰ 44' 34 ⁰ 23'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 31' 116 ⁰ 31' 117 ⁰ 04' 117 ⁰ 05' 116 ⁰ 32' 116 ⁰ 06' 116 ⁰ 06' 116 ⁰ 06' 115 ⁰ 43' 115 ⁰ 35'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannimup1992 Nannup1992	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 49' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 57' 34 ⁰ 50' 34 ⁰ 44' 34 ⁰ 23'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 26' 116 ⁰ 31' 116 ⁰ 31' 117 ⁰ 04' 117 ⁰ 04' 117 ⁰ 05' 116 ⁰ 06' 116 ⁰ 06' 116 ⁰ 04' 115 ⁰ 35'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 Nannup1992 Nannup1992 Nannup1992 Nannup1992 Nannup1992 Nannup1992 Quitjup Lake	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 50' 34 ⁰ 44' 34 ⁰ 43' 34 ⁰ 26' 34 ⁰ 23'	116 ⁰ 25' 116 ⁰ 03' 115 ⁰ 36' 116 ⁰ 26' 116 ⁰ 04' 116 ⁰ 31' 116 ⁰ 34' 117 ⁰ 05' 116 ⁰ 32' 116 ⁰ 06' 116 ⁰ 06' 116 ⁰ 04' 115 ⁰ 43' 115 ⁰ 35'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannimup1992 Nannup1992	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 50' 34 ⁰ 44' 34 ⁰ 43' 34 ⁰ 23'	116°25' 116°03' 115°36' 116°26' 116°31' 116°34' 117°05' 116°32' 116°06' 116°06' 116°04' 115°43' 115°35'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 Nannup1992 Nannup1992 Nannup1992 Nannup1992 Nannup1992 R. JAENSCH (1992) Quitjup Lake Lake Smith	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 49' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 11' 34 ⁰ 57' 34 ⁰ 57' 34 ⁰ 50' 34 ⁰ 44' 34 ⁰ 26' 34 ⁰ 23' 34 ⁰ 26' 34 ⁰ 24' 34 ⁰ 24' 34 ⁰ 24'	116°25' 116°03' 115°36' 116°26' 116°26' 116°31' 116°34' 117°05' 116°32' 116°06' 116°06' 116°06' 115°43' 115°43' 115°43' 115°43' 115°43' 115°43' 115°44' 116°06'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 Nannup1992 Nannup1992 Nannup1992 Nannup1y992	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 49' 34 ⁰ 49' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 50' 34 ⁰ 44' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 26' 34 ⁰ 43' 34 ⁰ 26' 34 ⁰ 43' 34 ⁰ 26' 34 ⁰ 44' 34 ⁰ 43'	116°25' 116°03' 115°36' 116°26' 116°26' 116°31' 116°34' 117°05' 116°32' 116°06' 116°06' 116°06' 115°43' 115°35' 115°35' 115°35' 115°36' 116°04' 116°06' 116°06'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 Nannup1992 R. JAENSCH (1992) Quitjup Lake Lake Smith Doggerup Lake Lake Florence	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 07' 34 ⁰ 49' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 50' 34 ⁰ 44' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 44' 34 ⁰ 43' 34 ⁰ 44' 34 ⁰ 50' 34 ⁰ 50' 34 ⁰ 50'	116°25' 116°03' 115°36' 116°26' 116°26' 116°31' 116°31' 117°04' 117°04' 117°05' 116°06' 116°06' 116°04' 115°35' 115°35' 115°43' 116°04' 116°06' 116°06' 116°06' 116°06' 116°12'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 Nannup1992 Nanup1992 R. JAENSCH (1992) Quitjup Lake Lake Smith Doggerup Lake Lake Florence Gardner River Lake	34°43' 34°38' 34°43' 34°49' 34°49' 34°49' 34°55' 35°00' 35°01' 34°57' 34°50' 34°23' 34°23' 34°26' 34°23' 34°43' 34°44' 34°50' 34°50' 34°50' 34°57'	116°25' 116°03' 115°36' 116°26' 116°31' 116°34' 117°05' 116°32' 116°06' 116°06' 115°43' 115°35' 115°35' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°32'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 Nannup1992 R. JAENSCH (1992) Quitjup Lake Lake Smith Doggerup Lake Lake Florence Gardner River Lake Maringup Lake Lake East of Broke Inlet Owingup Swamp	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 26' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 26' 34 ⁰ 44' 34 ⁰ 50' 34 ⁰ 50' 34 ⁰ 50' 34 ⁰ 50'	116°25' 116°03' 115°36' 116°26' 116°31' 116°34' 117°05' 116°32' 116°06' 116°06' 115°43' 115°35' 115°35' 116°06' 116°06' 116°06' 116°06' 116°12' 116°32' 117°04'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 R. JAENSCH (1992) Quitjup Lake Lake Smith Doggerup Lake Lake Florence Gardner River Lake Maringup Lake Lake East of Broke Inlet	34°43' 34°38' 34°43' 34°49' 34°49' 34°49' 34°55' 35°00' 35°01' 34°57' 34°50' 34°23' 34°23' 34°26' 34°23' 34°43' 34°44' 34°50' 34°50' 34°50' 34°57'	116°25' 116°03' 115°36' 116°26' 116°31' 116°34' 117°05' 116°32' 116°06' 116°06' 115°43' 115°35' 115°35' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°32'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannimup1992 Nannup1992 Nanijmup1992 R. JAENSCH (1992) Quitjup Lake Lake Smith Doggerup Lake Lake Florence Gardner River Lake Maringup Lake Lake East of Broke Inlet Owingup Swamp Boat Harbour Lake 1	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 26' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 26' 34 ⁰ 44' 34 ⁰ 50' 34 ⁰ 50' 34 ⁰ 50' 34 ⁰ 50'	116°25' 116°03' 115°36' 116°26' 116°31' 116°34' 117°05' 116°32' 116°06' 116°06' 115°43' 115°35' 115°35' 116°06' 116°06' 116°06' 116°06' 116°12' 116°32' 117°04'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 Nannup1992 R. JAENSCH (1992) Quitjup Lake Lake Smith Doggerup Lake Lake Florence Gardner River Lake Maringup Lake Lake East of Broke Inlet Owingup Swamp Boat Harbour Lake I	34°43' 34°38' 34°43' 34°49' 34°49' 34°49' 34°55' 35°00' 35°01' 34°57' 34°50' 34°23' 34°23' 34°26' 34°23' 34°26' 34°50' 34°50' 34°50' 34°57' 35°00' 35°01'	116°25' 116°03' 115°36' 116°26' 116°31' 116°34' 117°05' 116°32' 116°06' 116°06' 115°43' 115°35' 115°35' 116°06' 116°06' 116°06' 116°06' 116°12' 116°32' 117°04'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 Nannup1992 R. JAENSCH (1992) Quitjup Lake Lake Smith Doggerup Lake Lake Florence Gardner River Lake Maringup Lake Lake East of Broke Inlet Owingup Swamp Boat Harbour Lake 1 P. CHRISTENSEN (1982) Bevan Rd	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 26' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 26' 34 ⁰ 44' 34 ⁰ 50' 34 ⁰ 50' 34 ⁰ 50' 34 ⁰ 50'	116°25' 116°03' 115°36' 116°26' 116°04' 116°31' 116°34' 117°05' 116°32' 116°06' 116°06' 116°06' 115°43' 115°43' 115°43' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°05' 116°05' 116°05' 116°05' 116°05' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06' 116°06'
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Albany1976 Northcliffe1981 Northcliffe1986-Warren R Nannup1986-Blackwood R Nelson Rd1986-Shannon R Mt Chudalup1986 Walpole1986-Weld R Walpole1986-Inlet R Denmark1992 Denmark1992 Broke Inlet1992 Manjimup1992 Manjimup1992 Manjimup1992 Manjimup1992 Nannup1992 Nannup1992 R. JAENSCH (1992) Quitjup Lake Lake Smith Doggerup Lake Lake Florence Gardner River Lake Maringup Lake Lake East of Broke Inlet Owingup Swamp Boat Harbour Lake I	34 ⁰ 43' 34 ⁰ 38' 34 ⁰ 43' 34 ⁰ 49' 34 ⁰ 49' 34 ⁰ 55' 35 ⁰ 00' 35 ⁰ 01' 34 ⁰ 57' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 23' 34 ⁰ 50' 34 ⁰ 50'	116°25' 116°03' 115°36' 116°26' 116°04' 116°31' 116°34' 117°05' 116°32' 116°06' 116°06' 116°04' 115°35' 115°35' 115°35' 116°06' 116°06' 116°06' 116°12' 116°32' 117°05'

Table 9: Those sites at which adults of *Geotria australis* were captured during the present study, together with those recorded in the collections at the Western Australian Museum.

Site Number	General Location	Latitude	Longitude	
	MARGARET RIVER WATERSHED	_attrude	Longitude	
C5	Margaret R-1st Weir	33 ⁰ 56 92'		
C7	Margaret R-2nd Weir		115 ⁰ 03.83	
	Section Control Contro	33 ⁰ 56.89'	115 ⁰ 05.35	
Н6	DONNELLY RIVER WATERSHED			
H9	Donnelly River Mouth	34 ⁰ 29.11'	115 ⁰ 40.42	
H10	Donnelly River-One Tree Bridge	34 ⁰ 12.19'	115055.82	
	Fly Brook-Charlie Rd	34 ⁰ 27.24'	115 ⁰ 47.61'	
H11	Fly Brook-Fly Brook Rd	34 ⁰ 27.76'	115 ⁰ 52.45'	
H12	Carey Brook-Bridge on Cleave Rd	34 ⁰ 26.54'	115 ⁰ 47.25'	
	WARREN RIVER WATERSHED		113 47.25	
14	Warren River-Bridge on Pemb/North Rd	a .Oa		
15	Warren River-King Trout Farm	34 ⁰ 30.42'	115 ⁰ 59.54'	
16	Lefroy Brook-The Cascades	34 ⁰ 30.10'	115 ⁰ 59.85'	
17	Lefroy Brook-Downstream of trout hatch	34 ⁰ 28.60'	116 ⁰ 01.71'	
18	Lefroy Dam-Immediately downstream	34 ⁰ 26.60'	116 ⁰ 01.36'	
111	Lefroy Brook-Broken Bridge	34 ⁰ 26.41'	116 ⁰ 01.36'	
		34 ⁰ 25.19'	116 ⁰ 01.53'	
	MUSEUM RECORDS			
1	Collie1912	33 ⁰ 22'	0	
2	Collie1916	33°22' 33°18'	116 ⁰ 09'	
3	Harvey		115 ⁰ 44'	
4	Pemberton	33 ⁰ 23' 34 ⁰ 27'	115 ⁰ 55'	
5	Dardanup1951		116002'	
6	Roelands1936	33 ⁰ 21'	115 ⁰ 45'	
7	Bunbury	33 ⁰ 18'	115 ⁰ 49'	
8	1939	33 ⁰ 20'	115 ⁰ 38'	
9	1939	33 ⁰ 59'	118 ⁰ 02'	
10	Nannup1941	34 ⁰ 30'	115 ⁰ 59'	
11	1945	33 ⁰ 59'	115 ⁰ 45'	
12	1945	34 ⁰ 45'	117 ⁰ 04'	
13	Hardy Inlet1949	34 ⁰ 05'	115 ⁰ 30'	
14	Denmark1951	34 ⁰ 17'	115 ⁰ 09'	
15	Pemberton1961	34 ⁰ 57'	117 ⁰ 21'	
16	Denmark1968	34 ⁰ 28'	116 ⁰ 01'	
17	Parry Inlet1972	34 ⁰ 58'	117 ⁰ 21'	
18	Pemberton 1974	35 ⁰ 01'	117009	
19	Gardner River1982	34 ⁰ 31'	115 ⁰ 58'	
20	Albany1982	34 ⁰ 52'	116 ⁰ 12'	
20	Albany 1702	35 ⁰ 00'	117 ⁰ 52'	

Table 10: The sites at which ammocoetes of *Geotria australis* were captured during the present study, together with those ecorded in the ollections at the Western Australian Museum, and by Christensen (1982).

Site Number	General Location	Latitude	Longitude
	CAPEL WATERSHED		Longitude
A1	Capel River-under railway bridge		
A2	Capel River-south	33 ⁰ 33.18'	115 ⁰ 34.01'
		33 ⁰ 39.16'	115 ⁰ 45.43'
C5	MARGARET RIVER WATERSHED		
C7	Margaret R-1st Weir	33 ⁰ 56.92'	115 ⁰ 03.83'
C8	Margaret R-2nd Weir	33 ⁰ 56.89'	115°05.35'
Co	Margaret R-Margaret R Rd	33°56.53'	115°06.98'
	DONNELLY RIVER WATERSHED		115 5416.8
H7	Donnelly River-Boat Ramp	34 ⁰ 26.84'	115045 = 51
H8	Donnelly River-Bridge on Scott Rd	34 ⁰ 24.93'	115 ⁰ 46.38' 115 ⁰ 46.46'
H10	Fly Brook-Charlie Rd	34 ⁰ 27.24'	115°46.46'
H11	Fly Brook-Fly Brook Rd	34 ⁰ 27.76'	115047.61
H12	Carey Brook-Bridge on Cleave Rd	34°27.76° 34°26.54'	115 ⁰ 52.45'
H13	Carey Brook-Bridge on Vasse Hwy	34°25.34° 34°25.01'	115 ⁰ 47.25'
H17	Carey Brook-Steep Rd	34°23.01′ 34°23.56′	115 ⁰ 48.65
H18	Carey Brook-Stirling Track and Pile Rd		115 ⁰ 51.58'
H19	Carey Brook- " " and Beedelup Rd	34 ⁰ 23.24'	115 ⁰ 52.45
H20	Carey Brook-Thornhill & Seven Day Rds	34 ⁰ 23.49'	115 ⁰ 53.10'
		34 ⁰ 20.11'	115 ⁰ 54.37'
11	WARREN RIVER WATERSHED		
15	Warren R-Dombakup Brk-Plantation Rd	34 ^o 34.66'	115 ⁰ 57.98'
17	Warren River-King Trout Farm	34 ⁰ 30.10'	115°59.85'
111	Lefroy Brook-Downstream of trout hatch	34 ^o 26.60'	116 ⁰ 01.36'
112	Lefroy Brook-Broken Bridge	34°25.19'	116 ⁰ 01.53
116	Big Brook Dam-Under downstream bridge	34 ⁰ 24.73'	116 ⁰ 01.71'
117	Bridge south of Jn of 4 & 5 Mile Brooks	34 ⁰ 23.22'	116 ⁰ 00.58'
118	Four Mile Brook-Channybearup Rd	34 ⁰ 21 84'	116000.26
119	" " " -Seven Day Rd	34°18.65'	115°59.39'
119	Channybearup Brook-Seven Day Rd	34 ⁰ 19.11'	115057.52
	GARDNER RIVER WATERSHED		115 57.52
L37	Gardner River-South of bridge	24045 244	
L38	Gardner River-Bridge	34 ⁰ 47.21'	116 ⁰ 11.32'
L41	Gardner River-Laws Track	34 ⁰ 46.62'	116 ⁰ 10.87'
		34 ⁰ 42.49'	116 ⁰ 09.96'
M4	SHANNON RIVER WATERSHED		
IVI 4	Shannon River-Bridge on Cheaspeake Rd	34 ^o 50.36'	116 ⁰ 22.27'
	DEEP RIVER WATERSHED		-10 22.27
02	Weld River-Bridge on Beardmore Rd		
	Weld River-Bridge on Beardmore Rd	34 ⁰ 48.89'	116 ⁰ 34.75'
	P. CHRISTENSEN (1982)		
43			
43	Warren River-Lewin Rd	34 ⁰ 36'	115 ⁰ 55'

Table 11: The sites at which Leptatherina wallacei was captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Jaensch (1992).

Site Number	General Location	Latitude	Longitude
	ADD A / LUDI OW DD A DI A GE		
	ABBA/LUDLOW DRAINAGE	33 ⁰ 38.30'	115 ⁰ 25.91'
B24	Abba River-Bridge on Bypass	00.00	112 20.7.
	MARGARET RIVER WATERSHED		0
C6	Margaret R-Mouth	33 ⁰ 58.24'	114 ⁰ 59.38'
	BLACKWOOD RIVER WATERSHED	33 ⁰ 55.27'	115 ⁰ 48.35'
D4	Blackwood R-north of Nannup	34 ⁰ 04.54'	115 ⁰ 23.42'
D5	Blackwood R-Sues Bridge	34°56.84'	116 ⁰ 03.38'
D8	Blackwood R-Walter Willis Rd	33 ⁰ 58.72'	116 ⁰ 09.54'
D9	Blackwood R-Tweed Rd	33 ⁰ 59.89'	116 ⁰ 11.63'
D10	Blackwood R	33°54.95'	116 ⁰ 25.17'
D11	Blackwood R-Aegers Bridge Rd	33 ⁰ 54.47'	116 ⁰ 24.38'
D12	Blackwood R-Terry Rd	33 ⁰ 51.43'	116 ^o 22.66'
D13	Blackwood R-Terry Rd	33 ⁰ 46.35'	116°31.07'
D16	Blackwood R-Condinup Crossing Rd	33°46.33' 33°35.37'	116 ⁰ 47.17'
D18	Towerrinning Lake	33°52.39'	116 ⁰ 39.88'
D22	Blackwood R-Kulikup Rd & Lower Bridgetown	33 34.37	110 37.00
	SCOTT RIVER WATERSHED		0
E3 -	Scott R- Bridge on Milyeannup Rd (2)	34 ⁰ 17.70'	115 ⁰ 24.10'
	LAKE JASPER WATERSHED		
200		34 ⁰ 25.22'	115 ⁰ 41.19'
G1	Lake Jasper		
	GARDNER RIVER WATERSHED	24040.221	116 ⁰ 03.72'
L12	Pool opposite L13	34 ⁰ 49.23'	110 03.72
	SHANNON RIVER WATERSHED	8	
M5	Shannon River-Springbreak Rd	34 ⁰ 52.23'	116 ⁰ 22.37'
	BROKE INLET WATERSHED		
82	BROKE INLET WATERSHED	34 ⁰ 56.28'	116 ⁰ 31.84'
N10	Inlet River-A1km upstream of mouth	34 ⁰ 56.31	116 ⁰ 31.60'
N11	Inlet River-near mouth	34 ⁰ 53.75'	116 ⁰ 26.48'
N12	Small stream running into Broke Inlet	51 25:75	100 to 1774 - 2002/00/27 19300:
	MUSEUM RECORDS		
		33 ⁰ 26'	116 ⁰ 48'
1	V-1	33009	118 ⁰ 01'
2	Kukerin1964	33 ⁰ 41'	117 ⁰ 33'
3	Katanning1964	34 ⁰ 00'	116 ⁰ 20'
4	Mayanup1979	35 ⁰ 01'	117 ⁰ 44'
5	Albany1992	35°00'	117 ⁰ 04'
6	Denmark1992	34 ⁰ 57'	116 ⁰ 32'
7	Manjimup1992	34 ⁰ 01'	115°01'
8	Augusta/Margaret R1992		
	R. JAENSCH (1992)		
	* *	34 ⁰ 01'	115 ⁰ 01'
3	Devil's Pool	34 ⁰ 50'	116 ⁰ 12'
16	Lake Maringup	35 ⁰ 00'	117004
19	Owingup Swamp	35°01'	117044
27	Lake Powell	<i>JJ</i> 01	*** ***

Table 12: The sites at which *Psuedogobius olorum* was captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Jaensch (1992).

G'A N			
Site Number	General Location	Latitude	Longitude
	ABBA/LUDLOW DRAINAGE		
В1	Lake 9-RGC	33 ⁰ 33.66'	115 ⁰ 32.62'
B2 ·	Lake 10	33 ⁰ 33.74'	115 ⁰ 32.58'
B3	Lake 11	33 ⁰ 33.82'	115 ⁰ 32.54'
B13	Tigersnake Lake	33 ⁰ 35.60'	115°32.54
B15	Plover Lakes	33 ⁰ 36.00'	115 ⁰ 29.80'
B16	Pobblebonk Swamp	33°36.00 33°36.15'	115°29.80'
B17	Gravel Pool	33°36.13°	115°29.70'
B18	Stream south of above	33 ⁰ 36.25'	115 ⁰ 29.65'
B19	Ludlow Swamp	33 ⁰ 35.80'	115 ⁰ 29.80'
B20	Ludlow River-Bridge on Bypass	33 ⁰ 36.20'	115 ⁰ 28.82'
B24	Abba River-Bridge on Bypass	33 ⁰ 38.30'	115 ⁰ 25.91'
B25	Carbanup River	33 ⁰ 40.78'	115 ⁰ 12.19'
	MARGARET RIVER WATERSHED		
C6	Margaret R-Mouth	33 ⁰ 58.24'	114 ⁰ 59.38'
C15	Calgardup Brook, mouth-Redgate Rd	34 ⁰ 02.40'	115 ⁰ 00.16'
CIS	Calgardup Brook, mouth-Redgate Rd	34 02.40	113 00.10
	BLACKWOOD RIVER WATERSHED		
D4	Blackwood R-north of Nannup	33 ⁰ 55.27'	115 ⁰ 48.35'
D5	Blackwood R-Sues Bridge	34 ⁰ 04.54'	115 ⁰ 23.42'
D7	St John Brook (Blackwood River)	33 ⁰ 52.70'	115 ⁰ 40.59'
D18	Towerrinning Lake	33 ⁰ 35.37'	116 ⁰ 47.17'
D19	Arthur R-Moodiarup Rd	33 ⁰ 37.13'	116 ⁰ 47.96'
	•	55 575	110 11.20
	SCOTT RIVER WATERSHED		
E2	Scott R-Bridge on Milyeannup Rd (1)	34 ⁰ 17.56'	115 ⁰ 24.02'
E3	Scott R-" " " (2)	34 ^o 17.70'	115 ⁰ 24.10'
E4	Scott R- " " " (3)	34 ⁰ 17.80'	115 ⁰ 24.15'
E16	Pool on Scott River Rd-power pole 10	34 ⁰ 16.33'	115 ⁰ 16.17'
2.0		5. 10.55	10.17
	LAKE JASPER WATERSHED		
G1	Lake Jasper	34 ^o 25.22'	115 ⁰ 41.19'
	DONNELLY RIVER WATERSHED		
H8	Donnelly River-Bridge on Scott Rd	34 ⁰ 24.93'	115 ⁰ 46.46'
	WADDEN DIVER WATEROUSE		
	WARREN RIVER WATERSHED		
14	Warren River-Bridge on Pemb/North Rd	34 ⁰ 30.42'	115 ⁰ 59.54'
128	Wilgarup River-Muirs Hwy	34 ⁰ 19.86'	116 ^o 22.45'
	CARDAICH DIVIED WATEROUTED		
	GARDNER RIVER WATERSHED		
LI	Gardner River Mouth	34 ^o 50.43'	116 ⁰ 07.40'
L2	Blackwater-Pool 1	34 ⁰ 49.82'	116 ⁰ 07.29'
L3	Blackwater-Pool 2	34 ⁰ 49.82'	116 ⁰ 07.34'
L12	Pool opposite L13	34 ⁰ 49.23 ¹	116 ⁰ 03.72'
L16	Pool on Windy Harbour Rd	34 ⁰ 48.70'	116 ⁰ 04.20'
L48	Lake Maringup	34 ⁰ 50.22'	116 ⁰ 11.81'
	CHANDION DIVIED WATERCHED		
	SHANNON RIVER WATERSHED		
M 5	Shannon River-Springbreak Rd	34 ⁰ 52.23	116 ⁰ 22,37'
	BROKE INLET WATERSHED		
	and the contract of the contra	0	0
N10	Inlet River-A1km upstream of mouth	34 ⁰ 56.28'	116 ⁰ 31.84'
NII	Inlet River-near mouth	34 ⁰ 56.31'	116 ⁰ 31.60'
N12	Small stream running into Broke Inlet	34 ^o 53.75'	116 ⁰ 26.48'
	MUCEUM DECORDO		
	MUSEUM RECORDS		
1	1964	34 ⁰ 58'	117 ⁰ 28'
2	1959	34 ^o 30'	116 ⁰ 03'
3	Busselton1972	33 ⁰ 39'	115 ⁰ 29'
4	Albany1976	35 ⁰ 01'	117 ⁰ 45'
5	п п п	35°01'	117 ⁰ 43'
6	и о и	34 ^o 57'	118 ⁰ 05'
7	Northcliffe1986	34 ⁰ 31'	115 ⁰ 59'
8	Lake Powell1986	35 ⁰ 03'	117046
9	Albany1992	35°01'	117044'
10	" " "	35 ⁰ 03'	117 ⁰ 28'
11	Denmark1992	35 ⁰ 00'	117 ⁰ 13'
12		35 ⁰ 00'	117 ⁰ 04'
13	и и и	35 ⁰ 01'	117°04'
14	и и и	35°01°	117 ⁰ 06'
15	Manjimup1992	34 ⁰ 57'	116 ⁰ 32'
16	Mannup1992 Nannup1992	34°57' 34°24'	
17	Nannup1992 Augusta/Margaret River1992	34°24' 34°13'	115 ⁰ 41' 115 ⁰ 02'
18	Augusta/Margaret River1992	34 ⁰ 13' 34 ⁰ 01'	115°02' 115°01'
10		54*01*	113-01.
	R. JAENSCH (1992)		
		34 ⁰ 01'	0
-	B 11 B 1	7.400.11	115 ⁰ 01'
3	Devil's Pool		
4	Lake Davies	34 ⁰ 13'	115 ⁰ 02'
4 6	Lake Davies Lake Jasper	34 ⁰ 13' 34 ⁰ 24'	115 ⁰ 02' 115 ⁰ 41'
4 6 16	Lake Davies Lake Jasper Lake Maringup	34 ⁰ 13' 34 ⁰ 24' 34 ⁰ 50'	115 ⁰ 02' 115 ⁰ 41' 116 ⁰ 12'
4 6 16 19	Lake Davies Lake Jasper Lake Maringup Owingup Swamp	34 ⁰ 13' 34 ⁰ 24' 34 ⁰ 50' 35 ⁰ 00'	115 ⁰ 02' 115 ⁰ 41' 116 ⁰ 12' 117 ⁰ 04'
4 6 16 19 20	Lake Davies Lake Jasper Lake Maringup Owingup Swamp Boat Harbour Lake 1	34°13' 34°24' 34°50' 35°00' 35°01'	115 ⁰ 02' 115 ⁰ 41' 116 ⁰ 12' 117 ⁰ 04' 117 ⁰ 05'
4 6 16 19	Lake Davies Lake Jasper Lake Maringup Owingup Swamp	34 ⁰ 13' 34 ⁰ 24' 34 ⁰ 50' 35 ⁰ 00'	115 ⁰ 02' 115 ⁰ 41' 116 ⁰ 12' 117 ⁰ 04' 117 ⁰ 06'
4 6 16 19 20	Lake Davies Lake Jasper Lake Maringup Owingup Swamp Boat Harbour Lake 1	34°13' 34°24' 34°50' 35°00' 35°01' 35°01' 35°00'	115 ⁰ 02' 115 ⁰ 41' 116 ⁰ 12' 117 ⁰ 04' 117 ⁰ 06' 117 ⁰ 13'
4 6 16 19 20 22	Lake Davies Lake Jasper Lake Maringup Owingup Swamp Boat Harbour Lake I """ 3	34°13' 34°24' 34°50' 35°00' 35°01' 35°01'	115 ⁰ 02' 115 ⁰ 41' 116 ⁰ 12' 117 ⁰ 04' 117 ⁰ 06'
4 6 16 19 20 22 23	Lake Davies Lake Jasper Lake Maringup Owingup Swamp Boat Harbour Lake 1 " " " 3 Reserve 12046 Lake	34°13' 34°24' 34°50' 35°00' 35°01' 35°01' 35°00'	115 ⁰ 02' 115 ⁰ 41' 116 ⁰ 12' 117 ⁰ 04' 117 ⁰ 06' 117 ⁰ 13'

Table 13: The sites at which the trout species, *Onchorhynchus mykiss* and *Salmo trutta*, were captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Christensen (1982).

Site Number	General Location	Latitude	Longitude
	MARGARET RIVER WATERSHED		
C14	Margaret R-Ten Mile Brook Dam	33 ⁰ 57.98'	115 ⁰ 07.38'
	DONNELLY RIVER WATERSHED		
H10	Fly Brook-Charlie Rd	34 ⁰ 27.24'	115 ⁰ 47.61'
H11	Fly Brook-Fly Brook Rd	34 ^o 27.76'	115 ⁰ 52.45'
H13	Carey Brook-Bridge on Vasse Hwy	34 ⁰ 25.01'	115 ⁰ 48.65'
H14	Beedelup Brook-Karri Valley	34 ^o 25.35'	115 ⁰ 51.41'
H15	Beedelup Brook-Opposite Tobruk Rd	34 ⁰ 25.27'	115 ⁰ 49.68'
	WARREN RIVER WATERSHED		
17	Lefroy Brook-Downstream of trout hatch	34 ⁰ 26.60'	116 ⁰ 01.36'
111	Lefroy Brook-Broken Bridge	34 ⁰ 25.19'	116 ⁰ 01.53'
	GARDNER RIVER WATERSHED		
L42	Boorara Brook-Bettink's	34 ⁰ 41.46'	116 ⁰ 10.85'
	MUSEUM RECORDS		
1	Pemberton 1986	34 ⁰ 25'	116 ⁰ 01'
2	Northcliffe1986	34031	115 ⁰ 59'
	Totalenteryou	34 31	115 57
	P. CHRISTENSEN (1982)		
43	Lewin Rd	34 ⁰ 36'	115 ⁰ 55'

Table 14: The total numbers of trout, *Oncorhynchus mykiss* and *Salmo trutta*, stocked into public waters in the south-west of Australia between 1985 and 1994.

N.B. * refers to trout released in vibert boxes by the Western Australian Trout Fishing Association (Tasmanian stock). This information was provided by the Fisheries Department of Western Australia.

Waterbody	Stock	Age	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Total number of trout stocked in <u>rivers</u> in the south-west of	O. mykiss	Ova Fry Yearlings X-brood	209 000 22 000	3 000 6 800	63 000 1 000 2 700	4 000	83 000 4 000	174 000 2 000	28 000 112 000 1 400	160 000 3 000	228 000 13 000 600	225 000 17 000
Australia	S. trutta	Ova Fry Yearlings X-brood			1 700				* 9 000			
Total number of trout stocked in dams in the south-west of	O. mykiss	Ova Fry Yearlings X-brood	47 000 9 400	12 000	38 000 9 200	6 800	25 000 6 800	25 000 50 000 11 000	20 000 9 200 500	60 000 40 000 5 000 800	50 000 12 000 1 800	60 000 11 000 1 300
Australia	S. trutta	Ova Fry Yearlings X-brood			500				* 35 000 * 10 000			
Total number of trout stocked in <u>public waters</u> in the south-west	O. mykiss	Ova Fry Yearlings X-brood	256 000 31 400	3 000 18 800	101 000 10 200 2 700	10 800	108 000 10 800	25 000 224 000 13 000	28 000 132 000 10 600 500	60 000 200 000 8 000 800	278 000 25 000 2 400	285 000 28 000 1 300
of Australia	S. trutta	Ova Fry Yearlings X-brood	* 35 000		2 200				* 35 000 * 19 000			

Table 15: The sites at which Gambusia holbrooki was captured during the present study, together with those recorded in the collections at the Western Australian Museum, and by Jaensch (1992) and Christensen (1982).

Site Number	General Location	Latitude	Longitude
1	CAPEL WATERSHED		
A1	Capel River-under railway bridge	33 ⁰ 33.18'	115 ⁰ 34.01'
A2	Capel River-south	33 ⁰ 39.16'	115 ⁰ 45.43'
''-		25 57.10	110 10.10
	ABBA/LUDLOW DRAINAGE		
B1	Lake 9-RGC	33 ⁰ 33.66'	115 ⁰ 32.62'
B2	Lake 10	33 ⁰ 33.74'	115 ⁰ 32.58'
В3	Lake 11	33 ⁰ 33.82'	115 ⁰ 32.54'
B4	Swamphen Lake	33 ⁰ 35.27'	115 ⁰ 30.39'
B6	Peninsula Lake	33 ⁰ 35.30'	115 ^o 30.35'
В9	Crinea Creek	33 ⁰ 35.28'	115 ⁰ 30.15'
B10	Cadjeput Pool	33 ⁰ 35.50'	115 ⁰ 30.10'
B11	Taylor's Lake	33 ⁰ 35.70'	115 ⁰ 30.05'
B12	Boulder Lake	33 ⁰ 35.80'	115 ⁰ 30.02'
B13	Tigersnake Lake	33 ⁰ 35.60'	115 ^o 30.00'
B14	Priessiana Pool	33 ⁰ 35.75'	115 ⁰ 29.90'
B15	Plover Lakes	33 ⁰ 36.00'	115 ⁰ 29.80'
B16	Pobblebonk Swamp	33 ⁰ 36.15'	115 ⁰ 29.80'
B17	Gravel Pool	33 ⁰ 36.20'	115 ^o 29.70'
B18	Stream south of above	33 ⁰ 36.25'	115 ⁰ 29.65'
B19	Ludlow Swamp	33 ⁰ 35.80'	115 ⁰ 29.80'
B20	Ludlow River-Bridge on Bypass	33°36.20′	115°28.82'
B24	Abba River-Bridge on Bypass	33 ⁰ 38.30'	115 ⁰ 25.91'
B25	Carbanup River	33°40.78'	115 ⁰ 12.19'
	and the same same same same same same same sam	55 40.76	113 12,17
	MAGARET RIVER WATERSHED		
C5	Margaret River-1st Weir	33 ⁰ 56.92'	115 ⁰ 03.83'
C7	Margaret R-2nd Weir	33 ⁰ 56.89'	115 ⁰ 05.35'
C8	Margaret R-Margaret R Rd	33 ⁰ 56.53'	115 ⁰ 06.98'
C9	Margaret R-Margaret R Rd	33 ⁰ 56.42'	115 ⁰ 08 07'
C10	Margaret R-Margaret R Rd	33056.031	115 ⁰ 08.82'
	o oo em te sa a sur e mar i circit	22 20.03	5 55.02
	BLACKWOOD RIVER WATERSHED		
D4	Blackwood R-north of Nannup	33 ⁰ 55.27'	115 ⁰ 48.35'
D8	Blackwood R-Walter Willis Rd	34 ⁰ 56.84'	116 ⁰ 03.38'
D9	Blackwood R-Tweed Rd	33 ⁰ 58.72'	116 ⁰ 09.54'
D10	Blackwood R	33 ⁰ 59.89'	116 ⁰ 11.63'
D11	Blackwood R-Aegers Bridge Rd	33054.95'	116 ⁰ 25.17'
D12	Blackwood R-Terry Rd	33 ⁰ 54.47'	116 ⁰ 24.38'
D13	Blackwood R-Terry Rd	33 ⁰ 51.43'	116 ⁰ 22.66'
D14	Blackwood R-Arthur River Rd	33°44.57'	116°22.00 116°34.34'
D15	Blackwood R-Gibb Rd	33°43.84'	116 ⁰ 31.23'
D16	Blackwood R-Condinup Crossing Rd	33 ⁰ 46.35'	116 31.23 116 031.07'
D10	Arthur R-Moodiarup Rd	33°46.33° 33°37.13'	116°31.07° 116°47.96'
D20	Balgarup R	33°47.18'	
D20 D22	Blackwood R-Kulikup Rd & Lower Bridgetown	33 ⁰ 52.39	116 ⁰ 55.63'
D23			116 ⁰ 39.88'
D23 D24	Chapman Brook	34 ⁰ 04.61' 34 ⁰ 05.33'	115 ⁰ 11.31' 115 ⁰ 12.04'
D24	Chapman Brook	34 05.33	115°12.04'
	SCOTT RIVER WATERSHED		
E1	Scott River-Brennan Bridge	34 ⁰ 15.58'	115 ⁰ 16.23'
L I	Scott River-Brennan Bridge	34 13.36	115 10.23
	DONNELLY RIVER WATERSHED		
Н9	Donnelly River-One Tree Bridge	34 ⁰ 12.19'	115 ⁰ 55.82'
H14	Beedelup Brook-Karri Valley	34 ⁰ 25.35'	115 ⁰ 51.41'
111.7	Beedelap Brook-Raill Valley	34 23.33	115 51.41
	WARREN RIVER WATERSHED		
14	Warren River-Bridge on Pemb/North Rd	34 ⁰ 30.42'	115 ⁰ 59.54'
15	Warren River-King Trout Farm	34°30.42° 34°30.10°	115°59.85'
18	Lefroy Dam-Immediately downstream	34°30.10 34°26.41'	116 ⁰ 01.36'
19	Lefroy Dam- " upstream	34°26.41° 34°26.35'	116°01.36' 116°01.35'
110	Middle Weir-Lefroy Brook	34°25.65'	116°01.35°
111	Lefroy Brook-Broken Bridge	34°25.19'	116 ⁰ 01.53'
111	Big Brook Dam-Under downstream bridge	34°23.19° 34°24.73'	116 ⁰ 01.53
112	Big Brook Dam-Onder downstream bridge Big Brook Dam-Pool at bottom of dam	34°24.73° 34°24.68'	11601.71
113	Big Brook Dam-Pool at bottom of dam Big Brook Dam-Actual	34°24.68° 34°24.49'	116 ⁰ 01.71' 116 ⁰ 01.64'
		34°24.49' 34°23.41'	116°01.64' 116°25.52'
121	Peerup River-Bridge on Muirs Hwy Tone River-Two Mile		
125		34 ⁰ 26.24'	116 ⁰ 36.96'
126	Tone River-Two Mile	34 ⁰ 26.00'	116 ⁰ 36.00'
127	Tone River-Wingarup Gully	34 ⁰ 25.68'	116 ⁰ 35.00'
	LAKE MUIR WATERSHED		
J1	Lake Muir	34 ⁰ 26.41'	116 ⁰ 39.58'
J1 J2	Noobijup lake	34°26.41° 34°23.89'	116°39.58' 116°47.06'
J2 J3		34°23.89° 34°29.95'	116°47.06' 116°43.36'
J3 J4	Byenup Lagoon	34°29.95' 34°22.57'	
	Lake at Jn of Lake Unicup & Pindicup Rds		116 ⁰ 41.87'
J5	Cowerup Swamp (Surrounding Pools)	34 ⁰ 26.22'	116 ⁰ 38.68'
	Red Lake	34°26.30'	116 ⁰ 38.33'
J7	Desire Company Desired		116030 471
J7 J8	Drain fom Red Lake	34 ⁰ 26.25'	116 ⁰ 39.47'
J7 J8 J9	Red Lake	34 ⁰ 26.20'	116 ⁰ 39.40'
J7 J8 J9 J10	Red Lake Red Lake	34 ⁰ 26.20' 34 ⁰ 25.90'	116 ⁰ 39.40' 116 ⁰ 39.40'
J7 J8 J9 J10 J11	Red Lake Red Lake Drain-connect Red Lake/Lake Muir/Cowerup Sw	34 ⁰ 26.20' 34 ⁰ 25.90' 34 ⁰ 26.35'	116 ⁰ 39.40' 116 ⁰ 39.40' 116 ⁰ 39.07'
J7 J8 J9 J10 J11 J18	Red Lake Red Lake Drain-connect Red Lake/Lake Muir/Cowerup Sw Stream adjacent toLake Muir-Muirs Hwy	34 ⁰ 26.20' 34 ⁰ 25.90' 34 ⁰ 26.35' 34 ⁰ 26.41'	116 ⁰ 39.40' 116 ⁰ 39.40' 116 ⁰ 39.07' 116 ⁰ 41.50'
J7 J8 J9 J10 J11	Red Lake Red Lake Drain-connect Red Lake/Lake Muir/Cowerup Sw	34 ⁰ 26.20' 34 ⁰ 25.90' 34 ⁰ 26.35' 34 ⁰ 26.41' 34 ⁰ 26.49'	116 ⁰ 39.40' 116 ⁰ 39.40' 116 ⁰ 39.07' 116 ⁰ 41.50'
J7 J8 J9 J10 J11 J18	Red Lake Red Lake Drain-connect Red Lake/Lake Muir/Cowerup Sw Stream adjacent toLake Muir-Muirs Hwy Stream adjacent toLake Muir- " " Pool adjacent toLake Muir- " "	34 ⁰ 26.20' 34 ⁰ 25.90' 34 ⁰ 26.35' 34 ⁰ 26.41' 34 ⁰ 26.49' 34 ⁰ 26.46'	116 ⁰ 39.40' 116 ⁰ 39.40' 116 ⁰ 39.07' 116 ⁰ 41.50' 116 ⁰ 41.58' 116 ⁰ 40.32'
J7 J8 J9 J10 J11 J18 J19	Red Lake Red Lake Drain-connect Red Lake/Lake Muir/Cowerup Sw Stream adjacent toLake Muir-Muirs Hwy Stream adjacent toLake Muir- ""	34 ⁰ 26.20' 34 ⁰ 25.90' 34 ⁰ 26.35' 34 ⁰ 26.41' 34 ⁰ 26.49'	116 ⁰ 39.40' 116 ⁰ 39.40' 116 ⁰ 39.07' 116 ⁰ 41.50'

Table 15 (cont...)

Site Number	General Location	Latitude	Longitude
	GARDNER RIVER WATERSHED		
L16	Pool on Windy Harbour Rd	34 ⁰ 48.70'	116 ⁰ 04.20'
	COLLIE RIVER WATERSHED		
S1	Collie River-Schultz's Weir	33 ⁰ 23.19'	116 ⁰ 09.78'
S2	" " -Collieburn Pool	33024.66	116 ⁰ 11.97'
S3	" " -Townsend's Pool	33 ⁰ 25.45'	116 ⁰ 13.00'
S4	" " -Cox's Pool	33 ⁰ 25.80'	116 ⁰ 13.13'
S 5	-Round Pool	33°26.16'	116 ⁰ 13.40'
S6 S7	-western Collieries	33 ⁰ 28.34'	116 ⁰ 13.86'
57	" " -Davies' Pool	33 ⁰ 28.75'	116 ⁰ 13.90'
	MUSEUM RECORDS		
1	1964	34 ⁰ 35'	116 ⁰ 25'
2	1961	33006	115 ⁰ 42'
3	Katanning1971	33 ⁰ 42'	117 ⁰ 33'
4	Busselton1972	33 ⁰ 39'	115 ⁰ 29'
5 6	1981	34 ^o 25'	116 ⁰ 38'
7	Lake Powell1986	35 ⁰ 03'	117 ⁰ 46'
8	Albany1992	35 ⁰ 01'	117 ⁰ 44'
9	Manjimup1992	35 ⁰ 03'	117 ⁰ 28'
10	" " "	34034'	116 ⁰ 55'
		34 ⁰ 32'	115 ⁰ 53'
	R. JAENSCH (1992)		
9	Lake Yeagerup	340321	115 ⁰ 53'
A4	Warren River Oxbow	34 ⁰ 34'	115 ⁰ 55'
25	Lake Saide	35 ⁰ 03'	117028
27	Lake Powell	35 ⁰ 01'	117044'
	P. CHRISTENSEN (1982)		
97	Frankland River-Myalgelup	340331	116051'

Table 16: The sites at which Perca fluviatilis was captured during the present study, together with those recorded in the collections at the Western Australian Museum.

Site Number	General Location	Latitude	Longitude
	CAPEL WATERSHED		
A1	Capel River-under railway bridge	33 ⁰ 33.18'	115 ⁰ 34.01'
A1 A2	Capel River-south	33 ⁰ 39.16'	115 ⁰ 45.43'
A2	Capel River-south		
	MARGARET RIVER WATERSHED		
C14	Margaret R-Ten Mile Brook Dam	33 ⁰ 57.98'	115 ⁰ 07.38'
	TO DIELLY AND WATER GUED		
	DONNELLY RIVER WATERSHED	34 ⁰ 23.81'	115 ⁰ 50.39'
H16	Carey Brook-Staircase Rd	34-23.81	113 30.39
	WARREN RIVER WATERSHED		
11	Warren R-Dombakup Brk-Plantation Rd	34 ⁰ 34.66'	115 ⁰ 57.98'
111	Lefroy Brook-Broken Bridge	34 ⁰ 25.19'	116 ⁰ 01.53'
112	Big Brook Dam-Under downstream bridge	34 ⁰ 24.73'	116 ⁰ 01.71'
114	Big Brook Dam-Actual	34 ⁰ 24.49'	116 ⁰ 01.64'
	COLLIE RIVER WATERSHED		
S1	Collie River-Schultz's Weir	33 ⁰ 23.19'	116 ⁰ 09.78'
S2	" " -Collieburn Pool	33 ⁰ 24.66'	116 ⁰ 11.97'
S3	" " -Townsend's Pool	33 ⁰ 25.45'	116 ⁰ 13.00'
S4	" " -Cox's Pool	33 ⁰ 25.80'	116 ⁰ 13.13'
S5	" " -Round Pool	33 ⁰ 26.16'	116 ⁰ 13.40'
S6	" " -Western Collieries	33 ⁰ 28.34'	116 ⁰ 13.86′
S7	" " -Davies' Pool	33 ⁰ 28.75'	116 ⁰ 13.90'
37	201100 1001		
	MUSEUM RECORDS		
1	Bridgetown1937	33 ⁰ 57'	116 ⁰ 08'