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A Brief Survey of the Macro - Invertebrate Fauna of Lake Edgar and its Immediate Environs. (South West Tasmania).

by

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INTRODUCTION

THE invertebrate fauna from the South Western area of Tasmania is poorly known, but serious attempts to study this fauna were begun shortly after the announcement by the Hydro Electric Commission of Tasmania (H. E. C.) of plans to flood the Huon Plains (see McKenry, 1972, for the history of the H. E. C. processes leading to the decision to proceed with the Middle Gordon Hydro-Electric Power Scheme). Bayly (1965) sounded warnings of likely adverse affects resulting from rapidly changing water levels in the proposed new impoundment, especially upon the littoral fauna of Lake Pedder and also upon the biota downstream from the dams built by the H. E. C.

During the following year, Bayly and others (Bayly et al, 1966) carried out a short preliminary limnological survey of Lake Pedder, recording chemical properties of the water of Lake Pedder and surrounding swamps, as well as determining so far as they could in the time available, the nature and abundance of zooplankton, psammon, benthos, macrophytes and also the planktonic, littoral and benthic algae present. In 1970, Swain and his co-workers (Swain et al, 1970) described a new genus and species of syncarid (Allanaspides helonomus) which was found in the environs of Lake Pedder. By 1972, the list of species endemic to the Lake Pedder area had grown to 17 (Bayly, 1972; Bayly et al, 1972). Meanwhile, no attention had been directed towards elucidating the biological state of Lake Edgar, situated 10 miles east of Lake Pedder and at the extreme eastern limit of the Huon Plains.

Consequently, a party of five zoologists from the University of Tasmania, on route to make a "final" collection from Lake Pedder before that lake was drowned, digressed to collect for several hours in Lake Edgar (on 3 May, 1972). Results from that preliminary survey suggested that the fauna of Lake Edgar could well be as interesting as the fauna of Lake Pedder, possibly being both more diverse and more abundant in number.

It was decided (by P. S. L.) to take the Zoology Honours class of 1972 (6 students) to Lake Edgar (on 17 May, 1972) and with their assistance to attempt to make representative samples of the fauna associated with various habitats in and around the Lake. To allow for the compilation of a fuller ecological survey, 3 botanists of the Botany Department, University of Tasmania, visited Lake Edgar on the same day and listed and mapped the flora in the environs of Lake Edgar. Their report has already been published (Macphail and Shepherd, 1973).

This paper reports the present knowledge, by the Zoology Department, University of Tasmania, of the fauna of Lake Edgar and its environs. Where possible, comparisons are drawn with the Lake Pedder fauna.

LAKE EDGAR & ENVIRONS

Origin. Lake Edgar (146° 21' W, 43° 1'S or reference Tasmania Topographic Survey Map, Old River Sheet, Lake centre at co-ordinates DN467366) is a shallow lake, approximately 1.7 metres deep at its deepest point but is easily wadeable across most of its expanse, which is nearly rectangular (1.1 km x 0.7km) in outline.

A small island lies within the lake. At present, the Lake lies eastwards of, and drains into, the Huon River.*

Such has not always been the case. During Quaternary times, a long lake draining into the Gordon River filled the Serpentine Valley and Lake Edgar lay just within the eastern shoreline of this ancestral Lake Pedder (Tas. Uni. Geol. Dept., 1961). The Huon River then lay beyond a divide further east than this ancestral Lake Pedder. But recent movements (Tas. Uni. Geol. Dept., 1961; Sutherland, 1971) along an old fracture line co-inciding with an eastward tilting of the Gordon - Huon area gave rise to the formation of sag ponds east (the down-thrown side) of the fault, and the capture of the headwaters of the Serpentine Valley (i.e., the ancestral lake) by the Huon River. Lake Edgar and its companion lake are thus regarded as the remnants of one such recently formed sag pond (formed within the last few hundred years). The movements of the Edgar Fault are very recent, and substantial movements are probable in the future (Tas. Uni. Geol. Dept., 1961).

* Since this investigation was carried out, waters from the H.E.C. Serpentine - Huon River impoundment have drowned Lake Edgar.

Macrophytes associated with Lake Edgar. The area is subject to prevailing south-westerly winds, and these have played an important role in shaping the shoreline of Lake Edgar. The windward shore is sharply defined, with masses of dead reeds piled up above the shoreline in bays between the emergent shrubs (Melaleuca and Leptospermum spp.) and buttongrass (Gymnoschoenus sphaerocephalus) tussocks, suggesting that the wind and wave action have a strong scouring effect, especially in areas where the marginal scrub is disturbed (Macphaill and Sheppard, 1973, p9). The substrate of the lake along this shore is formed of coarse quartzitic sands with formations of "Edgar pennies" being common. (Edgar pennies, approximately 5 - 6cm diameter and 1cm thick, are penny shaped concretions which probably derive from blue-green algae metabolism.) However, on the western or leeward shore, vegetation (Leptospermum lanigerum, Melaleuca squamea, M. squarrosa, and Hakea epiglottis) extends into the Lake rendering this shoreline indistinct. Lakeside, this vegetation is fringed by a margin of Restio tetraphyllus and adjacent mats of Myriophyllum propinquum. Just beyond this fringe of vegetation is the deepest part of the lake (1.7m deep), an area of black organic ooze deposits beneath open surface water.

Sedge and reed growths cover most of Lake Edgar. The reed Cladium glomeratum is found in water deeper than 0.8m; dead stems are blown to form the dead reed beds on the eastern shore. The sedges Lepidosperma longitudinale and Chorisandra cymbaria grow in the shallower water, especially along the eastern and southern shorelines. Dead leaves of the sedges are not blown ashore but decay on the floor of the lake.

Water. Three main sources feed water into Lake Edgar. Precipitation must add sizeable quantities of water directly to the lake, because rainfall at Mt. Wedge over a 3 year average is 8266 points or 210cm per year (Macphail and Shepherd, 1973), as well as adding water to the lake indirectly via runoff from the ridges to the east

of Lake Edgar and via the swamps to the north and south. One creek drains from Lake Edgar into the Huon River. The incessant wind and heavy rain are thought to be important for explaining the chemistry of Lake Edgar surface.

The inert basement rocks, of unmetamorphosed younger Precambrian dolomites, sandstones, quartzites etc. (Spry and Banks, 1962; Corbett, 1969) which are widespread throughout the Lake Edgar area, are thought to be prevented from contributing to the major ion chemistry of the water of Lake Edgar by their covering of moor podzol peats (Buckney and Tyler, 1973). Hence these authors believe that the major ion concentrations of water in the Lake Pedder - Lake Edgar area result from windborne seaspray. Whilst this contention has yet to be proved correct, it is the reason advanced to explain the observation that surface waters of Lake Edgar etc. usually resemble sea water in the relative abundance of the more common ions, namely

$Na > Mg > Ca > K$; $Cl > SO_4 > HCO_3$ (see Table 1 for the results of atomic spectrophotometer analyses of the water). However, in Lake Edgar the concentration of Ca and Mg ions increases at times through leaching from nearby localized outcrops of dolomite (Buckney and Tyler, 1973).

The swamps surrounding Lake Edgar are formed of buttongrass and restio - epacrid communities (Macphail and Shepherd, 1973) on moor podzol peats (Nicolls and Dimmock, 1965). Because of restricted drainage, organic matter accumulates in these soils to give very strongly acid peats. Skeletal soils cover most of the ridges (i.e. except where rock outcrops) and these soils, although capable of supporting wet sclerophyll forest (Eucalyptus simmondsii) and wet scrub (Banksia marginata - Casuarina monolifera association) communities, contain an abundance of organic matter, and are also strongly acid and well leached (Nicolls and Dimmock, 1965).

It is not perhaps surprising then that Lake Edgar is described as a typical humic lake (Buckney and Tyler, 1973). In humic lakes, humic acids are important constituents of the water. These humic materials contribute considerably to the total dissolved solids (T. D. S.) in the water. The organic matter washed into Lake Edgar from the surrounding soils gives rise to the high acidity and dark brown colour of the water.

Sample No. (from B & T)	Date	K_{18} per μS/cm	Colour pt units	pH	Na ppm	K ppm	Ca ppm	Mg ppm	Cl μequiv l^{-1}	HCO_3 ppm	SO_4 ppm	Turb. (J. T. U.)	00F (Oceanic Origin Factor)
7	5.3.72	39.2	120	6.26	274	13	49	93	260	96	44	1.3	72.0
8	18.3.72	51.4	150	4.64	387	15	56	166	451	12	60	1.7	95.5
10	8.5.72	45.6	120	4.68	270	6	43	99	292	13	45	1.2	92.4
27	5.3.72	46.1	100	6.37	294	20	79	136	301	151	51	2.0	66.2
28	30.4.72	46.4	120	5.57	278	6	75	130	300	85	59	2.7	74.8
29	17.5.72	46.5	100	5.88	297	15	49	142	337	95	46	2.8	78.0
30	24.6.72			5.67	266	15	40	128	289	78	46	2.0	77.5

Table 1 Results of water analyses from Buckney & Tyler (in 1973 – Tables 1 & 2). Samples 27, 28, 29, 30 were taken from Lake Edgar. For comparison, water samples 7, 8, 9 taken from Lake Pedder at approximately the same time as those from L. Edgar, are given.

SAMPLING TRIPS & METHODS

THREE collecting trips were made to Lake Edgar.

Trip 1, 3/5/1972. The benthic and pelagic fauna of a small area of the sedge (Lepidosperma and Chorisandra) and reed (Cladium) communities near the mid-eastern shore of Lake Edgar was sampled using Freshwater Biological Association (FBA) nets. Animals were hand sorted and preserved in the field. Additionally, animals were collected from the wet and 'dry' dead reed beds.

Participants : P.S.L., J.L.H., R.S., T.W., & B.K.

Trip 2, 17/5/1972. This was the most intensive collecting trip to Lake Edgar; the data presented herein is based mainly on evidence gathered on this trip.

Sampling sites (SS) are shown on Map 1.

SS 1 - 10 inclusive were all shoreline stations.

SS 11, 13, 16, 17, and 18 were benthic sampling sites, 11, 13, 16 and 17 at depths of approximately 1.3m whilst the water depth at site 18 varied from 1.5m to 1.7m.

SS 12, 14, and 15 sampled for pelagic animals.

SS 19 and 20 were samples from wet and 'dry' dead reed beds respectively.

SS 21 sampled the island soil.

SS 22 sampled surface pools on the island.

Lepidosperma and Chorisandra habitats were thus sampled at SS 1, 2, 3, 4, 5, 6, 7, 11 and 12; the Cladium habitat was sampled at SS 13, 14, 15, 16 and 17; the Restio and Myriophyllum habitats were sampled at SS 8, 9 and 10, whilst the open water was sampled only at SS 18.

SS 1 - 18 were sampled using FBA nets; SS 11 - 18 were sampled from a dinghy. A plastic kitchen strainer was used at SS 22. In all cases, bulk samples were placed in large plastic bags, returned to the laboratory and stored at 5°C until the animals were manually removed from the debris. A zooplankton net (mesh 60/inch) was hauled through the open water to gather the zooplankton sample.

Participants : P.S.L., T.M.B., R.R., J.L., P.R., E.G., V.T., K.K.U., T.W., A.B. & M.L. Co-incidentally, J.L.H., R.S., R.B.M., P.C., D.C., & B.K. sampled the Lake Edgar outflow creek and surrounding swamps.

Trip 3, 22/6/1972. Moss and soil samples from the island were collected by J.L.H., R.B.M., & B.K. Animals were separated from the debris in the laboratory using modified Tullgren funnels.

All animals were preserved in 70% alcohol.

RESULTS

Except where otherwise stated, taxonomic and numerical determinations have been made by the Zoology Honours students (V.T., E.G., K.K.U., P.R., A.B., and T.W.). Most of the animals collected in this survey can be identified only to the level of family ranking with any degree of certainty, since systematic knowledge of much of the aquatic invertebrate fauna of Tasmania is rather limited. As a result, the data is presented as the number of individuals per lowest taxonomic

determination, usually family, possible. The results are presented in Table 2. An attempt was made to standardize the effort expended in gaining each sample. However, the numerical data should not be considered as evidence of some absolute abundance per taxon; rather the data at best indicates a trend in relative abundances and degree of numerical dominance.

Wherever possible, material has been forwarded to taxonomists for further identification. Nevertheless, the Coleoptera, Odonata, Ephemeroptera, Plecoptera, Diptera and Annelida still await accurate identification. The following diagnoses have been received as private communications to Dr. P. S. Lake.

Hemiptera:- Identified by Dr. I. Lansbury (Hope Dept. of Entomology, Oxford); the corixids from the lake itself belong to the species Sigara tasmaniae Jaczewski, those from the surrounding creeks belong to the genus Diaprepocoris and probably the species personata Hale. The pleid is provisionally (because of the lack of a male specimen) identified as Plea (Paraplea) halei Lundblad.

Trichoptera:- All of the trichopteran larvae are in the hands of Mr. A. Neboiss, National Museum of Victoria. Mosely and Kimmins (1953) classified all of the then known adult Trichoptera of Australia. It will be a mammoth task to link the various larval stages with the adult fly.

Mollusca :- The freshwater molluscs were sent to Dr. B. J. Smith, National Museum of Victoria. In a recent paper (Smith, 1973) describing a planispiral snail from the Huon Plains area, Valvata (?) pedderi, Smith lists the holotype as having been collected by J. L. H. on 17/5/1972. In addition, Smith lists further material obtained from the Lake Pedder area on 17/5/1972, this latter material being collected by Dr. P. Tyler, University of Tasmania. Either Smith's date for the collection of this latter material is wrong, because Dr. P. Tyler was not in Tasmania at that time (pers. com.), or the material was in fact collected under the supervision of Dr. P. S. Lake on 17/5/1972. If this second alternative is indeed correct, then 2 valvatids have been incorrectly listed in Table 2 under the heading Planorbidae.

Identification of the remaining gastropods and bivalves has yet to be completed.

Zooplankton :- The copepods were identified by Dr. I. A. E. Bayly, Monash University. The zooplankton consisted almost entirely of the calanoid copepod Calamoecia expansa Sars, but also infrequently present was the cyclopoid copepod Eucyclops sp.

Amphipoda :- The amphipods were identified by Mr. B. Knott, University of Tasmania. Four forms are recognizable.

One species of the family Ceinidae, Austrochiltonia australis (Sayce), was present. The taxonomy of the Australian freshwater members of the family Gammaridae is soon to be revised by Dr. W. D. Williams, Monash University, and the collection is at present on loan to Dr. Williams. Two forms, tentatively assigned to the genus Neoniphargus, were found, an eyed and a blind form. The distribution of the 2 forms is given in Table 3. One as yet undescribed species of the family Eusiridae genus Paracalliope was also discovered.

Station	1	2	3	5	7	13	15	16	17	18	19	20.
Blind											19	4
Eyed	1	1	1	1	1	3	5	33	10	20	31	

Table 3. The numbers of the two forms of 'Neoniphargus' collected at the sampling sites, Lake Edgar, 17/5/1972.

Isopoda :- The Phreatoicidae were identified by Mr. B. Knott. The taxonomy of Tasmanian phreatoicids is currently being revised, but until further taxonomies are published, Nicholls' (1942, 1943) generic and species descriptions must stand. Two species are present in Lake Edgar, both undescribed. Species A, from all sampling sites listing phreatoicids except SS 19 belongs to the genus Colubotelson Nicholls; all phreatoicids from SS 19, species B, are of unknown generic affinity.

Although not studied formally, the asellote isopods, family Janiridae, probably belong to the genus Heterias.

Decapoda :- The only decapods belonged to the family Parastacidae, and were identified by Dr. J. L. Hickman, University of Tasmania. The yabbies from Lake Edgar itself are placed, on the expression of key characters, as Parastacoides leptomerus Riek, a species synonymized with Parastacoides tasmanicus (Erichson) by Sumner (1971, unpublished). Yabbies from the plains around Lake Edgar are placed as P. tasmanicus.

Island Sample :- From the island litter, samples of the following orders were extracted.

From moss : Hymenoptera, Coleoptera, Lepidoptera, Diptera, Hemiptera, Collembola, Chilopoda, Acarina, Oligochaeta and Hirudinea.

From litter beneath cutting grass (Gahni) tussocks : Hymenoptera, Coleoptera, Lepidoptera, Diptera, Hemiptera, Collembola, Chilopoda, Acarina and Symphila.

Several beetles were also collected from the creeper Hypolaena.

Since the island has not been subjected to heavy or recent firing, in contrast to the eastern banks of Lake Edgar where the climax vegetation has been deflected by fires (Macphail and Shepherd, 1973) it is not surprizing to record an enriched cryptic fauna compared to that from SS 19 and 20.

DISCUSSION

The fauna of Lake Pedder is known to a very limited degree. Until this survey was carried out, there was no published data on the freshwater invertebrate fauna of Lake Edgar or the remainder of South West Tasmania. Yet the fauna of the two lakes may show interesting relationships :-

i) Lakes Edgar and Pedder were once portions of one old lake, draining into the Gordon River, (Tas. Uni. Geol. Dept., 1961).

ii) Lake Edgar was formed recently after movement of the Edgar Fault.

iii) Drainage of the Edgar area, previously to the Gordon system, was captured by the Huon River system.

iv) The unmetamorphosed Precambrian basement rocks of the Edgar area may

(but improbably) give different water properties to those of the waters of Lake Pedder which stands on metamorphosed Precambrian basement rocks. No significantly different concentrations of inorganic ions or other water properties have been discovered (Buckley and Tyler, 1973).

The Edgar fauna, then, may show similarities with the Pedder fauna, both having derived from the lake originally filling the Serpentine Valley, and showing strong affinities with a fauna restricted to buttongrass areas of western Tasmania. Alternatively, the fauna of the two lakes may be quite different owing to the migration of animal groups along the altered course of the Huon River so that the fauna of Lake Edgar bears strong affinities to the fauna of eastern Tasmania and alpine South East Australia.

An additional complication is that Lake Edgar, like Lake Maria, is well advanced serally and thus bears a large macrophyte community. The macrophyte community of Lake Pedder is not extensively developed.

However, until the taxonomic status of all the animal groups collected from both lakes is assessed, it is obviously impossible to measure the zoogeographical differentiation between the two water bodies. Intuitively, one expects that any differentiation would be slight, since the only physical barrier of any note between the two systems is the Huon River, and that in itself may not serve as a strong barrier in summer. There is a slight trend in the data supporting this supposition. For example, phreatoicids (species A), valvatids, and possibly some oligochaetes (groups with limited powers of dispersal) and the copepods (restricted physiologically to acidic lakes) may be common to Lakes Edgar and Pedder. The highly mobile hemipteran groups, however, segregate between either lake. These points may be fruitfully elaborated according to taxon.

Zooplankton :- The calanoid copepod which dominates the zooplankton of Lake Edgar, Calamoccia expansa, also dominates this trophic level in Lake Pedder, (Bayly et al, 1966, where it is recorded as C. australis (Searle), a junior homonym of C. expansa). C. expansa has so far been recorded from three other lakes, including Big Lake Waterhouse, each time being associated with acidic, peaty conditions (Bayly et al, 1966).

Amphipoda :- The species Austrochiltonia australis is extremely widespread in Tasmania occurring in small, isolated coastal ponds and lakes on the Central Plateau. It is only found in gently flowing or still waters associated with vegetation. Preliminary experiments suggest that these animals are fairly resistant to dessication, and the possibility of their passive transport in the plumage of birds cannot be ignored. Thus, their wide distribution is not really inexplicable so far as mobility is concerned.

A. australis is known from Maria Creek and Lake Edgar, but has not yet been found in the yabbyhole or swamp complex of the surrounding countryside. It was not found at SS 18. These observations suggest that the species is relatively intolerant of anoxic conditions.

It has not yet been determined whether the blind and eyed forms of neoniphargids are valid species, or simply morphs of the one species. Until further

detailed examination detects greater morphological differences between the two forms, they are considered here as one species. Nevertheless, there is some evidence of habitat segregation by the two forms. The blind form is restricted to SS 19 and 20 in Lake Edgar, but is found in the interstices of the yabbyholes on the Huon Plains; i.e., it may well be an interstitial form tolerant of anoxia. The eyed form replaces A. australis in the anoxic areas of Lake Edgar, and also occurs in surface water on the surrounding plain.

A species of Paracalliope was also infrequently found, both in Lake Edgar and the yabbyholes on the plains. The same species is known from the Bathurst Harbour area.

Another undescribed species of Paracalliope is abundant in some creeks on the eastern part of this State, especially near the brackish regime of creeks.

Williams (in press) suggests that Paracalliope is a recent invader of freshwater. However, the stream dwelling paracalliopes could just as reasonably be the longtime inhabitants of a stable habitat. The presence of Paracalliope closely associated with yabby complexes on the buttongrass plains of South West Tasmania supports the claim for an ancient invasion of freshwaters by this genus of an otherwise marine family.

Isopoda :- Phreatoicids of the genus Colubotelson are widely distributed in Tasmania, and the mountains of South East Australia. The pigmented and eyed benthic form from Lake Edgar, species A, is identical to the pigmented form from Lake Pedder, (see Bayly et al, 1972). However, the second form from Lake Edgar, species B, found only in the dead reed beds, is non-pigmented and blind. The 'B' form phreatoicids, of which all those found were sexually mature, are not obviously akin to the second species of phreatoicid (Bayly et al, 1972, p46) from Pedder Beach. This latter phreatoicid is a juvenile stage of the larger, pigmented species at Pedder.

Janirids are widespread in Tasmania. The pigmented form occurring in Lake Edgar is also found at Lake Pedder, in the intervening swamps and yabby burrow interstices and may extend its range to Bathurst Harbour. All previous accounts of janirid occurrence in lakes record the isopod as being strictly confined to the littoral habitat; in contrast, the janirids from Lake Edgar were found at depths of 1.3m at the base of reed stems.

Hemiptera :- The hemipteran fauna of Lake Edgar is depleted, both in diversity and abundance, compared with this fauna found in farm ponds. Notonectids and naucorids, both extremely common in farm ponds were not found at all, neither were pond skaters - hemipterans of the superfamily Gerroidea. This latter group may be excluded from the area by the low winter temperatures.

Sigara tasmaniae is found elsewhere in Tasmania. Also, the several creeks draining into or out of Lake Edgar harbour another widely distributed corixid, Diaprepocoris personata.

In contrast, the species known from Lake Pedder are endemic to that lake. Both species, the corixid Diaprepocoris pedderensis Knowles and a notonectid of the genus Anisops, are strong fliers, and it is difficult to explain why they have not established populations at Lake Edgar, which is down-wind from Lake Pedder.

The pleid recovered at SS 18, in the bottom ooze of the weed free zone, is the first record for the presence of the family in Tasmania. The species, Plea halei is only known elsewhere from South Australia (Williams, 1968). Pleids are now known to be widespread in Tasmania and the Bass Strait Islands, being particularly abundant in the lagoons of North East Tasmania where the water properties are in sharp contrast to the humic conditions of Lake Edgar.

Trichoptera :- Little taxonomic knowledge of the trichopteran larval fauna of Tasmania is documented, but it is possible to state that this survey has not discovered any individuals of the family Plectrotarsidae. One plectrotarsid, probably very closely related to the New Zealand genus Kokiria, is known to occur at Lake Pedder (Bayly et al, 1972). If the identification of the bereid is correct, then this is the first account of the family occurring beyond the mountains of South East Australia.

Hydroptilid and leptocerid larvae construct protective cases and hydroptilid larvae inhabit deeply silted ponds, so it is not surprising to find them abundant on the silted shoreline of Lake Edgar. The family Leptoceridae dominates the trichopteran fauna of Australia, with species breeding in a wide variety of habitats, including mountain streams and swamps. They appear capable of withstanding conditions too polluted for many animal species. For example, they tolerate very high levels of heavy metal contamination in their environment (Thorp, 1973).

Psychomyiid and rhyacophilid larvae were found in zones 1, 2 and 3.

Odonata :- Of the anisopteran family Synthemidae, the genus Synthemiopsis is endemic to Tasmania. Adults of the species Synthemiopsis gomphomacromioides Tillyard have been collected from Lake Pedder (Bayly et al, 1966.) Synthemid nymphs are similar in appearance to nymphs of the family Corduliidae, and accurate designation of nymphs to either family is difficult. The possibility must remain that in the cordulid nymphs recorded in Table 2 are really nymphs of the genus Synthemoipsis.

Lestid and aeshnid nymphs are common in Tasmanian waterways. Lestids are found amongst the vegetation of gently flowing or still water; those from Lake Edgar show no obvious preference towards any particular macrophyte. Aeshnid nymphs are robust and found in habitats ranging from the turbulent, e.g. rockfaces in waterfalls, to stagnant pools. Those found in Lake Edgar (being the same as the species from Lake Pedder, namely Acanthaeschna parvistigma Selys, ?) were restricted to the turbulent eastern shoreline.

Diptera :- Chaoborids are common in ponds and reservoirs, especially where stagnant conditions prevail, or where oxygen levels are depleted during summer evenings. Although not frequently collected in Tasmania, the black organic ooze sediments beneath the open water at Lake Edgar undoubtedly provide a suitable habitat. Their life-style is discussed by Williams (1968).

Mollusca :- The Valvatidae (?) recorded from Lake Edgar is also known to be in Lake Pedder, and is similar to a valvatid from southern Chile (Smith, 1973). Both species could well belong to the family Hydrobiidae.

Because of the high numbers of molluscs found in Lake Edgar, the view expressed (Bayly et al, 1972, p46) that because of ".... the acidic nature and

low calcium content of the waters of Lake Pedder, it is surprising to find snails living successfully there, considering their high requirements for calcium in shell construction" applies equally well to Lake Edgar, despite occasional leaching from the nearby dolomite outcrops (see Table 1). Research carried out overseas has demonstrated that freshwater mollusc distribution is influenced by ambient calcium levels, (Macan, 1961; Bayly and Williams, 1973).

Annelida:- Lake Edgar would seem to be quite depauperate in oligochaetes with worms found only in the plant free bottom-ooze area and the wet mat of dead reeds beside the lake. Nevertheless, some of the worms collected do represent significant finds.

Species of the family Phreodrilidae are restricted to the Southern Hemisphere, although no species from Tasmania have been described. (Goddard 1909, recorded the occurrence of the family in Tasmania). Three species are known from Lake Pedder, but because all material collected to date is juvenile, these species remain undescribed (Brinkhurst, 1971). It remains to be determined whether the phreodrilids from Lake Edgar are of the same species as those from Lake Pedder, or whether they belong to the group of "other specimens with completely bizarre setal arrangements . . " which " . . may not even be attributed to a particular family at present" (Brinkhurst, 1971, p. 110).

The cosmopolitan family, Tubificidae, has few described representatives in Tasmania. Limnodrilus udekemianus Claparède is thought to occur on the southern shoreline of Lake Pedder (Brinkhurst, 1971). Further, Brinkhurst (1971) described two species of tubificid from Lake Pedder which he assigned to the disjunctly distributed genus Telmatodrilus. Telmatodrilus, known from California, Karelia, Kamchatka and Tasmania, and the closely related genus Macquaridrilus, from Macquarie Island and the South Pacific, are thought to be the survivors of an ancient line of tubificid (Brinkhurst and Jamieson, 1971, p532). It is important, then, that the identity and generic relationships of the Lake Edgar tubificids be determined.

The family Naididae is known to be cosmopolitan, but none have yet been recorded from Tasmania. Lumbricids are very widely distributed oligochaetes, and the family Lumbricidae has terrestrial, aquatic and semi-aquatic representatives.

Although Aeolosomatids were long considered to be a family within the order Oligochaeta, Brinkhurst (in Brinkhurst and Jamieson, 1971) presents reasons for placing the Aeolosomatidae in some undetermined position outside the Oligochaeta. Aeolosomatids are typically very small worms (1mm long) and are often missed by collectors. Some species are known to be very widely distributed, but no species has been recorded from Tasmania. The present account is thus the first record of the presence of aeolosomatids in Tasmania.

Of the list of animals collected from Lake Edgar, there are some surprising omissions. Syncarids are not listed, yet Allanaspides helonomus Swain et al is found in the swamps very close to Lake Edgar, and Anaspides tasmaniae (Thomson) occurs in at least one creek flowing into the nearby companion lake. Lake Pedder is the home of one endemic fish, Galaxias pedderensis Frankenberg, and Galaxias parvus Frank is found in the adjoining swamps. No fish were found in Lake Edgar.

The ecosystem of Lake Pedder is regarded as simple (being based on a limited number of inter-relationships), stable and with low productivity (Bayly et al, 1972). Detritivores, feeding on bacteria and detritus, comprise the bulk of the animals. The bacteria utilize the existing allochthonous and autochthonous organic material.

Whilst it is not possible, because of lack of data, to compare the productivity of Lake Pedder with that of Lake Edgar, there is no evidence for suggesting that the ecosystems operating in the two lakes are vastly different. Presumably the similarity of the ecosystems of Lakes Edgar and Maria is even closer.

Detritivores collected from Lake Edgar include the phreatoicids, dipteran larvae, molluscs and annelids. The trichopterans, ephemeropterans and amphipods probably browse on algae, and the plecopterans, hemipterans and odonatans constitute the only carnivores present.

Despite the near certainty that Lake Edgar does not stratify, nor is likely to generate any strong temperature or chemical gradients because the shallow lake is continually being stirred by strong winds, four distinct zones of animal abundance and diversity are discernible. Although these zones, and in particular zone 1, coincide with different vegetation types, physical factors, particularly the nature of the substrate and exposure to wave action, are probably the important factors governing the distribution of the animals. Thus lestid nymphs, which cling to plant stems and are probably strong enough to withstand jerky movements of the stems without being dislodged were found associated with plants at all relevant sampling stations. The amphipod, A. australis, similarly was found associated with all the types of vegetation throughout the lake.

Zone 1, (SS 1-7, 11, 12). This is the zone associated with the sedges Lepidosperma longitudinale and Chorisandra cymbaria, lying mainly along the eastern and southern shorelines but also around the southern shoreline of the island. The substrate of the former shorelines, sloping gently from the lake edge, is predominantly sandy, with quartzitic pebbles and 'Edgar pennies' common. The shoreline is subject to strong wave action.

Unsheltered shorelines in lakes typically harbour populations of ephemeropterans and plecopterans clinging to the underside of rocks. Also, it is not unexpected to find aeschnid nymphs clinging to strands of vegetation in the zone, but it is not clear why these animals should apparently be so restricted.

Few animals were found at the deeper and outer margin of the sedge zone, depth 1.3m, SS 11 and 12. The presence of only strong swimmers - some trichopterans and chaoborids - together with animals capable of strong attachment to plants and the fact of a reduced benthic fauna indicate an area of strong wave action over an unsuitable substrate of coarse sand particles.

The bays between the emergent plants (Melaleuca, Leptospermum, and Gymnoschoenus) on the eastern shoreline are filled with dead stems of the reed Cladium glomeratum. The dead reeds snap free and are piled by the wind and waves in matts partially out of the water. Hence two bands of reed bed are formed : a band of soaking wet reed (SS 19) whose lower layers may actually be continuous with the

water of the lake, and a band (SS 20) immediately higher up the bank than the wet reed but whose lower layers were, at the time of sampling, quite moist. The dead reeds are apparently broken down physically by grinding action; there is little evidence of rapid biological degradation.

Besides serving as a source of some food, the wet reed beds act as refuges for much of the fauna found out in the open water of Zone 1, e.g. the amphipods, leptocerids, anisopterans and bivalves. The fact that blind neoniphargids and yabbies were collected in the open water of Zone 1 just after dark on Trip 1 but were only found in the dead reed beds during the daytime collecting of Trip 2 may be a result of the natural activity cycles of these animals.

The 'dry' dead reed beds harbour a cryptic fauna of adult coleopterans, dipteran larvae, annelids, molluscs and isopods. Some of this fauna is well able to occupy the upper layers of the wet reed beds, e.g. Styloniscidae, Annelida and Mollusca. The neoniphargids recovered at SS 20 must be geographically quite near the extreme limit of their distribution within Lake Edgar so far as the ability to tolerate dry conditions for any length of time is concerned. Perhaps somewhat surprisingly, no terrestrial amphipods of the family Talitridae were discovered. They are frequently found in moist leaf litter elsewhere in South East Australia.

Zone 2, SS 8, 9 and 10. Zone 2 lies along the western shoreline. Contrasting with the clearly defined eastern shoreline, that along the western margin of the lake is poorly defined because of the invading vegetation, Restio tetraphyllus and Myriophyllum propinquum. Additionally, an extensive silt deposit beneath a deeper layer of water gives rise to an unstable substrate surface. Wind effects are minimal because of protection from the thick scrub clothing the fault scarp immediately to the west of the lake.

The lack of a stable, well defined heterogeneous substrate appears to be the factor causing the depletion of the fauna in this zone. Other than hydroptilids, which are usually very abundant in unsteady, silting portions of lakes, only highly mobile amphipods, corixids and lestids were collected. That is, a benthic fauna of detritivores is apparently absent in this zone.

Zone 3, SS 13-17 inclusive. This is a zone based on the reed Cladium glomeratum and is removed from both shorelines. The substrate is more consolidated than it is in Zone 2. The fauna constitutes an intermediate stage between those found in Zones 1 and 2. For example, a benthic fauna of predominantly detritivores (phreatoicids, annelids and bivalves) but including amphipods and chironomids is more evident than in Zone 1. Also, austrochiltonids, trichopterans and carnivorous lestid nymphs, all strong swimmers, were found in the zone.

Zone 4, SS 18. The greatest abundance of animals was found in the black organic oozes in the deepest part of the lake, beneath the open water.

Phreatoicids, oligochaetes, chironomids and bivalves comprise the most commonly collected animals from sediments in Tasmanian alpine lakes and rivers. Lake Edgar provides no exception. Neoniphargids, too, are sometimes found in the sediments of some shallow Tasmanian alpine lakes. Their feeding habits, whether they be detritivores, algal feeder or both, are not known. Chaoborid larvae, whilst

still in the benthic phase, are found in the organic oozes of ponds, lakes and reservoirs and are believed to act as detritivores, but on changing to their swimming phase, they become carnivorous (Williams, 1968). No carnivores were found in Zone 4.

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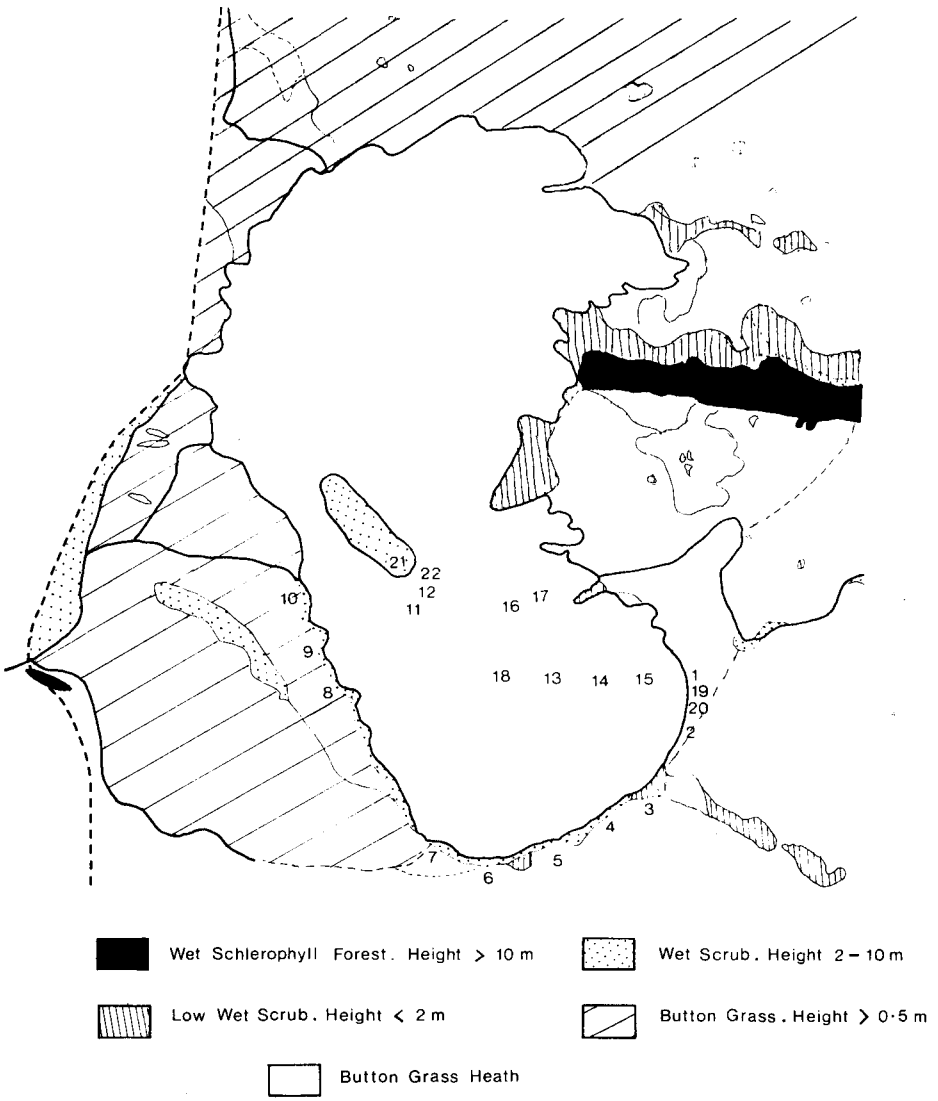
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Wet Schlerophyll Forest. Height > 10 m
Wet Scrub. Height 2 – 10 m
Low Wet Scrub. Height < 2 m
Button Grass. Height > 0·5 m
Button Grass Heath