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COMPILATION OF A LIST OF THREATENED INVERTEBRATES: THE TASMANIAN EXPERIENCE.

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Abstract

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The Invertebrate Advisory Committee was convened in 1992 to produce a list of rare and threatened non-marine invertebrates for Tasmania. The interim list, completed in 1994, was prepared for inclusion in threatened species legislation and to ensure consideration was given to invertebrates in forest harvesting operations. 175 species from seven phyla, eight classes and 25 orders were listed according to IUCN categories. In some cases entire taxonomic groups had to be ignored due to lack of information, hence the interim status of the list and the need for regular review. Some of the problems encountered during the compilation of the list are outlined. Lists of threatened species can be used as a tool to further other habitat, ecosystem or multi-species approaches to invertebrate conservation.

Invertebrate Advisory Committee

The Invertebrate Advisory Committee was convened by the Tasmanian Parks and Wildlife Service in August 1992 to compile a list of rare and threatened terrestrial and aquatic invertebrates for Tasmania. The stimulus for the production of such a list was provided by the recommendation of the RAVES (Rare, Vulnerable and Endangered Species) Working Group that legislation be introduced which protected threatened species on all land tenures in Tasmania. The Invertebrate Advisory Committee was composed of eight representatives drawn from the University of Tasmania, government departments, the two Tasmanian Museums and a private consultant. Members were chosen for their knowledge of Tasmania's native invertebrates and their ability to critically evaluate the conservation status of a species.

The review process

The Committee reviewed all native terrestrial and freshwater invertebrates in Tasmania, excluding Macquarie Island (due to insufficient information). Marine invertebrates were not included because they are defined under the *Living Marine Resources Act 1995* and hence are the responsibility of the Sea Fisheries section of the Departrment of Primary Industries and Fisheries. Each member of the committee was given several groups of invertebrates to assess. For insects, orders were the unit of grouping whereas whole phyla were allocated for the remaining invertebrates. These groups of invertebrates were allocated to members of the committee on the basis of their knowledge of the group whilst trying to equalise the work load. The paucity of knowledge on some groups, for example mites and nematodes, precluded their consideration.

Each committee member was responsible for compiling data on the status of species in the groups they were allocated. Information was obtained from Australian and overseas specialists, from published sources and from their own unpublished material. All species that had been listed as being rare or threatened in other compilations (Wells et al., 1983; Hill and Michaelis, 1988; Smith, 1989) were targeted. Once the compilation of information for a group had been completed it was presented to the committee for its consideration. The status of some species was unanimously agreed upon whilst for others a majority decision decided their categorisation.

Assessing rarity

The problem of deciding when to classify a species as rare was considered by the Committee before any species were categorised. Two categories of rarity were devised as working definitions. The first included species that were widespread, but never abundant, and possessed ecological characteristics which put them at risk. The second included species that were well researched and known to occur in 10 or fewer 1 km grid squares. The level of research work which was considered sufficient for the latter definition was left open to interpretation by

individual specialists based on their knowledge of the group and its ecology. As work progressed it was found that the definitions of rarity had to be used flexibly in conjunction with an assessment of survey effort. The distribution and ecological requirements of some species were well known and the two categories could be applied easily. However, for most species some interpretation of the distribution data had to be made in the light of survey effort. An example of the known locations of five species of caddisflies are shown in Fig. 1. Each species was known from only one or two locations. However, access into the area between the two locations (Cradle Mountain and a tributary of the Gordon River) where *Poecilochorema lepnevae* was found was difficult and most of this area had not been sampled. For the other species in Fig 1, however, there was good access and areas around the known locations had been sampled.

For one group, the hydrobiid snails, the rarity category was accepted as being appropriate despite the fact that the distributions of species were not known in detail. Work by Ponder et al. (1994) on Wilsons Promontory in Victoria had shown that these snails showed high levels of local endemism with very low rates of gene flow between catchments. It was therefore likely that species exhibiting small distributions from the work of Ponder et al. (1993) would not have their distributions increased substantially by further survey work.

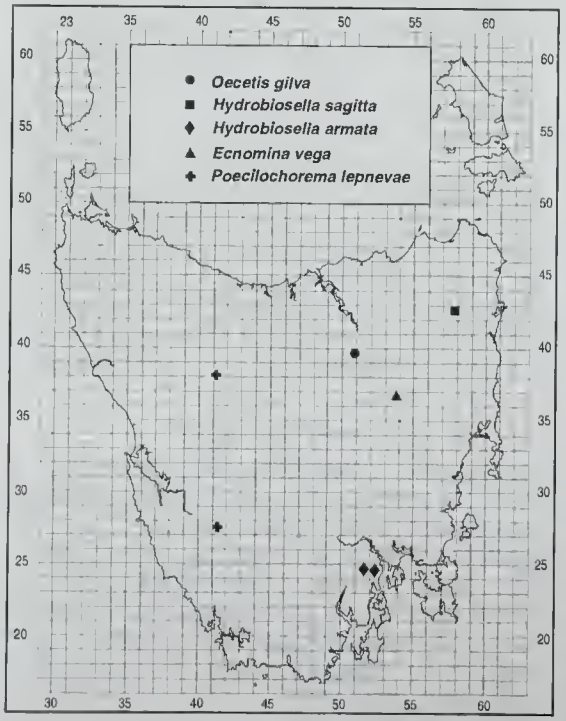

Figure 1. Known locations for five species of caddisflies. Adapted from Neboiss (1977).

Unpublished information from experts

Unpublished information and opinions on the status of species was sought from experts on particular groups or species. However, opinions of experts were not accepted outright. The data were always assessed independently by the committee. Taxonomic opinion was also required to be assessed when it affected the status of a species. Thus one submission to the committee argued that a certain named species should not be included as it was synonymous with another more widely distributed species. The committee debated whether this information should be accepted without having gone through the normal scientific review process. After further detailed reasoning was requested from the expert the committee decided to accept his opinion.

Risk codes

The committee began assessing the conservation status of species according to the IUCN Red Data categories from 1990 (i.e. rare, vulnerable, endangered, extinct). During this assessment process the IUCN released several discussion papers relating to a revision of threatened species categories. One of these (Mace et al. 1992) included the new category 'susceptible' for species which did not qualify in the higher categories of threat but whose status was of concern because of a restricted range (typically less than 100 km) and/or being found at few locations which rendered it prone to human disturbance. The Committee considered the 'susceptible' category as an ideal classification for many invertebrate species which had small ranges but were not obviously threatened. Many species previously classified as rare were therefore reclassified as susceptible. However, in the next revision of the IUCN categories (Mace and Stuart, 1994), which were subsequently adopted by the IUCN Species Survival Commission (1994), the susceptible category was subsumed into the vulnerable category. However, because the foreshadowed Tasmanian legislation included a 'rare' category it was felt that in our listing these two categories should not be amalgamated. Thus our rare category included

species that were very uncommon but widespread and those with very small or restricted populations that were mostly contained within reserves. The criteria for our vulnerable category were as for IUCN Species Survival Commission (1994) with the exclusion of criteria D. Those meeting the criteria D of the vulnerable category of the new IUCN system and whose distributions where mostly outside of reserves were classified as rare (susceptible) under our system. The other categories were the same as that used in IUCN Species Survival Commission (1994).

The list and its uses

An interim list of rare and threatened invertebrates for Tasmania was published in August 1994 (Invertebrate Advisory Committee,1994). To our knowledge this is the first time that an attempt has been made to comprehensively examine the conservation status of a state's native invertebrates. The list was titled as 'interim' to emphasise the fact that only a relatively small proportion of Tasmania's non-marine invertebrates were able to be considered. Table 1 summarises the listed species according to taxonomic groups. In total 175 species from seven phyla, eight classes and 25 were included.

To date the list has been used for three major purposes. The first two relate to forest management. A compilation of the locations of rare and threatened species associated with forest has been produced as a manual by Forestry Tasmania (Jackson and Taylor, 1995). Released in January 1995 the manual is now used widely by Forestry officers to assess whether a rare or threatened species is known or likely to occur in areas to be logged. By the end of October 1995 42 cases involving known or suspected locations for rare or threatened species were reported from State forest and private land. Nine species were involved with 69% of cases related to two species. The biodiversity component of the Comprehensive Regional Assessment for Tasmania's Regional Forest Agreement (Commonwealth of Australia, 1995) has specifically targeted rare and threatened invertebrates associated with forest. Functional groups with an obvious predominance on the list, such as burrowing crayfish, aquatic snails, troglobites and log dwelling beetles, have been targeted for the preparation of thematic management prescriptions.

The second purpose of the list has been to provide the basis of a schedule of rare and threatened invertebrates included on Tasmania's *Threatened Species Protection Act* proclaimed in November 1995. The Act, however,

Table 1. Summary of rare and threatened native invertebrates in Tasmania.

Group	Extinct	Endangered	Vulnerable	Rare (susceptible)	Rare	Total
Oligochaeta	1	-	-	-	**1**	
Arachnida	2	-	-	5	613	
Malacostraca	-	1	4	12	4	**21**
Mollusca						
Terrestrial	1	-	2	2	6	**11**
Aquatic	-	-	2	41	7	**50**
Onychophora	-	1	-	2	-	**3**
Cestoda	-	-	1		-	**1**
Chilopoda	-	-	-	3	-	**3**
Insecta						
Coleoptera	1	1	5	3	1	**11**
Lepidoptera	1	1	4	3	2	**11**
Orthoptera	-	1		2	4	**7**
Plecoptera	-	-	-	1	4	**5**
Trichoptera	2	2	-	12	18	**34**
Others	-	-	-	-	4	**4**
Total	8	7	18	86	56	175

did not include the non-susceptible category of the rare species nor the twenty-two undescribed species from the interim list as it was considered to be politically and/or legally unwise. A Scientific Advisory Committee is to be established within the Act to oversee the listing and delisting process. It is likely that upon appointment this committee will review the complete list. It is envisaged that the Invertebrate Advisory Committee will most likely continue the assessment and revision of the list and make recommendations to the Scientiific Advisory Committee.

Production of the list has already stimulated research. A spider previously thought extinct, *Plesiothele fentoni,* has been rediscovered and detailed survey work on the velvet worm *Ooperipatellus 'cryptus'* and the snail *Anoglypta launcestonsis*, that was stimulated by the listing of these species, has lead to recommendations that these species be delisted (R. Mesibov and K. Bonham, pers. comm.). Surveys of two log-dwelling beetles (*Lissotes menalcus*, and *Hoplogonus simsoni*) are currently being undertaken and have lead to interim protection measures being implemented for the latter species.

Value of the listing process

Tasmania's interim list of rare and threatened invertebrates represents a significant starting point in highlighting the magnitude of invertebrate biodiversity in Tasmania. Previously only high profile or 'glamour' invertebrates, such as the giant freshwater crayfish *Astacopsis gouldi* and the butterfly *Oreixenica ptunarra*, had been used to increase awareness of invertebrates in the community or to attract funding through the federal Recovery Plan process. The list has highlighted the diversity of invertebrates and, although short (0.6% of a possible 30 000 species, Greenslade, 1985), highlights the paucity of information and the need for further surveys and taxonomic research. To date very little funding has been provided by the Endangered Species Unit of the Australian Nature Conservation Agency for invertebrate conservation. However, production of lists such as this should assist with lobbying to remedy this funding imbalance and assist in expediting the inclusion of invertebrates on the schedule of the national *Endangered Species Protection Act 1992.*

Single species versus multi-species or habitat conservation

The listing and recovery plan process for single species of invertebrates has been questioned by Yen and New (1995) because they see it as being ineffective given the large number of invertebrates which could potentially swamp such a system. They argue for a habitat or species assemblage approach. We agree that such broader strategies are extremely important. However, we would argue that the best way to go about achieving the political recognition of the need for such strategies is through the listing of single species. The single species approach has been accepted and legislated for throughout all Australian states. If the view that 'we need more data' (e.g. see Yen and Butcher (1992) and Greenslade (1992) for a reply), is continued to be espoused as the major way forward then we believe invertebrate conservation will continue to be ignored by funding agencies. The listing of species in itself does not necessarily improve an invertebrate's chance of survival, as demonstrated by the experience with the United States *Endangered Species Act 1973* (Losos, 1993). However, such listings have been used successfully to achieve reservation of significant remnant habitats in the US (Hafernik, 1992). Such remnant habitats are sometimes too small to support viable populations of vertebrates but can be important refuges for invertebrates and plants (Main, 1987; Wilson, 1987).

In the short time since the listing of threatened invertebrates in Tasmania we have seen a dramatic increase in the profile and level of conservation research carried out on this group. So far only those species that are listed have been the focus of attention. However, because of the presence of certain groups of species on the list, we have been able to focus attention on to habitats that seem to be important for threatened invertebrates (e.g. decaying logs, caves) or functional groups that are particularly at risk (e.g. aquatic snails, log-dwelling beetles). A review of the US experience lead to the recommendation that more emphasis be placed on multi-species and ecosystem-level recovery plans (Tear et al., 1995). We believe that the pressure that is required to gain acceptance at a political level for the need for such work will come from the fact that the case can be argued on the basis of

species that are listed as threatened. Such lists are not a panacea, however, and must be seen as only one of many tools that should be used to achieve the conservation of invertebrates.

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