

Opening a can of words. The importance of definitions in the *NSW Threatened Species Conservation Act*

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ABSTRACT

The *NSW Threatened Species Conservation Act 1995* provides for the listing on schedules of threatened species, populations, ecological communities and of key threatening processes. The definitions of these concepts are discussed. The implicit component parts of the definition of species are analysed and differences between legal and science based approaches are discussed. Issues arising from application of the concept of endangered ecological community are discussed in the light of the interpretations provided by the Court of Appeal. Listing is a means to an end, and not an end in itself. The importance of listing to the promotion of the development of conservation measures for threatened species is discussed. The potential for the implementation of Threat Abatement Plans to play a major role in biodiversity conservation is stressed.

Key words: threatened species, endangered ecological communities, endangered populations, key threatening processes, definition of concepts.

Introduction

The *NSW Threatened Species Conservation Act 1995* is an important component of the legislation which governs the development and application of biodiversity conservation policy in New South Wales.

The development of conservation legislation in the State is reviewed by Jarman and Brock (2004) and Farrier and Whelan (2004). The *Threatened Species Conservation Act* was, in the most immediate sense, the replacement of the *Endangered Fauna (Interim Protection) Act 1991*, which had a sunset clause effective at the end of 1995. However, it was also the opportunity to give effect to obligations to conserve biodiversity arising from the Rio Biodiversity Convention of 1992. As such it introduced a number of new features into the State's legislation. Unlike previous legislation it is not taxonomically restrained although matters covered by the *Fisheries Management Act 1994* are excluded. When the *Threatened Species Conservation Bill* was first introduced into Parliament in late 1995 it was all encompassing, but during its passage through the legislature it was amended by the Government to exclude fisheries matters. This created a number of apparent anomalies, for example some dragonflies are eligible for listing under the *Threatened Species Conservation Act* as they have non-aquatic larvae but the majority would be categorized as fish. While fisheries and terrestrial resource management are separated under many jurisdictions, separation for purposes of determining conservation status of elements of biodiversity is possibly unique. The

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* does not differentiate between 'fish' and 'others' in its listing process. The vertebrate fauna on the Schedules of the *Endangered Fauna (Interim Protection) Act* were transferred to the Schedules of the *Threatened Species Conservation Act*. The initial Schedules also included vascular plants but for the first time the way was open for formal recognition of the conservation status of organisms such as fungi, lichens and invertebrates as well as the traditional objects of concern. Importantly ecological communities are recognized and also, a category unique to New South Wales, populations. The Act also provides for public involvement through nomination of matters to be listed to an independent Scientific Committee, and through submissions on preliminary determinations.

The Act deals extensively with concepts which are in everyday use by ecologists. However, they are not always used with precision and textbooks do not offer a uniformity of definitions. Additionally society at large has some understanding of the concepts, adding an additional range of nuances of meaning. It is important, therefore, that those who have need to interpret and apply the Act are aware of the definitions which are provided in (s)4 of the Act, rather than assuming some perceived common usage. Not all terms are defined, and hence there may be circumstances where several interpretations could be offered and where resolution may require a determination in the Courts. (An example of an instance where the meaning of

*The views expressed in this paper are those of the author and not of the Scientific Committee established by the *Threatened Species Conservation Act*.

a concept in general usage amongst ecologists could not be agreed upon by expert witnesses arose in *Slack-Smith and Another-v-Director General of the Department of Land and Water Conservation* [2003] NSWLEC.189, a case under the *Native Vegetation Conservation Act 1997*, where there was failure to come to agreement on whether or not a particular species was predominant in the vegetation in dispute.) The definitions provided in the *Threatened Species Conservation Act* are generally similar to those in (s)528 of the *Commonwealth Environment Protection and Biodiversity Conservation Act*, but there are some differences.

The context

The context in which listing occurs, and the subsequent importance of listings, can be best appreciated in the light of the objectives of the Act((s)3) which are:

- (a) to conserve biological diversity and promote ecologically sustainable development, and
- (b) to prevent the extinction and promote the recovery of threatened species, populations and ecological communities, and
- (c) to protect the critical habitat of those threatened species, populations and ecological communities that are endangered, and
- (d) to eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities, and
- (e) to ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed, and
- (f) to encourage the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.

The first objective of the Act is the conservation of 'biological diversity'. Although the Act is entitled the *Threatened Species Conservation Act*, threatened species are only a subset of biological diversity. While there are sound reasons for promoting conservation of threatened species, a reductionist approach which separates threatened species and their management from biodiversity as a whole will not necessarily advance biodiversity conservation nor, in the long term, save the species concerned. Recognition of endangered ecological communities and key threatening processes, and the implementation of community recovery plans and threat abatement plans, have the potential to assist conservation of biological diversity (including the many as yet unknown and undescribed components of biodiversity) to a much greater extent.

Species

The definition of species in the Act is as follows:

species of animal or plant includes any defined sub-species and taxon below a sub-species and any recognizable variant of a sub-species or taxon.

This does not adopt any particular concept of species, although the Commonwealth has explicitly adopted the biological species concept in the definition provided in the *Environment Protection and Biodiversity Conservation Act*.

Species means a group of biological entities that:

- (a) interbreed to produce fertile offspring; or
- (b) possess common characteristics derived from a common gene pool;

and includes:

- (c) a sub-species; and
 - (ca) for the purposes of Part 13A-a distinct population of such biological entities; and
- (d) except for the purposes of Part 13A-a distinct population of such biological entities that the Minister has determined, under section 517, to be a species for the purposes of this Act.

Although many textbooks indicate that the biological species concept is the preferred basis for defining species the concept is, in the vast majority of cases, an hypothesis rather than a reflection of the process through which taxonomic decisions were made. Many species have been described on the basis of long dead specimens rather than observation in the field. It is difficult, for example, to discern much about the mating behaviour of insects pinned in a display case! On the basis of experience and intuition, taxonomists would expect that what are regarded as 'good' species on morphological or other characters would behave as 'biological' species. In some cases this has been confirmed subsequently, but in most it remains an assumption.

Importantly, entities below species rank can, for the purposes of the Act, be treated as if they were species. This is an important mechanism for capturing components of the genetic variation level of biodiversity. Also, importantly, the entities need not have been formally named to be listed, provided they are 'recognisable'.

To fully understand the scope of the species definition the meanings of animal and plant also need to be considered. [The binary division into plant and animals is understandable to the general public, but does not accord with the currently scientifically accepted three domain classification e.g. Campbell and Reece 2002].

animal means any animal-life that is indigenous to New South Wales or is known to periodically or occasionally migrate to New South Wales, whether vertebrate or invertebrate and in any stage of biological development, but does not include:

- (a) humans, or
- (b) fish within the meaning of Part 7A of the *Fisheries Management Act 1994*.

This allows migrant species to be considered for listing, although whether a distinction can be drawn between vagrant and 'occasionally' migrant species may be debatable. New South Wales for purposes of the Act extends 3 nautical miles to sea, and hence marine mammals, reptiles and birds become potentially eligible for listing.

The definition of plant is similar:

plant means any plant-life that is indigenous to New South Wales, whether vascular or non-vascular and in any stage of biological development, and includes fungi and lichens, but does not include marine vegetation within the meaning of Part 7A of the Fisheries Management Act 1994.

The exclusion of marine vegetation precludes listing of marine algae, seagrasses and mangroves, but not freshwater algae and macrophytes. A separate listing process, overseen by the Fisheries Scientific Committee, is now provided for in the *Fisheries Management Act*.

For both plants and animals the definition encompasses 'any stage of biological development'. This is extremely important for ensuring long term conservation, but does create practical difficulties, both for making determinations for listing and subsequently in the assessment of sites and the significance of possible impacts of development on species. The importance of protecting birds' eggs from collection and destruction has long been recognized in legislation in many jurisdictions. Invertebrate larval stages, seeds and spores have received much less attention in legislation and site assessment. Nevertheless the existence of a seedbank or larvae in the soil may permit individual species or whole communities to regenerate after disturbance. Just because a site has been cleared above ground does not automatically mean that all conservation values are lost, and that threatened species, populations and communities might not still exist. Including "all stages of the life cycle" within the concept of the species, while making good biological sense, may create some interesting dilemmas for conservation.

One of the iconic species for European plant conservation is the Killarney fern *Trichomanes speciosum* (Ratcliffe *et al.* 1993). This beautiful filmy fern was always regarded as an uncommon plant of the most oceanic parts of western Europe, and is thought to have become very rare as a result of excessive collection during the Victorian era (Ratcliffe *et al.* 1993, Moore 1998). However, the object of concern was the sporophytic generation – the stage the public would regard as a fern. As with all ferns *Trichomanes* shows alternation of generations, with sexual reproduction occurring in the haploid gametophyte. In most ferns the gametophyte is short lived, but in *Trichomanes* it is persistent and more desiccation and frost tolerant than the sporophyte (Moore 1998). It was known that in some North American species of *Trichomanes*, gametophytes occurred at sites geographically distant from known locations of sporophytes. The gametophytes of *T. speciosum* in Europe were long over looked, or, if noticed, dismissed as algae, but were recorded for the first time, in abundance, in 1989. Subsequently they were shown to be widespread in eastern England and as far east in Europe as the Czech Republic (Rumsey *et al.* 1998). How should the conservation status of this species be assessed?

We know of no example in Australia where the ecology and distribution of different life cycle stages are so different, but we should be aware of the possibility of such cases.

The final piece of the jigsaw of species' definition is indigenous.

A reference in this Act to animal-life or plant-life indigenous to New South Wales is a reference to animal-life or plant-life of a species that was established in New South Wales before European settlement.

Clearly we do not want to use scarce conservation resources to promote introduced animals and weeds and further threaten native biodiversity. The cut off of European settlement has, however, brought the dingo *Canis lupus dingo* within the purview of the Act even though it is a relatively recent introduction (Dickman and Lunney 2001). However, it also creates an arbitrary deadline at which 'natural' processes are deemed to have ceased. Despite the huge increase in human assisted dispersals, some species have undoubtedly spread and become established in new locations without obvious human assistance since 1788. Even if such a species were otherwise to satisfy the criteria for listing as a threatened species it would be ineligible. (Most documented examples of recent natural spread are birds but there is no reason to suppose that the phenomenon does not occur in other taxa. One example of a species which has recently spread over much of the globe, including Australia, is the cattle egret *Bubucus ibis* L. – see Handtke and Mauersberg 1977). Unfortunately we do not have a comprehensive account of the biota of NSW in 1788 (nor do we have one for 2003). When a species is newly discovered in NSW, and is thought to be threatened, the Scientific Committee must decide whether it is indigenous or a recent immigrant before listing can occur. If what has been discovered is a new species of tree whose population includes large mature individuals then the decision is straight forward, but for most taxa there has to be an element of expert opinion rather than absolute certainty. To date, the question of the indigenous status of species listed has not been seriously challenged.

Eligibility for listing

Having dissected the meaning of species (in the context of the Act), the next issue is eligibility for listing. The criteria for listing of endangered and vulnerable species are provided in s10 and s14 of the Act respectively.

A species is eligible to be listed as an endangered species if, in the opinion of the Scientific Committee:

- (a) *it is likely to become extinct in nature in New South Wales unless the circumstances and factors threatening its survival or evolutionary development cease to operate, or*
- (b) *its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction, or*
- (c) *it might already be extinct, but is not presumed extinct.*

A species is eligible to be listed as a vulnerable species if, in the opinion of the Scientific Committee, the species is likely to become endangered in New South Wales unless the circumstances and factors threatening its survival or evolutionary development cease to operate.

While the Scientific Committee may be informed by the results of other assessments of conservation status (for example application of the IUCN Scheme – see Burgman

2004), the ultimate test is whether the Committee is satisfied that the criteria specified in the Act are met. Given current knowledge of distribution and abundance (past and present) it is extremely unlikely that the Scientific Committee would be able to assess the status of most invertebrates or cryptogamic plants. For those few species in these categories which can be assessed, and which are found to satisfy the criteria, listing is important, not only as it will provide an impetus for targeted conservation measures but as a means of getting the message across to the broader public that all components of biodiversity are of value. For the majority of invertebrates and lower plants, however, any improvement of conservation status through the *Threatened Species Conservation Act* will arise through their occurrence in listed Endangered Ecological Communities.

Populations

A population is defined in the Act as

a group of organisms, all of the same species, occupying a particular area.

and

A population is eligible to be listed as an endangered population if, in the opinion of the Scientific Committee, it is facing a high risk of becoming extinct in nature in New South Wales and it is of conservation value at the State or regional level for one or more of the following reasons:

- (a) it is disjunct or near the limit of its geographic range,*
- (b) it is or is likely to be genetically, morphologically or ecologically distinct,*
- (c) it is otherwise of significant conservation value.*

In its particular formulation the ability to list populations is unique to NSW. In some circumstances populations can be listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act*, but as if they were species, rather than in a category of their own. The ability to recognize populations is a valuable feature; it allows listing of distinctive subspecific variants and hence addresses in part the conservation of the genetic level of biodiversity and also provides acknowledgement that species become extinct on a population by population basis so that protection of populations is one measure to reduce extinction risk at species level. In some localities, most particularly North Head, endangered populations have become the focus of local conservation effort (Banks 2004, Lambert 2004). A more comprehensive analysis of issues associated with endangered populations is provided by Baker (2004).

Ecological Communities

The provision to list endangered ecological communities potentially provides a very powerful tool for biodiversity conservation. It has proved to be one of the more controversial aspects of the Act, partly because of unfamiliarity by many with the concept, and also because of claims that community listing has a greater potential to obstruct development than does listing species.

Ecology textbooks provide a variety of definitions of 'community' but for purposes of the Act:

ecological community means an assemblage of species occupying a particular area.

This definition does not constrain the type of species making up an assemblage. There is a widespread view that equates ecological community with vegetation type, but this is not a requirement of the legislation. The majority of the communities listed to date have been based on plant communities, which reflects the availability of data.

Communities can, by analogy, be considered as Russian Dolls, in both a physical and conceptual sense.

In a physical sense, communities consist of sets of working parts. Each of these sets will, in its own right, satisfy the definition of an ecological community. For example the Hygrocybeae Community of Lane Cove Bushland Park has been listed as an Endangered Ecological Community, even though this fungal assemblage is dependent on the vascular plant community in which it occurs.

Most community classifications are hierarchical, and the entities at any level in the hierarchy meet the definition of ecological community. Thus, depending on our purpose, we could recognize rainforest in NSW as a single entity, as four (subtropical, warm temperate, cool temperate and dry) or as a much larger number of types nested within the higher levels in the hierarchy. For purposes of listing, what level in the hierarchy is appropriate? The Act provides no guidance and the Scientific Committee is required to exercise judgement on a case by case basis.

What is an endangered ecological community?

Section 12 of the Act states:

An ecological community is eligible to be listed as an endangered ecological community if, in the opinion of the Scientific Committee:

- (a) it is likely to become extinct in nature in New South Wales unless the circumstances and factors threatening its survival cease to operate, or*
- (b) it might already be extinct.*

There is a number of consequences of this section. Firstly, any listing is of communities and not of individual sites (although clearly stands of plant communities occupy sites, but sites are not identified in the Schedules). There is no direct equivalent in NSW legislation of the concept of Site of Special Scientific Interest embodied in UK conservation and planning law (Evans 1997). A site may be of exceptional interest because, for example, it supports the largest known population of a particular species, but this could not be the basis for listing the site as an Endangered Ecological Community. It is possible that protection could be afforded through reaching a Voluntary Conservation Agreement or via heritage legislation, but it is not within the scope of the *Threatened Species Conservation Act*. Secondly the criteria make no reference to the condition of examples of the community. In relation to Commonwealth listing, Purdie (2003) has

recently argued that “Very highly disturbed remnants are generally not considered to be part of the communities listed under the EPBC Act”, while noting that “Although highly disturbed areas may not be part of the listed ecological community they can still be very important, especially where very little of the vegetation remains in good condition.”

I would argue that there needs to be a clear separation of the processes of identifying a particular stand as being of an endangered ecological community and the assessment of the significance of that stand. The *Threatened Species Conservation Act* amended the *Environmental Planning and Assessment Act 1989* by requiring that possible impacts of proposals on items listed on the Schedules of the *Threatened Species Conservation Act* be assessed during the planning process. The first stage of this assessment is the identification of possible significant impacts through the so-called 8-part test, subsequently there may be a requirement to examine these possible impacts in more detail in a Species Impact Statement (a Species Impact Statement can be prepared for populations and ecological communities as well as for species). If the condition of a stand were used to deny the occurrence of an endangered ecological community then the 8-part test would not be conducted. In my opinion this would be contrary to the intent of the Act. My view in this regard has received support from the Land and Environment Court. In *Plumb-v-Penrith City Council and Anor [2002] NSWLEC223*, Chief Justice Pearlman decided that Cumberland Plain Woodland (an endangered ecological community) occurred on the site in contention, but the question of the occurrence of the community (which had been debated) should be answered separately from that of its importance, and in that regard determined that an 8-part test would lead to a conclusion of no significant impact and hence a Species Impact Statement had not be required. As Purdie (2003) acknowledged, there may be circumstances when a highly degraded remnant of a community is of great significance, but it is difficult to encapsulate these as a universal rules embodied in the legislation. Rather the legislation has established a regime to allow each situation to be examined on a case basis, and this regime needs to be followed rather than evaded.

What does extinction of a community mean?

In order to be listed as endangered, a community must be in danger of extinction (or be already extinct).

For a species, the concept of extinction is straight forward. A species becomes extinct when the last individual dies – while in practice it may be very difficult to be certain when this occurs, there is no doubt as to the measure of extinction. For communities it is not so simple. If the sites of all the former stands of a community no longer support the community, nor provide opportunities for regeneration, then the community could clearly be said to be extinct. At the time of listing, the Eastern Suburbs Banksia Scrub (see Lambert 2004) was clearly close to this state. However, for most communities the threat is not one of being covered by concrete but of environmental

degradation (changed nutrient status, hydrology, invasion by weeds and feral animals) leading to loss of components of the original community, or preventing regeneration. If regeneration cannot occur, then the community is effectively extinct; even if sites remain vegetated, the integrity of the community has been lost.

Issues associated with community listing

Community listings have attracted a great deal of controversy and criticism, far more than has been generated by species and population listings. One of the reasons for this is that we lack an agreed community typology appropriate for the listing of endangered ecological communities, even if we restrict consideration to communities based on vegetation types. There are numerous approaches to vegetation classification; the appropriateness of any particular method depending on the use to which it is put.

Historically approaches to vegetation classification in Australia have utilized different attributes at different levels in the hierarchy. The upper level units have been defined structurally or physiognomically, the lower level units floristically, although often only canopy or dominant species are considered (see for example Beadle 1981). These approaches are appropriate for preparing large area vegetation maps, and for addressing a variety of natural resource management issues. The definition of community required by the Act gives absolute predominance to an “assemblage” of species, so in the case of plant communities this would require a floristic approach. This is appropriate in the context of an objective to promote biodiversity conservation. While in some instances there may be concordance between structural and floristic classifications this is not always the case. There is a long tradition in Europe of comprehensive floristic classifications (e.g. Ellenberg 1978, Westhoff and den Held 1969), but these classifications took many years to develop. The National Vegetation Classification of Britain (Rodwell 1991-2000) took nearly a quarter of a century to complete (despite the land area and size of flora being a fraction of that of NSW). Interestingly Rodwell (1991-2000) aimed to provide descriptions of communities, and while maps of the location of quadrats are provided there is no overall vegetation map. Clearly the listing of endangered ecological communities in NSW cannot await the completion of a comprehensive floristically based vegetation classification. The Scientific Committee will have to make assessments for communities originally defined on other than floristic criteria. The work required to obtain sufficient data, on a case by case basis, to characterize the assemblage of species occurring in a community may be considerable.

Criticisms of community listings have been many and varied but the main issues of contention have involved:

- the nature of the ‘assemblage of species’
- the nature of the ‘particular area’
- the assessment of likelihood of extinction.

Many of the issues have been addressed at length by the Court of Appeal in *VAW (Kurri Kurri) Pty. Ltd.-v-Scientific Committee (Established under s127 of the Threatened Species Conservation Act 1995)* [2003] NSWCA 297. (Henceforth referred to as *VAW*).

The total assemblage of species comprising any ecological community is unknown and, for all practical purposes, unknowable. A community will contain a range of taxa from mammals to viruses, many of which will have been uncollected and unnamed. Nevertheless, the Final Determination for the community will include a list of species whose presence can be used to recognize and delineate occurrences of the community. Measures taken to protect and conserve the community will benefit all the organisms within it, not just those included in the determination. Actions not specifically identified in the determinations, which might harm components of a community, for example spraying insecticide on a stand of an endangered ecological community for which the identifying species are vascular plants, would constitute damage to the community.

The lists of species provided in determinations are, in most cases, considerably less than the total number of species which have been recorded for any community. The lists are provided for a number of reasons. Firstly they provide evidence that the community has been defined by an assemblage of species, and that the assemblage is different from that in other communities. Secondly “the terms of the Scientific Committee’s final determination must enable a citizen to decide whether a specific location falls within it” (Chief Justice Spigelman in *VAW*). The list of species must enable the community to be identified. Unfortunately, not every citizen is able to identify species. In the case of fungi or lichens very few ecologists would be confident of their identifications, but in general, competent consultants and informed members of the public should be able to recognize and identify the species concerned. Few of the species mentioned in the determination will be restricted to a single community, it is the co-occurrence of species forming the assemblage that determines the distinctiveness of a community (see Westhoff and van der Maarel 1973). Nor is it a requirement that any of the species listed be themselves threatened. Some communities may contain no currently listed species, in other cases threatened species are so rare that they may occur in only a few stands of the community so that their inclusion on the list would not assist in the identification of most examples of a community.

A frequently-raised issue is how many of the species listed in determinations have to be present in order for a particular community to occur. In *Commonwealth of Australia-v-Randwick City Council* [2001] NSWLEC 79, the Commonwealth argued in relation to Eastern Suburbs Banksia Scrub that, “to qualify as ESBS, all 46 species of the Final Determination must be present.” However, “The Court rejects this construction of the Final Determination since it is unlikely that any ecological community would contain all 46 species.” Chief Justice Spigelman in *VAW* found that the preparation of a final determination “does not necessitate the enumeration of the minimum number

of species that must be found together to constitute the community” and also “that the wording of final determinations must be sufficiently flexible as to enable the protection of communities through periods of seasonal and climatic fluctuations.”

The number of species from the determination, and the total number of recordable species, in a stand may vary for a number of reasons, including size of stand, disturbance history and local environmental conditions. It would surely defeat the object of the Act if an example of an endangered ecological community could not be regarded as being part of the community immediately after a fire, when the species listed in the determination could not be identified as being present.

Listings of species apply throughout the State. Although a determination for a species may indicate a restricted known distribution, should that species subsequently be found in different locations then it is still an endangered or vulnerable species (as the case may be) in these new localities and all the consequences of being listed automatically apply.

In the case of endangered ecological communities and endangered populations the situation is different. The listing only applies to ‘a particular area’ as defined in the final determination. If a final determination understates the extent and location of occurrences, the occurrences beyond the boundary of the particular area specified in the determination are not included in the listing and it would be necessary to undertake a formal revision to create a new determination altering the boundary of ‘the particular area’.

In an ecological context the particular area occupied by a community is its habitat, and it would be possible to define this in terms of biophysical factors with varying degrees of precision. Determinations for communities include information on habitat but, although the Act does not include any definition of ‘particular area’, it is clear that merely to describe the distribution in terms of habitat is insufficient and that area requires a spatial geographic description.

The question then arises as to how restrictive the account of the geographic distribution of a community should be. Determinations tend to specify occurrence in bioregions, supplemented by local government areas in which the community is known to occur. In some cases the habitat of a community is so restricted in distribution that ‘the particular area’ is of very limited extent (for example Genowlan Point *Allocasuarina nana* heathland or the Hygrocybeae Community of Lane Cove Bushland Park), in other cases the ‘particular area’ may encompass one or more bioregions (for example White Box Yellow Box Blakely’s Red Gum Woodland).

It is of the nature of communities, just as it is of species, that extent of distributions vary – not all endangered species will be restricted to single localities, and not all endangered ecological communities will occur as a single patch. Examination of the overseas literature demonstrates that in this regard there is nothing unusual about the distribution patterns of communities in NSW.

(For example in the UK, *Erica vagans* – *Ulex europaeus* heath is restricted to the Lizard peninsula in Cornwall where it is associated with soils derived from a particular form of serpentine (Rodwell 1991), while *Calluna vulgaris* – *Scilla verna* heath is found on coastal headlands from Lands End to the Shetlands although, because of the specialized nature of the habitat, the total area is not large (Rodwell 1991)).

A frequent demand from property owners and local councils is that maps should be available of the distribution of listed communities, or that they should be defined by cadastral boundaries. In some cases maps may be available, but often published maps are inadequate to determine whether a particular community occurs on a development site. Vegetation maps at scales of 1:100 000 or 1:250 000 cannot accurately depict the occurrence of small stands of communities, and in any event maps are representative of the situation at the time their supporting data were collected. Changes in distribution occur over time so that maps would need to be checked by ground truthing to ascertain their continuing relevance. Chief Justice Spigelman found in VAW that there was no requirement in Determinations for “the provision of maps indicating where the community may be found”.

That a community is likely to become extinct is an opinion to be reached by the Scientific Committee. Clearly there must be grounds for reaching this opinion, but the fact that others might disagree does not invalidate the Committee’s opinion. In most instances submissions questioning the opinion have a narrower concept of what might constitute extinction than that discussed earlier in this paper.

Threatening Processes

Species, populations and communities are threatened in most cases because of the operation of particular processes, many as a direct or indirect result of human actions. The identification and listing by the Scientific Committee of Key Threatening Processes results in an obligation on the Government to develop and implement a Threat Abatement Plan. Successfully identifying and addressing Key Threatening Processes should provide a more effective and efficient means of achieving biodiversity conservation than implementing programs on a species by species (or community by community) basis without an understanding of the causes of decline to threatened status.

A threatening process is eligible to be listed as a key threatening process if, in the opinion of the Scientific Committee, it:

- (a) adversely affects 2 or more threatened species, populations or ecological communities, or
- (b) could cause species, populations or ecological communities that are not threatened to become threatened.

The requirement for listing of a Key Threatening Process is that it adversely affects species populations or communities. Depending on the particular entities threatened, a key threatening process may be widespread or localized in its operation. Although most listed

key threatening processes have been state wide one, ‘Predation by the Ship Rat *Rattus rattus* on Lord Howe Island’, is relevant only to a small part of the State.

Provisional listing

The final aspect of listing which needs to be discussed is provisional listing:

A species is eligible to be provisionally listed in Schedule 1 as an endangered species if, in the opinion of the Scientific Committee:

- (a) the species
 - (i) although not previously known to have existed in New South Wales, is believed on current knowledge to be indigenous to New South Wales, or
 - (ii) was presumed to be extinct in New South Wales but has been rediscovered, and
- (b) the species is not listed in Part 1 of Schedule 1.

The effect of provisional listing is that a species is immediately entered on the schedules, without the processes of provisional and final determination. Subsequent to provisional listing, which lapses after a year, the ‘normal’ avenue of advertising a provisional determination to seek submissions and then the making of a final determination must be followed. Only species can be subject to provisional listing, there is no mechanism for the emergency listing of populations or communities.

Discussion

The *Threatened Species Conservation Act 1995* has been operating since the start of 1996. During that time a large number of nominations have been assessed by the Scientific Committee (see Dickman 2004). The diversity of sources of nominations is a measure of the success of the Act in tapping the wealth of community knowledge of biodiversity. A process that relied only upon existing “official” sources of information would have been unlikely to have resulted in determinations for fungi, a lichen community or most of the now-listed invertebrates.

The schedules are far from comprehensive, and for many groups of cryptogamic plants and invertebrates, the depth of our ignorance is such that it will be very many years before we can make judgements as to which individual species are threatened. If these species are to be conserved, we cannot wait for listing and the implementation of individual species recovery plans; if the *Threatened Species Conservation Act* is to work in these cases it will be through Threat Abatement Plans addressing Key Threatening Processes (see Leys 2004), or recovery plans for Endangered Ecological Communities (see Auld and Tozer 2004).

Even for what are considered the better known taxonomic groups, vertebrates and flowering plants there will be many changes to the schedules, some arising from the discovery of species new to NSW, others from a reassessment of the status of long known species. Amongst the flowering plants the distribution of threatened species is uneven

both taxonomically and geographically (Mokany and Adam 2000, Adam 2002). Whether the patterns are 'real', reflect under recording or result from inadequate assessment of data remains to be determined.

Burgman (2004) has argued that the decision-making process leads to uncertainty as to the status of species, given differences of opinion between experts. The degree of uncertainty may, however, depend on the complexity of the assessment process. Under the *Threatened Species Conservation Act* the number of categories of threat status is limited (non threatened, vulnerable, endangered for species; non threatened, endangered for populations and ecological communities, the greater number of categories in the schemes discussed by Burgman may promote variation in opinions. In the context of a legislative scheme, simplicity is desirable. A more complex scheme may be appropriate in prioritization of management actions, but it is debatable whether such a scheme should be embodied in legislation.

The mechanisms for reviewing the schedules, including through nomination for amendment or delisting, provide means by which perceived uncertainties in the listings.

The great majority of listings by the Scientific Committee have attracted little controversy. Some ecological community determinations have been extremely controversial, but a number has passed through the process to listing with little public comment. The whole concept of ecological communities is still regarded with suspicion in some quarters. In many cases there will be a need to determine the application of listings in the field on a case by case basis and there may be residual

uncertainty as to the exact boundaries of stands of particular communities. The Court of Appeal in VAW recognized there was an inherent 'uncertainty' associated with community determinations but that this need not be such as to invalidate determinations. [Chief Justice Spigelman "The intricacy of all ecological communities means that some indeterminateness is bound to arise from the form of expression used to describe them". Justice of Appeal Hodgson "It is plain therefore that a certain amount of vagueness and uncertainty in the determination of boundaries of ecological communities is an inevitable result of formulations chosen by the legislature. It must follow, in my opinion, that a certain amount of vagueness and imprecision will not necessarily cause a determination that a named ecological community is an endangered ecological community to be regarded as void or invalid because of uncertainty or lack of definition]. This does remove from the Scientific Committee the obligation to make its determinations as clear, precise and unambiguous as possible, but it does mean that the absolute certainty demanded by some critics is unrealistic and based on misunderstandings as to the nature of ecological communities.

The listing process is an essential step in developing conservation measures for species populations and ecological communities, but of itself does not guarantee successful conservation outcomes. The real measure of the success of the *Threatened Species Conservation Act* – whether it is indeed more than just an act – will be in the reduction in threats to biodiversity and in the success of *in situ* measures to improve the conservation status, in the wild, of elements of biodiversity.

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Postscript 24 September 2004.

At the time of going to press the *Threatened Species Legislation Amendment Bill* 2004 was before Parliament. The bill will amend the *Threatened Species Conservation Act* 1995 and the *Fisheries Management Act* 1994. The amendments, if passed, will substantially alter the operation of the *Threatened Species Conservation Act*. The Bill will make provision for biodiversity certification, by the Minister for the Environment, of the native vegetation reform package and of environmental planning instruments, EPIs. (EPIs include a range of plans, but the most important in this context will be local government Local Environmental Plans, LEPs). The Minister may grant biodiversity certification where an EPI seeks to promote conservation of threatened species. Where certification is granted, development or an activity permitted by the EPI will be deemed not likely to significantly affect threatened species, thus removing the need to address the significance of possible impacts for threatened species and the need for preparation of a species impact statement. Importantly certification would potentially remain in force regardless of changes in the Schedules of the TSCA. The government has put in place new bodies which will be the major players in the application and policing of natural resource management with the establishment of thirteen independent Catchment Management Authorities and the Natural Resources Commission. The existing requirements for the preparation of recovery plans and threat abatement plans will be replaced by new provisions for the Director-General of the Department of Environment and Conservation to prepare and adopt a Threatened Species Priorities Action Statement, which will set priorities for the recovery of threatened species and for the abatement of key threatening processes. The Bill seeks to establish new categories of critically endangered species and ecological communities and foreshadows regulations which will set criteria to be met for listing under the various schedules. Provision is also to be made for an extra step in the listing process, by which the Scientific Committee would inform the Minister of an intent to make a final determination, and the Minister could refer the matter back to the Committee for further consideration. The ultimate decision would, however, remain with the Scientific Committee.

The intent of the most of the changes is said to be to give greater certainty in land use planning. Whether this will be the practical outcome, and whether it can be achieved at the same time as satisfying the core objective of the TSCA of conserving biodiversity remains to be seen. A few years hence a future symposium may be required to critically analyse the outcome of the new statutory regime.