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Invertebrate Conservation News

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INVERTEBRATE CONSERVATION NEWS

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No. 56, June 2008

EDITORIAL

Humankind seems always to have experienced famine in one part of the world or another, even when food has globally been in surplus. For a variety of reasons, the global surplus now seems to be disappearing. These include the increasing human population, an increasing diversion of foodstuffs into meat production, the use of agricultural land for bio-fuel farming, soil degradation and an increasing frequency of unfavourable weather. In the face of these changes, there is clearly a need to overcome human hunger, but this should not overshadow the need to conserve biodiversity.

Attempts to increase food production and the adoption of bio-fuel farming are likely to have far-reaching consequences for invertebrate populations. There will, in particular, be an increased use of relatively infertile land, where cash-crop production has until now been economically marginal and where there has therefore been room for wildlife to flourish. Also, in areas where agriculture has previously not been intensive, it is likely to become so, with a resulting loss of habitat niches and an increased use of pest control methods. Tropical forests are also increasingly being felled to make way for oil palm plantations. The oil is being used not only for conventional uses in various food and non-food products, but also as bio-fuel.

In some parts of the world, a proportion of agricultural land has, at various times, been set aside so as to control food surpluses and hence maintain prices. In the European Union (EU), all set-aside land has recently been returned to food production so as to meet the increased demand. This will probably lead to a loss of species-abundance, since set-aside land was evidently supporting large populations of a limited range of invertebrate species.

In the UK and other EU countries, there is a further factor that seems to be acting against biodiversity, i.e. food prices have increased to the extent that various agri-environment schemes have become less attractive to farmers. Such schemes had been offering some prospect of improving farmland biodiversity.

The increased use of genetically modified (GM) crop varieties is likely to be another consequence of the need to produce more food for people. As discussed in previous editions of *ICN*, the use of such varieties is of some concern with regard to invertebrate conservation. In particular, if genes are introduced into the crop variety so as to make it toxic to insects, these genes can be transferred to wild plants with which the variety is able to inter-breed. This is especially likely to happen with members of the cabbage family (Brassiceae). The wild plants then become toxic to non-target species of dependent invertebrates. Even if interbreeding cannot occur, there is some concern that invertebrates which feed directly on crop plants but are not pests will be harmed by the use of GM varieties. Also, the pollen from GM crops could be toxic to invertebrates that feed on it.

Although non-target invertebrates can be harmed by the use of certain kinds of GM crops, this does not mean that GM crops are always bad as far as conservation is concerned. Thus, if the GM varieties do not require pesticide sprays, there could be an enhanced survival of various kinds of non-pest invertebrates that would otherwise be harmed by spraying.

According to general principles, the increased diversion of natural resources towards the production of food and fuel for humans seems likely to harm invertebrates and other wildlife. There is, however, much scope for adopting cropping systems that can co-exist with wildlife habitats. It is therefore important that such systems should find favour with the governmental and other agencies which are now seeking to overcome the world food shortage.

NEWS, VIEWS AND GENERAL INFORMATION

Climate change threatens unique Antarctic marine invertebrates

In 2004, two Brazilian research workers, Marcus Tavares and Gustavo De Melo, published the first record of the North Atlantic spider crab *Hyas araneus* in the waters around the Antarctic. Both in the original report and in a number of reviews that have been published more recently, concern has been expressed about the potential impact of invasive species on the unique low-temperature marine fauna of the Antarctic Southern Ocean fauna. The Antarctic fauna is considered to be especially vulnerable, since it has developed over millions of years in the absence of aggressive predators such as *H. araneus*, which attack their prey by crushing shells or skeletons.

A review by a British and American group (Aronson *et al.* (2007) considers the mechanisms by which the Antarctic fauna has apparently been isolated from the faunas of warmer waters. The low temperature of the water, which is thought to have prevailed for at least 25 million years and perhaps for 33.5 million years in the eastern Antarctic, is a major factor in excluding various predatory taxa and thus allowing the survival of relatively fragile life-forms, including many suspension feeders, in relatively shallow (< 100 m) waters. In this unique assemblage, which has affinities with fossil faunas, slow-moving invertebrates are generally the top predators. The taxa include giant sea spiders, brittle stars, and marine pill-bugs. More familiar marine predators, including fast-moving, skeleton-crushing bony fish, sharks, and crabs, are rare or absent.

The last 2.5 million years have brought a series of Pleistocene glacial periods, during which the extent of sea ice and of very cold water has been greater than at present. The glaciations have restricted the fauna still further, so that it now comprises only cold-adapted species. Various species from warmer waters might in theory be able to re-colonise Antarctic waters, but the circumpolar current tends to act as a barrier which prevents this from happening. The current is believed to have started flowing about 25 million years ago, as the ocean widened between Antarctica and the other fragments of the earlier southern continent (Gondwana) to which it had been attached.

The current threat from invasive species is due to two aspects of human activity. First, the juvenile stages of such species can be transported in the bilge-water of ships. Second, an increase in water temperature, attributable to global warming (and thus arguably to anthropogenic emissions of greenhouse gases), is increasingly

providing conditions under which the invasive species could survive. As far as *H. araneus* is concerned, the temperature is already favourable in the relatively deep waters off the Antarctic Peninsula, where the complex effects of the ocean current maintain a temperature slightly higher than in the shallow waters where the unique fauna exists. There are, however, fears that continued warming (perhaps with concomitant weakening of the circumpolar current) will enable *H. araneus*, and perhaps other potentially invasive species, to thrive in the shallower regions and thus to disrupt the fauna.

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New guidelines on the feeding of invertebrates to captive bats

Several months ago, an AES member reported that a county bat group in southern England had been feeding wild-caught moths to bats that were being rehabilitated in flight cages prior to release. The member felt that this was not a good practice and initially expressed concern to the bat group, but she evidently received a dismissive response.

It does not of course necessarily follow that the population of a moth species will be harmed by feeding a proportion of it to bats. If, however, the proportion is large, there is potential for harm, just as if an entomologist kills the entire catch from a light trap. Thus, according to the precautionary principle, any unnecessary mass killing of invertebrates ought to be avoided, especially if the species concerned (like many British moths) has been showing a steep decline in its population. Guidance against mass killing is included in the code of collecting to which all the main UK invertebrate societies subscribe (Invertebrate Link, 2002).

Apart from specific concerns about possibly contributing to the decline of moth populations, it is arguably bad in principle to interfere with wildlife by feeding wild-caught specimens of one species to captive specimens of another, even if those species have a predator-prey relationship in the wild. Also it is highly desirable for everyone who collects invertebrates in the UK to do so in a way that accords with the Invertebrate Link code (*op. cit.*, 2002). If people whose main

interest is in vertebrates are seen to be flouting the code, their actions might lead invertebrate-fanciers to feel that they are wasting their time by conscientiously complying with it. In this context, it is highly paradoxical that some people vindictively persecute entomologists for taking voucher specimens.

In recent e-mail correspondence about the feeding of bats, some concern was expressed about the ecological implications of artificially boosting bat populations by rearing orphaned juveniles or rehabilitating injured adults. Some of the bat species concerned might be under threat from human activities, so that there would be justification for nurturing individuals that would otherwise die. Also, people understandably feel compassion for vertebrates, which can suffer pain or distress. There is, however, a need to justify any actions that could in principle interfere with the interactions between populations of predators and their prey.

Ecological considerations aside, if orphaned or rehabilitated bats are released into the wild, they require practice at catching flying insects; hence the use of flight cages into which insect-prey is released. Presumably, the insects ought to be species that are normally eaten by the species of bat concerned. As pointed out by AES Conservation Committee member Dafydd Lewis, published information indicates that a high proportion of British bat species feed mostly on insects other than Lepidoptera (Emmet & Langmaid, 2002). For example, only 3% of the natural diet of the Pipistrelle *Pipistrellus pipistrellus*, Daubenton's (*Myotis daubentonii*) and Natterer's (*M. nattereri*) bats has been found to consist of Lepidoptera. Among seven other bat species listed, only the Barbastelle *Barbastella barbastellus* is listed as feeding predominantly on Lepidoptera.

Following the concerns that were raised, discussions took place between the Bat Conservation Trust (BCT) and other organisations, including Natural England, the Countryside Council for Wales, the Joint Nature Conservation Committee, local bat group members, Butterfly Conservation, Buglife and the AES. As a result, BCT has issued the following guidelines to bat carers.

- BCT advises against the indiscriminate trapping of wild invertebrates for bat rehabilitation.
- Native, captive-bred species should be used where possible, and steps should be taken to prevent individuals from escaping into the wild. Non-native species should not be used, because these could disturb local wild populations of insects if they were to inadvertently

escape. (Native species are available commercially. If fed sugared water or kept in a fridge until required, they should survive for several weeks as adults.)

- In exceptional situations, where experienced bat carers feel that the use of captive-bred insects is not feasible, carers should seek the advice of national or local invertebrate conservation groups and/or local invertebrate recorders, regarding whether limited trapping of wild invertebrates would be appropriate for that specific locality; that is, ensuring that it would have minimum impact upon the local populations of moths and other invertebrate groups.
- If, as a result of consultation with invertebrate conservation groups and/or invertebrate recorders, trapping appears feasible, further advice should be sought on methodology. For example, on the positioning of the flight cage, the type of bulb used and the timing of trapping.
- Bat carers should also seek to have an experienced entomologist present during any trapping that takes place. This is to ensure that, should they be caught, any scarce, rare, nationally threatened and/or locally threatened species are correctly identified and released into the wild, unharmed.

On a related matter, it is interesting to recall an article in *ICN* No. 9 (April 1984), regarding a practice in Chinese paddy fields whereby moths are captured in vast numbers in light traps and then fed to pigs. Enquiries indicated that the moths concerned are mostly pest species and that they are trapped only during their peak emergence periods. Also, it can be argued that they will have been feeding on the rice crop anyway and that it makes sound practice to put them back into the human food chain.

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Principles for legal protection of invertebrate species by law

Any laws intended to protect invertebrate species in the wild ought to be based on appropriate principles. Such principles are set out in a new document, produced by Invertebrate Link, the UK's umbrella-group for organisations involved in invertebrate conservation. The document replaces an earlier unpublished version, which dated back to 1992.

The document examines the reasons why there may sometimes be justification for imposing legal controls on the killing or taking of invertebrates from the wild. It explains why such controls are not appropriate for the great majority of species. As such, it is largely consistent with the approach that has been taken by the regulatory authorities in the UK, even though there are sometimes differences of opinion over individual species. In many other countries, however, indiscriminate 'blanket' legislation has been enacted, thus criminalising anyone who takes or possess specimens of invertebrates without a licence.

The new document is being formally published this year in the British Journal of Entomology and Natural History. The editor of the journal, John Badmin, and the Chairman of Invertebrate Link, Oliver Cheesman, have kindly given permission for the statement to be reproduced in full in this edition of *ICN*. It appears below under the heading 'Special Feature'.

SPECIAL FEATURE

Invertebrate Link (JCCBI)

Statement on the appropriate role of legislation in controlling activities likely to harm specified taxa of terrestrial and freshwater invertebrates, with particular reference to taking and killing

1. Purpose and scope of this statement

This statement is intended as guidance for everyone with an interest in laws intended to protect specified taxa of terrestrial and freshwater invertebrates in the wild. It sets out basic principles and emphasises the need for legislation to be based on reliable evidence. Paragraphs 2 and 3 refer to the principles that should be taken into account when considering legal measures to protect particular invertebrates, whether by safeguarding their habitats or by any other means. Paragraph 4 sets out criteria for deciding whether particular invertebrate species should be scheduled for protection in relation to taking or killing. Additional control over these activities should be promoted through voluntary individual restraint, so as to fulfil a proper degree of personal responsibility towards invertebrates in the wild (for example, as represented by this Committee's publication "A Code of Conduct for Collecting Insects and Other Invertebrates".

2. Potential reasons for enacting legal controls

Arguments for legal protection of particular invertebrate taxa in the wild could be advanced for various reasons, including:

- The occurrence of activities likely to result in extinctions of the species concerned
- The need to protect habitats and ecosystems where those species occur
- Support of conservation management objectives at particular sites
- Regulation of the use of natural resources (e.g. for commercial exploitation)
- The upholding of moral values in human utilisation of wildlife

3. Practical reasons for ensuring that legislation is kept within bounds defined by reliable evidence

- For the conservation of invertebrates, the protection of habitats is generally more important than that of specified taxa. This is even more the case than for vertebrates, whose populations generally can be harmed more by the killing or taking of individuals. Legislation needs to reflect this balance proportionately.
- Invertebrate conservation depends on knowledge gathered by naturalists and scientists, who may need to take specimens for identification and study. There is a need to foster a climate in which this work can be done and be taken up by new generations without needless discouragement or impediment.
- Inappropriate laws may impede not only the study of invertebrates in general but also the conduct of particular studies, which are essential for conservation (e.g. the recording of species covered by the UK Biodiversity Action Plan) or environmental monitoring.
- The implementation of laws is costly for government agencies, and imposes a frequently unfulfilled need to apply the law correctly and consistently. There is a cost also to voluntary organisations which are, for example, effectively required to ensure legal compliance by people using their facilities. Bad laws can unnecessarily divert resources away from worthwhile work, which could help to conserve invertebrates.

4. Criteria for deciding whether any particular species should be scheduled for legal protection with respect to taking or killing in the wild

The central criterion is as follows: that, according to all reliable evidence, these activities would significantly increase the risk of any of the regionally, nationally or internationally important populations of the

species becoming extinct. In this context, the scale and purpose of the activity should be taken into account, so as to decide the exact nature of the legal protection (if any) that is judged to be appropriate. For example, taking large numbers of specimens for trade or killing numerous individuals as an incidental result of site development is likely to be far more harmful than the removal of small numbers of specimens for study or for the development of personal collections. Each of the following questions should be addressed, where relevant, and according to the best available information:

- Current status and geographic distribution of the species
- Is the species known to exist only in very few, small populations within the country or region concerned?
- Are its populations in serious decline on a regional, national or international scale?
- Do its populations within the country concerned represent a highly significant part of its international distribution?
- Resilience/vulnerability/viability of populations
- What is the likely minimum size from which the population could permanently recover following a low point?
- How quickly might a population recover from a low point (e.g. on the basis of fecundity, generation time and survivorship)?
- What is the inherent ability of the species to found new colonies (re-establishment potential)?
- If a local population were to become extinct, what effect would this probably have on the viability of any wider metapopulation?
- Ease of collection, attractiveness to collectors and side-effects of collecting
- Is the species easily collected?
- Is it likely to be collected?
- Is collecting pressure likely to contribute a significant risk to population viability?
- How vulnerable is its habitat to damage in the course of collecting?

If the above questions cannot be answered on the basis of reliable evidence, such evidence should in principle be sought before proposing any legal protection for the species concerned. If, however, this is impracticable and if there are strong circumstantial indications that the activities under consideration are placing the species at serious risk (or would soon do so), there may be a case for invoking the precautionary principle.

5. Consultation

Detailed consultation with all appropriate organisations should begin at the preparatory stages of any legislation. In the UK, these include all the national organisations concerned with the study or conservation of invertebrates and the forum to which they belong, namely Invertebrate Link (JCCBI).

SITES AND SPECIES OF INTEREST

Captive breeding of Pearl mussel in Wales

As mentioned in *ICN* No. 48, there is a recovery programme for the freshwater pearl mussel *Margaritifera margaritifera* in Wales. This bivalve mollusc can live up to 100 years and grow to 12 cm (4 inches) in length. Fertilisation of the eggs by water-borne spermatozoa takes place within a pouch in the gills of the adult female. The eggs hatch into tiny free-swimming larvae called glochidia, which can continue their life cycle only if they are drawn into the gills of young stages of suitable fish species. They encyst on the gills of the fish and grow as ectoparasites, without apparently harming the fish. During the following spring, they drop off and begin their lives as filter-feeders on the river bed. The success of a recovery programme can be assessed only partly in the short to medium term, since the young mussels take 12 to 15 years to reach sexual maturity.

The recovery programme in Wales is being undertaken by the Countryside Council for Wales (CCW), by means of a captive breeding programme, taking adult mussels under licence from the Rivers Conwy, Dee, Ddu and Eden. Initial success depended on the establishment of encysted juvenile stages in the gills of fish. Adrian Fowles of CCW has recently reported that there was successful encystment in four rivers in 2007. Meanwhile, the juveniles that were bred in the first year of the programme are now into their third year. Several thousand of them still survive, despite expected mortality.

It is anticipated that wild-caught fish that have been infected in the hatcheries will be released into one or two rivers this year as another element of the strategy to restore mussel populations to Welsh rivers. Meanwhile, a research project is under way in collaboration with Cambridge University. This involves a review of captive-breeding techniques so as to help optimise future practice.

UK: Species-amendments to Wildlife and Countryside Act

Schedules 5 and 8 of species protected under the above UK law, enacted in 1981, are reviewed every five years. The fourth review (which was long delayed) has produced only one change in the listing of invertebrates; i.e. the addition of the Roman snail *Helix pomatia*. Thus, with effect from 6th April 2008, it is a criminal offence intentionally to kill, take or injure any wild-caught specimens of *H. pomatia* or to possess or offer them for sale. In the UK, this species is localised, rather than rare, but it has reportedly been heavily targeted for culinary use. Since this activity could be unsustainable for such a sedentary species, there were few dissenting voices against the argument for full protection.

Defra, the government department which implements the 1981 Act, considered recommendations to add two burnet moths to Schedule 5: the Slender-Scotch *Zygaena loti* and the Talisker (or Narrow-bordered five-spot) *Zygaena lonicerae jocelynae*. Since the UK populations of these moths occur only in the Inner Hebrides, Defra saw no conservation benefit in prohibiting their killing, taking or injury in England. In any case, such measures could have been justified only if there had been sound evidence that the populations were currently threatened by these activities. Several member-organisations of Invertebrate Link, including the AES, had argued that such evidence was lacking, but they had supported a proposal to prohibit the sale of specimens of these moths. Defra has indicated a future willingness to implement this provision, but only if the Scottish Government decides in favour of it.

Endangered tiger beetle on American beaches

Populations of the Northeast beach tiger beetle *Cicindela dorsalis*, a North American species, have declined greatly in the last 100 years. The beetle was once commonly found along sandy beaches from Massachusetts southwards to Chesapeake Bay, but there is now only one viable population: north of Chesapeake Bay on the island of Martha's Vineyard. It was listed under the federal Endangered Species Act in 1991.

The beetle used to occur in an area known as Fire Island, which was acquired by the US National Park Service in 1964. The island is subject to management plans for ten endangered species including *C. dorsalis*. It is the only one of the ten species not currently present on the island, having been last recorded there fifty years ago. It is thought to have

become extinct at that time due to construction on the island. When the area became protected, construction was halted and existing property owners were required to leave. Also, cars have been excluded from various areas at certain times of the year, so that the potential habitat is now less disturbed. If the beetle were to re-colonise the island, the authorities would be obliged to exclude people from a 32-mile (53 km) stretch of beach, which currently receives 6,293,000 visitors each year. There is therefore much concern about the liberties of people, versus the protection of the potential habitat from disturbance.

The concern has been prompted by the intention of federal biologists in the US Fish and Wildlife Service to re-introduce the beetle to a suitable area of coastline in the north-eastern USA. They are therefore breeding it at Gateway National Recreation Area at Sandy Hook, New Jersey, where re-introduction trials have been successful. They have denied any intention to release specimens at Fire Island, but local people are concerned that the species could spread to the island after becoming re-established elsewhere. It can reportedly fly up to 70 miles (120 km), and so this seems possible.

Although there is cause for conflict, the need to exclude people from the beach would not apply if the conservation status of beetle were to improve sufficiently for it to be removed from the Endangered Species list. A biologist is quoted as saying that this could be done when there had been a peak of 500 adults in a colony and three colonies in the North-eastern USA.

News of Galápagos biocontrol trial of invasive mealybug

The Cottony cushion scale insect *Icerya purchasi*, an Australian native, has colonised thirteen islands in the Galápagos since its first appearance there in 1982 and is now killing approximately 19 plant species, including the white mangrove and five endangered species.

As mentioned in *ICN* No. 39, the Australian ladybird *Rodolia cardinalis* was released experimentally as a biocontrol agent at selected sites in Santa Cruz Island in the Galápagos, following a painstaking study to assess the risks of doing so. The release took place in 2002 and has been followed up by a report from the Charles Darwin Foundation. This states that the release of *Rodolia cardinalis* was successful and had contributed to the significant decline in the mealy bug populations in most of the release sites. Also, *R. cardinalis* was also recorded on Baltra Island, indicating its establishment and active

spread from Santa Cruz Island. The foundation also reports that its scientists are successfully controlling the introduced fire ant *Wasmannia auropunctata* on Marchena.

Endangered snail in Iowa, USA

The Iowa Pleistocene Snail *Discus macclintocki* is thus named because it was once thought to exist only as a fossil from the glacial periods of the Pleistocene. In the 1950s, living specimens were discovered in areas of Iowa and Illinois with a micro-climate that has allowed this formerly widespread species to survive locally into the current interglacial period. It is a small species, about 6 mm in diameter, with a brown or greenish-white shell.

The snail's habitat is amongst leaf litter on algific, mostly north-facing talus slopes, where the conditions remain cool and moist due to the flow of ice-cooled air and water from cracks in the ground. The ground temperature remains below 13°C (55°F) in summer and above -10°C (14°F) in winter. The snail cannot survive above 2°EC (75°F). There are about 30 sites where natural air-conditioning has enabled the species to survive. They lie within the Driftless Area, so-named because it was bypassed by glaciers that deposited drift in surrounding regions during the last 50,000 years.

Climate change clearly poses a long-term threat for a species which is confined to relatively few sites with a special micro-climate. Other threats, which are affecting populations in the immediate term, have also been identified. For example, logging removes shade and thus increases summer temperatures. Trampling by humans or livestock leads to erosion, which clogs up the natural ventilation cracks. There are threats also from quarrying, invasive species and the mis-application of pesticides.

In view of its conservation status, *D. macclintocki* was listed as an endangered species in the USA in 1978. Under the species recovery plan, the Driftless Area National Wildlife Refuge was established in 1989. It comprises scattered parcels of land in north-east Iowa with a total area of 775 acres (315 ha), in which there are colonies both of *D. macclintocki* and a rare plant known as the Northern monkshood. There are also a further eight glacial relict snail species in the area, including the Mid-west Pleistocene vertigo (*Vertigo hubrichti hubrichti*), some of which might be more rare than *D. macclintocki.*

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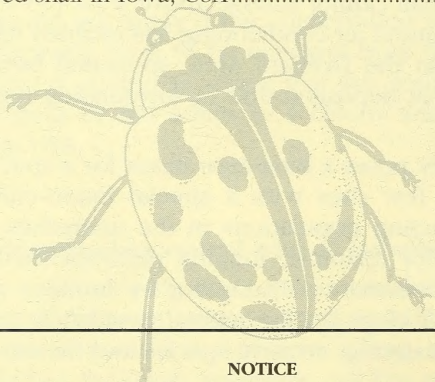

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