News and views

Grizzly problems

From the 1890s until 1969 Yellowstone National Park's grizzly bears *Ursus arctos* flourished as a result of feeding at the park's rubbish dumps. Scientists, John and Frank Craighead, who had launched a long-term study of the bears in 1959, argued that the dumps had bolstered the nutrition of the bears and had kept them safe inside the park's boundaries. When the dumps were finally closed as part of a new approach, to restore natural balances, many grizzlies died.

Many of the bears were killed by wildlife rangers because, deprived of their habitual dumps, they repeatedly raided camp sites. Others left the park in search of food and were killed by state agencies, in car accidents or by poachers. The Craigheads estimated that 150 grizzlies were lost in the five years following the dump closures. The Craigheads were joined by many people who wanted to supplement again the diet of the grizzlies in Yellowstone.

The National Park Service, at first confident that bears would redistribute and recover, is now also expressing concern at the grizzlies' decline. There are fewer than 200 left, half of those are immature and only 30 are adult females. Although there is still disagreement over the causes of this decline there is concerted concern over the drop in the reproductive rate. In the 1960s average litter size was 2.2 cubs; between 1975 and 1982 it was 1.9. This change has most often been attributed to poor nutrition.

A task force was appointed at the beginning of 1983 to consider the possibilities of initiating a supplemental feeding programme. Almost a year of deliberation resulted in the final report in December recommending against supplementary feeding for the immediate future, mainly because it should not become a substitute for proper management of habitat and human activities inside and outside the park. The Interagency Grizzly Bear Committee accepted this report, but is still greatly concerned over the welfare of the Yellowstone grizzly, especially because of the high level of poaching and accidental killings.

Meanwhile the closing of Fishing Bridge, a large trailer camp, which is considered an essential step as far as helping the grizzlies is concerned, is being hampered by strong opposition by some groups concerned with recreational use of the park. The camp site is in the heart of the park's best grizzly habitat. As a result, since 1968, 10 of the park's 16 grizzly-related human injuries have occurred there and 102 of the 272 grizzly relocations since 1968 have involved bears near Fishing Bridge. Nearly a quarter of all bears removed from the park in the same period were from this habitat and six adult females have been lost. In addition, an unknown number of grizzlies are deterred from using the area by the large amount of human activity.

Yet another problem looms in plans for a ski resort whose boundaries would be a mere 12 miles from the west entrance to Yellowstone. Of its 2900 acres, 1800 would be on national forest land. It is expected that the resort would draw 3000–6000 people and there are plans for hotels and private houses and apartments. When plans were first submitted in 1977 a study revealed no evidence of grizzlies using these forest lands, and after a review of the study in 1984 the Forest Service gave the ski project the go-ahead by issuing a special use permit. According to new information there are now four male and three female radio-collared grizzlies in the forests and a new study is being made. If the results of this suggest that the endangered grizzly is indeed further threatened by the development there is no guarantee that the Forest Service would rescind the permit and yet another threat would be added to a list that is already far too long.

The golden slipper orchid of Yunnan

The golden slipper orchid *Paphiopedilum armeniacum*, first described in 1982, may now be almost extinct in the wild. Within two years of its existence being made known to the scientific world enormous numbers had been collected from its only known location, a limestone mountain in south Yunnan. Phillip Cribb, Curator of the Orchid Herbarium at the Royal Botanic Gardens, Kew, reports in *The Garden* (**109**, 9) that he saw 200 specimens in nurseries and collections in California, two of which had already flowered by the end of January 1984. The California plants are no doubt only a proportion of those collected

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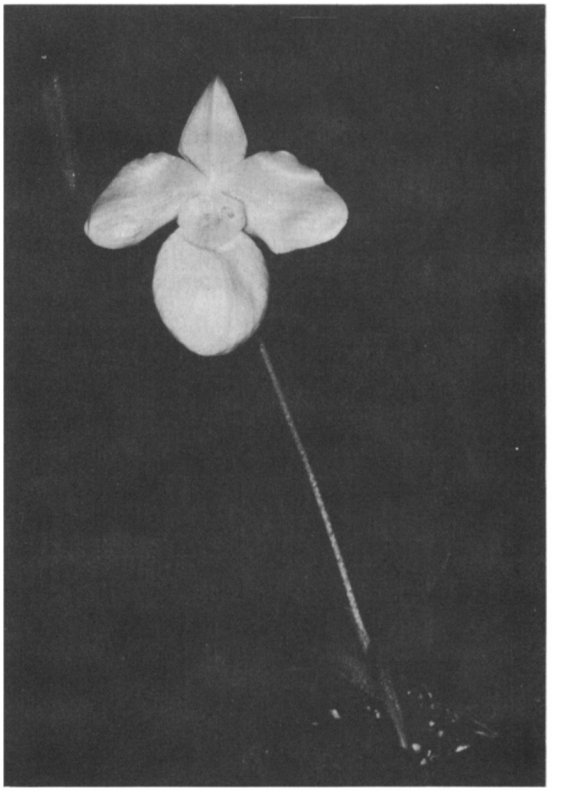
from the wild; individuals are also on sale in Taiwan, where the plants now in the USA originated, Japan and the UK—at £150 each.

The golden slipper orchid is closely related to the pink-flowered *P. delenatii,* which is now known only in cultivation, all specimens having been derived from one plant collected from Vietnam in 1924. It has not been seen in the wild since. It may be already too late to save the wild population of the golden slipper orchid, but Phillip Cribb urges orchid growers to try to produce seed so that at least the species can be multiplied in cultivation.



Golden slipper orchid *Paphiopedilum armeniacum:* is it extinct in the wild? *(P.J. Cribb).*

Pall of poison: the 'spray drift' problem

When crops are sprayed in Britain using spray-booms mounted behind tractors only a small proportion of the spray ends up on the target plant. This is because the hydraulic nozzle produces a wide range of droplet sizes; the large ones roll off the plant and pollute the soil and the very small ones remain in the air to be carried away by the breeze, a phenomenon called 'spray drift'. When spraying is done from aircraft the drift problem is ten times worse. In addition, vapour drift occurs when some chemical sprays, especially ester formulation herbicides, volatilise several days after landing on crops or soil.

Spray drift damage to crops is the most deeply investigated effect; most of this is due to hormone herbicides, used on cereal crops to control broad-leaved weeds, blowing on to vegetable crops. Many other chemicals are involved; the agricultural chemical industry has spent the last 30 years developing progressively more lethal pesticides. Livestock has been affected too; there have been several successful claims recently against farmers responsible for spray drift damage to sheep and cattle. Bees and other insects, many beneficial, are killed by being caught in the spray or by feeding on treated plants. There must too be an immense amount of damage, largely unrecorded, occurring to wildlife habitats, especially to hedgerows.

Recent studies have shown that at least 20 per cent of the spray volume dispersed by the kind of nozzles in current use is carried away by the wind; this means that every year in Britain 200 million gallons of poisonous chemical solutions are released into the air. There have been recent encouraging developments in spraying technology. Notably, controlled drop application (CDA) produces a much narrower band of droplet sizes and, properly applied, it has the potential of eliminating dangerously small droplets and also of drastically cutting down the amount of chemical needed.

There has been, however, enormous resistance to CDA by the industry and in some official quarters, despite favourable reports from farmers experimenting with the technique. Perhaps this is to be expected; the greater efficiency of CDA, if widely adopted, would mean smaller profits for the agricultural chemical industry. Under the Pesticides Safety Precautions Scheme (PSPS) the chemical companies recommend the minimum amount of any given chemical to be used in crop treatment. The proposed UK Pesticides Bill included a provision for these PSPS instructions to be enshrined in law. This would have meant

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that farmers using CDA and thus less chemical, would have been breaking the law. However, as a result of the Soil Association's report *Pall of Poison* there was a wide debate on the efficacy of the new CDA technology and the Minister of State has now announced that there will be no restrictions on the minimum use of pesticides in the forthcoming Pesticides Bill. A 'small but useful victory' concludes a report in the Soil Association's *Quarterly Review* (December, 1984).

The anti-eucalyptus movement

In the Western Ghats of Karnataka a grass-roots movement, the Apiko, has sprung up to protest against the Indian Government's afforestation projects using *Eucalyptus* species. It began, according to a report in *The Ecologist* (**14,** 4) in August 1983 with farmers marching to a nursery at Holatalli and pulling out all the eucalyptus seedlings, inserting tamarind seeds in their place. A few days later another group of farmers from Neginahalla village pulled out eucalyptus saplings from a forest nursery at Buddhigavi. When the farmers were arrested local villagers turned out to support them.

The Apiko movement, which can be compared to the tree-hugging Chipko movement, reflects a growing awareness amongst farmers, villagers and scientists that eucalyptus plantations deplete water resources and soil fertility, and increase soil erosion. Two of the scientists involved claim that the large-scale expansion of eucalyptus monocultures on food-producing land in India, which the Government promotes by distributing free seed to farmers, is a failure. The plantations fail to serve the needs of local communities—the wood is used to supply resource-starved commercial pulp-based industries—and accentuate the food crisis by taking up valuable food-growing land.

Although the scheme was meant to be a support for agriculture, *Eucalyptus* spp. are not useful in agroforestry, which involves the intercropping of trees with field crops, because of their high moisture demand and their tendency to produce toxins in the soil.

It seems that the movement has a long battle ahead; although Indian scientists tend to agree about the unsuitability of eucalyptus for village projects, government officials have stated that 'there is yet no evidence to show that the *Eucalyptus* affects the environment'.

Crocodile farming: a costly conservation option?

Countries tempted to embark on captive-breeding programmes for crocodiles as a means of raising foreign income through trade at the same time as conserving crocodiles should be aware that it can be a costly option, argues William E. Magnusson in a recent *Wildlife Society Bulletin*. He stresses that captive propagation has an undoubtedly important role in the preservation of species on the brink of extinction, for example the gharial *Gavialis gangeticus* and the Chinese alligator *Alligator sinensis,* but that it is no substitute for management of wild stocks.

Most crocodile skins in world trade result from hunting wild populations; the greatest volume of trade sanctioned by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is in *Caiman crocodilus:* 500,000 skins in 1979. This species is not being propagated in commercial quantities anywhere in the world and the skins are reported to have come from Bolivia, Colombia and Paraguay, although many are almost certainly taken in and smuggled out of Brazil. Of the 79,687 skins of other species reported to CITES in 1979, 53,984 came from the USA, Papua New Guinea and Zimbabwe, the only three countries where extensive farming or ranching programmes exist. The contribution farms make to the trade are, however, very small. For example, in 1981 the USA exported 29,449 skins of *Alligator mississippiensis,* but the country's farms only produced 4000 hatchlings in that year. Most skins came from the harvest of wild alligators in Louisiana. In Zimbabwe most stock is ranched, collected as eggs from the wild, and only a small proportion is captive-bred. Papua New Guinea's trade is still based on the capture of small live crocodiles by local people, although captive propagation schemes have started recently.

One of the problems of crocodile farming is that crocodiles are very expensive to maintain in

captivity; labour and feeding costs must be added to the high cost of buildings. In the USA farming is a rich man's hobby, taken up by farmers who have substantial income from other sources and who can afford to wait 10–20 years to recover their investment. Zimbabwe's crocodile industry developed when labour and food (culled elephants and trash fish) were cheap, but now labour and food costs are rising. The Papua New Guinea Government supports the crocodile industry because it employs local people and earns foreign exchange, but it is mostly based on the sale of animals from the wild. In 1979 it exported 49,768 skins of *Crocodylus novaeguineae* and *C. porosus* when at the time there were only 17,000 crocodiles of both species on farms. In addition, the skins exported by these countries are all from species that are highly valued commercially; none of the industries would be economically viable if it relied on the export of less valued species, *C. crocodilus*, for example.

William E. Magnusson concludes that crocodile trade projects that have the greatest conservation value involve direct hunting of adults, hatchlings or eggs by local landowners who are thus encouraged to maintain stocks, and habitat. If Zimbabwe's ranches, for example, became farms and produced their own stock there would be less incentive to maintain wild populations. Captive propagation may be a costly alternative for a developing country; a better use of a limited wildlife budget is likely to be the employment of a trained wildlife biologist to recommend the best way to manage wild populations.

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No need for otters to drown

Many European otters *Lutra lutra* could be saved from untimely death by adopting an effective, cheap and urgently needed conservation measure, argues Jane Twelves in a recent paper. In continental Europe eels are considered a great delicacy and are most often caught commercially with fyke nets set on the bottoms of lakes, rivers and streams. They consist of two walls of netting leading to a central 'fyke', a gradually tapering tunnel equipped with flaps to prevent the eels or other fish that enter from retreating. The nets are effective, not only in catching fish but also in ensnaring and drowning otters.

In Denmark, where all dead otters have to be sent to a museum, 11 of the 12 dead otters received at the Aarhus Museum of Natural History in four recent years drowned in fyke nets. This was an important loss in a country whose total estimated otter population in 1981 was 200 individuals. The destructiveness of these nets was demonstrated during the operation of eel fyke nets in the summers of 1976 and 1977 in a small number of lochs in South Uist and Benbecula in the Outer Hebrides in Scotland. In a total of 18 weeks of netting, 23 otters drowned.

Fyke nets, of course, constitute only one factor that affected or is still affecting otters in some parts of their range. But where fyke nets are still used in places where otters still live or where it is hoped to reintroduce them, Jane Twelves urges that the mouths of the nets should be covered with nylon or polypropylene netting to prevent otters entering—a cheap and effective answer to the problem.

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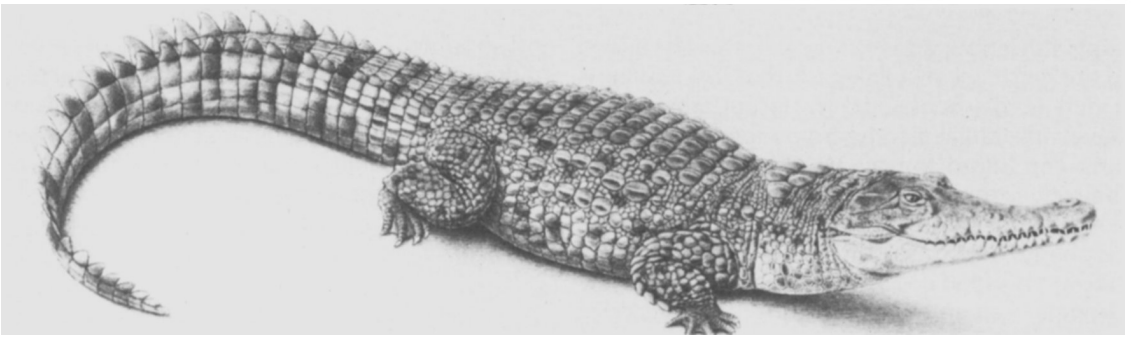
IUCN points to plight of the world's threatened plants and animals, parks and reserves

Although there are now 3000 protected natural areas in the world that are recognised by the United Nations, few are immune from threat. The IUCN at its General Assembly in Madrid last November issued a list of 11 national parks and reserves under serious threat, a further 32 in similar danger, and stressed that these 43 were only representative of a much larger number of threatened protected areas in the world.

Manu National Park in Peru is one of the 11,

News and views



Hunting the Orinoco crocodile for its skin has wiped it out from most of its range in Colombia and Venezuela. Only 1000–1500 are left, mostly as scattered individuals *(Urs Woy/WWF)*.

facing perhaps a wider range of threats than any other park in the world. The Peruvian Government plans to build a road through it to promote settlement, forestry, agriculture and ranching; oil and mineral exploitation have been allowed, including prospecting for gold; a canal is planned that would affect stream flows, allow boats into the park and remove some forest.

The other 10 most threatened protected natural areas are: Araguaia National Park in Brazil, with its damaging road construction and squatter invasions; Juan Fernandez National Park in Chile, where introduced animals are causing serious erosion and alien plants are overwhelming native species; Krkonôse National Park in Czechoslovakia, seriously affected by air pollution; Kutai Game Reserve (a proposed national park) in Indonesia, damaged by fire and affected by timber, mineral and oil exploitation; Tai National Park in Ivory Coast, severely affected by poachers, gold prospectors and illegal settlers; Mt Apo National Park in the Philippines, of which half has been destroyed by logging and encroachment; Ngorongoro Conservation Area in Tanzania, where control of heavy poaching, illegal grazing and fires are beyond the scope of limited management resources; John Pennekamp Coral Reef State Park and Key Largo National Marine Sanctuary in the USA, whose reefs are threatened by dredging, landfilling, sewage, fishermen and shell collectors; Durmitor National Park in Yugoslavia, where it is proposed to release lead processing wastes into the Tara River; Garamba National Park in Zaïre, where the world's last 10 northern white rhinos and other species are threatened by poaching.

At the same meeting IUCN drew attention to 12 plants and 12 animals identified as among the world's most endangered species by the Species Survival Commission. In the words of Grenville Lucas, Chairman of the Commission, they were chosen to 'act as standard bearers to alert the world to the grave situation facing the complex web of life on earth for which we humans are

Hibiscus insularis is endemic to Philip Island (Australia) and has been grazed almost to extinction by feral goats, pigs and rabbits *(Barbara Everard)*.

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Above: *Rafflesia arnoldii*, with its metre-wide flowers it has the largest flower in the world. It is threatened by destruction of rain forest in Sumatra and by collectors *(WWF/ D.H. Rijksen)*.

Left: The kagu is a flightless ghost-grey heron-like bird endemic to New Caledonia, where its habitat is being destroyed and it is harassed by introduced predators *(Paul Barruel/WWF)*.

responsible'. The 12 selected plants are: African violet *Saintpaulia ionantha*, bamboo cycad *Ceratozamia hildae*, Drury's slipper orchid *Paphiopedilum druryi*, Flor de Mayo Lenoso *Senecio hadrosomus*, giant rafflesia *Rafflesia arnoldii*, Kau silversword *Argyroxiphium kauense*, Neogomesia cactus *Ariocarpus agavoides*, Philip Island hibiscus *Hibiscus insularis*, Palenque mahogany *Persea theobromifolia*, Socotran pomegranate *Punica protopunica*, Tarout cypress *Cupressus dupreziana*, and Yeheb nut bush *Cordeauxia edulis*. The 12 selected animals are: bumblebee bat *Craseonycteris thonglongyai*; kouprey *Bos sauveli*; Mediterranean monk seal *Monachus monachus*; woolly spider monkey or muriqui *Brachyteles arachnoides*; pygmy hog *Sus salvanus*; northern white rhinoceros *Ceratotherium simum cottoni*; Sumatran rhinoceros *Didermoceros sumatrensis*; kagu *Rhynochetos jubatus*; angonoka *Geochelone yniphora*; Orinoco crocodile *Crocodylus intermedius*; Queen Alexandra's birdwing *Ornithoptera alexandrae*; and Hawaiian or oahu tree snails *Achatinella* spp.

Disappearing pitcher plants
by Sara Oldfield

International smuggling is a major threat to the survival of the world's rarest pitcher plants. Species of the genus *Nepenthes* are insectivorous, digesting insects in highly specialised pitchers, which can be up to 30 cm long. Collecting these curious plants became fashionable in Victorian times and remains popular with more ambitious carnivorous plant enthusiasts. Unfortunately *Nepenthes* plants in trade are still taken from the wild.

There are about 70 species of *Nepenthes* with a natural distribution ranging from Madagascar to New Caledonia, and from north Australia northwards to China. The centre of distribution of the genus is in Borneo, which has over 30 endemic species. Many of the species remain poorly known in the wild with their conservation status uncertain. Perhaps the most famous species of *Nepenthes* is *N. rajah* which is endemic to Mount Kinabalu and is now considered to be endangered. Plants of *N. rajah* have been repeatedly collected from the wild for international trade with poaching of specimens from inside the Mount Kinabalu National Park. *N. rajah* is the only species of *Nepenthes* to be covered by the Convention on International Trade in Endangered Species (CITES) and is given the strict protection of Appendix 1 listing. This theoretically bans international trade in wild collected material.

Enforcement is, however, hindered by difficulties in identifying specimens to species level once the pitchers have been removed. *N. rajah* is particularly desirable to collectors because it has the largest pitchers of all species and unfortunately

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also because of its rarity. It is notoriously difficult in cultivation, both to propagate and to maintain in cultivation for any length of time. Recently, however, plants have been successfully raised from seed following ecological observations of the species in the wild (Gibson, 1983). The techniques used may also be applicable to other species threatened by trade such as *N. villosa,* also restricted to Mount Kinabalu and India's endemic *N. khasiana.* Tissue culture techniques could also be developed to satisfy the demand for rarer species. At the same time effective *in situ* protection is required.

One species of *Nepenthes* may recently have become extinct in the wild. *N. neglecta,* known only from Labuan, Borneo, is believed to have been lost through the development of housing on the island (R. Cantley, pers. comm., 1984). Other naturally restricted species under severe threat include *N. muluensis* and *N. northiana. N. muluensis* is confined to a small area at the summit of Gunung Mulu in Sarawak, where it is subjected to increasing visitor pressure. The limestone habitat of *N. northiana* in the Bau hills of Sarawak is likely to be exploited for cement manufacture threatening the survival of this endemic species. Logging is a threat to lowland rain forest species such as *N. veitchii* which also occurs in Sarawak.

Further research is required on *Nepenthes* species, both in the wild and in cultivation, to secure their conservation. In the meantime the whole genus remains a candidate for CITES listing as a means to control trade in wild specimens and to co-ordinate action on international smuggling.

Reference

Gibson, T.C. 1983. On the cultivation of the giant Malaysian pitcher plant (*Nepenthes rajah*). *Carnivorous Plant Newsletter* **12**(4), 82–84.

Postscript

A newspaper investigation has uncovered an international syndicate that smuggles rare plants and has been stripping Mt Kinabalu of pitcher plants. The Pinasok area of the Park, once the heart of *Nepenthes rajah* country, has none of these pitcher plants left. *The Borneo Bulletin's* front page story on 27 October 1984 exposed the operation, naming Lawrie Watson, an Australian, as a key figure behind the racket. The newspaper had photographed him shortly before boarding a light aircraft at Bario in the Kelabit Highlands, which is not a protected area, with four boxloads of pitcher plants. Park officials caught Watson about two years ago trying to smuggle pitcher plant seeds out of Mt Kinabalu National Park, and fined him; since then he has made several trips to Borneo to collect pitcher plants, smuggling them out by falsely labelling boxes. When the *Bulletin* received news that Watson planned another trip it alerted Sabah authorities. Watson arrived in Sabah in December and was arrested after a fracas at the National Parks' Office in Kota Kinabalu. At the time of writing charges were still outstanding against him.
Editor

Dippers and stream acidity

S.J. Ormerod and S.J. Tyler

Despite mounting evidence of relationships between the acidity of water-courses and their aquatic faunas, and of historical changes in the chemical and biological status of rivers and lakes in North America and Europe, the evidence is sparse over the effects of surface-water acidification on organisms that are not wholly aquatic. Waterfowl, such as goldeneye *Bucephala clangula,* may benefit from reduced competition for invertebrate prey in acidic lakes in which fish are scarce. Among fish-eating birds, divers *Gavia* spp. feed their young on small fish (< 20 cm) and hence are susceptible to changes in the size structure of populations which occur with reduced recruitment. However, the relatively transparent waters, which characterise unproductive, acidic lakes, may facilitate fishing by divers and sawbills *Mergus* spp. Pied flycatchers *Ficedula hypoleuca* and other passerines nesting near to some moderately acidic lakes in Sweden have been shown to lay significantly smaller clutches, containing eggs with defective shells, than the same species nesting further away. Post-mortem analyses of birds from the same populations have revealed high concentrations of aluminium, frequently implicated as a toxic agent in acidic waters, in the bones of the least successful breeders, although its source or transfer to the birds has not been demonstrated.

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In the UK, Fry and Cooke (1984) reported an increase over the last 20 years in the lengths of territories held on some Scottish streams by dippers *Cinclus cinclus*, which are passerine birds dependent on aquatic invertebrates and fish as sources of food. The same streams had undergone concomitantly an increase in acidity, and a reduction in productivity, and the authors inferred that the trend in territory length was consistent with a decline in the dipper population.

We are now able to report on research undertaken in Wales that considerably strengthens the case that the breeding distribution of dippers is influenced by stream acidity, and hence that these birds may be sensitive to acidification.

In 1982, over 230 km of the Wye river-system were surveyed and the results revealed a striking relationship between the abundance of breeding dippers and the abundances of certain groups of riverine invertebrates—most notably caddis-larvae (dominantly net-spinning Hydropsychidae) and, to a lesser extent, may-fly nymphs (Ormerod *et al.*, 1985). Separate dietary investigations also indicated that these respective groups were of considerable importance to dippers in feeding older and younger nestlings and, in total, they provided about 65 per cent of the caloric content of the combined diet of nestlings and breeding adults. The same groups, both in the Wye catchment and elsewhere, were known to be scarce in acidic streams and further analysis revealed that the abundance of breeding dippers was highly significantly correlated with water acidity over the upper reaches of the 17 tributaries for which data were available: dippers were indeed scarcest along acidic streams.

We were unsure at this stage whether the pattern was simply spatial, with dippers scarce or even absent where the waters were naturally acidic, or whether there had been any relatively recent changes that were partly responsible. Nor did we know if invertebrate productivity was related more to some other factor such as calcium concentration, which was correlated with acidity over the range of sites we had examined. Then, historical data became available, which indicated that the upper reaches of one study-river, the Irfon, whose catchment had been afforested over the last three to four decades, had progressively undergone a drastic increase in acidity, which was consistent with recent research on the acidifying influence of planted conifer forests on soft-water streams. Accurate ornithological data also showed that the abundance of breeding dippers over this 15-km stretch had fallen between the mid-1950s and 1982 by over 75 per cent. In few places did the forest impinge directly on to the river to create a physical alteration and there had been no apparent loss of nest sites.

In 1984, a survey throughout Wales by the RSPB in association with Welsh Water's 'Acid Waters' programme, focused our attention solely on soft-water streams (those at risk from acidification). Of 74 sites that were physiographically suitable, breeding territories were confirmed at less than 25 per cent and dippers were in most cases completely absent. Moreover, sites without breeding dippers were significantly more acidic, had higher concentrations of dissolved aluminium, fewer may-fly nymphs and caddis-larvae, and had more conifer afforestation on their catchments, than did the sites where territories were confirmed.

Taken together, the results of these studies represent a worrying state for dippers breeding on soft-water streams in areas of Scotland and Wales that have been regarded as strongholds for the species in the UK. Furthermore, the presence of conifer afforestation, possibly in addition to acidic depositions, on the catchments of these streams, represents a clear anthropogenic influence on the ecology of a species whose distribution is indicative of stream ecosystems as a whole.

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