SECTION III

DIVERSITY AND NICHE

BIRD POPULATIONS IN NATIVE (CALIFORNIA) AND PLANTED (AUSTRALIA) MONTEREY PINE FORESTS

R. G. BEIDLEMAN

Department of Biology, Colorado College, Colorado Springs, Colorado, USA

Comparative studies were made in plantations of introduced Monterey Pine near Canberra and stands of native Monterey Pine along California's coast. Canberra plantations are usually dense, even-aged and have little ground cover except litter. Californian stands are more open, with small to large trees and an abundant diverse understorey. Both are restricted in extent, edge on other ecosystems. In each area dense young forests may be unpopulated, but ecotones exhibit greatest diversity. Within dense older Australian plantations, shade-tolerant Yellow Robins *Eopsaltria australis* predominate, occasionally with Grey Shrike-thrushes *Colluricincla harmonica*, Speckled Warblers *Chthonicola sagittata* and transient flocks of White-winged Choughs *Corcorax melanorhamphus*. Bands of thornbills *Acanthiza* (especially Brown *A. pusilla*) move through crown layer, as may parrots; occasionally White-browed Scrub-wrens *Sericornis frontalis* frequent litter on the forest floor. In California bands of Chestnut-backed Chickadees *Parus rufescens* and Pygmy Nuthatches *Sitta pygmaea* are predominant crown workers, moving lower in open brushy forest, with Hutton's Vireo *Vireo huttoni*, Oregon Junco *Junco h. oreganus*, New World warblers and flycatchers. Bewick's *Thyromanes bewickii* and Winter *Troglodytes troglodytes* Wrens and Wrentits *Chamaea fasciata* frequent litter and brush; Bushtits *Psaltriparus minimus* and Scrub Jays *Aphelocoma coerulescens* occur in brush; Brown Creepers *Certhia familiaris*, Steller's Jays *Cyanositta stelleri* and several woodpeckers within the forest.

Nowhere are there exclusive 'indicators' for Monterey Pine forest. The Yellow Robin has best adapted to dense Australian stands, with no equivalent in California; woodpeckers have no equivalent in Canberra. California's more diversified stands exhibit higher, more varied populations of birds.

ECOLOGY OF FRUIT-PIGEONS IN TROPICAL NORTHERN QUEENSLAND

F. H. J. CROME

Division of Wildlife Research, CSIRO, Canberra, ACT, Australia

Seven species of fruit-pigeons co-exist in rainforest in northern Queensland. Five are entirely frugivorous and two partially graminivorous; they depend on the staggered fruiting seasons of the plants for a supply of food throughout the year. Availability of fruit is seasonal with the dry season (July to November) being the time of maximum abundance. The late wet season (February to April) is a time of shortage. The size of the dry-season peak varies from year to year. The abundance of pigeons and their breeding cycles were timed to these dry season peaks. Over sixty species of plant provided fruit for the pigeons but one family, the Lauraceae, the fruits of which are extremely nutritious, was of paramount importance for the obligate frugivores but not for the partial graminivores. Co-existence was facilitated by each species feeding on different plants and by nomadism and migration. At any one time two or three species only are common. During a three-year period overlap was quite low but at a particular time it could be quite high.

HABITAT AND FEEDING SITES OF SOUTH AUSTRALIAN HONEYEATERS (MELIPHAGIDAE)

H. A. FORD

Department of Zoology, University of Adelaide, Adelaide, SA, Australia

Eight species of honeyeaters are common in dry sclerophyll forest and savanna woodlands of the Mount Lofty Ranges near Adelaide. Four of these, two in each of the genera *Meliphaga* (*M. chrysops* and *M. penicillata*) and *Melithreptus* (*M. lunatus* and *M. brevirostris*) are chiefly insectivorous, taking insects from leaves and bark of *Eucalyptus*. The habitats of members of the same genus differ markedly. The flowers they visit are of the open-cup type, specially *Eucalyptus*. The other four species overlap extensively in habitat and feed on nectar at least as often as on insects. They capture most of their insects in the air and visit many types of flowers. All visit open-cut flowers but the Red Wattlebird *Anthochaera carunculata* prefers the brush-type inflorescences of *Banksia, Xanthorrhoea* and *Callistemon*, the Spinebill *Acanthorhynchus tenuirostris* tubular flowers of *Correa, Epacris* and *Astroloma*, the Crescent Honeyeater *Phylidonyris pyrrhoptera* also tubular flowers but to a lesser extent and the New Holland Honeyeater *P. novaehollandiae* many different flowers.

The differences in habitat and feeding site illustrate how related species can partition an environment between themselves but the high degree of overlap between some species indicates that interspecific competition may be an important factor in the biology of these birds.

NICHES OF BIRDS IN NOTHOFAGUS FORESTS

J. KIKKAWA

Department of Zoology, University of Queensland, Brisbane, Qld, Australia

Nothofagus forest is a habitat peculiar to the southern hemisphere and characterized by a paucity of fauna. The structure of this habitat in relation to the distribution of birds has been examined in the South Island of New Zealand (1958–60), Tasmania (1962), New South Wales (1961–64), south-eastern Queensland (1965–70), New Guinea (1969, 1970), southern Andes and Tierra del Fuego (1971). The low diversity of species and density of population of birds in the forests were not consistent throughout. In north-eastern New South Wales up to thirty-eight species with a total density of 645 birds per forty hectares have been recorded during the breeding season. Because *Nothofagus* trees provided very few resources for birds, the associated features of the forest were considered important in determining the diversity and density of birds. Peculiar niches include the moss-covered tree-trunks occupied by *Acanthisitta chloris* (Acanthisittidae) in New Zealand, *Acanthornis magnus* (Sylviidae) in Tasmania, *Ifrita kowaldi* (Timaliidae) in New Guinea and *Pygarrhichas albogularis* (Furnariidae) in southern Andes. Other features that contribute to increased local diversity and density are the black honey-fungi on tree-trunks attracting *Anthornis melanura* (Meliphagidae) in New Zealand, epiphytes with nectariferous flowers and succulent fruits attracting parrots such as *Charmosyna papou* in New Guinea, and dense bamboo thickets providing cover for shy ground-birds such as *Melampitta lugubris* (Timaliidae) in New Guinea and *Scelorchilus rubecula* (Rhinocryptidae) in the Andes. In contrast to the sclerophyll habitats of Australia where seasonal or unseasonal superabundance of a particular resource such as nectar increases diversity of species, in the *Nothofagus* forest it is the complexity of the associated structure that governs the diversity by allowing partitioning of the resources among ecologically and taxonomically divergent groups of birds.

ON AN INCREASE IN THE NUMBERS OF GULLS AND ON THE EXPANSION OF THEIR HABITAT IN THE BASIN OF THE BALTIC SEA OVER THE LAST HUNDRED YEARS

E. KUMARI

Institute of Zoology and Botany of the Academy of Sciences of the Estonian SSR

In the basin of the Baltic Sea, gulls have been very conspicuous because of marked changes in their numbers and of their occupation of new habitats. Two of the six species (*Larus minutus, L. ridibundus, L. fuscus, L. argentatus, L. marinus, L. canus*) that have lived permanently in this basin are somewhat exceptional. They are the Little Gull, whose numbers have fluctuated considerably, and the Lesser Black-backed Gull, whose numbers have shown only a slight increase. The numbers of the remaining four species have greatly increased in the last hundred years. The increase has been particularly remarkable since the 1930s. The Black-headed Gull, the Herring Gull, and the Common Gull have increased most.

Along with a numerical increase, some species have expanded their habitats. This may be because previous habitats became overcrowded. In the Baltic Sea basin, the Lesser and the Great Black-backed Gulls have remained maritime species. Within the last fifty years the Common and Herring Gulls, which had been maritime species, have started to nest on inland waters. The occupation of pools on large raised peat bogs by the Herring Gull and recently also by the Common Gull has attracted special attention. The Black-headed Gull, which was associated only with inland waters (and bays rich in vegetation), has in the last few decades increasingly started to nest on islands in the sea. This shows the broad ecological range and the good adaptability to the environment of gulls. Gulls may be good indicator-species for environmental monitoring.

POPULATION SYSTEMATICS AND ADAPTATIONS IN BIRDS OF THE TROPICAL AUSTRALIAN CLOSED FOREST

H. J. LAVERY and R. J. GRIMES

Department of Primary Industries, North Queensland Fauna Centre, Townsville, Qld, Australia

Closed forest in Australia occurs discontinuously mostly on mountain ranges in three zones along the Great Dividing Range. The zone from near Cooktown to near Townsville, between the deciduous tropical closed forest of Cape York Peninsula and the temperate closed forest, is of considerable significance because of the numerous endemic species. The characteristics of this habitat are the subject of studies for conservation begun in 1970 using results from field observations and routine samples of a principal index-species, the Northern Chowchilla *Orthonyx spaldingii* Ramsay (Orthonychinae: Muscicapidae), compared in detail with results from eight other species (from non-passerine Megapodiidae to passerine Ptilonorhynchidae).

Distributions of species have been determined throughout discrete localities. Differences between populations of species at localities representative of different latitudes and altitudes have been assessed on distinctive features such as size and plumage, breeding season and feeding habitats, and moulting and song. Characters such as social organization and size of territory have also been compared by studying individuals.

Throughout this uniform habitat species moult at the same time, which is very significant and shows how annual cycles are controlled by the conditions.

RELATION BETWEEN DESTRUCTION OF HABITAT AND EXTENSION OF RANGE OF PASSER M. MOABITICUS

H. MENDELSSOHN

Tel Aviv University, Tel Aviv, Israel

Passer m. moabiticus, distributed in desert areas, occurs in riparian habitats during the breeding season. In Palestine, its main distribution was on the flood plains along the lower Jordan. These were inundated during the winter rains, but dry during the rest of the year. They supported a growth of *Tamarix*, some halophytous shrubs and quite a dense cover of annuals. Because of lack of ground water during the summer, the *Tamarix* trees were of poor growth and their stems were heavily infested by the larvae of the buprestid beetle *Steraspis squamosa tamaricicola* Thoms. Many of the trees died and in the bare branches *Passer moabiticus* built its nest. The eggs are not incubated during the day; the high ambient temperature and strong solar radiation create inside the globular nest the temperature necessary for incubation. Between 1948 and 1967 water from the Upper Jordan and its tributaries was used for irrigation, resulting in a lowering of the level of the river and preventing inundation of the flood plains. The flood plains are used for irrigated agriculture. This resulted in increased availability of food, because its food plants became common weeds, but the few remaining *Tamarix* were lush and green and could not be used for nests.

Attempts to nest were made in inadequate biotypes round the Dead Sea. At the same time, nesting *Passer moabiticus* spread northwards along the Jordan Valley, eventually to south-eastern Turkey, and southwards to the shore of the Red Sea. In the northern areas of its distribution, adequate nesting facilities are at a premium and many nesting attempts fail. Nests are built in spring in deciduous trees and abandoned as soon as the trees become covered with leaves.

OVERWINTERING BY THE AMERICAN GOLDFINCH SPINUS TRISTIS IN SOUTHERN ONTARIO, CANADA

A. L. A. MIDDLETON

Department of Zoology, University of Guelph, Guelph, Ontario, Canada

Data from annual Audubon Christmas Censuses during the past fifty years reveal a marked increase in the numbers of American Goldfinches overwintering in southern Ontario. Winter (December–April) banding results from Guelph, Ontario, show that birds of the year outnumber all other age classes (3.5:1). All birds now show a 20-per cent decrease in weight between late March and early May when they are undergoing their pre-nuptial moult. Winter at Guelph is characterized by low temperatures (monthly means ranging between −1 °C and −4 °C), abundant snowfall with intermittent thaws and freezing rainstorms. It is hypothesized that until recently high mortality occurred in overwintering flocks. Banding results have also shown a regular return of Goldfinches to the city in mid-November. Overwintering flocks (in the city) gradually increase in numbers until the flock is more than 1,000 strong. These birds show a reliance upon the food available at feeding stations and move freely (distances greater than 4.8 km) across the city in search of food. Sales of bird seed within Ontario have increased dramatically in recent years.

It is suggested that the American Goldfinch is now successfully overwintering in large numbers in parts of Ontario where it was formerly extirpated by adverse conditions. This increased survival apparently is linked to a process of urbanization by certain elements of the population and their adaptation to using an abundant food supply provided by man.

C

THE ROLE OF HIGH-QUALITY HABITAT IN MAXIMIZING PRODUCTION OF DUCKS

H. K. NELSON

US Fish and Wildlife Service, Northern Prairie Wildlife Research Center, Jamestown, North Dakota, USA

Recently concepts regarding the breeding biology and population ecology of upland-nesting ducks have changed. The continual decline of populations of most ducks in the Glaciated Prairie Region of North America has focused research on the influence of various environmental factors on annual production. One of the most important influences is the intensified use of land, which continues to decrease the habitat for wildlife. Even where Federal and State programmes have protected a large part of the wetland, there is no control over the use of other land. Thus, the upland nesting habitat continues to deteriorate. It is evident that the preservation of wetland alone will not achieve the objects of waterfowl production originally cited for the prairie region. Other ground-nesting birds are affected similarly. The loss or deterioration of nesting habitat is usually accompanied by increased predation and other decimating influences that further decrease nesting success.

Our research has shown that establishment of blocks of high-quality nesting cover of 30–40 hectares in the midst of existing wetland restores the capability of such habitats to produce ducks. Examples are given of nesting densities of 2.5–6.0 per hectare of upland cover. Good nesting cover appears to provide a natural deterrent to mammalian predators, thus raising average nesting success from about 20 to over 70 per cent. Other significant findings discussed include wetland:upland ratios, size and shape of blocks of cover, effect of predation, impact of increased nesting success and survival rates on building local breeding populations, lack of edge-effect, breakdown of interspecific strife among dabbling ducks and information on a pilot programme being initiated for establishing good upland nesting cover on private lands in the United States.

INTRASPECIFIC ADAPTATIONS IN ECOLOGY AND BEHAVIOUR IN SEA-BIRDS

J. B. NELSON

Department of Zoology, University of Aberdeen, Aberdeen, Scotland

Though adaptive radiation produces well-marked syndromes in different species, it is rarely investigated at the population level. Yet different populations of the same species may show extremely well-marked adaptive systems, for example a relation to the nature and availability of their food. These, though principally ecological, necessarily involve behavioural adaptations as executive mechanisms. This paper explores the theme for selected species, mainly from the Sulidae and Fregatidae.

BREEDING AND FORAGING CHARACTERISTICS OF A BIRD COMMUNITY IN A TROPICAL SOUTH AMERICAN DESERT

S. M. RUSSELL

Department of Biological Sciences, University of Arizona, Tucson, Arizona, USA

A community in desert scrub at sea-level in a rain shadow on the northern coast of Colombia, 11° north of the equator, was studied for one year. Precipitation averages about 250 mm annually and normally falls from June to October; the long rainless

season is accentuated by drying winds although temperatures rarely exceed 30°C. About twenty species of birds nest in the area; banding indicates that nearly all are residents. Individuals of species typical of nearby more mesic environments occasionally foraged through the area but did not nest. Numbers of insectivorous North American migrants occurred in October and November but all left by December as green vegetation disappeared; they were apparently unable to compete with the residents. Breeding activity in most species began with the rains and persisted for several months; there were indications that some individuals nested when less than a year old. Most species moulted at the end of the wet season. Compared to the avifauna in similar plant communities in nearctic deserts, these tropical desert birds differed in having relatively few seed-eating species and the insectivorous birds also consumed fruit during the dry season.

INTERSPECIFIC COMPETITION IN WOODPECKERS

L. L. SHORT

Ornithology Department, American Museum of Natural History, New York, USA

Woodpeckers are specialized for arboreal foraging, woodpecking and excavating cavities for nesting in trees. Closely related species of this specialized group are apt to compete for food and nesting sites. Some indications and direct evidence of competition are presented.

Various studies have documented sexual differences in foraging among some woodpeckers. One species, *Picoides scalaris,* exhibits such a sexual difference, which is greatest in areas where no closely related species occur with it, but least where one or two congeners occur sympatrically; here interspecific competition may be the factor responsible for reduced sexual dimorphism. Another, *Picoides villosus,* sympatric with a related species where habitats are vegetationally complex, overlaps territorially with it. The two differ somewhat in size and ecology. In simplified (xeric) environments the larger species usually is excluded or, if it does occur, interspecific territories are maintained. In India two related species portion foraging sites between them with some overlap. When the two happen to forage on the same tree, the larger species, which prefers the trunk and major branches, actively restricts the smaller species to the twigs and small branches by moving to attack it whenever it perches on the trunk or a large branch, but ignoring it so long as it remains in the twigs.

These and other cases clearly demonstrate the occurrence and impact of interspecific competition on the ecology, distribution and speciation of woodpeckers.