SECTION IX

REGIONAL AVIFAUNAS

THE AUDUBON CHRISTMAS BIRD COUNT – SHOULD IT GO WORLDWIDE ?

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For seventy-four years the National Audubon Society of the US has organized, supervised and published a Christmas Bird Count in which professional and amateur birdwatchers unite to survey areas twenty-four kilometres in diameter in a single day, recording the birds encountered. This endeavour, which began with twenty-five counts taken in 1900, has reached heroic proportions; some 1,039 counts were taken in 1973–74, involving over 20,000 observers. In America it is the biggest event of the birdwatching year.

Until recently counts have been limited mainly to US and Canada, but in the last two years Middle America and the West Indies have been added. Occasionally in the past counts have been published from other countries such as China and England, usually by US servicemen overseas. The increased coverage of North America is now providing much valuable data on the early winter distribution and populations of our birds. One result has been a project to map this distribution, which has produced over 400 species maps by over 150 volunteers. The question is raised and the idea suggested that other countries might consider instituting their own Christmas Bird Counts on the US pattern; promised is good sport, keen competition and valuable data on distribution of species and densities of populations. The National Audubon Society is ready to assist.

COMPARATIVE ANALYSIS OF THE ORNITHOFAUNA AND BIRD COMMUNITIES IN THE ARID REGIONS OF CENTRAL ASIA, NORTHERN AFRICA AND AUSTRALIA

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The desert regions of central Asia, northern Africa and Australia are separated to different degrees, resulting in different levels of the relationship and interaction of their ornithofaunas. Comparison of the desert ornithofaunas of central Asia and northern Africa demonstrates differences reaching to the subspecific and specific levels and only to some extent the generic. On the whole the ornithofauna of central Asia represents the northern simplified non-tropical variation of the desert ornithofauna of the southern Palaearctic, having an almost continuous historico-geographical connexion with the deserts of northern Africa through arid south-western Asia.

A comparison of the desert ornithofaunas of the southern Palaearctic and inland Australia brings to light two independent centres of evolution of arid ornithofaunas. Differentiation between them can be observed not only at the specific and generic levels but to a large extent at family level as well. Historico-geographical connexions between these two faunas are slight and can be traced by few examples.

Analysis of ecological niches and structures of populations and communities of birds reveals quite distinct analogous features. The ecological and structural characters appear to be rather similar in all three regions. However, the zonal differences between ecological conditions in the deserts of northern Africa and central Asia cause some

variations in structure of the communities and in the correlation of ecological groups. Thus in the deserts of northern Africa compared to those of central Asia there is some predominance of ground-nesting and seed-eating birds; bush-nesting and insectivorous birds are somewhat less represented.

Comparative analysis of ecological niches and communities of birds in central Asia and inland Australia demonstrates an extensive similarity of these characters in spite of geographical separation and lack of historical and faunistic continuity. The density of populations, the horizontal and vertical distribution and the ratio of biological groups of birds are found to be rather similar, though they are composed of different faunistic elements in both regions, an outcome of the principle of convergent adaptation. Distinctions consist of the formation in Australian deserts of some specific ecological variations of the structure of populations that are conditioned by the richness of the ornithofauna as the initial material for ecological adaptation and saturation of the niches. This phenomenon can be clearly observed in the variety of structure of the birds in the tree and shrub levels. The scantiness of ground-birds in the deserts of inland Australia is explained by the character of ecological conditions and by the long isolation from other centres of evolution that prevented the penetration of some groups of typical ground-birds into Australia.

Thus the ornithofauna and communities of birds are formed in the separated arid regions of the earth in different ways under the influence of a variety of factors–historical and geographical contacts and isolation, structure of ecological niches, convergent adaptation, etc.

A COMPARATIVE ANALYSIS OF THE DENSITY OF PREDATORY BIRDS IN TWO SELECTED AREAS WITHIN THE PALAEARCTIC AND ORIENTAL REGIONS, NEAR MOSCOW AND DELHI

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Despite significant differences (geographical, climatic, faunistic, etc.) the selected areas have one common character: a high degree of anthropogenic alteration of territories. Both are highly populated industrial and agricultural regions of some 50,000 sq. km each.

The number of birds of prey in the Moscow area was estimated in 1958–59 and 1973 as: *Buteo buteo* 3,500 breeding pairs, *Accipiter nisus* 900, *Falco tinnunculus* 800, *Milvus migrans* 700, *Pernis apivorus* 500 and others (12 species) 1,200; total number 7,600 (roughly 7–10 thousand) or 15 pairs for 100 sq. km. In the Delhi area predatory birds were counted in 1967–71: *Gyps bengalensis* 71,500 breeding pairs (including 1,500 in towns), *Milvus migrans* 22,000 (10,000 in towns), *Neophron percnopterus* 12,500 (less than 500 in towns), *Elanus caeruleus* and *Butastur teesa* 5,000 each and others (11 species) 9,000; total number 125,000 (roughly 120–150 thousand) or 250 pairs per 100 sq. km.

The great quantitative difference between the populations is accompanied (or probably caused) by the significant difference in their quality as well. Three dominant species of both populations are entirely different ecologically; in the Moscow area Buzzard, Sparrowhawk and Kestrel (70 per cent of the total number of raptors) are active predators, but in the Delhi area White-backed Vulture, Kite and Egyptian Vulture (85 per cent of the total population) are passive scavengers.

The population of birds of prey in the Delhi area absolutely (15–20 times!) outnumbers that of the Moscow area because food is abundant, a large part of it being in fact provided by man (garbage, carcasses of cattle, wild animals killed by traffic, etc.) and because of the traditional good-will of Indian people to wildlife including predatory birds. The above comparison leads to the presumption that nowadays in modern environments (anthropogenic in the main) the status at least of some wild populations might be determined by factors of social rather than natural characters.

BIRDS IN SUBARCTIC ECOSYSTEMS

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Birds make up an insignificant part (0.2–3.3 per cent) of the total zoo-mass in terrestrial subarctic (tundra) ecosystems but their role in the communities seems to be more important than can be judged by rough estimates of energy. The following facts are essential:

Birds in tundras occupy top levels of various trophic chains. Some important components of the ecosystems (mosses, lichens, collembola, many annelids) are hardly ever used by birds but others are consumed intensively (dipteran larvae and imagines, voles; sometimes sedges, grasses, beetles).

Tundra birds are adapted to sharp seasonal and annual dynamics of supply of food. Long-distance migrations are well known. Besides, most birds can eat various sorts of food, feeding on the type most abundant at a given period. The nutrition of many populations changes sharply and repeatedly during the summer, but different species may have nearly the same food simultaneously. The evolution of many birds seems to have been linked with conditions outside the tundra.

Many birds have complex systems of seasonal movements (rapid departure from tundra of social groups that become unnecessary for reproduction, etc.), as well as specific seasonal changes in territorial behaviour and social interactions and annual changes in the whole pattern of distribution. These peculiarities can be considered as adaptations to the optimum use of resources of food in a very unstable ecosystem.

On the whole, the seasonal changes of the trophic role of tundra birds are essential. Total biomass of various trophic groups changes greatly during summer because of movements of different sex, age and social groups and changes in their nutrition.

Birds in tundras eat large amounts of fresh-water invertebrates, specially in temporary ponds. "Freshwater-terrestrial" transfer of energy and matter that is effected by the birds seems to be most important in tundra ecosystems.

Tundra birds serve as important agents of the transfer of energy between marine and terrestrial ecosystems. Many birds breed in tundra and spend the rest of their life on seas – arctic, boreal and tropical. This is possible only in birds that can perform active long-distance migrations. In the tundra zone, the intensity of exchange of energy between sea and land birds seems to be the greatest.

The Subarctic is probably much less unfavourable for birds in general than for other groups of animals. The impoverishment in species of birds is less than that of other groups and the degree of endemism is higher. The main role of birds in subarctic ecosystems does not seem to consist in a simple transfer of energy through trophic chains but in regulating flows of energy between various chains at their top levels and in transferring energy and matter between different types of ecosystems (including geographically remote ones).

Non-trophic functions of birds are also important. They are: local increase in primary and total productivity of ecosystems by manuring; local successions; acceleration of turnover of nutrients; long-distance transportation of organisms, etc. These functions must have developed because of the great mobility of the birds.

SOME NOTABLE CHANGES IN THE STATUS OF SYDNEY'S BIRDS DURING RECENT YEARS

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It is reasonable to expect a decline or increase in the status of some birds in any area over a certain period. However, this is mainly influenced by seasonal conditions, change

of habitat or some irregularity in recording the necessary data. Little has been published on counts of populations over a long period. More often they cover a season or a particularly dry or wet period.

About thirty-five years ago I selected certain localities near Sydney and tried to visit each at convenient intervals during later years to assess populations, entering the record of each visit in a journal as a condensed graph, so that it is now possible to select fairly surely those species that are failing and those that have moved in to vacant ecological niches. I do not include introduced birds. However, some bias is shown towards increased populations but not to decreased ones, which are mainly the result of a fast-growing city.

Notable increases include *Threskiornis molucca, Anas castanea, Chenonetta jubata, Himantopus h. leucocephalus* (13 listed during 24 visits in 1943–45 against 884 same area during 26 surveys 1971–73), *Cacatua roseicapilla, Psephotus haematonotus* and *Meliphaga penicillata.* Those surely declining include *Haliastur sphenurus, Charadrius ruficapillus, Charadrius melanops, Malurus lamberti, Sericornis lathami, Ephthianura albifrons* (93 one area over 38 visits 1943–45 against nil same place 43 trips 1963–65), and *Microeca leucophaea.*

BIRDS OF THE ECOSYSTEM OF THE ANTARCTIC ICE-PACK

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Under the auspices of the National Science Foundation (USARP Program) and in conjunction with several oceanographical studies, ornithological observations were made from the USCGS *Glacier* in the Weddell Sea from 22 January to 27 February 1973. Because of highly favourable ice-conditions at the time, the icebreaker was able to negotiate not only the eastern section but also the little explored central section of the Weddell Sea. Numerous observations of birds were made at sea within the ice-pack and in large open areas of the pack. Special attention was given to species apparently dependent on icebergs in the open sea. Observations also were made at various places from Cape Norwegia westward along the Filchner Ice Shelf as far as 77°37′S, 47°47′W. A number of seemingly important observations were made, including penguin colonies unreported before, far-southern sightings of albatrosses and giant-petrels, and sightings of large numbers of Arctic Terns undergoing extensive moult in the central Weddell Sea. Some Arctic Terns were collected for a better understanding of the moult. Approximately 150 specimens of various species were collected for museums, DDT analysis, and studies of internal parasites.

SOME SUGGESTED PROCEDURES FOR GLOBAL MONITORING OF BIRD POPULATIONS

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No single monitoring system yet proposed is ideally suited to conditions in all parts of the world. Programmes now in progress in various countries are: Species Inventories (specially for rare, locally distributed or colonially nesting species); the Common Bird Census of the British Isles and the Audubon Breeding Bird Census of North America (both based on mapping territories by making eight or ten field trips through the study plot); the Breeding Bird Atlas, successfully used in Great Britain and Ireland and currently in progress in many other European countries, in New Zealand and experimentally in Australia and parts of the United States; the Breeding Bird Survey in

United States and Canada (a highly standardized count involving fifty stops of three minutes along each of 2,000 randomly distributed roads); the Audubon Christmas Bird Count (sampling about 1,000 circular plots of radius twelve kilometres) in the United States and Canada; the Winter Bird Count of Finland (more standardized than the Audubon Christmas Count); the Audubon Winter Bird-Population Study in the United States and Canada, which reports the average number of birds of each species recorded in a series of eight or ten trips; and the Winter Bird Survey being tested experimentally in the United States and England (consisting of 8-kilometre transects that are covered in four hours on foot).

Each method has advantages and disadvantages. Those that are most highly standardized show the most promise for application of statistical methods to interpret the results. Because bird censusing requires highly trained field observers and because the number of qualified and interested personnel is small, there are advantages in those census methods that require just a single coverage per year. The Spot-mapping, Breeding Bird Survey and Winter Bird Survey are now well enough standardized that results can be compared from year to year and from one continent or nation or habitat to another. The Breeding Bird Atlas can also be employed if provision is made to include numerical estimates. Close contact between investigators in different countries is very important to achieve standardization and international co-operation. Since 1968, the biennial meetings of the International Bird Census Committee have proved most beneficial. Ornithologists in those countries with monitoring programmes would be most willing to discuss with others the programmes in use and the advantages and disadvantages of each as a means of monitoring populations.

BIRDS AND ENVIRONMENTAL MONITORING – THE SWEDISH CENSUS AND ATLAS PROGRAMMES

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Birds are becoming increasingly important as indicators of environmental health. Most habitats, types of landscape and geographical regions contain many species representing a great variety of feeding habits and trophic levels; birds are broad-spectrum detectors. Most birds are easy to detect, identify and count. Numerous ornithologists are prepared to participate in field work in most countries. Birds are also important for the study of population dynamics and related branches of ecology. These properties make birds particularly suitable as objects for large-scale environmental monitoring programmes. There are three such programmes running in Sweden at present. The International Wildfowl Counts of IWRB has been carried out in mid-winter since 1967, with counts in November since 1969. Counts are being made in all important localities. The Swedish Breeding Bird Census started in 1970. It is based on censuses of permanent sample plots (80 in 1973) by the technique of mapping territories recommended by the International Bird Census Committee. About forty common species can be monitored satisfactorily. The Swedish Breeding Bird Atlas started in 1974. It aims at mapping all species on a basis of 5 x 5 kilometres during ten years.

THE SOUTHERN CRESTED GREBE PODICEPS CRISTATUS AUSTRALIS IN NEW ZEALAND

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The Crested Grebe is one of the northern hemisphere forms that has penetrated the southern hemisphere, establishing breeding populations in Australia and later New Zealand. The southern subspecies *Podiceps cristatus australis* has become smaller and

darker and differs radically from its northern progenitor by retaining its breeding plumage throughout the year, a response to a milder and more even environment where winter migration is unnecessary and where breeding takes place over a much longer period controlled by availability of water.

Crested Grebes probably crossed the Tasman Sea within the last few thousand years and subspecific differentiation has not taken place in New Zealand. This darker and smaller form has smaller eggs and lower clutch-size. In New Zealand it disappeared last century from its few breeding lakes in the North Island and now occurs only on high-country lakes and some lowland lakes and lagoons (particularly on the western coast) of the South Island; the total population is about 150 pairs, numbers constantly declining. Courtship display can be observed in practically any month of the year, but most nesting is surprisingly late in the season, usually November–January. Flight is rarely observed, the grebes being sedentary on their breeding lakes.

AVIFAUNAL STUDIES AT THE US UNDERGROUND NUCLEAR TEST-SITE IN THE ALEUTIAN ISLANDS

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As a part of the US underground nuclear testing programme, Amchitka Island, Western Aleutians, was selected as a test-site. The Island is about equidistant from the Alaskan mainland and eastern Asia. Between 1967 and 1973 the avifauna was studied. Plots were established to measure changes in density of terrestrial birds. Lappland Longspurs *Calcarius lapponicus* were the most numerous passerines averaging 100 pairs per 40 hectares in some habitats with about 10,000 pairs for the island. Rock Sandpipers *Calidris ptilocnemis* reached upper densities of about 8 pairs per 40 hectares. Rock Ptarmigan *Lagopus mutus* were censused on a study-plot by means of male territories. About 1.3 pairs occurred per 40 hectares. Cliff-nesting birds such as Red-faced Cormorant *Phalacrocorax urile*, Pelagic Cormorant *P. pelagicus* and puffins were studied to determine distribution and consistency of use of colonies. Special studies were undertaken on selected species. About eighteen pairs of Peregrine Falcons *Falco peregrinus* nested annually. Their rate of production was equivalent to that before chlorinated hydrocarbons were used. About sixty-five pairs of Bald Eagles *Haliaeetus leucocephalus* nested annually. Their population dynamics are discussed. One of the few known colonies of Aleutian Terns *Sterna aleutica*, actually in the Aleutian Islands, was studied. Data on the species are discussed. Winter Wrens *Troglodytes troglodytes* were extirpated from the Island by 1958, but had returned by 1967. Data on density and distribution are discussed. Problems of studies in the tundra are discussed as is the effect of underground testing on the avifauna.