The International Waterfowl (and Wetlands) Research Bureau: *c.* 1945–1995

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Abstract

The International Waterfowl and Wetlands Research Bureau (IWRB) – an international network of networks co-ordinated by a small Secretariat – was the most important international motivator for wetland conservation of the 20th century. Its legacy includes the International Waterbird Census (IWC) – one of the largest internationally harmonised biodiversity monitoring schemes in the world; advocacy for, and drafting of, the first multilateral environmental agreement – the "Ramsar" Convention on wetlands; the production of multiple contextual data syntheses, including a global series of regional wetland inventories and waterbird flyway atlases; providing mechanisms through which international concerns regarding "unwise use" of wetlands could be highlighted and raised with governments; and the establishment of a wide range of global standards for conservation, notably the selection of protected areas which remains fundamental to contemporary wetland conservation. This is the story of the organisation, from its origins in the 1920s to its eventual merger with other regional wetland conservation organisations in 1995, told in relation to its structures, staffing, activities and achievements. Whilst much has been taken forward since 1995 and continues to this day, through legacy initiatives and successor bodies, much has also been lost – which is regrettable, especially given the biodiversity crisis now facing the world.

Key words: conservation, international co-ordination, monitoring, publications, waterbirds, waterfowl, wetlands, wildfowl.

The International Waterfowl and Wetlands Research Bureau (IWRB) was one of the most important drivers of science-based nature conservation in the 20th century, particularly for waterbirds and wetlands at the global scale. Its legacy includes the International Waterbird Census (described as one of the largest, internationally harmonised, biodiversity monitoring schemes in the world); global coordination of waterbird research (through its family of thematic Research Groups – RGs); a global

series of regional wetland inventories; the Ramsar Convention on wetlands; the "wise use" concept that underpins much of current nature conservation action; and much, much more.

So how did a small British wildfowl census become an international organisation of global conservation importance, along the way stimulating the first modern multilateral environmental agreement, and a huge raft of conservation activities around the world, before new management directions following an organisational merger resulted in a broadening of its conservation remit and loss of its original focus and identity (and many of its important functions)? This review seeks to answer some of these questions, especially since its huge achievements risk becoming forgotten: shockingly, in September 2022, it does not even have the simplest of Wikipedia accounts.

The growth of the "IWRB" over more than four decades was evolutionary, as witness its seven different identities over that period (Table 1) – although for the sake of simplicity, the organisation is generally referred to just as IWRB. Note that this review largely confines itself to the period before the 1995 merger that created Wetlands International, while sometimes referring to activities initiated before 1995 but culminating after that time. From the outset, IWRB's structure was a unique "meta-network" – a network of networks – composed of wetland and waterbird conservationists. Its structural concept eventually had both "vertical" and "horizontal" elements (Fig. 1). Its vertical activities came through its national delegates (see page 25) supported sometimes by national sections, charged with progressing activities at a country scale. Its horizontal (or

Table 1. The changing identity of "IWRB": 1922–1995.

Formal title	Period
International Committee of Bird Preservation [ICBP] (British Section)	1922–1935
ICBP Wildfowl Inquiry Committee/Sub-Committee – International Wildfowl Inquiry*	1936–1941
International Wildfowl Research Institute (IWRI)	1947–1954
International Wildfowl Research Bureau (IWRB)	1954–1971
International Waterfowl Research Bureau (IWRB)	1971–1985
International Waterfowl & Wetlands Research Bureau (IWRB)	1985–1995
Wetlands International	> 1995

*The committee is variously referred to as a Committee by Hindle (1964), and simultaneously as both a Committee and a Sub-Committee respectively by Berry (1939) and International Wildfowl Inquiry (1941). Both terms seem to apply to the same body.

Figure 1. Phyllis Barclay-Smith. Photograph courtesy of *British Birds*.

geographically cross-cutting) activities came from the work of either thematic or taxon-related Research Groups. Supporting these elements was initially a small Secretariat, later developing into a small headquarters organisation, but whose actions typically were catalytic – seeking to stimulate (and support) action from others, albeit in contexts which were always under-resourced and consequently grossly under-staffed.

This paper reviews the history of IWRB across the nearly five decades of its existence and summarises – at high level – the main themes of its work. As context, it is critically important to recall that for most of its existence IWRB functioned in the years prior to the internet and of instant communications, or at least before its wide-scale use and functionality. In its last decade, high technology international communication came in the form of the telex, first introduced by Joost van de Ven (IWRB's Assistant Director) in 1986, and then the fax machine in the early 1990s – quite revolutionary advances at the time that allowed the (near) real-time transfer of documents. Assistant Director Mike Smart collected the very first IWRB computer purchased for the South American inventory (Scott & Carbonell 1989) in *c.* 1983, from a small supplier in the London suburbs *en route* home from a meeting. The first five desk-top computers for the office (Amstrad PCs purchased in Gloucester) started replacing typewriters from 1986, yet the age of e-mail, websites and the internet had yet to arrive. For this reason, the "life history" of IWRB exists only in paper records (including the archive of Board minutes retained by Geoffrey Matthews) and much, especially from early years, has been lost. Before the mid-1980s, there was also a fundamentally different way of working internationally, including the small number of individuals that it was practical to work with and a slower pace of working. The revolution in ease of communications was one of the drivers for change in the

1990s; IWRB's original working model, with its between-meetings reliance on erratic international postal services and phone calls being no longer sustainable (T. Jones *in litt.*).

Beginnings: the growth of European concern for wildfowl

The IWRB's roots lie in developing concern from the 1920s onwards about the state of Europe's wildfowl (Anatidae) populations. The essential awareness of the unsustainability of wildfowl harvests were similar to concerns that, a decade or so earlier, had led in North America to the adoption of the 1916 Migratory Birds Treaty signed between the United States of America and the UK (on behalf of Canada; US Department of the Interior 1964) and later the North American Waterfowl Management Plan (agreed in 1986 with regular updates thereafter), which also more recently provided examples for the development of the Agreement on the conservation of African-Eurasian migratory Waterbirds (AEWA). Hindle (1964) succinctly set out the genesis of European concern as follows:

> "The diminution of wildfowl in Europe first attracted serious consideration in 1925 when Professor Einar Lönnberg of Sweden instituted enquiries in the views held by ornithological experts on this subject. The following year the Swedish government addressed proposals to other European Governments with the object of promoting international regulations aimed at improved protection during migration, and the problem was raised by Dr Percy R. Lowe at the International Ornithological Congress at Copenhagen in 1926. It was agreed that a conference of nations more immediately concerned should take place, and the following year an international conference was held in [London]. The resultant report ... contained recommendations for the shortening of the open season during which wildfowl might legally be killed, and for the investigation of migratory routes by means of ringing. [*Authors' note: It is unclear the extent to which these recommendations were ever implemented by national governments but, with no follow-up, this is doubtful.*]
>
> "Previously to these events the International Committee for Bird Preservation [ICBP] with national sections in each of the adhering countries, had been founded in 1922, but until its reorganisation in 1935 no very obvious practical result had been achieved. In that year the British section of the I.C.B.P. took the lead and appointed a special committee under the chairmanship of Dr Percy R. Lowe to inquire into the status of wild ducks and geese.
>
> "At the start of this Wildfowl Inquiry Committee the Chairman stated "…*the object of the inquiry is to provide, if possible, for the future welfare of the duck population, not only of the British Isles but of Europe generally.*""

Thus, from the outset of the Wildfowl Inquiry Committee's work, whilst the primary focus was on British wildfowl, these were placed in a wider, European context. As in North America, this early concern

came from within the hunting community, some of which recognised the risks to populations (and thus their sport) of unsustainable harvesting. The Committee actively promoted and helped develop new UK legislation on the protection of ducks and geese in 1939.

The Committee produced two publications, presented as being from the "International Wildfowl Inquiry". Owing to the onset of war, the first to be published was Volume II in 1939, on "*The Status and Distribution of Wild Geese and Wild Duck in Scotland*" (Berry 1939). This was ground-breaking at the time in its level of historical review and detail. The first volume was published two years later as "*Factors Affecting the General Status of Wild Geese and Wild Ducks*" (International Wildfowl Inquiry 1941) – a multi-authored compilation of papers, including accounts of arctic breeding grounds in northeast Greenland, Iceland, Spitsbergen and Norwegian Lapland. Most of the papers had international emphasis, included reviews of European duck movements based on ringing recoveries mapped across the continent. Perhaps the most outward looking contribution was on "Close Time" (pp. 106–120), which provided a review of what was known of European hunting seasons by the indefatigable Phyllis Barclay-Smith, the Secretary of the Inquiry Sub-committee (Fig. 1, Supporting Materials Fig. S1). She concluded with an "Appeal to the Countries of Europe":

> *"If all the countries of Europe would accord an adequate "close season", the future of the common stock of wild duck and geese would be more assured. It is also of great importance that all countries should co-operate in prohibiting the import of wildfowl during the close season in order to assist the endeavours of their neighbours to secure the preservation of wild geese and duck in their respective countries."*

Whilst one cannot fault the conservation objective, the anticipation that countries might "co-operate" on issues of international trade in wildfowl as a World

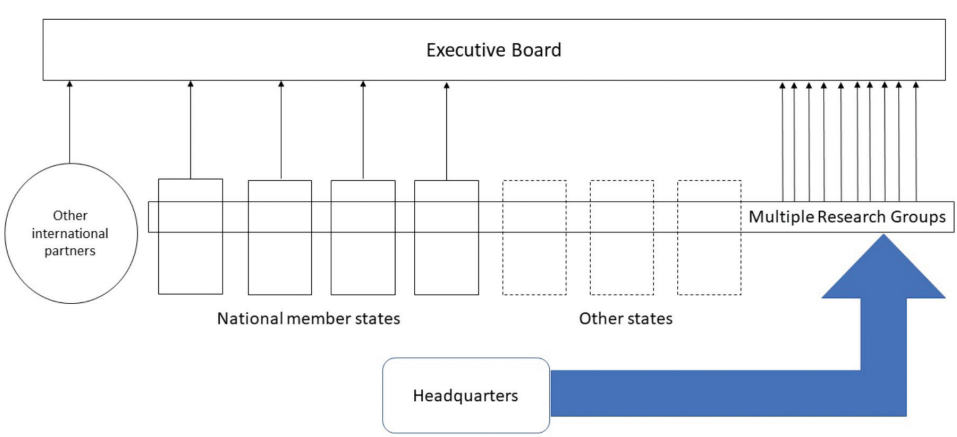

Figure 2. Conceptual structure of IWRB, 1960s–1980s.

War raged across the continent seems unrealistically ambitious to say the very least!

Hindle (1964) noted that no meetings of the Committee were held between July 1938 and October 1945 but activities were quickly resumed after the war with agreement of a statement of objectives relevant "not only of the British Isles but of Europe generally". These addressed the need to ascertain the status of each species and to monitor and report on them; to endeavour to understand the causes of any declines and take actions to address relevant threats; if necessary, to press for adequate legislation both in the British Isles and in other countries concerned; and to frame actions in an awareness of the scientific, aesthetic and economic value of wildfowl.

> *"A Conference of the European National Sections of the [ICBP] was held … in London in June 1947, attended by representatives of fourteen nations…it was unanimously agreed that the Wildfowl Inquiry Committee of the British Section should correlate the results of inquiries concerning wildfowl carried out by the various European countries. The British Wildfowl Inquiry Committee therefore decided to form an International Wildfowl Research Institute [IWRI] for the purpose of this special work and allied problems."* (Hindle 1964).

So, when did IWRB start? A case can be made for 1935 with the establishment of the British but Europe-leaning, International Wildfowl Inquiry. Or was it in 1947 when ICBP mandated the IWRI? Perhaps it does not matter, other than to note that the organisation evolved from a continuum of growing international concern for waterbirds and their wetland habitats, and that over five decades this eventually and directly led to the spawning of international treaties in the 1970s and subsequently.

Whenever the birth of IWRB occurred, it is clear that the midwife was the extraordinarily active Phyllis Barclay-Smith or "PBS". Already in 1941, with her major review of European open hunting seasons (*i.e.* Barclay-Smith 1941), she was clearly in correspondence with at least 26 other countries from the Black Sea to Fennoscandia and Iberia. PBS deserves a starring position in conservation's Hall of Fame for her multiple achievements over decades, yet today she remains somewhat eclipsed by her male contemporaries such as Peter Scott and Luc Hoffman. Her energy was fundamental to creating the IWRB, of which she was Joint Honorary Secretary from 1948–1969 (Nicholson 1980; Low 2021). As such she can claim major credit for all that followed…

1940s–1950s: early years

Initially, IWRI was based in Tring in offices provided by the British Museum (Natural History) (BM(NH)). A Board provided its governance, comprising senior ICBP officers, with activities undertaken by an Honorary Director (Hindle), Secretary (PBS) and four Honorary Research Associates. A voluntary programme of work commenced overseen by an Advisory Scientific Committee. Financial support of £1,000 was made available in 1949 (equivalent to £37,650 in 2022) by the UK's Nature Conservancy, renewed for two subsequent years which enabled the employment of a full-time Research

Associate and a move to the ICBP Secretariat offices in the main BM(NH) premises in 1952. Initial work had a strong research orientation, with analyses such as on Shelduck *Tadorna tadorna* moult migration resulting in papers issued as formal IWRI Publications (see Supporting Materials Annex S1).

The move to London and withdrawal of financial support resulted in a changed mode of working – moving from species-specific research to a more co-ordinating role. Hindle (1964) summarises the main initial themes of IWRI/IWRB activity as: the promotion of national legislation according to sound principles; the continued promotion of international wildfowl counts, including the establishment of an African Wildfowl Enquiry in 1954; the international co-ordination of goose research; and collation and analysis of ringing recoveries. However, above all these was IWRB's over-arching mission to promote international liaison: by 1965 a total of 11 countries were regularly participating in Executive Board (hereafter Board) meetings (Fig. 3).

At the same time, the Institute renamed itself a "Bureau" to reflect this changed modus, including a greater focus also on wetlands, a change approved by the ICBP Conference in May 1954. Whilst initial "staffing" of IWRI was exclusively British (the Research Associates were Jeffery Harrison, Peter Scott, George Atkinson-Willes, James Campbell, R.A.H. Coombes, Christopher Dalgety and Russell Goddard), with its evolution into a Bureau a more international approach started to develop, with appointments from France of George Olivier as Joint Honorary Secretary, and in 1960 François Edmond-Blanc as Meetings Secretary. An internal briefing paper by Max Nicholson, the Director-General of Britain's Nature Conservancy, following the 4th Board meeting in 1958, provides a

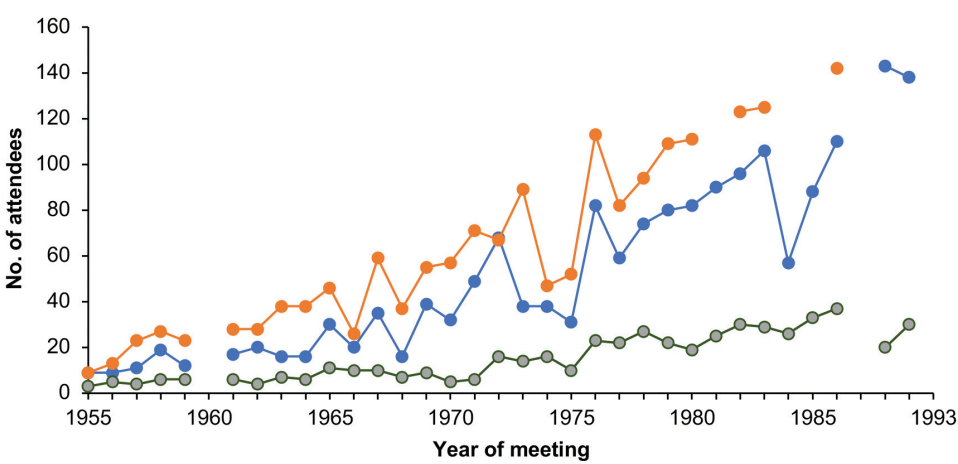

Figure 3. Attendance at IWRB Executive Board meetings. Blue circles = total number of attendees; orange circles = attendees plus potential attendees (apologised for non-attendance); grey circles = national members.

perceptive summary of IWRB's rationale in the 1950s:

> "…*The Bureau is in form a fairly new body but it carries on functions that have continued over thirty years under various guises. … The Bureau itself does no research and although it sometimes initiates and sponsors investigations, it functions as a policy-making and advisory body, neither financing nor supervising enquiries. (Its predecessor the IWRI did attempt to do research but this approach to the problem was not satisfactory.) The Bureau does, however, play a useful role in stimulating necessary investigations and removing obstacles in their way, enlisting powerful support and bringing in additional countries as participants, and also composing dissentions or misunderstanding which threaten international co-operation, and discouraging waste of effort on half-baked schemes.*
>
> *"On the whole the Bureau has the confidence and support of the more influential and responsible leaders in its field although this is not true of North America, where governments have long developed wildfowl conservation more professionally and on a much larger scale through the N. American Wildlife Conference. … While in some countries there is a lively interest in Wildfowl and their conservation, others are interested at present only in hunting and many are not yet interested at all. The Bureau therefore has to combine an increasingly detailed and practical range of services to the advanced and largely "converted" countries with simple propaganda and missionary gestures to the "unconverted"*.…"

The 1958 ICBP World Conference requested IWRB to co-ordinate flyway scale research on geese and, following this, a Goose Research Group was established under the leadership of M.F. Mörzer-Bruijns from the Netherlands. This group was the first of the IWRB family of Research Groups (see later) and built on the earlier contacts and work on Brent Geese *Branta bernicla* co-ordinated from 1954 by Finn Salomonsen – a Dane with remarkable international perspectives and the initiator of the Greenland Ringing Scheme (Ferdinand 1979).

In passing, it is worth noting the role of the "upper classes" and European aristocracy in driving the formation of the organisation. As was common for other international bodies (*e.g.* the International Union for the Conservation of Nature (IUCN); Holdgate 1999), in the first half of the 20th century it was typically those with independent financial means that were able to devote time to conservation organisation building. The participant lists of early IWRI (and later IWRB), as well as ICBP and International Council for Game and Wildlife Conservation (CIC) meetings typically included many aristocratic titles (and with titled daughters acting as secretaries). There was a large overlap with sporting interests – a strong and linked interest of privileged classes (Marchington 1980). Until late in the 20th century, it was only the "wealthy" hunters (other than professional wildfowlers), that were interested in waterbird numbers and had been the first to report their declines. In many ways, this is socially unsurprising in the decades before nature conservation, or environmental science more widely, had established the potential for professional careers. The other well-represented group came from museums and academia – then

essentially the only salaried biological employment. The financially privileged "upper" classes were able to use their social networks to argue the case for resource support for the IWRI/B and other nascent international conservation organisations such as IUCN and (later) the World Wildlife Fund (WWF) and ICBP, as well as nationally as for Natuurmonumenten and Vogelbescherming in the Netherlands.

1960s: Project Mar

In 1962, significant organisational change occurred with a move of HQ from London to the Camargue (France), precipitated by the retirement of Edward Hindle as Director and the consequent stepping down by PBS as Honorary Secretary. Luc Hoffman offered to host IWRB at the Station Biologique de la Tour du Valat, with Georges Olivier taking on the role of Secretary. In the subsequent years, the organisation thrived under Hoffmann's dynamic leadership as Director and started to exert very significant influence. This included the organisation of European-scale conferences; the development of critical inventories such as related to the status of national refuge networks (Hoffman 1964a; IWRB 1966a) and shooting legislation (IWRB 1966b); as well as turning to the wider issue of wetlands and their protection, plus the adoption of the iconic logo (see Supporting Materials Box S1).

The rapid loss of wetlands had been recognised from the earliest days of IWRI/B and by the late 1950s, the need to co-ordinate responses internationally had grown increasingly urgent. In early 1961, IUCN's Executive Board and its scientific advisory body (the Commission on Ecology) proposed to develop a programme on the conservation and management of "*temperate marshes, bogs and other wetlands*". This was to be called Project Mar – so-called because "mar" is the root of many European words for wetland – marsh in English, marais in French, marismas in Spanish (very important in 1961 when concern about drainage of Doñana (Zorrilla-Miras *et al.* 2014) led to creation of the WWF), maremma in Italian, Marsch in German, *etc.* From the outset of the conference planning, IUCN sought close co-operation with ICBP and IWRB.

The objectives of the programme were ambitious (and indeed continue to have contemporary significance), namely:

(1) to prepare a broad statement on the importance of marshes and wetlands to modern mankind and to give the widest publicity to this statement;

(2) to assemble all important data on means of conserving wetlands, to keep or improve them for wildlife through proper management, to restore them when debilitated and to make manmade aquatic habitats useful for wildlife: to make this information known and available to all those in a position to take action to advance the conservation of wetlands;

(3) to make an inventory and classification of all European and northwest African marshes, bogs and other wetlands of international importance; and

(4) to offer technical assistance for establishment of reserves in marshes, bogs and other wetlands classified as of international importance.

The work to organise the Project dominated IWRB activity for a number of years – as documented by the relevant minutes of the Board. The initial phase was the organisation of a major international conference, attended by 84 participants from 16 countries and held in the small city of Saintes-Maries-de-la-Mer, Camargue, from 12–16 November 1962. The conference programme was framed to address the programme's objectives via its plenary sessions, namely: (1) Reasons for conservation, including economic, scientific and moral considerations; (2) Basic criteria for defining reserve areas and surrounding protective buffer-zones; (3) Legal and administrative ways of achieving protection; (4) Management and utilisation of wetlands; (5) Restoration of modified wetlands; (6) Wildlife utilisation of man-made habitats; and (7) International efforts for the conservation of wetlands and wetland fauna.

Multiple important outputs from the conference were forthcoming. The 475-page *Proceedings* was published by IUCN two years later (Hoffman 1964b) and contains the rich diversity of presentations, many still of contemporary relevance. The 13 Recommendations of the conference were the first international statement to address wetland conservation needs and covered all the themes of the programme objectives. Of particular significance was Recommendation IX, which called for the establishment of an inventory of European and North African wetlands of international importance "*and further recommends* that this list may be considered as a foundation for an international convention on wetlands." Work soon started on compiling this inventory. Peter Olney was seconded from the Wildfowl Trust (working under another Nature Conservancy grant), based at Tour du Valat to co-ordinate the task. The conference had decided that:

> *"the first list should be based primarily on ornithological data, although a second list, based on all zoological and botanical aspects, should be prepared as soon as sufficient information was available. The use of ornithological data mainly is partly a matter of expediency in that there is already available a considerable amount of information on the ecology of birds in relation to wetlands."*

The Mar list was stated to be limited to about 200 sites "*for practical reasons … since this was thought to be the maximum on which the international bodies concerned would be able to promote effective conservation action, in the immediate future, under section 4 of the project*" (Carp 1980). It was envisaged that the international recognition provided by the Mar list would be promoted to governments in the cause of their protection. The urgency with which that was seen as a need was palpable in the comments of Max Nicholson, the visionary first Director General of Britain's Nature Conservancy, at the 1963 IWRB St Andrews Conference:

> *"But for the moment the most urgent need is to have the Mar list out as soon as possible and to refer it to governments straight away. It might be possible to prepare a better list in 3 years' time but by then many of the areas would have disappeared."* (IWRB 1964, p. 168).

The first list of European and North African wetlands of international importance was subsequently published by IUCN in 1965 (Olney & IWRB/Mar Bureau 1965;

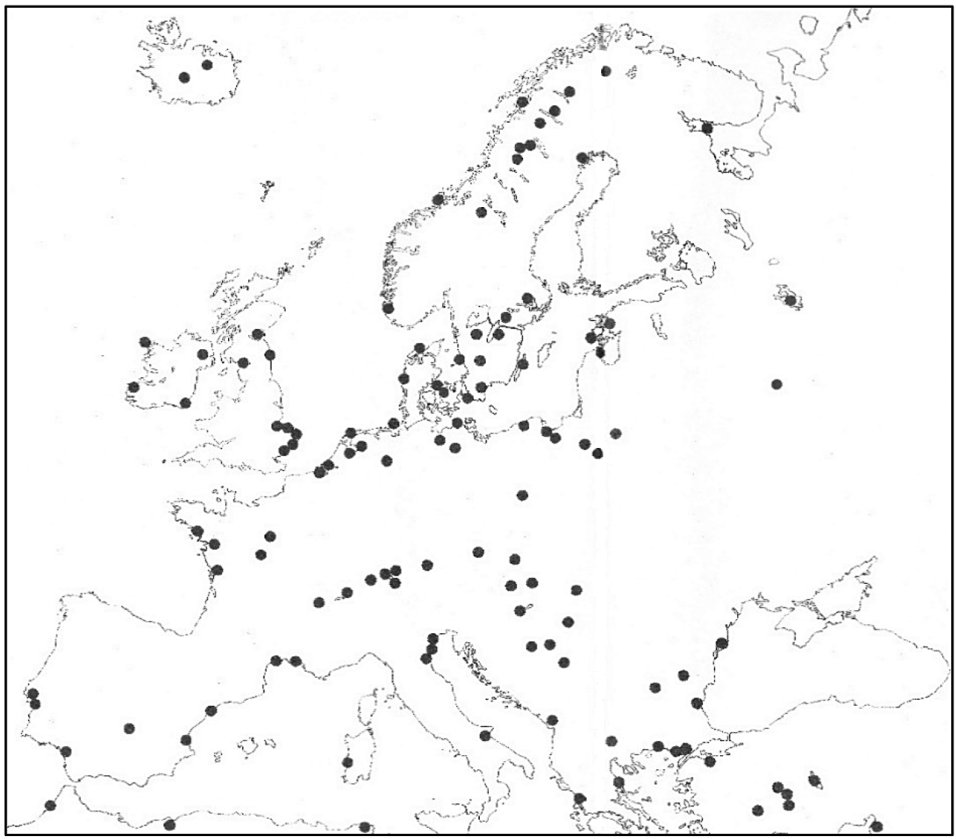

Figure 4. Distribution of List A sites (wetlands of major importance for wetland bird populations) identified by national governments in the first pan-European and north African assessment of internationally important wetlands for Project Mar. From Olney & IWRB/Mar Bureau 1965.

Fig. 4). There was no immediate "second list" in complementary format; this effectively came with Erik Carp's *Directory of Western Palearctic Wetlands* published fifteen years later by the United Nations Environment Programme (UNEP) and IUCN (Carp 1980), although commenced in 1973. Subsequently, IWRB developed a global programme of regional wetland inventories (below) delivered largely by the ever-energetic Derek Scott. Sites on the Mar lists were categorised as either A sites – "*of major importance for the conservation of European wetland bird populations*" or B sites – "*of still vital importance*" but with lower concentrations of waterbirds. The allocation of a wetland to the A or B list was determined by each country and was typically poorly defined. Later inventories did not distinguish between A and B categories.

What is fascinating today about the Mar list(s) are those wetlands currently recognised of major international importance that are *missing*. Fig. 5 compares the UK Mar

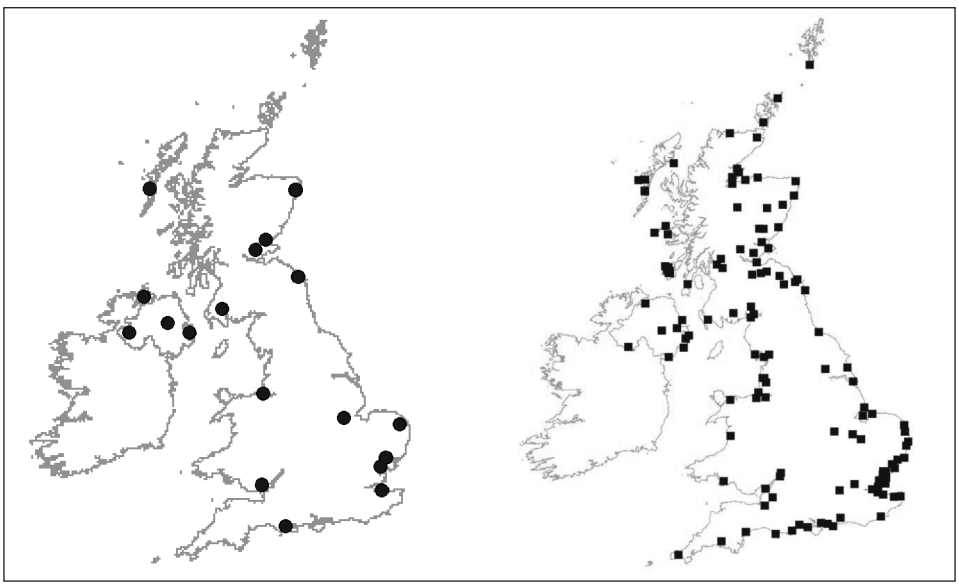

Figure 5. UK wetlands identified as being of international importance for waterbirds. Left: 18 sites included as List A and List B sites under Project Mar in 1962 (Olney & IWRB/Mar Bureau 1965). Note that some sites contain more than one current Special Protection Area (SPA). Right: sites classed as SPAs in 2001 for their European importance for non-breeding waterbirds using near-equivalent criteria (Stroud *et al.* 2001).

list with the subsequent EU Special Protection Area (SPA) network classified by 2001 using near equivalent criteria. Similar enlargement of national protected area networks occurred in the Netherlands. This shows the consequence of knowledge growth over four decades of survey and monitoring. The Mar inventory of 123 List A sites and 105 List B sites (Fig. 6) was however unique at the time, although (despite an attempted consistent selection through use of criteria) national approaches adopted varied markedly. Many sites contain multiple listed subsites – some of which today have individual protected area status, with site sizes ranging from a 50 ha Dutch wetland to the 1,000,000 ha Volga Delta in the USSR.

Early concepts for drafting the wetland convention proposed under Recommendation IX of the Mar Conference proceedings envisaged that the Mar list sites could and would be included within the convention, hence "automatically" gaining some sort of legal protection (Stroud *et al.* 2022). However, such an approach involved too much loss of sovereignty, and the adopted treaty stepped back from this initial idea to a national selection and designation process. Initial analysis of the 1965 Mar list (D. Stroud unpubl. assessment) shows that whilst indeed many were subsequently designated as Ramsar Sites, many others were not and have seemingly been lost.

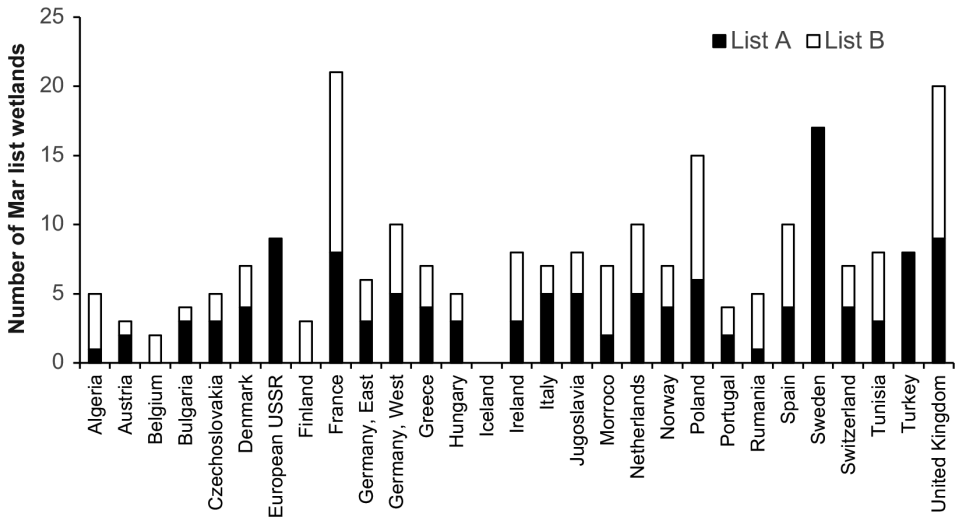

Figure 6. Number of wetlands of international importance in Europe and North Africa documented by Project Mar in the early 1960s (Olney & IWRB/Mar Bureau 1965).

1963–1971: Building a wetland convention

At the 1963 meeting of the Board, Max Nicholson proposed an international conference "*convinced that effective international co-operation would only come about if governments were directly involved in the conferences, along with experts and representatives of international organisations*" (Matthews 1993). The Board agreed the proposed joint UK/IWRB European conference, although with some dissent (from H.H. Buisman) as "*to the value of yet another conference, especially one in Scotland*". Harsh!

The very successful first European meeting on wildfowl conservation was held in St. Andrews in October 1963 (IWRB 1964) and in many respects started to put flesh on bones established by Project Mar. Seventeen Recommendations covered issues ranging from oil pollution, cold weather closure of shooting, spring shooting, shooting statistics and the need for wildfowl counts in southern Europe. Curiously in retrospect, the issue of wetland conservation so prominent at the Mar Conference the previous year, received scant attention. Geoffrey Matthews (Supporting Materials Fig. S2), who succeeded Luc Hoffman as IWRB Director in 1969, has documented the development of what became the Ramsar Convention on wetlands (Matthews 1993; De Klemm & Crétaux 1995; Stroud *et al.* 2022), an initiative in which IWRB played an absolutely critical facilitating role – despite the chronic absence of finances. The six sequential drafts of the convention recorded by Matthews (1993), and securely archived by him, have recently been published (Stroud *et al.* 2022).

Essentially, from 1965 to the final intergovernmental negotiating conference at Ramsar, Iran in February 1971, IWRB consistently pushed forward the initiative recognising the need for governmental ownership of the nascent treaty (Stroud *et al.* 2022). Both at the outset, to get the ball rolling, and later when the Netherlands was unable to deliver promised drafts in 1969 (Matthews 1993), IWRB kept the treaty negotiation process active. Indeed, its organisational structures (annual Board meetings including government representatives) and the more informal international relationships created by IWRB from 1948 onwards, were quite critical to the process of developing the wetlands convention. Annual meetings were crucial, and an essential IWRB difference from the ICBP, which met only every four years (see pages 30–31).

The intervention of Eskandar Firouz, the Iranian government's senior official for the environment, on a visit to Slimbridge after the 1968 Leningrad Conference, was critical. Geoffrey Matthews told him that IWRB was looking for a country to host a conference to adopt the text of the Convention, whereupon Mr Firouz invited IWRB to come to Iran, which had good neighbour relations with USSR. This meant that the finalisation of the new convention moved out of Europe into the developing world, where the concept of wise use – introduced into the text at that final meeting – became a key concept.

Following the adoption of the Convention in February, in December 1971, the 17th Executive Board meeting of the IWRB voted to change "Wildfowl" in the organisation's name to "Waterfowl". The minuted justification was not only that "*"waterfowl" was a more readily translatable and understandable in the major languages*" but significantly that "*The need to link IWRB more firmly with the "Waterfowl" in the title of "the Convention on Wetlands of International Importance especially as Waterfowl Habitat" was relevant.*"

This period also saw waterfowl counting take off nationally, with major growth of the International Waterbird Census (IWC). This was stimulated also by the immediate conservation "use" that the new Convention provided for these monitoring data notably through the application of the 1% threshold (see page 36) to provide a simple means of assessing international importance of wetlands (Stroud & Davidson 2021). For example, in Denmark, Anders Holm Joensen undertook aerial counts for the first time in all coastal waters documenting the unique role of its extensive shallow seas. These data later formed the basis for almost all Danish Ramsar sites and later most SPAs. Joensen was a European pioneer of extensive small plane surveys, inspired by the Americans and Hugh Boyd in UK, albeit across much smaller areas. This pioneering work was followed up in the 1970s with national surveys of waders including multiple aerial counts over the Wadden Sea (H. Meltofte *in litt.*).

The second half of the 1960s was beset by financial crises, with a 1964 deficit of 14,500 Fr (£1,061), largely the result of non-payment of national subscriptions. Two years later, Board Minutes report gratitude to Luc Hoffman for a donation that balanced the accounts, and clearly the same happened in 1967 to allow balanced

accounts as the HQ transferred from Tour du Valat to Slimbridge (page 29). Aside from this generous support, through the 1960s the World Wildlife Fund (WWF) had seemingly kept the organisation viable with *ad hoc* grants, but increasingly there were Board discussions as to how to establish a more viable system of subscriptions. Yet income and expenditure slowly grew (Fig. 7).

1972–1988: Developing monitoring and advocating for Ramsar

The need for a full-time administrator had become apparent, with Erik Carp appointed into this position in 1969. He had been with IWRB based at Tour du Valat as Luc Hoffman's assistant on international wetland conservation matters when Luc Hoffman was Director and working with the Dutch government on early drafts of the Ramsar Convention. However, in his new role he moved to Slimbridge. (He was followed in this role by Eugeniusz Nowak in 1973, Mike Smart in 1974, and finally Simon Nash from 1987 up until the merger to form Wetlands International.)

The 1970s and 1980s were decades of huge activity for IWRB, as the Ramsar Convention slowly gained momentum, bringing increased needs for technical support, not just to the structures of the convention but also to its Contracting Parties. To that end, the development of the series of regional inventories (described below) was hugely significant.

The Convention, innovative as it was, however lacked multiple critical functions such as: (1) provision for both scientific and organisational support; (2) a budget to pay for things; and (3) legal ability to amend the convention. The struggle to resolve these issues, and IWRB's role in that story, is

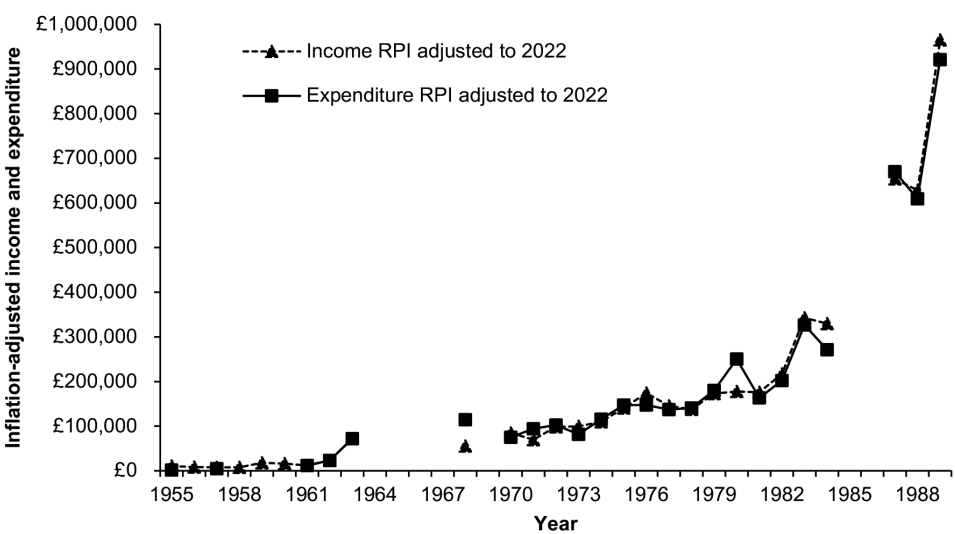

Figure 7. IWRB income and expenditure at 2022 values. Sources: Executive Board minutes and NCC files. Annual figures adjusted for inflation by the annual UK Retail Prices Index (RPI).

documented by Matthews (1993). The key issue was who would support the "new-born" convention? IUCN had blown hot and cold as to the convention from its outset (Stroud *et al.* 2022) and continued to do so after it was adopted – especially in relation to its assigned "continuing Bureau duties" under Article 8. Responsibilities that were assigned with no financial support.

However, ensuring the new-born convention was brought into life was critical. Matthews (1993) documents how "there was a strong possibility … of the Convention withering on the vine" and recorded:

> *"Having spent nine years in helping to bring the Convention into being, IWRB was not willing to see it founder. It therefore offered to undertake the activities IUCN was unwilling to shoulder. IWRB was already stretched to achieve its functions of inspiring and coordinating international research on and conservation of waterfowl and their wetland habitats. … One way in which IWRB was able to recruit new Parties, and encourage vigorous implementation of the Convention, was by making the Convention a primary item for reporting and discussion at its annual meetings (which were accompanied by scientific symposia)."*

With symposia organised back-to-back with Board meetings from 1970 (Supporting Materials Table S1a) these now resulted in a steady flow of specialist publications. Matthews records the trials associated with the organisation of the first Ramsar Conference of the Parties (COP) at Cagliari in Italy at which IWRB "*shouldered quite undue financial loss when expected assistance from an international source did not materialise.*"

Ultimately, the "interim arrangements" through which IWRB kept the convention afloat at its own cost, were resolved, with much stress, and with an agreed budget and formal Bureau/Secretariat arrangements established (Matthews 1993). IWRB's meetings also influenced in the way that states joined Ramsar. For example, Australia joined in 1974 at the time of an ICBP meeting and Japan joined in 1981 at the time it was hosting the Board in Sapporo.

Meanwhile IWRB continued to reach out to all those involved on wetland and waterbird conservation. Pre-internet, the regular production and mailing of a twice-yearly information-rich *Bulletin* (transformed to *IWRB News* in January 1989) was a major editorial undertaking. These communications products were hugely important means of sharing news internationally: of events, people, sites and threats, latest updates from the IWC, national reports, the latest from the Research Groups (RGs), recent publications (in a bibliography series), and much, much more besides. For those wishing to understand the rapidly developing international waterbird and wetland scene, they became very well-thumbed indeed. Their informal style was also very important in building the international "family" ethos that was such an important feature of IWRB (see Supporting Materials Box S2). Thus, for example, the staff news in *Bulletin* 43/44 even reports the birth details of the long-serving Secretary's new baby boy – something unlikely to be compliant with privacy legislation in the 21st century! The budget, always small, had grown significantly through the 1970s, from £4,803 in 1970 to

£28,215 in 1979, although a financial position paper prepared by the Director in 1981 noted: "The present Headquarters staff [*Authors' note: two – the Administrator and a Secretary – as the Director's role was honorary*] is no larger than at the start of the decade. Most of the work of IWRB continues to be done by professionals in their own time or by leave of their institutes in many countries."

However, by the 1980s, the always chronically inadequate capacity of headquarters finally started to be increased with secondments from either national agencies or other supporting organisations, as described on page 29 below.

1988–1995: Final years

The period of Mike Moser's Directorship from 1988–1995 was characterised by significant expansion, although the fact that this is the period most fresh in current memories perhaps means it inevitably comes into sharper focus. It was a period when a growing number of secondees and growing financial support allowed significant growth of staffing: contrast for example the 1993 staff photo (see Supporting Materials Fig. S3a) with the limited headquarters capacity of the 1950s – or indeed the early 1980s – when it all was held together by Geoffrey Matthews (in a part time capacity) and Mike Smart (juggling two hugely demanding roles for both IWRB and Ramsar), plus a Secretary (Supporting Materials Box S3).

Highlights of the period, explored in following sections, include:

(1) consolidation of the organisation's international presence and status, notably in its support to Ramsar as one if the Conventions "International Organisation Partners" (IOP). At the start of the period, it hosted a team from the Ramsar Bureau for a few years (Mike Smart, Tim Jones, Christine Samuel and Martina Bernhard). However, with the eventual transfer to Switzerland, first of Mike Smart, and then Tim Jones (and leaving IWRB with only the maintenance of the Ramsar Database), resulted in the need to "re-invent" its relations with the Convention given the loss of the former technical support functions;

(2) support for development of a legal flyway treaty covering Africa and Eurasia under the Convention on Migratory Species (the Bonn Convention) (Boere 2010);

(3) continued growth of the programme of regional wetland inventories and International Waterbird Census;

(4) a greatly enhanced publications programme;

(5) growth of and support for the Research Group networks, who in turn cascaded activity and outputs;

(6) initiation and support for regional initiatives such as MedWet in the Mediterranean and in the Black Sea region; and

(7) increasing capacity to engage with countries to resolve site-related wetland management problems and conflicts, not least through a dedicated wetland management programme.

Growing pains: moving from Slimbridge

By the early 1990s, growth of headquarters staffing had meant space allocation at Slimbridge was becoming increasingly problematic – with few options for on-site expansion and lukewarm support from WWT to explore new and potential innovative solutions. Both staff and the Standing Committee had expressed concern about the quality and quantity of accommodation available (several staff were billeted in portacabins). Additionally, the relatively remote rural location – 3 hours from international airports with poor transportation links – was becoming especially difficult, not only for international visitors but also for staff undertaking ever more international travel.

Initial UK options centred around a site in Cambridge where, on a redundant university site, a hub of international organisation secretariats could be created. However, this would have needed UK government support. The political ethos of Margaret Thatcher's government essentially saw a "free market" for international organisations and could not commit to taking this forward. The establishment of the David Attenborough Building in 2015 finally delivered this concept at an arguably better, city-centre site – albeit without IWRB/Wetlands International.

In September 1994, the Standing Committee agreed that a search should begin for new location options, recommending this be restricted to locations in Austria, Belgium, Denmark, Germany, France, the Netherlands, and the UK. National delegates were invited to consider whether they could submit alternative offers for the headquarters. At the 12th Standing Committee meeting in Kuala Lumpur, Malaysia in October 1995, an independent review panel comprising Larry Mason (retired Assistant Director of the US Fish & Wildlife Service) and Torsten Larsson (Head of Species Conservation, Swedish Environmental Protection Agency) was established to assess offers. Additionally, the Director, representing staff, was invited to serve as an advisor (Larsson & Mason 1996).

By November 1995, three formal offers had been received, from France, Germany and the Netherlands. Preliminary reviews concluded that the French offer would not provide adequate sustainability for Wetlands International, whereas offers from the Netherlands (at Wageningen and Lelystad) and Germany (at Bonn) should be investigated further. The panel undertook site visits in December 1995, deciding in January 1996 to recommend Wageningen as the new location for Wetlands International. This provided the best overall support "package" based on both short-term and long-term economic implications, as well as the office accommodation offered, availability of amenities (*e.g.* banks, shops, local public transport), and including housing for re-locating staff (Larsson & Mason 1996).

Organisational merger: the end of IWRB

Organisations with similar objectives had emerged in Asia and the Americas: the Asian

Wetland Bureau (AWB) was initiated as the regional wader research co-ordination group INTERWADER in 1983, and Wetlands for the Americas (WA) had formed in 1989 with links to the Western Hemisphere Shorebird Reserve Network (initiated in 1985) and the young Neotropical Waterbird Census (see page 41). Relations between these organisations started to become complex. Whilst WA and AWB had clear regional identities, IWRB was nominally global in scope (albeit in reality its main focus was within the European, west Eurasian and to a much lesser extent African regions) and thus had overlapping areas of interest with WA and AWB, and potentially conflicting interests with respect to fund-raising for wetland conservation projects. From 1991, to strengthen their mutual operations, the three organisations started to work more closely together, initially in terms of joint publications.

By 1993, the links had become stronger through a cooperation agreement, with a tag-line appearing on publications to the effect that: "*IWRB is affiliated with the Asian Wetland Bureau (AWB) and is represented by AWB in the Asia/Pacific region.*" The successful working relationship progressively evolved into plans for a fuller merger to create a single global organisation to be called Wetlands International (WI). However, the different organisations had different emphases from the outset. Human and resource capacity building was (and remains) a key requirement in regions with limited conservation capacity, as also awareness raising. Such regional priorities may have contributed to differences in how IWRB and AWB transitioned into WI.

The proposed new structure was complex (largely due to the desire for a high level of retained independence in governance of the founding partners), and as the events of subsequent years played out, difficult to operate effectively – it has now been simplified. The concept was to have a small International Co-ordination Unit (WI–ICU) that maintained global functions and governance, and which "franchised" three regional entities comprising the staff of the former regional organisations. Thus, IWRB became Wetlands International–Africa, Europe, and Middle East (WI–AEME), AWB became WI–Asia Pacific, and WA became WI–Americas. Each of the three regional franchisees would be financially independent and maintain their staffing and governance. The new structure was agreed by the Standing Committee in 1994 and the final meeting of the Executive Board in October 1995, thus winding up IWRB and creating Wetlands International which came into existence at the beginning of January 1996.

The new arrangements were not to prove initially successful, however. Firstly, the Americas and then Asia-Pacific had financial crises, requiring bailout loans from AEME to stay afloat. In turn, AEME had its own financial crisis from which – now without financial reserves – it was impossible to recover, going into bankruptcy in 2002. In essence, the problem had been that following the move from Slimbridge in 1996, the staff complement had increased unsustainably and was over-dependent on project-related income streams, which in turn had been neglected.

Following AEME's bankruptcy, many of its redundant personal (including former

IWRB staff) were transferred by Dutch court order to WI–ICU without financial obligations, and the task of regenerating a single global, and financially sustainable WI commenced under a revised governance structure headed by Stewart Morrison and Max Finlayson and with support from the Government of the Netherlands. However, that is Wetlands International's story, not IWRB's.

Relationship with the hunting community

From the outset, the relationship between IWRB and the hunting community was crucial (and remains so to the present), as reflected by the dual representation of national delegates (page 25). In the 1940s, much of the motivation for IWRI/B had come from hunters. This motivation related, quite rationally, from self-interested concern as to the sustainability of their harvests. Relations depended mainly on personal contacts and mutual respect. Indeed, throughout its existence, most IWRB recommendations or declarations were very balanced as to what might be seen as different interests.

However, in the early years of the waterfowl counts some birdwatchers were afraid to participate, because the use of "their" data could result in controversial changes in hunting regulations (*e.g.* in relation to the hunting of species as snipe *Gallinago* sp. and Eurasian Curlew *Numenius arquata*, and spring shooting).

Notwithstanding the forum for dialogue that IWRB provided, liaison was not always easy. Already in 1958, Mörzer-Bruijns was mediating between IWRB and the Wildfowl Working Group of the International Union of Game Biologists (IUGB), which had been established in response to negative attitudes within IUGB towards IWRB. This had led to unhelpful duplication of activity, especially in relation to waterbird monitoring (G. Boere *in litt.*). Later, negotiations on the draft international flyway plan for Dark-bellied Brent Geese *Branta bernicla bernicla* (van Nugteren 1997; see page 47), got stuck on discussions of potential sustainable harvest levels – challenging issues due to the totemic status of the species in both hunting and preservationist "camps" (but ultimately resolved – in that forum at least; again see page 47).

Overall, however, the historical culture of IWRB was of a shared, and mutually supportive, hunting and conservation ethos where difficult questions could be debated – usually with consensus outcomes. The prominence of hunting as a concern was highlighted by the no less than five Research Groups in 1974 that addressed different aspects: Hunting Rationalisation; Hunting Harvest; Hunting Impact; Hunting Kill Statistics; and the Hunter/Conservationist RG. By 1992 however, just the Harvest and Impact RGs seem to have been extant. Yet, whilst in early post-war decades discussions were between hunters and nature conservationists (hunters more often also being nature conservationists and nature conservationists also being hunters), through time an increasing number of nature conservationists are also animal welfare activists rejecting animal killing, thus making it difficult to find mutually agreed

outcomes with regard to hunting (Mooij *in litt.*).

Early initiatives sought to collate information on the different national approaches to hunting legislation – quarry lists, shooting seasons, prohibited techniques, *etc.* A loose-leaf "red book" (IWRB 1966b) was issued in April 1966 and contained a wealth of relevant national data and information (see Supporting Materials Box S4). Through its focus on collating information on hunting *status quo* in the 1960s and a decade later through the tireless work of the Finn Teppo Lampio (Lampio 1974, 1977, 1983), IWRB did much to create consensus on international standards for hunting regulations. Lampio's approach on hunting standards was an inspiring forerunner of the sustainable harvest concepts that followed, right up to modern adaptive harvest management approaches. One important discussion was the recommendation on no waterbird hunting after mid-winter, defined later as 31 January. That directly influenced the requirement of Article 7(4) of the 1979 Birds Directive that there should be no bird hunting "during their period of reproduction or during their return to their rearing grounds" (H. Meltofte *in litt.*).

A "green book" (IWRB 1966b) was issued in similar format with datasheets on 284 wildfowl refuges in Europe, North Africa and the Middle East totalling over 230,000 ha. This built on a compilation of information on refuges prepared for the St Andrews Conference four years previously (Hoffman 1964b). The data remain fascinating (Fig. 8) contrasting the then already well-established national refuge networks (at least on paper) in countries such as Denmark and the Netherlands, to the situation at that time in some other (especially southern European) countries.

The dual focus on shorter open seasons and networks of refuges was important but took time to deliver. Some countries such as Denmark, had commenced establishing refuge networks from the 1920s, gained more momentum in the middle of the century, but not developing into a full national network until the 1990s (H. Meltofte *in litt.*). The result of such activity has been the recovery of several flyway populations, especially of geese (Stroud *et al.* 2016), during the second half of the 20th century, but notwithstanding that, significantly reduced populations of others are likely.

Structure and governance

Constitutional and political status

Through its early years, the constitutional status of IWRI/B was vague – which was one of the problematic reasons that got in the way of Ramsar contracting its "continuing bureau functions" to the organisation (see page 18). As late as 1971, Hoekstra (1971) refers to it as "an international subsidiary organisation of the ICBP".

It had no legal status until 1987 when a constitution was approved, with subsequent registration as a UK charity following in 1989.

Matthews (1970) noted that "*IWRB maintains a scrupulous independence from any sort of political affiliation. Any country with wildfowl and wetlands within its borders is welcome to join in the work of the Bureau and take part in guiding*

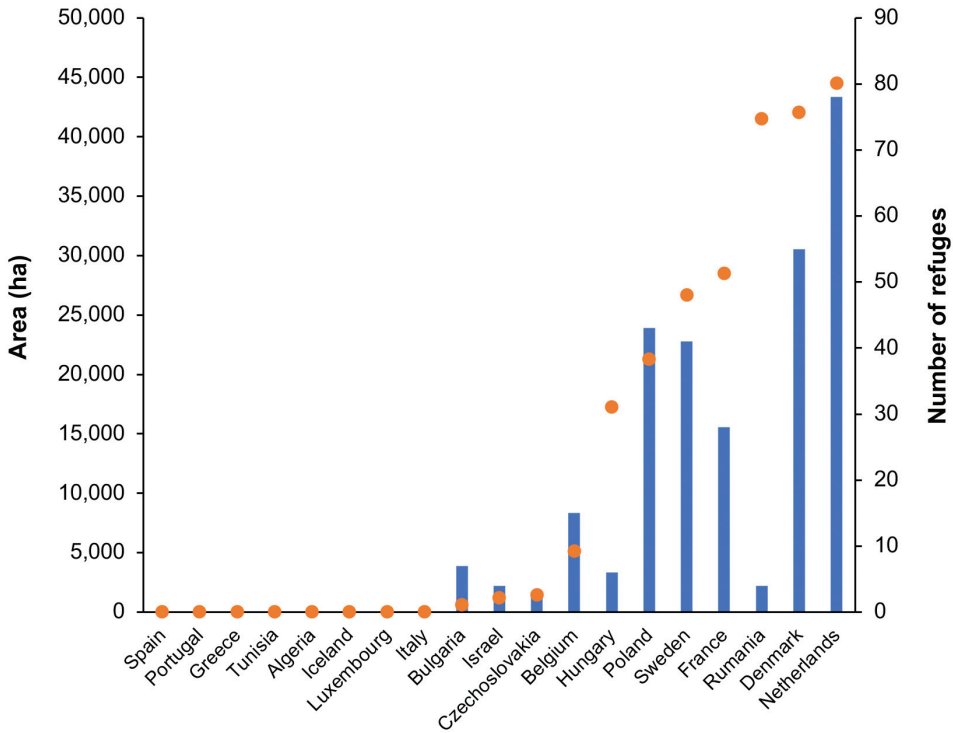

Figure 8. Totals (columns) and area (dots) of wildfowl refuges established by 1966 in 19 European, North African and Middle Eastern countries. Excluded are ten, landscape-scale Swedish National Parks covering 7,437 km^2. From data in Hoffman & German 1964b and IWRB 1966b.

its activities by nominating official representatives to the Executive Board." Despite "the Cold War", IWRB engaged with multiple countries on both sides of "the Iron Curtain". Indeed, such measured neutrality had been critical in ensuring wide international acceptance of the proposed wetlands convention during its negotiation (Matthews 1993; Stroud *et al.* 2022). Yet, whilst determinedly non-political, IWRB and Ramsar reflected their era in that a mechanism for exchange of information and experts was desperately needed in a region of many small states with an Iron Curtain across the middle, and difficulties still arose, *e.g.* at the 1968 Leningrad Conference, with reconciliation occurring at the Alushta meeting (in Crimea) in 1976. This is in marked contrast to North America, where an international agreement for birds migrating between the USA and Canada was signed as long ago as 1916.

Executive Board

The first meeting of the Executive Board of the newly renamed IWRB was held in the offices of the Zoological Society of London on 28 June 1955. The Executive Board was the primary governance body of IWRB and met 36 times (Supporting Materials Table S1a) until its final meeting in 1985

in Kuala Lumpur, Malaysia. The Board had progressively grown over those *c.* five decades from a small management group of nine to a huge gathering of 139 in 1992 – a veritable conference (Fig. 3).

The Board was the principal means of face-to-face networking, with a significance much beyond the need to review and establish work programmes. After 1970, meetings were held back-to-back with technical symposia (Supporting Materials Table S1a), a cost-effective way of maximising the opportunities arising from such large gatherings. Progressively, as meetings moved between countries, the involvement of significant numbers of national experts, by invitation, served to expose many to the work of IWRB.

National sections and national delegates

In later years, IWRB encouraged two representatives to attend Executive Board meetings – one representing government interests (typically from Environment Ministries or their national conservation agencies) and one from the relevant scientific community (whether a hunting or conservation non-government organisation (NGO)). The original construct however, had been slightly different with the dual representation involving government (agency) on the one hand, and shooting interests on the other. Yet the aim in 1955, as also in 1995, was to achieve input from a spread of interests, expertise and opinion. Such a formalised "broad church" approach was undoubtedly a major element in the creative dynamism of the organisation: IWRB being very open to alternative views sought to avoid "silo" thinking (H. Meltofte *in litt.*), a fault which bedevils much contemporary conservation.

IWRB was not "intergovernmental". Its country "members" (*e.g.* UK, France, Switzerland, *etc.*) were not quite "national" members (in the UN sense or even in the IUCN State Member sense). IWRB member countries were voluntary members (of various sorts, such as the French Ministry of Environment, or Sempach Ornithological Research Centre in Switzerland) who agreed to make financial contributions to the work of IWRB – a small, but regular injection of core-funding, but more importantly representing a national commitment to the work of the organisation. Further, it was anticipated that they would organise activities through "national sections" (of which perhaps the Japan Committee – see page 30) was the most significant example. IWRB's national delegates constituted a very strong, and ultimately wide (Fig. 9), network of government allies who were instrumental in securing membership dues for IWRB, and staff took great care to nurture these relationships.

Yet there were many challenges in securing contributions due to: (a) an increasing number of countries also having to pay dues to Ramsar; (b) their voluntary nature; and (c) the fact that IWRB was not active on the ground in some regions. These national links (and financial contributions) progressively diminished with the change from IWRB to WI (page 52).

Whilst a loose concept at the outset, by the time of the 34th Board meeting in Astrakhan, USSR there were formal "*Guidelines for the Activities of IWRB National*

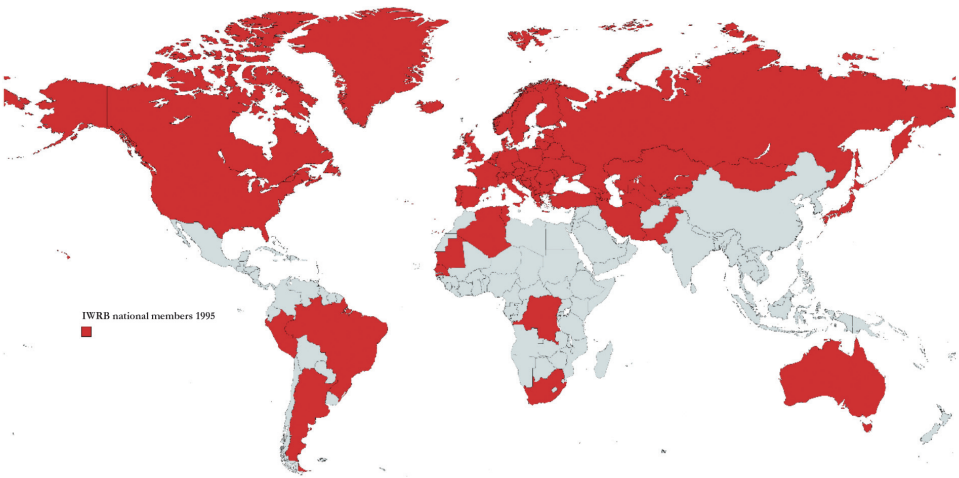

Figure 9. IWRB national member countries as in 1995 (including the whole extent of the former USSR membership).

Delegates" (see Supporting Materials Figs. S5 and S6). In summary, these recommended: (1) acting as contact points for IWRB in their countries; (2) regularly liaising with key contacts in government; (3) assisting HQ in fund-raising; (4) reviewing and inputting to IWRB's triennial forward plan; (5) undertaking triennial of national mailing lists, *inter alia* of *IWRB News*; (6) participating in Board meetings and other regional scientific meetings as possible; (7) advising HQ in relation to potential national interventions on threatened wetlands; (8) providing articles for *IWRB News*; and (9) offering nominations for the Standing Committee.

National engagement with the Board (and in the payment of annual dues) was variable. Minutes show that a small number of the originally initiating northwest European countries were very consistent in their attendance and typically these periodically hosted meetings also (Fig. 10; Supporting Materials Table S1a,b). Between 1955 and 1992, a total of 80 countries were represented at Board meetings. However, logistics and costs meant that attendance was often aided by the location of the meeting. The 1985 meeting in Paracas, Peru (successor to a meeting in Edmonton in 1982, also well-attended by Latin American delegates) was notable for representation from 23 Neotropical countries (near-complete geographic attendance, including of many developing and island states such as Cuba, Guyana and Suriname), as well as for the presentation of Derek Scott's Latin American inventory work.

Correspondents

Another pragmatic means of initiating liaison in the early years in particular, was through correspondents. Matthews (1970) noted that "*A number of other countries in Asia and Africa are not yet in a position to nominate official representatives. Here the Bureau itself appoints correspondents to maintain*

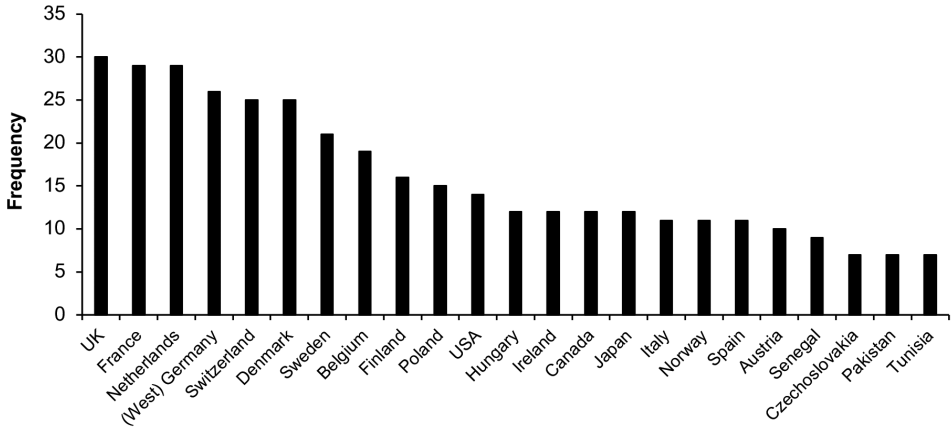

Figure 10. Frequency of attendance of national members and invited national representatives at 33 of the 36 IWRB Executive Board meetings. Only those attending seven or more meetings plotted.

the essential liaison. Often these are Europeans temporary resident in the country concerned."

Contributor organisations

In the early years, the role of private donations and grants from WWF in particular were critical as "the Bureau's other main sources of income" (Matthews 1970). From the very outset, important elements of the membership were the NGO "Contributor Organisations". These were bodies that shared IWRB's objectives: their payment of limited subscription aided IWRB finances, bringing with it a place on the Executive Board and thus securing their engagement with IWRB. In 1992, 11 Contributor Organisations attended the 35th Board meeting including national shooting organisations for Canada, Denmark, France, the Netherlands, UK and USA; national conservation organisations from Germany, Switzerland and UK; and the International Crane Foundation.

Relations with other international conservation bodies

From its very first Board meeting, IWRB had positively engaged with other international organisations with shared objectives. Initially this was ICBP and CIC, but by the late 1960s, as the landscape of international conservation bodies grew more diverse, IUCN, WWF, the International Union of Game Biologists, UNEP, the United Nations Educational, Scientific and Cultural Organization, Council of Europe and the European Commission were all regular attendees and provided significant inputs to the annual steering of IWRB. Active collaboration continued outside meetings, especially with respect to threatened wetlands, where IWRB participation in Ramsar advisory missions was frequent (see page 44 for the example of St Lucia, South Africa).

Standing Committee

As the Executive Board progressively grew in size and scope – not least as a result of its

increasing tendency to hold meetings back-to-back with conferences (which positively inflated attendance levels; see above) – governance became increasingly unwieldy. The solution was the creation of a Standing Committee in 1987 with nominees from the Board. This was a smaller group, meeting more frequently annually, with a mandate to take decisions between a now longer cycle of Board meetings, and to provide advice and strategic direction to the Director. It proved an effective structure and allowed the frequency of Board meetings to be reduced, with significant cost savings, not least in staff time required for their preparation.

Working and Research Groups

Working Groups (WG) later renamed as Research Groups (and ultimately Specialist Groups within WI) were created as an effective means of co-ordinating areas of work related to particular taxa, geographic areas or thematic issues such as hunting (Supporting Materials Table S2). These international networks progressively developed as the "engine room" of IWRB and as a crucial element of its structure had the same governance status as did national delegates.

It is impossible within a single paper to adequately review the activities of these groups over five decades, each of which have their own stories, characters, and achievements to tell – which given their significant reports in annual Board minutes could and should be documented.

From the outset, the taxonomic groups had been a crucial element of IWRB's activity, with the Goose RG (under Mörzer-Bruijns) being first (page 10), and fundamental in coordinating efforts to define separate flyway populations and on this basis, to then assess their abundance. George Atkinson-Willes (see Supporting Materials Fig. S4) was very active doing similar things for ducks – creating a group that continues to meet and be active to the present. The Wader RG was also at the first Board meeting (1967) with recorded RG attendance.

In retrospect, it is clear that the most active groups were those with "natural" rather than artificial memberships: where groups of like-minded enthusiasts were already co-operating around shared interests. Notable examples were the Woodcock and Snipe RG – active within the hunting community, and the International Wader Study Group, which had had an independent existence from 1970 but from 1993 operated as the Wader RG under an MoU with IWRB. Other more "contrived" groups (such as the Wetland Evaluation RG) soon perished. In discussion of group proliferation at the 20th Board meeting, Peter Scott made the perceptive observation that *"the enthusiasm of a small group often produced better results than a larger wide-ranging body: the [IUCN's] Orang-Utang Group had been a great success but collapsed when enlarged to a Primates group"*.

Whilst WGs had been important from the first years of IWRB, their role in organisational governance was slower to develop, with their first appearance in minuted attendance lists of the Executive Board only in 1967. Following that however, there was good attendance of groups at subsequent Board meetings and their detailed summary reports of activities typically comprise a very significant element of meeting minutes.

By the mid-1980s, the Research Groups were mostly made of waterfowl "family" groups (ducks, sea ducks, geese, swans, woodcock, flamingo, *etc.*) with few that were thematic (Supporting Materials Table S2). Under Mike Smart's guidance, a large amount of networking was then necessary to reshuffle and revitalise the groups, with agreements on new objectives, meetings and conferences.

When Janine van Vessem subsequently assumed responsibility for Research Groups in 1990, she started to work on their strategy and better coordination (together with James Kushlan – Coordinator of the Heron RG), trying to increase their input to IWRB even more. This resulted in the initiative to link the RGs with the groups of ICBP and the Specialist Groups of IUCN's Species Survival Commission. The consequence was joint groups, whereby IWRB had responsibility for the waterbird-related groups of ICBP and wetland-related birds and topics for IUCN.

Staff

For much of its early existence, IWRB was staffed by secondees from either national conservation agencies (as UK support for Peter Olney to produce the Mar wetland inventory – page 12) or from other interested organisations. This mode of support and capacity development was critical to the organisation's growth. Arnd Rüger was seconded from 1982 thanks to support from German hunting interests and from the Schleswig-Holstein state government. Jean-Yves Mondain-Monval was employed by CIC and seconded to IWRB for three years from 1985, whilst Christian Perennou was directly employed by IWRB with funds from CIC. Jean-Yves Pirot was seconded from the Station Biologique de la Tour du Valat facilitated by Luc Hoffmann, and Joost van der Ven came from the Dutch Ministry of Agriculture (and latterly Gerard Boere to the WI–ICU). After Mike Smart's move to Gland, Switzerland to support Ramsar, Tim Jones was appointed – with Ramsar funding – as IWRB-Ramsar Liaison Officer, based in Slimbridge, but was very much an IWRB staff member. Max Finlayson's appointment for three years from 1989 was supported by Wildlife Habitat Canada, facilitated by Jim Patterson from Ducks Unlimited Canada, which represented increased and welcome support for IWRB from outside of Europe.

Headquarters: London, Tour du Valat and Slimbridge

IWRI/B operated from three headquarters. The first years were at the BM(NH) in London, subsequently transferring in 1962 – following support from Luc Hoffman – to Station Biologique de la Tour du Valat in the French Camargue (Matthews 1969). The organisation grew at Tour du Valat, but by the late 1960s the Station was expanding strongly into international research and also starting its own projects on Mediterranean wetlands. Apparently, Hoffman believed (J.-Y. Pirot *in litt.*) that IWRB would be better off in the good hands of his old friend Peter Scott and Geoffrey Matthews. However, as Pirot notes, Hoffman "*never ceased his support for IWRB (through secondments, projects, and also probably through supporting actions we will never know about, always done in his good and discreet style)*."

On 1 January 1969, the HQ functions (with the arrival of Erik Carp and Anthea Mower) thus moved back to UK at the Wildfowl Trust's (WT) Slimbridge base where there was a long-term relationship with Peter Scott. Key support came from the part-time secondment as Honorary Director of Geoffrey Matthews (WT's Director of Research and Conservation from 1955–1988; Supporting Materials Fig. S2), and who had been elected IWRB Director by the Morges Board meeting the previous September. For many years after that, Slimbridge proved a good base allowing support and synergy between the activities of IWRB and WT (which subsequently changed its name to the Wildfowl and Wetlands Trust in 1989). Indeed, in later years, IWRB published work contracted to, or undertaken by WT/WWT – for example, the pan-European analysis of cold weather movements of ducks by Ridgill & Fox (1990) – with exchanges (and marriages) of staff also. However, ultimately, the growth of IWRB required a move away from Slimbridge, as outlined above.

IWRB Japan Committee

The role of IWRB Japan Committee was unique, and perhaps can be seen as an extremely well-developed form of "national delegate" function, in that it developed an independent office and Board with funding from the Japanese Ministry of the Environment (one of the few IWRB government members in Asia) and other sources. Established in 1997, it was an alliance of Japanese NGOs, including the Swan Society of Japan, All Japan Hunting Club, Wild Bird Society of Japan, Japan Hunters Association, Yamashina Institute of Ornithology, WWF Japan, Kushiro International Wetland Centre, Japanese Society for Preservation of Birds, The Ornithological Society of Japan and Japan Association for Wild Geese Protection. It brought together NGOs, research institutions and government agencies nationally to facilitate waterbird and wetland inventory and conservation work in Japan and more widely. From the outset it played an important role in engaging Japan and Asia in wetland conservation and producing many Japanese and English publications (*e.g.* Chan 1999; Miyabayashi & Mundkur 1999).

Formal links between the Japan Committee with IWRB and its Executive Board were loose, although its work and direction largely tracked that of the international body. In later years, it provided a crucial link to channel financial resources from the Ministry and other donors to support the international coordination of the Asian Waterbird Census and its periodic publications as well as co-organising regional meetings with AWB. This included the 1994 Kushiro Workshop that led to the establishment of the Asia-Pacific Migratory Waterbird Conservation Strategies (Anonymous 1996), and so provided a basis for the establishment of the East Asian–Australasian Flyway Partnership.

Networking and co-ordination: the role of meetings

Executive Board

The organisation of meetings, workshops and conferences was a core IWRB activity. Before the internet, other than

correspondence, conferences and workshops were the main means of exchanging information and joint working. Physical meetings were thus not only essential for stimulating joint activities, but also – through associated excursions to nearby wetlands – helped expand the collective knowledge of participants to the range of international wetland types and conservation management issues. These progressively became an ever more important part of Board meetings – perhaps culminating with a six-day, expenses paid, study tour across Canada for delegates to the 28th Board meeting in Edmonton in 1982.

The principal annual meeting was the Executive Board, attendance at which progressively grew with the organisation (Fig. 3). It was important the Board met annually to maintain momentum. Mike Smart recalls that "*Geoffrey was always horrified that nothing happened for four years between ICBP meetings and came back from the Lake Ohrid ICBP meeting in the 1970s determined that things should change.*" The principle was established for the Board to meet one year on one side of the Iron Curtain and the following year on the other, although this was not always feasible (Supporting Materials Table S1a).

The 1976 Board meeting in Alushta, Crimea was a reconciliation with USSR after the 1968 Leningrad Conference, boycotted by western European countries following the USSR-led invasion of Czechoslovakia that year. The first North American meeting was held in Edmonton, Canada in 1982 and the first South American meeting in Peru in 1985 (above) were both heavily dependent on support from Hugh Boyd of the Canadian Wildlife Service (see Supporting Materials Fig. S5).

From 1970, most Board meetings were held back-to-back with symposia on a particular theme and generally organised by one of the Research Groups. This was an effective means of exposing academic and other workshop attendees to the work of IWRB, whilst also being cost-effective in the context of engaging national Board members with the topic of the symposium. It also greatly enhanced the flow of publications (see Supporting Materials Annex S1).

Workshops and conferences

Many of the workshops were organised by individual Research Groups. For instance, the Swan RG organised international conferences alongside Board meetings at Slimbridge, UK in 1971 and Sapporo, Japan in 1980 (see Supporting Materials Fig. S6), and the Feeding Ecology RG organised a symposium on the feeding ecology of waterfowl after the 1977 meeting in Switzerland. Most of these conferences were subsequently published (Supporting Materials Table S1b).

As well as meetings associated with the Board, many of the larger and more active Research Groups held their own workshops. Thus, the Wader Study Group following its assumption of the Wader RG role in 1993 (Davidson 1994), has continued to hold a very well-attended annual meeting (typically of > 100 members), whilst the Goose RG also meet annually with more periodic conferences of the Woodcock and Snipe RG.

IWRB was an effective means through which national agencies and governments

could fund meetings on issues of particular concern. Examples from the world of geese include the Second International Symposium of Western Palearctic Geese in 1989 (IWRB Publication 14 in Supporting Materials Annex S1) initiated by the government of North Rhine-Westphalia in Germany; and a major workshop reviewing waterfowl crop damage conflicts in Europe stimulated by the Dutch Ministry of Agriculture, Nature Management and Fisheries in 1991 (IWRB Publication 21 in Supporting Materials Annex S1). Both these meetings were fundamental in helping to develop relevant monitoring and policy initiatives that were developed in the years following.

Some conferences were one-off events, reflecting the need to give international attention to an issue and kick-start conservation responses. One good example was the West African regional wetland meetings held in Senegal and Mauritania in the early 1980s which drew attention to the importance of wetlands like Djoudj and Banc d'Arguin and brought these and other countries in the region into the IWRB/Ramsar ambit. Another example was a two-day workshop on lead poisoning in waterfowl convened in Brussels in June 1991 (Pain 1992). This followed significant discussion of the issue at the Board meetings of 1986 and 1990 and brought together over 100 participants from 21 countries and importantly sought to present North American experience in legal controls on use of lead gunshot for waterbird hunting. The meeting and the prompt publication of the proceedings was instrumental in significantly raising the profile of the problem. UK's Joint Nature Conservation Committee (JNCC) funded IWRB to use its network of delegates to compile subsequent update reports documenting international progress toward eliminating the use of toxic lead gunshot (Fawcett & van Vessem 1995; Kuivenhoven & van Vessem 1997). This was helpful in maintaining a high international profile for the issue – a role that more recently has been assumed by national reporting under AEWA, although has been lost for other regions of the world since 1995.

Notable other major "stand-alone" meetings were 1994's "*Anatidae 2000*" conference co-hosted with the French government and held in the European Parliament in Strasbourg (Birkan *et al.* 1996), and the Grado Conference on Mediterranean wetlands and their birds (Finlayson *et al.* 1992) that led to the formation of the MedWet wetland initiative, with support from the European Union, and multiple governments and NGOs.

The formal Japan–Australia Migratory Bird Agreement of 1981 provided a crucial impetus for flyway scale communication and cooperation, with the IWRB Japan Committee along with other international NGOs playing a major supportive role. This enabled co-organising regional meetings with the Asian Wetland Bureau, including the 1994 Conference in Kushiro Japan that produced the Kushiro Initiative in turn stimulating the establishment of the Asia-Pacific Migratory Waterbird Conservation Strategy 1996–2000 and 2001–2005 (Wells & Mundkur 1996). The Conservation Strategy provided a valuable framework in the absence of a formal multilateral intergovernmental agreement (like AEWA),

with significant further developments led by Wetlands International to the present.

Meetings of government representatives

From early in its existence the importance of meetings as a means of engaging governments and co-ordinating with other international organisations was recognised (see page 15). Following the 1963 first European meeting on wildfowl conservation (IWRB 1964), further intergovernmental meetings were held at Noordwijk aan Zee, the Netherlands in 1966, and in Leningrad, USSR in 1968 aimed at engaging Soviet Bloc countries with the nascent wetlands convention. Attendance at subsequent waterbirds conferences progressively grew (Fig. 11) to the 2004 *Waterbirds Around the World* conference in Edinburgh (co-convened by Wetlands International with the Netherlands and UK governments) where 456 participants attended from 90 countries and 58 participants represented 14 international organisations (Boere *et al.* 2006). This conference included personal reflections by Geoffrey Matthews and by Eckhart Kuijken from Belgium on the development of the Ramsar Convention.

Notwithstanding the call in the Edinburgh Conference Declaration "to meet again as a conference in ten years' time to review progress", no subsequent international waterbird meeting has been

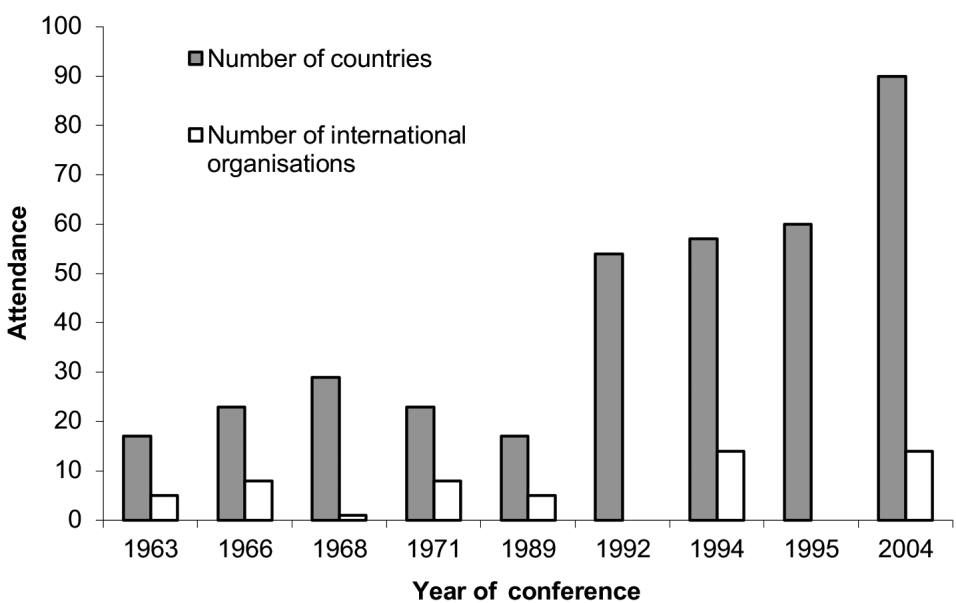

Figure 11. Attendance of countries and international organisations at IWRB/WI-convened international conferences on waterbird conservation, 1963–2004 (from Stroud *et al.* 2006). Conferences are as listed by year in Table S1b except for 1995 (the 36th Executive Board/International Conference on Wetlands and Development, Kuala Lumpur, Malaysia) and 2004 (the *Waterbirds Around the World* conference, Edinburgh, UK; Boere *et al.* 2006).

convened to date. Arguably, the function of IWRB's conferences to bring governments together to discuss waterbird and wetland conservation is now being delivered by the fruits of its other institution-building, namely the regular meetings of Parties to the Ramsar Convention, AEWA and other flyway initiatives. IWRB's waterbird conferences focussed on clear scientific issues (often globally) rather than issues of wider policy. Yet these latter meetings have neither the same function, approach, or character. Wetland conferences are held annually by the Society of Wetland Scientists and every four years by INTECOL, with limited connection to specific issues related to waterbird science or policy, although with an increased focus on global issues and education. A further global waterbird conference is long overdue!

Publications

One of IWRB's principal achievements was its dissemination of knowledge through a significant publications programme. There can be few (if any) waterbird conservationists that do not have at least one of these IWRB publications listed in Supporting Materials Annex S1 on their shelves…

Earliest publications were reprints of journal papers and in essence reported on its brief research programme (see Supporting Materials Annex S1). From the 1960s to early 1980s, publication effort was directed to the significant tasks of compiling and editing texts related to the programme of international conferences. These were initially from the European Meetings on Wildfowl Conservation held at St Andrews in 1963 and Noordwijk aan Zee in 1966, but then the conference at Ramsar in 1971, the Heiligenhafen Conference of December 1974 (which should have been the first Conference of Ramsar Parties, but the required seven countries had not ratified by then) and subsequently at successive Conference of the Parties (COP) where Mike Smart played a huge editorial role. From 1980, a series of *Special Publications* were produced to largely uniform format (below), although following No. 28, the publications ceased to be "Special". In the days before the internet, this series was enormously influential in disseminating the activities of IWRB (see Supporting Materials Annex S1). The content matter of the series was impressively wide-ranging, including volumes reporting the results of international censuses (Nos. 6, 8, 15, 24, 29, 34 & 35); waterbird movements and ringing (Nos. 1 & 13); and action plans or other summaries of species-related information (Nos. 10, 11, 17, 23, 27 & 36). From the mid-1980s, as the revitalised headquarters gained momentum, there were multiple proceedings of international conferences and symposia (Nos. 12, 14, 16, 20, 21, 25, 26, 30 & 31). The appointment of Max Finlayson to head the wetland division, stimulated many volumes related to wetland ecology and inventory (Nos. 2, 18, 20, 22, 28 & 38) and especially wetland restoration (Nos. 32 & 37).

The Research Groups also produced a stream of newsletters and bulletins that similarly supported the cohesion of these groups, as well as valuable exchange of experiences and research results perhaps not suitable for scientific journals. These very

much fulfilled a need, and some continue to be published.

These influential publications were widely distributed, typically free of charge. This was the result of financial support for publication from national conservation agencies, notably those from Switzerland, UK (JNCC), France (Office de la Chasse – ONC), USA and the Netherlands, non-government hunting and conservation organisations such as Ducks Unlimited, FACE and CIC, national chapters of WWF, the Wildfowl & Wetlands Trust as well as from other international bodies such as UNEP, IUCN, WWF International, the British Council and the Ramsar Bureau. Many were jointly published in other publication series, further extending their reach – for example, the volume on wader flyway conservation (No. 7) was also a *Wader Study Group Bulletin Special Issue,* whilst the 1989 Western Palearctic Goose Symposium (No. 14) was also a special issue of the Dutch journal *Ardea.*

Compliance – site interventions before international treaties

Important wetlands have been modified by humans for millennia. Activities that degraded wetlands for development or conversion to agriculture were especially prevalent in the decades after the Second World War, yet it was not until the advent of the Ramsar Convention that at least some of its Parties undertook – in theory at least – to manage all wetlands "wisely". Later international frameworks in Europe have included the Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats, with the European Union's Birds Directive from 1979 and Habitats Directive from 1992. All these provide a range of compliance mechanisms through which governments can be held to the obligations they have assumed.

Prior to these there was no formal process for raising international concern regarding national developments that had the potential to damage important wetlands and their waterbirds. Nor indeed was it possible to raise issues over ill-advised policy about the potential impacts on species. For much of its existence, one of IWRB's core functions was to provide a mechanism through which international concerns about what might be characterised as "unwise use" could be raised with national authorities (typically ministers). National representatives in particular, used Board meetings as opportunities to gain support from IWRB in their efforts to combat threats to national wetlands and waterbirds in the form of "recommendations" and follow-up actions that could be used back home (H. Meltofte *in litt.*). Examples include interventions to urge strengthening of conservation and management measures for several large Mediterranean wetlands such as Guadalquivir and the Ebro Deltas in Spain, and Lake Ichkeul in Tunisia. A small selection of such interventions is summarised in Supporting Materials Table S3, drawn especially from the minutes of the Executive Board, although the outcome of these was not always recorded in subsequent minutes.

As the Ramsar Convention developed its processes and procedures, IWRB provided

technical assistance to its international review groups under the variously titled Management Guidance Procedure/Ramsar Advisory Mission, and also sought to gather information on wetlands with management problems, to encourage their listing on the Ramsar Montreux Record (established in 1990), which focuses attention on Ramsar Sites where changes in ecological character resulting from development, pollution or other human activity are anticipated or underway. IWRB played a key role in initial drafting of the Monitoring Procedure and Montreux Record mechanism, and subsequently participated in Monitoring Procedure missions involving IUCN and WWF also, and which often culminated in the initiation of planning processes to improve wetland management. In more recent years however, such systematic support has ceased and relatively few missions now occur owing to severe lack of resourcing.

Science

Development of standards

One of IWRB's critical roles was the development and promotion of a wide range of international standards for wetland and waterbird conservation. In its early years these included standards in relation to waterbird ringing, as well as the development of protocols for wetland inventory commencing with Project Mar's site listing (Olney & IWRB/Mar Bureau 1965 – see pages 12 and 43).

George Atkinson-Willes, supported by Derek Scott, was instrumental in deriving the waterbird selection criteria for the international importance of wetlands, analysing IWC data to explore threshold options (Atkinson-Willes 1976; Atkinson-Willes *et al.* 1982). These are now adopted by Ramsar as Criterion 5 (20,000 waterbirds) and Criterion 6 (1% of populations; Stroud & Davidson 2021) and have provided a crucial common international standard for the identification of wetlands of international importance for their species.

Subsequently, Paul Rose and Derek Scott collaborated to produce a first global list of waterbird population estimates and derived 1% thresholds to standardise the application of Criterion 6. They presented these to Ramsar's fifth Convention of Parties (COP5) and subsequently published the first in a series of *Waterbirds Population Estimates* publications (Rose & Scott 1994), which was moved to an on-line portal in 2012 and redeveloped as an interactive map-based version in 2021 (https://wpp.wetlands.org).

The International Waterbird Census

Waterbird monitoring was, from the outset, a core function of IWRB – indeed, it was its earliest rationale (page 6). From the very beginning and through the first decades, activity was co-ordinated by George Atkinson-Willes. Extraordinarily, George was able not only to co-ordinate the international census but also the national British census as well, additionally producing a regular output of papers, reports and books (*e.g.* Atkinson-Willes 1963). Initially the scope of counts was limited. In his first report, Atkinson-Willes (1952) noted counting activity in Austria, Belgium, Denmark, Ireland, Great Britain, France, the Netherlands, and Switzerland,

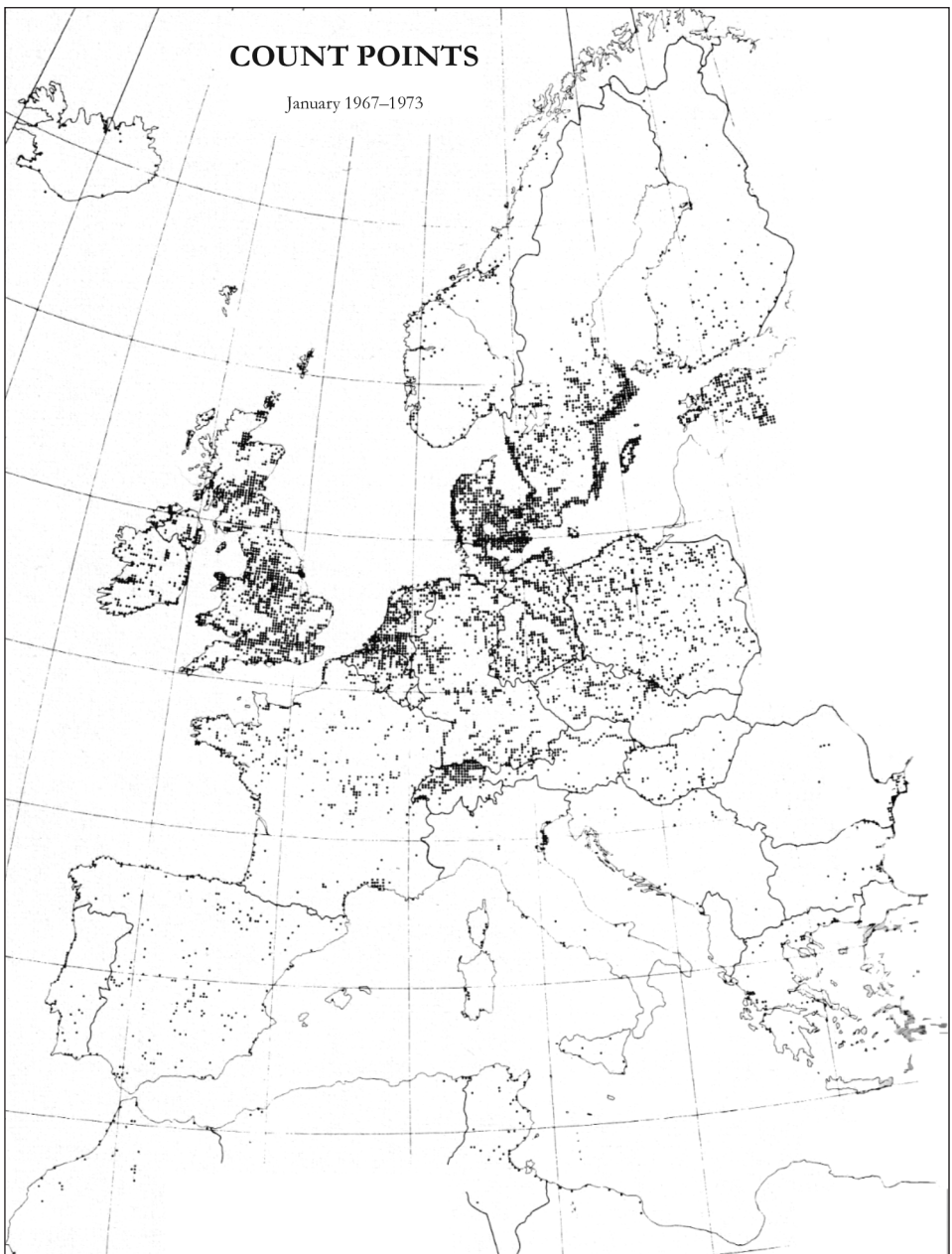

Figure 12. International Waterbird Census (IWC) coverage in the western Palearctic during the mid-20th century (from Atkinson-Willes 1976). Each dot marks a 10 km grid square in which January counts of waterfowl were made in one or more years, from 1967–1973 inclusive.

reporting "*it is hoped that an increasing stream of information on wildfowl will be received from abroad, and … it will eventually be possible to deduce and maintain a true picture of the fluctuations of wildfowl populations in Europe as a whole*". This was an ambitious aspiration, to say the least, in post-war Europe. However remarkable progress was made, with Atkinson-Willes (1976) summarising data holdings across continental Europe up to 1973 (Fig. 12), and Rüger *et al.* (1986) presenting data trends for an extended period to 1983.

There had been early counting in the Middle East, specifically the initiation of mid-winter counts in Iran by Dave Ferguson, an American Peace Corps volunteer attached to Iran's Game and Fish Department, and Lindon Cornwallis, a lecturer at the University in Shiraz, Fars, in 1966/67, and by the Tour du Valat/IWRB sponsored expeditions of Fred Koning, Hubert Kowalski, Paul Isenmann, Alain Tamisier and Jacques Vielliard to Turkey, Iran and Afghanistan in the late 1960s. The visits of these expeditions to Iran in winters of 1968/69 and 1969/70 covered areas in western Iran never previously visited and laid groundwork for the nationwide counts that Derek Scott inaugurated in winter 1970/71 (immediately preceding the conference at Ramsar). Subsequently in the early 1970s, breeding season surveys were undertaken at all Iranian wetlands thought likely to be important for breeding waterfowl. These included several aerial censuses of the huge breeding colonies of Greater Flamingo *Phoenicopterus roseus*, Great White Pelican *Pelecanus onocrotalus* and other waterfowl at Lake Uromiyeh, and boat surveys to islands in the Persian Gulf known or thought to be important for breeding seabirds (Scott 1995; D. Scott *in litt.*).

Through the early decades, analysis of IWC counts and production of population change indices was undertaken manually, and before e-mail data submission was by post, which worked as well as disparate international postal services would allow – and benefited the stamp collections of HQ staff! In the absence of internet reference sources and public access to detailed geo-referenced maps, exact location of wetlands on rather small-scale maps was especially problematic. Further, before the fall of the Berlin Wall and the collapse of the USSR, there were also political barriers and censorship to be overcome. IWRB's technical/scientific focus (page 23) made it easier to establish and maintain some sort of correspondence with experts "behind the Iron Curtain" (T. Jones *in litt.*).

However, the arrival of desktop computers in the 1980s revolutionised data management. At the time of the arrival of Jean-Yves Mondain-Monval in July 1985, only the IWC counts were computerised on the WWT computer but not site-related information. Acquisition of IWRB's first computers in 1983 (page 5) allowed work independent from WWT to code data and produce regular estimates and trends. The progressive enthusiastic development of national count site networks resulted in problems such as multiple names for single sites; variant boundaries for stretches of rivers or coastlines; and lack of coordinates. A programme of data input commenced, with site lists returned to countries for

checking and geo-referencing. The first electronic data submissions occurred in 1987, which was incredibly welcome notwithstanding that data formats varied markedly between different countries and IWRB (J.-Y. Mondain-Monval *in litt.*). For a decade, Val Taylor worked tirelessly to keep the communication with coordinators going, to chase potential errors in the data and to painstakingly track down count sites and find their geo-references – crucial "back-room" legwork.

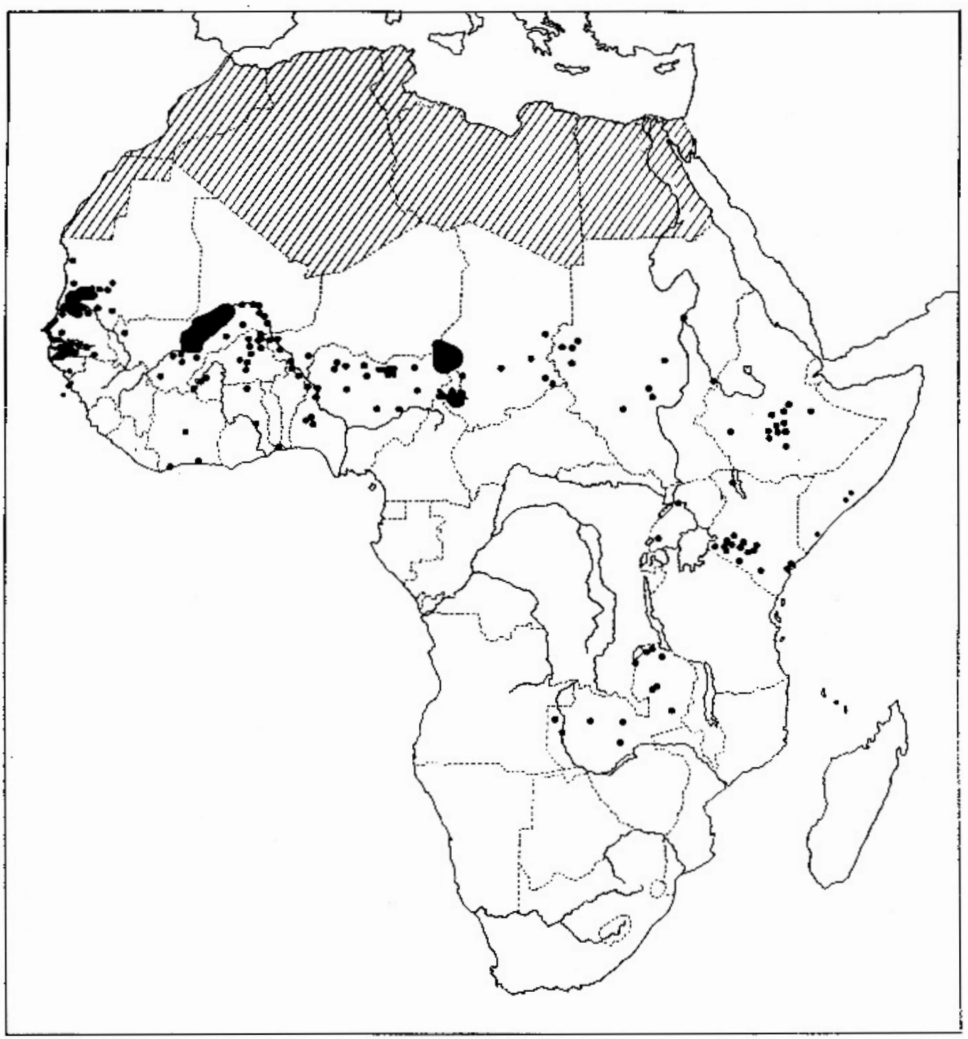

Figure 13. Sites counted at least once by the International Waterbird Census (IWC) in Africa in the period 1983–1987 (from Perennou 1991). Hatching = area covered by the Western Palearctic census; black shading/dots = sites covered at least once for the IWC.

The story of IWC has been one of progressive desire to enhance the quality, quantity and geographic scope of counts. By the 1980s, major gap-filling expansion of IWC was occurring into eastern Europe/Soviet Bloc countries, North Africa, eastern Mediterranean in Greece and especially with expeditions to the Turkish lakes, often through expeditions sponsored by Tour du Valat. From 1983, aerial surveys were being undertaken by the Paris Natural History Museum (Roux & Jarry 1984) of Sahelian wetlands in the Senegal, Niger and Logone/Lake Chad basins), increasingly coordinated with IWRB with results subsequently summarised by Christian Perennou (1991; Fig. 13). This was particularly important to map wetlands but also to estimate population sizes for Garganey *Spatula querquedula* and Pintail *Anas acuta*, together with Afro-tropical waterfowl never estimated before. Aerial surveys of waterfowl across (whole) sub-Saharan Africa (including the Blue and White Niles) have been developed more recently by the French ONC (now Office Français de la Biodiversité) under the coordination of Jean-Yves Mondain-Monval (Girard *et al.* 2004).

Over time, the term "International Waterbird Census" (IWC) has come to be used as a global umbrella term for several regionally-organised censuses – including the aptly named CWAC in South Africa

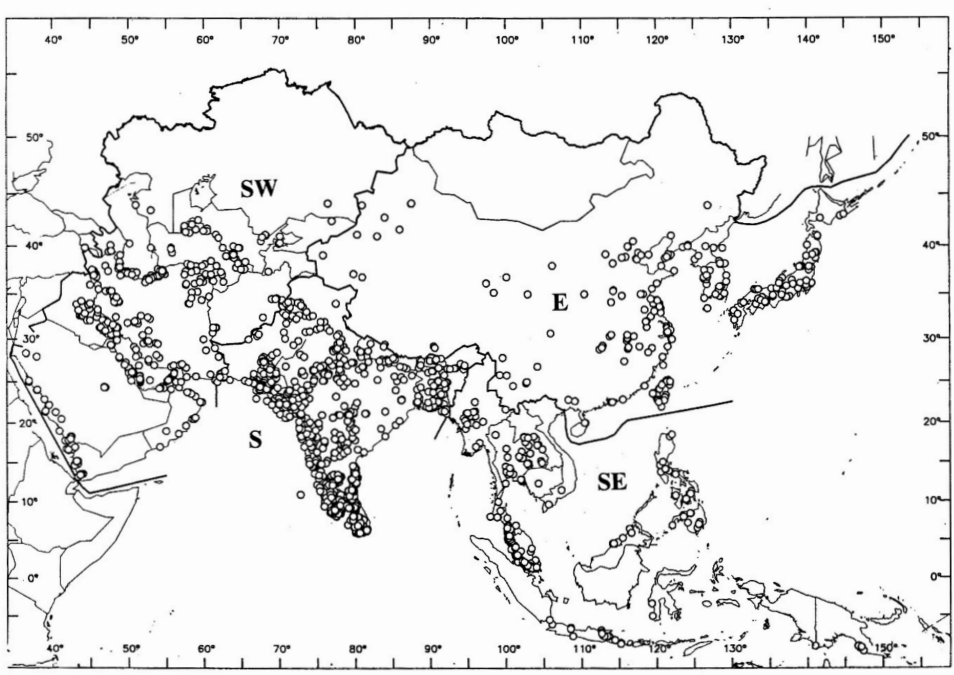

Figure 14. Total coverage of AWC between 1987–1991, also with sites counted between 1967–1979 in Afghanistan, Iraq, Kirghizstan and Takjistan not participating in AWC in the period concerned (from Perennou *et al.* 1994). Regions: S = South Asia; SE = Southeast Asia; E = East Asia; SW = Southwest Asia.

(Coordinated WAterbird Census)! As well as in the western Palearctic, these now include distinct programmes in Africa, Asia and the Neotropics.

The African Waterbird Census (AfWC) covering sub-Saharan Africa, was initiated as a separate entity in 1991, when 15 countries participated. However, waterbird counts in Africa had been made from 1950 with an African Wildfowl Enquiry launched in 1955, albeit with initial surveys only taking place in South Africa and the Central African Federation (1957 Board minutes). Responsibility for the Inquiry was transferred to the South African Percy Fitzpatrick Institute in *c.* 1962. Since its launch as a distinct scheme, AfWC has gradually extended its coverage to reach most parts of the continent and Africa's outlying islands, particularly in the Indian Ocean, such as Madagascar, with co-ordination transferring to Dakar, Senegal in 1999 (Diagana *et al.* 2006).

The Asian Waterfowl Census (AWC) commenced in 1987 with coverage of 403 sites, rising to 1,878 in 1992 but falling by 1995 to 918. However, given counts were not always possible annually, more significant were the overall coverage totals of 3,109 wetlands in 32 countries counted at least once in the five northern winters of 1986/7 to 1990/1 (Fig. 14). The establishment and growth of the AWC was only possible through the significant leadership and work of Joost van der Ven who communicated widely within the region and travelled to encourage participation. Annual reports produced in the first seven years helped to build the programme across Asia and Australasia. The census has continued to provide core monitoring information to governments, Ramsar, the Convention on Migratory Species (CMS) and the East Asian-Australasian Flyway Partnership.

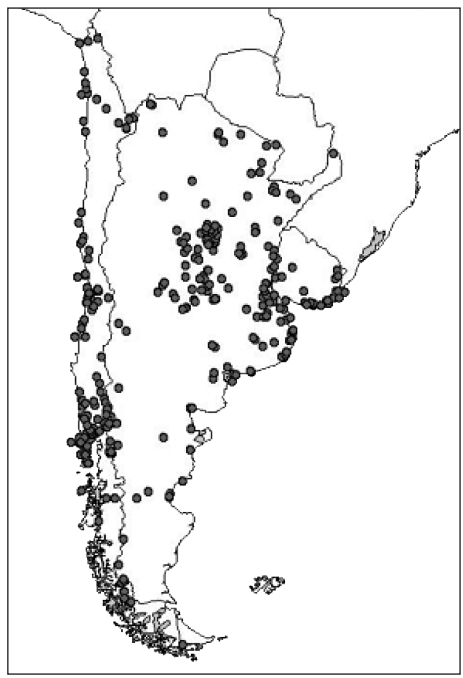

Figure 15. Distribution of NWC counted sites in Argentina, Chile and Uruguay for 1990–1995 (from Blanco & Carbonell 2001).

The Neotropical Waterbird Census (NWC) had weaker ties to IWRB, being financially supported by Ducks Unlimited and the Canadian Wildlife Service's Latin American Program. NWC started in 1990 under the direction of the late Pablo Canevari with technical coordination by Daniel Blanco. Until 1995, results (Fig. 15) were published annually with data for the first ten years published by Blanco & Carbonell (2001).

Unravelling migration and populations

An early and important focus for IWRI was to stimulate wildfowl ringing so as to better understand the complexity of populations at a continental scale. Essentially all of the first five publications of IWRI/B attempted to provide such international contexts (Supporting Materials Annex S1), whilst a major study of European Mallard *Anas platyrhynchos* was initiated by IWRI but seems to have run into the sand some years later as just too complex.

The issue of the delineation of populations, or units of conservation management was a major theme for early international wildfowl conferences with all having significant sessions on this theme. The piecing together of consistent approaches took years, aided by growing databanks of ringing recoveries and IWC count data. Population and flyway delineation was of particular interest historically to ornithologists in Russia/USSR, with early publications by Menzbier (1886) showing general flyways for birds which occurred in European Russia, and Wuczeticz & Tugarinov (1937) publishing more elaborate flyway maps and ring recoveries. A major "*Symposium on the Mapping of Waterbird Distributions, Migrations and Habitats*" was held back-to-back with the 22nd Board meeting in Alushta, Crimea in 1976 (Matthews & Isakov 1981), exchanging expertise across the Iron Curtain together with that from North America, though not succeeding in its aim of setting the groundwork for an international atlas of waterbird migrations, which had to wait another 20 years.

The Ramsar Bureau took a close interest in this work, because the delineation of populations provided crucial contextual frameworks for the selection of Ramsar Sites for waterbirds. Relevant technical sessions were included at the first three COPs and was a major focus at COP3 in Regina, Canada, facilitated by Hugh Boyd, IWRB's Canadian delegate. Special Publication 9 from that meeting provided a major international "stock check" on progress (Boyd & Pirot 1989).

Ultimately, all this activity led to the flyway atlases, which outline and justify the separate biogeographical populations for each species. The first of these, for African-Eurasian Anatidae, was developed by Derek Scott and Paul Rose in the last days of IWRB and published by Wetlands International (Scott & Rose 1996). With populations delineated, their sizes could be estimated and 1% thresholds for selection of sites determined – a process which advanced in parallel. This inspired development of flyway atlases elsewhere, especially by Marc van Roomen (SOVON) in the context of developing crucial information summaries for the development of what was to become AEWA. Other major assessments included the *Atlas of Key Sites for Anatidae in the East Asian Flyway* (Miyabayashi & Mundkur 1999) and the *Atlas of Key Sites for Cranes in the East Asian Flyway* (Chan 1999) published by Wetlands International–Japan (page 30) with support of the Japanese government.

In many respects, the issue was the quintessential IWRB enterprise, and at which it excelled – synthesising vast amounts of field data into science-based

information products of direct conservation utility for government decision makers. This also involved the whole IWRB family: enthusiastic and technically competent staff; interested national delegates such as Yuri Isakov in the USSR, Hugh Boyd in Canada and Karsten Laursen in Denmark; but particularly the Research Groups who were especially engaged in making sense of the growing data for "their" taxa (*e.g.* Smit & Piersma 1989).

Wetland inventories

IWRB's programme of wetland inventories was one of its crowning achievements (Supporting Materials Table S4). This had commenced with the Mar list of wetlands in Europe and North Africa (page 12), which had been a simple international compilation of national submissions. Through the 1980s and 1990s what was to become a global programme of regional inventories was taken forward, initially by Erik Carp for the Western Palearctic and then subsequently more widely under the leadership of Derek Scott. Funding was provided on an *ad hoc* basis by several other international organisations including IUCN, UNEP and WWF International, with co-production assistance from the Asian Wetland Bureau.

The decades of data gathering through the IWC provided a unique resource for analysis, whilst national correspondents in most countries provided further information and checked draft inventories. Subsets of data from the basic inventories were published to generate further inventory products including directories of designated Ramsar Sites (for, and funded by, the Ramsar Bureau) whilst inventories of Important Bird Areas (IBA) published with BirdLife International also included additionally gathered data for all wetland sites, marshalled for IWRB by Tim Jones. The effort to compile these inventories was immense and their value undoubtedly high given major gaps in global knowledge and documentation of the distribution and extent of wetlands globally. They also contributed greatly to later wetland area data compilations that have identified further gaps in knowledge that have yet to be addressed fully, potentially using more recent remote sensing technologies (Finlayson *et al.* 1999).

By 1995, IWRB was publishing overviews on the state of wetland inventory activity in the Mediterranean – in support of a MedWet sub-project on inventory and monitoring co-ordinated by IWRB (Hecker & Tomàs Vives 1995) (see page 46).

Wetland management and restoration

Promoting the need for, and the techniques of, wetland management had always been a prominent activity for IWRB, encouraged by an active Habitat/Wetland Management RG from at least 1969. Specific sessions at the 1962 Mar Conference led to the publication of a loose-leaf *Manual of Wetland Management* first issued in 1972 and which was to include 16 chapters by 1980 (IWRB 1972–1980). This sought to disseminate effective site management experiences internationally, and drew on case studies from Canada, Denmark, France, Germany, Latvia, Norway, Sweden, UK, USA and USSR. Wetland management was the primary focus

of the Third Technical Meeting on Western Palearctic Bird Management in 1982, presenting additional experiences from the Dutch Antilles, Finland and the Netherlands, and the issue was to be the main theme of multiple subsequent meetings through the 1980s and 1990s (Supporting Materials Table S1a).

With the appointment of Max Finlayson as Assistant Director Wetlands in 1989, there was a concerted effort to extend IWRB's support for wetland management activities. This was supported by the RG then led by Ted Hollis – a hydrologist from University College London who had, with EU financial support, undertaken major work at the important Ichkeul wetland in Tunisia. The group was used to catalyse a greater focus on wetlands to parallel the more established effort on waterbirds. Examples of activities undertaken through the group included assisting with a workshop on the restoration efforts at Lake Hornborga in Sweden (Finlayson & Larson 1991), an extremely ambitious and controversial project (Björk 1994). This was at a time when restoration efforts were not as widely accepted as they are nowadays and not supported by the same level of research and knowledge.

At the same time, IWRB's growing wetland programme gave greater focus to wetland restoration. In 1994, Martina Eiseltová was funded (initially by WWF UK) to develop and run a specific wetland management and conservation training programme. Rather than providing direct technical advice at sites, IWRB invited experts to provide training courses on wetland restoration, which was then synthesised in published training handbooks. The first related to the restoration of lake ecosystems (Eiseltová 1994) and drew on a wide range of European experience. A subsequent training handbook for restoration of streams followed, emphasising integrated catchment approaches (Eiseltová & Biggs 1995).

The complexity of restoring wetlands in central Europe was also addressed in a workshop and priority setting in Třeboň, Czechoslovakia (now Czechia) where humans had interacted closely with peatlands and human-constructed fishponds for centuries (Finlayson 1992c).

IWRB played an important role in providing technical expertise in advising on problematic management issues. Typical was its engagement at coastal wetland ecosystem of St Lucia, Natal – the largest estuary in South Africa (Forbes *et al.* 2020) where a proposal to mine rare earth minerals from sand dunes adjacent to the wetlands was hotly contested, within the political context of trade sanctions and the dismantling of the apartheid regime. This led to a Ramsar Advisory Mission (then known as a Monitoring Procedure) organised by the Ramsar Secretariat in late April 1992 (Smart 1992), with Max Finlayson participating as an observer. The issue raised international concern that mining the dunes would negatively affect the biodiversity and the groundwater balance with possible impacts extending to the estuary as well as impacts from extending the existing sand mining to the nature reserve where a pre-existing mining lease existed (Cowan 1992). Further concern was expressed about the ability to fully restore the naturally forested dune

system after any mining (Smart 1992). The considerations around the mining proposal were contained within the wider social setting of pressure from local people who had previously been removed from the nature reserve, and the anticipated establishment of a post-apartheid government, in addition to argument for and against the mining. Ultimately the mining did not proceed with the lease within the nature reserve being resumed by the government. The area was designated as South Africa's first World Heritage Site in 1999.

IWRB was also contracted by WWF International to implement an integrated wetland analysis in the Russian Volga Delta, following the dissolution of USSR. This included an analysis of the relative importance of multiple pressures on the lower Volga, assessing the relative effects of different sectors, all within rapidly changing social-economic conditions as the Russian Federation assumed the responsibilities of the former USSR for the management of the river and the northern part of the Caspian Sea (Finlayson 1992a; Finlayson & Volz 1994). This work led to the production of a strategic action plan (Finlayson 1992b; Finlayson *et al.* 1993).

A further large effort included active involvement in the development of a strategy for the management of Mediterranean wetlands and their birds in a broad partnership of other actors. This comprised a major conference in the Italian town of Grado, where technical experts were asked to outline the extent of knowledge on wetlands around the Mediterranean, including addressing the likely impacts of global climate change, and the necessity of holistic or integrated management responses and engagement with local communities (Finlayson *et al.* 1992). The conference also agreed a strategy to "halt and reverse the loss of Mediterranean wetlands" (Hollis *et al.* 1992). This was one of the first times that this statement had been made, and it was recognised that the loss and degradation of wetlands needed not only to be stopped but turned around through active restoration. In this way, the conference and strategy not only catalysed further activity in the Mediterranean, but raised with scientists, governmental officials and conservationists the critical issues associated with wetland management at the time and into the future. The efforts of Ted Hollis (who died in 1996 at a wetland conference in Perth, Australia) in promoting these efforts were profound and drove the wider wetland community to extend from considering only traditional ecological science to engage more widely with the effects of hydrology, economics, agriculture and trade on managing wetlands (Hollis *et al.* 1992). He was truly pioneering in many respects, in stepping outside the bounds of the established scientific disciplines (sometimes in the face of substantial resistance from others) and embracing what we nowadays would call a multi-disciplinary or trans-disciplinary approach.

Following the Grado Conference, a multi-organisational effort led to the establishment in 1992 of the MedWet initiative for Mediterranean wetlands (below). One aspect of this included a concerted effort to provide guidance to Mediterranean countries on wetland inventory and monitoring, with funding support from the

EU. This included substantial guidance approaches for wetland inventory (Tomàs Vives 1996) and monitoring of relevance to Mediterranean efforts, but also influencing similar efforts in other regions, as outlined in Finlayson & van der Valk (1995) for example, and subsequent efforts through Wetlands International and the Ramsar Convention (Aubrecht *et al.* 1994; Finlayson & Davidson 1999; Finlayson *et al.* 1999).

The initiatives catalysed by IWRB were instrumental in the later adoption of formal decisions by the Ramsar Convention covering wetland management, inventory, assessment and monitoring, with technical detail subsequently provided by the series of Ramsar "*Wise Use Handbooks"* published by the Ramsar Secretariat and now in their fourth editions.

Wetland strategies and regional programmes

The ability to establish strategic directions for wetland and waterbird conservation was a particular strength of IWRB. These drew from the ability to bring together multiple experts across multiple topic areas to synthesis strategic outlooks.

For waterbirds, such strategies included Tim Dodman's waterbird monitoring strategy for Africa (Dodman 1997) building on knowledge gained since IWRB's initiation of the African Waterbird Census in 1991.

IWRB's wetlands programme resulted in a number of regional or basin strategies including for the Mediterranean (Finlayson *et al.* 1992) leading to the Grado Declaration and the ongoing Mediterranean Wetlands Initiative (MedWet, above), the Black Sea (Wilson & Moser 1994) and Lower Volga, Russia (Finlayson 1992, above). Further, a major international symposium was organised in December 1991 by IWRB, and others resulted in a Karachi Declaration focussed on the co-operation in South and West Asia, including the Indus and more widely the Central Asian Flyway, the proceedings of which were jointly produced by IWRB and AWB (Moser & van Vessem 1993).

Regional programmes, later well developed by WI, were starting to be initiated by IWRB. Tim Dodman's appointment in February 1995 as "Technical Advisor Africa Programme" focused on developing an Africa Programme from scratch. Until then, African engagement was restricted to the AfWC (above). Initial reconnaissance work involved two 1995 West Africa trips and the organisation of a visit to Slimbridge by Abdoulaye Ndiaye, then with Senegal's Direction des Parcs Nationaux. A further three-month Africa programme development tour followed in early 1996 (taking in eight countries by public transport) and included organising a February 1996 workshop in Senegal on which the Africa Monitoring Strategy was based (Dodman 1997). Whilst by then organised by WI, the inception and early planning was through IWRB and represented a significant development for the organisation. In its last several months IWRB moved from the AfWC being its only activity in Africa to looking seriously at setting up an Africa Programme, which was taken forward by WI a couple of years later including establishing offices in Senegal, Mali and Guinea-Bissau – all of which remain active today (T. Dodman *in litt.*).

Significant species conservation initiatives

Brent Geese

Prior to the advent of multiple international treaties addressing migratory bird species conservation in the late 1970s, there were no legal mechanisms to address the conservation needs of birds that migrated through different countries. The case of Brent Geese was a case study of how IWRB stimulated monitoring, research and legal protection in the initial decades after the Second World War, prior to the existing frameworks which we now take for granted. The first international review of the species, made by the fledging IWRB during the 1950s, was coordinated by Finn Salomonsen from Denmark who documented, for the first time, the poor European status and historical declines of the three populations of Brent Geese in Europe: a likely decline of > 75% since the second half of the 19th century. One thousand reprints of his review paper (Salomonsen 1958) were ordered and widely distributed to raise awareness of the situation.

A significant thrust of IWRB activity in the years that followed – the issue was virtually a standing item in Board meetings for decades – was to influence Range States to respond to this major decline, either through national protection or by significantly reducing the duration of hunting seasons (as well as putting in place refuge provision), thus stimulating population recovery. At the same time, annual monitoring data from IWC provided continuing status assessments. Legislative protection was ultimately effective, with population growth especially following hunting bans in the Netherlands from 1950, UK from 1954, France from 1966, and finally Denmark from 1972 (Smart 1979). The consequence was a discussion from the late 1970s onwards, about the conditions under which a sustainable harvest could resume, and how that might occur without jeopardising the species' recovery. In particular, how a sustainable annual quota could be calculated (especially in the context of episodic productivity) and how this might be shared between Range States. Major IWRB workshops in Paris in 1977 (Smart 1979) and 1979 (Scott & Smart 1982) were opportunities to explore these issues in detail, especially for Dark-bellied Brent Geese and start to build an international consensus on future approaches. These meetings highlighted the extensive research in eastern England and the German Wadden Sea by Andrew St Joseph and Peter Prokosch, which ultimately contributed to the recent establishment of the whole of the Wadden Sea (in Denmark, Germany and the Netherlands) as a World Heritage site.

However, the situation became more legally complicated following adoption of the EU Birds Directive in 1979, which established an international basis for the species' protection status, and which has essentially "locked in" protection for some states given the European Commission's unwillingness to revise the Directive's Annex II quarry list since 1979.

The recovery of the three populations of European Brent Geese was a major success for IWRB, the result of decades of quiet diplomacy to encourage Range States to

adopt more rational hunting policies in the absence of the international legal frameworks governing hunting now provided by the EU and AEWA. Indeed, AEWA's European Goose Management Programme has since pioneered the development of adaptive harvest protocols shared across Range States and, although not currently focussed on Brent Geese, provides potentially transferrable experience to other geese.

Tackling non-natives: Ruddy Duck in Europe

In the early 1990s, it became clear from studies in UK and extensive research in Spain, that birds from a growing population of North American Ruddy Ducks *Oxyura jamacensis* in England were migrating to Spain, breeding with the globally endangered White-headed Ducks *Oxyura leucocephala* and producing fertile hybrids – a threat unforeseen when IWRB published a conservation action plan for the species in 1990 (Anstey 1990), although a decade earlier, Derek Scott had already clearly identified the (then apparently remote) risk (Rooth & Scott 1982). The story of the, now near-complete, eradication of Ruddy Ducks from the UK has been told by others (Smith *et al.* 2005; Henderson 2010).

IWRB's early role was critical in providing international contexts, including co-convening an international workshop in England in March 1993 to review European Ruddy Duck status, attended by 50 delegates from 10 countries (Galbraith & Holmes 1993). This clear international endorsement gave political confidence to the UK government to commence working towards eradication (DEFRA 2003; see page 50). Subsequent IWRB activity included the compilation of a series of status reviews to document changing European numbers, as well as co-convening a further international meeting in Spain in September 1994.

Flyway action plans: Greenland White-fronted and Brent Geese

Species action planning is now well established but until the 1990s there were few, if any, examples of international plans for single species. IWRB had published a number of status reviews in the late 1980s for rarer species/smaller populations that were difficult to estimate as part of the regular IWC and required special assessments. These included White-headed Duck (Anstey 1990), Scarlet Ibis *Eudocimus ruber* (Frederick *et al.* 1990), White-winged Wood Duck *Cairina scutulata* (Green 1992), and Marbled Teal *Marmaronetta angustirostris* (Green 1993). Many of these supported local conservation initiatives but did not engage significantly either with Range State governments or with stakeholders.

In the early 1990s, IWRB supported the Irish initiative to develop a first flyway scale, single-species, action plan for Greenland White-fronted Geese *Anser albifrons flavirostris*, a threatened population with a simple flyway comprising four Range States: Greenland, Iceland, UK and Ireland. This resulted in a draft plan (Stroud 1992) based on well-established site management planning principles, and subsequently negotiated at an international workshop of Range States and stakeholders convened by Ireland in Wexford in March 1992 (van Vessem 1992). Diminished political interest thereafter unfortunately resulted in lack of

finalisation of both the plan and a draft Memorandum of Understanding between Range States. Presentation of the approach and experience gained at IWRB's 1992 Florida meeting (Stroud 1993) however resulted in significant international interest and stimulated the first flyway management plan for Dark-bellied Brent Geese sponsored by the Dutch government (van Nugteren 1997) and other initiatives. Single (and multiple) Species Action Plans have since developed as a major means of prioritising necessary conservation interventions.

Treaty building and organisational capacity development

The role of IWRB in developing the concept of a wetlands convention, and progressively overseeing a negotiated text through to its adoption in 1971, has been described above and in detail by Matthews (1993). As noted by Stroud *et al.* (2022), the significance of the Ramsar Convention is not just what it achieved for wetlands, but that it served as a model for other international environmental treaties.

In the second half of the 1960s there were few, if any, examples of what a broad-ranging and, more importantly, an effective multilateral environmental treaty might look like. The prospects for a comprehensive and effective global wetland convention were limited, with the cover note to the first draft stating "…*so far hardly any experience has been gained of general agreements concluded by a plurality of States and concerned with natural environmental planning*…" However, the Convention on wetlands served as a model for later treaties addressing trade in wildlife, migratory species and subsequently global biodiversity.

IWRB's role in advocating state membership of the new wetlands convention through the 1970s was immense, significantly encouraging its rapid growth in Europe, the Mediterranean, and parts of Africa and Asia.

As Ramsar started to grow away from its waterbird "roots", the need for legally binding flyway-scale treaties for migratory waterbirds became apparent, with clear opportunities under the new Convention on Migratory Species (Boere 1991). The story of IWRB's support for the first such Agreement – for the African-Eurasian region – has been fully documented by Boere (2010). Suffice to say that, as for Ramsar a generation earlier, IWRB's role eventually was critical, although it needed to be argued for given the views of some that Ramsar already delivered in full all the potential scope of a waterbirds Agreement (Boere 2010). Initially support had been through the opportunities that IWRB Board meetings and conferences had given to promote the concept of the new agreement, explore opportunities, and consider risks and problems. Subsequently, as the text started to develop, the IWRB team of Mike Moser, Janine van Vessem and Derek Scott were crucial in supporting the Dutch government's lead negotiators with technical assessments, especially as the treaty expanded its scope both taxonomically and geographically (Supporting Materials Figs. S10 and S11).

Capacity development for wetland conservation at regional scales was, and remains of importance. IWRB played a key facilitating role in the development of MedWet – the Mediterranean Wetlands

Initiative (above, https://medwet.org/medwet/history/) which brought together 27 Mediterranean and peri-Mediterranean countries that are Ramsar Parties together with Palestine and a number of organisations and wetland centres. It was the first such Regional Initiative under Ramsar, which paved the way for *c.* 12 more to follow.

The IWRB "family"

What IWRB was able to deliver over five decades was almost entirely due to an ethos of collective engagement, mutual respect and support from all those involved. Wetland conservation was, and is, difficult, controversial and challenging – very especially for those in government who have to transmit difficult messages to politicians. IWRB provided a "mutual support" forum where collective experience could be shared.

Right from the very start, the power of IWRB came from its ability to facilitate dialogue and personal relationships, between national delegates, between government representatives and non-governmental experts, or between those more, or less, interested in hunting. Relationship-building is central to international conservation (Stroud *et al.* 2021) with IWRB excelling throughout its five decades of existence.

Mooij (*in litt.*) notes that *"the construction of IWRB with voluntary members with two more or less equal delegates (respectively from government and non-government) was brilliant and supported the effective "family" structure of the organisation. The NGO delegate connected IWRB with the national nature conservation scene and most of the time ensured the funding by the state "member"".*

The direct influence of IWRB on national conservation policies

The foregoing review documents just a few of the ways through which IWRB significantly influenced international policies for wetland and waterbird conservation, not least through the creation of many of the institutional and legal frameworks we have today. It also had significant influence nationally. For example, and just in UK alone, IWRB materially influenced national policy in a number of high-profile areas of conservation policy. These included:

(1) Stimulating the compilation by the Nature Conservancy Council (NCC), of a national inventory of important waterbird sites in Britain. This detailed site list (in NCC unpublished files) was then published in the *Nature Conservation Review* (Ratcliffe 1977) – the first national review of priority sites for conservation. The list of key sites subsequently became the basis of the UK's national list of IBAs (Grimmett & Jones 1989) and the near-identical national network of SPAs (Stroud *et al.* 1990).

(2) Providing international context for control of Ruddy Ducks. International endorsement by IWRB of the problem posed by Ruddy Ducks (page 48) and the need for lethal control was fundamental to persuading UK Environment Minister Eliot Morley to announce the controversial decision to nationally eradicate Ruddy Ducks (DEFRA 2003) in March 2003.

(3) Initiating a national process to phase out the use of lead gunshot in wetlands. Whilst the problems associated with lead gunshot had been known in the UK for many years,

it was as the direct result of IWRB's international workshop on lead in wetlands (Brussels, June 1991) with its call for national action that led to the establishment of a stakeholder working group in September 1991. The work of the "Lead in Wetlands Working Group" prepared the way for late 1990s legislation prohibiting the use of lead gunshot in UK wetlands (Stroud 2015).

IWRB and sustainable development

The issue of wetland ecosystem services in support of sustainable development was not central to IWRB's activities, although neither was it neglected. From the 1962 Mar Conference forward, the issue appears in nearly all the major conferences with the concepts being enshrined in the text of the Ramsar Convention. However, for IWRB the focus of the RGs was squarely on species and habitat conservation. This reflected the thinking prevalent through to the 1980s and which provided the primary mandate for wetland conservation nationally and internationally. Yet especially beyond Europe and North America, a different reality was emerging with governments, especially in Africa and Asia-Pacific focussing on human development and industrialisation in support of the need to ensure livelihoods for several billion people. Internationally, in the mid-1980s, the Brundtland Commission (World Commission on Environment and Development 1987) prepared the way for the 1992 Earth Summit in Rio de Janeiro. That meeting adopted the Agenda 21 framework – the "Rio Declaration" – placing sustainable development issues centre stage, although at the time IWRB did little to respond to the new international architecture including the Convention on Biological Diversity, or in some cases was even actively dismissive of it considering that proper implementation of existing international treaties (notably Ramsar) was all that was needed.

In some ways, AWB had transitioned into the need for new modes of wetland advocacy earlier than IWRB, co-organising the 1995 Wetlands and Development Conference in Kuala Lumpur. However, many of IWRB's publications in the late 1980s and early 1990s, indicate that the organisation was also rapidly prioritising this approach. There was a growing awareness that "*species-focused arguments are unlikely to have any influence on decision-making on trade-offs between the maintenance of wetland ecosystems and sustainable development, and more potent arguments are likely to involve the importance of maintaining and enhancing ecosystem services so that they continue to support human livelihood*" (Davidson & Stroud 2006). Yet the consequence of the subsequent move by Wetlands International in a significantly different strategic direction was that, in marketing terms, IWRB unwittingly lost a long-established and trusted "brand" with established supporters for a new, unknown, identity as Wetlands International.

Whilst there were new opportunities that could be pursued, what occurred in reality however, was a more radical change of strategic emphasis yet without maintaining the programmes that had given IWRB its core competence and international reputation. That was not a necessary consequence of the merger but decisions of new governance. This had two immediate consequences. First, by focussing more on

wetland sustainable development issues, WI was in immediate competition, for both project funds and influence, with longer-established international sustainable development actors. This led to immediate confusion. Second, long-term government funders – at least in Europe – were unhappy with the initial de-prioritisation of many biodiversity programmes, such as the IWC, whose reporting slipped to less than annual owing to funding cuts. This led, after a few years, to removal of formal subscription support by previous significant funders such as the UK and France. A practical contributory factor was that environment ministries (who had long paid IWRB subscriptions) were unable to justify support for essentially sustainable development programmes (as being beyond their direct statutory remits), rather than those targeting biodiversity conservation. The logical alternative source of national subscriptions was now national development agencies, but to these the new WI was an unknown quantity in contrast to their long-established partners such as IUCN and WWF. That was the view in parts of Europe, but it should be noted of course that a greater focus on sustainable development issues (within both IWRB and WI) was welcomed by many developing countries as more relevant to their priorities.

The variant viewpoints as to the centrality of wetland sustainable development between – broadly – the developed and developing world continue to play out in other fora such as the Biodiversity and Ramsar Conventions. (Since the crisis of the early 2010s, a recovery package has led to ring-fenced funding being allocated from WI's core budget for basic running costs of the IWC and associated activities, which is now strongly supported by the wider waterbird monitoring community.)

Conclusions

IWRB was a hugely important and structurally unique organisation that created foundations for much contemporary wetland conservation activity. For most of its life, its operations reflected three principles: first, the maintenance of a network of networks that ultimately stretched across and engaged with nearly all those involved in wetland and waterbird conservation and management; second, in the years before our current easy global access to knowledge, maintaining a significant programme of collating and disseminating information; and third, acting catalytically with, and through, other actors rather than embarking on significant "organisation building". Its essence was the juxtaposition of committed scientists, most of them active in the field, and administrators from government offices, to whom the scientists managed to communicate their feeling of urgent need for action.

In the decades before easy international communication, IWRB's meetings and conferences were critical not only to that information exchange but also to developing internationally shared perspectives on wetland and waterbird conservation issues as well as facilitating relationship building between individuals. It can be argued that the meetings of many of the conservation treaties IWRB helped to stimulate (such as the Ramsar Convention and AEWA), now allow for these networking functions; however, these are neither non-political "safe

spaces" for free discussions by government representatives (Stroud *et al.* 2021), nor do they allow for more technical scientific exchanges such as IWRB meetings previously encouraged. Arguably the key element of IWRB's success was its role as a "stimulating" organisation with powerful networks, giving IWRB both serious international credentials while not having to support the bureaucracy (and thus costs) of a true intergovernmental body.

It played a critical role in creating and maintaining a wide range of international standards for wetland and waterbird conservation. Particular achievements were the series of ground-breaking regional inventories of wetlands of international importance, which directly stimulated nominations for Ramsar Site designation; its development, support and geographic expansion of the International Waterbird Census; and of course, its critical role in both initiating the Ramsar Convention in the 1960s, and then supporting its growth subsequently – notably strongly advocating membership to hesitant potential Contracting Parties in its early years.

Much of IWRB's success was in building – through its conferences, workshops, newsletters and Research Groups – the first international networks of passionate wetland/waterbird scientists and conservationists active in the field. This centralised coordination worked well but constrained the geographical coverage until new communication technologies arrived. In that context, it is greatly disappointing that so little of IWRB's veritable library of significant publications over five decades is accessible online, including data-rich inventories such as those related to hunting standards and national refuges (IWRB 1966a,b) which provide important baselines for current wetland and waterbird conservation policies. It is important that priority is given to making these available.

IWRB was also served remarkably well, from its outset, by its staff, all of whom dedicated huge energy to the organisation and its aims. Particularly given that, in the 1970s and early 1980s, there was only one member of IWRB staff plus an administrative assistant available to promote both the IWC *and* the Ramsar Convention.

However, IWRB was not without problems. Most significant until the 1980s, was the lack of legal structure, the reason why IUCN was instead given Ramsar Bureau duties as the Convention sought to develop institutional support (Matthews 1993). However, despite this, practical and pragmatic ways were progressively devised that allowed provision of technical support from IWRB to the developing Bureau, although the limited staff capacity available and major logistic challenges arising from having staff in both Slimbridge and Gland were always problematic. Later, problems concerned finding its new niche as the Ramsar Bureau was established and satisfying also its members around the world from a European base (and at least historically, developed-world perspectives).

Whilst its successor, WI, has maintained some of IWRB's programmes – such as the International Waterbird Census, *Waterbird Population Estimates* and (until the 2010s) support for Specialist Groups – these have had significantly limited resources, low profile and little organisational recognition.

The consequence of its significant downplaying of these to develop new programmes of activity led to the loss of much of IWRB's waterbird and linked wetland related technical and scientific functions, which is highly regrettable. Perhaps what was missed was the looming public profile of the "biodiversity crisis" and that species-focussed conservation is a critical part of wider anthropocentric concerns for ecosystems. Indeed, it is the absolute foundation on which ecosystem services stand, and the deep knowledge to understand and respond to biodiversity losses is critical to deliver effective responses. Less tangible, but as important in any "accounting", has been the loss of the passion and enthusiasm of its multiple networks, so important a driver of IWRB activity, as well as the loss of focus and visibility among government officials – an absolutely key audience as the gate-keepers to national politicians.

The comment "*Personally, I miss IWRB very much as a coordinating body for international scientific exchange and stimulus*" represents a near unanimous view of all those contacted for this review. Notwithstanding regretting the loss of many of the organisational functions in the present, we must however celebrate its incredible and pioneering achievements over its near 50-year lifespan, and wish its legacy and successor initiatives and organisations every success. Without them, the wetlands and waterbirds of the world would undoubtedly be even more endangered.

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References

Anonymous 1996. *Asia-Pacific Migratory Waterbird Conservation Strategy: 1996–2000*. Wetlands International Publication No. 117. Wetlands International – Asia Pacific, Kuala Lumpur, Malaysia and International Waterfowl and

Wetlands Research Bureau – Japan Committee, Tokyo, Japan.

Anstey, S. 1990. *The White-headed Duck* Oxyura leucocephala. *A Conservation Action Plan*. International Waterfowl and Wetlands Research Bureau and Wildfowl & Wetlands Trust, Slimbridge, UK.

Atkinson-Willes, G.L. 1952. *Wildfowl Counts 1947–1952*. IWRI Publication No. 3. IWRI, London, UK.

Atkinson-Willes, G.L. 1963. *Wildfowl in Great Britain*. Her Majesty's Stationery Office, London, UK.

Atkinson-Willes, G.L. 1976. The numerical distribution of ducks, swans and coots as a guide in assessing the importance of wetlands in midwinter. *In* M. Smart (ed.), Proceedings of the International Conference on the Conservation of Wetlands and Waterfowl, Heiligenhafen, Federal Republic of Germany, December 1974. IWRB, Slimbridge, UK.

Atkinson-Willes, G.L., Scott, D.A. & Prater, A.J. 1982. Criteria for selecting wetlands of international importance. *In* M. Spagnesi (ed.), Proceedings of the conference on the conservation of wetlands of international importance especially as waterfowl habitat. Cagliari, Italy, 24–29 November 1980. *Supplemento alle Ricerche di Biologia della Selvaggina* 81: 1017–1042.

Aubrecht, G., Dick, G. & Prentice, C. (eds.) 1994. *Monitoring of Ecological Change in Wetlands of Middle Europe. Proceedings of an International Workshop held in Linz, Austria, 26–30 October 1993*. IWRB, Slimbridge, UK.

Barclay-Smith, P. 1941. Close time. *In* J. Berry (ed.), *The Status and Distribution of Wild Geese and Wild Duck in Scotland. International Wildfowl Inquiry, Volume I*, pp. 106–120. Cambridge University Press, Cambridge, UK.

Berry, J. 1939. *The Status and Distribution of Wild Geese and Wild Duck in Scotland. International Wildfowl Inquiry, Volume II*. Cambridge University Press, Cambridge, UK.

Birkan, M., van Vessem, J., Havet, P., Madsen, J., Trolliet, B. & Moser, M. (eds.) 1996. Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5–9 December 1994. *Game Faune Sauvage* 13, in two volumes.

Björk, S. 1994. Treatment of overgrown shallow lakes – macrophyte control: Lake Hornborga, Sweden. *In* M. Eiseltová (ed.), *Restoration of Lake Ecosystems – a Holistic Approach*, pp. 154–168. IWRB Special Publication No. 32. IWRB, Slimbridge, UK.

Blanco, D.E. & M. Carbonell, M. (eds.) 2001. *The Neotropical Waterbird Census. The First 10 Years: 1990–1999*. Wetlands International, Buenos Aires, Argentina and Ducks Unlimited, Inc., Memphis, USA.

Boere, G.C. 1991. Priorities for the conservation of migratory waterbirds. *In* T. Salathé (ed.), *Conserving Migratory Birds*, pp. 345–360. ICBP Technical Publication No. 12. International Committee for Bird Preservation, Cambridge, UK.

Boere, G.C. 2010. *The History of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds. Its Development and Implementation on the Period 1985–2000, with the Broader Context of Waterbird and Wetlands Conservation*. UNEP/AEWA Secretariat, Bonn, Germany.

Boere, G.C., Galbraith, C.A. & Stroud, D.A. (eds.) 2006. *Waterbirds Around the World*. The Stationery Office, Edinburgh, UK.

Boyd, H. & Pirot, J.-Y. 1989. *Flyways and Reserve Networks for Water Birds*. IWRB Special Publication No. 9. IWRB, Slimbridge, UK.

Carp, E. 1980. *Directory of Wetlands of International Importance in the Western Palearctic*. IUCN, Gland, Switzerland.

Chan, S. 1999. *Atlas of Key Sites for Cranes in the East Asian Flyway*. Wetlands International, Tokyo, Japan.

Cowan, G.I. 1992. St Lucia wetland system, South Africa. *IWRB News* 8: 8–9.

Davidson, N.C. 1994. WSG's Liaison Agreement with the International Waterfowl and Wetlands Research Bureau (IWRB). *Wader Study Group Bulletin* 73: 17–18.

Davidson, N.C. & Stroud, D.A. 2006. African-Western Eurasian Flyways: current knowledge, population status and future challenges. *In* G.C. Boere, C.A. Galbraith & D.A. Stroud (eds.), *Waterbirds Around the World*, pp. 63–73. The Stationery Office, Edinburgh, UK.

DEFRA 2003. *Ruddy Duck – the Threat to the White-headed Duck. The Case for UK Action*. Department for Environment, Food and Rural Affairs, London, UK.

de Klemm, C. & Créteaux, I. 1995. *The Legal Development of the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat (2 February 1971)*. Ramsar Convention Bureau, Gland, Switzerland.

Diagana, C.H., Dodman, T. & Sylla, S.I. 2006. The African Waterbird Census (1991–2004): fourteen years of waterbird surveys in Africa. *In* G.C. Boere, C.A. Galbraith & D.A. Stroud (eds.), *Waterbirds Around the World*, pp. 453–456. The Stationery Office, Edinburgh, UK.

Dodman, T. (ed.) 1997. *A Preliminary Waterbird Monitoring Strategy for Africa*. Wetlands International Publication No. 43. Wetlands International, Wageningen, the Netherlands.

Eiseltová, M. (ed.) 1994. *Restoration of Lake Ecosystems – a Holistic Approach*. IWRB Publication No. 32. IWRB, Slimbridge, UK.

Eiseltová, M. & Biggs, J. 1995. *Restoration of Stream Ecosystems. An Integrated Catchment Approach: a Training Handbook*. IWRB Special Publication No. 37. IWRB, Slimbridge, UK.

Fawcett, D. & van Vessem, J. 1995. *Lead Poisoning in Waterfowl. International Update Report 1995*. IWRB, Slimbridge, UK.

Ferdinand, L. 1979. Finn Salomonsen og fuglene. *Dansk Ornithologisk Forenings Tidsskrift* 73: 5–8.

Finlayson, C.M. (ed.) 1992a. *Wetland Conservation and Management in the Lower Volga, Russia*. IWRB Special Publication No. 18. IWRB, Slimbridge, UK.

Finlayson, C.M. (ed.) 1992b. *A Strategy and Action Plan to Conserve the Wetlands of the Lower Volga, Russia*. IWRB, Slimbridge, UK.

Finlayson, C.M. 1992c. Management and conservation of peat bogs, floodplains and fish ponds in central and Eastern Europe. *In* C.M. Finlayson (ed.), *Integrated Management and Conservation of Wetlands in Agricultural and Forested Landscapes*, pp. 88–93. IWRB Special Publication No. 22. IWRB, Slimbridge, UK.

Finlayson, C.M. & Davidson, N.C. (collators) 1999. Global review of wetland resources and priorities for wetland inventory: summary report. *In* C.M. Finlayson & A.G. Spiers (eds.), *Global Review of Wetland Resources and Priorities for Wetland Inventory*, pp. 1–13. Supervising Scientist Report No. 144. Supervising Scientist Group, Canberra, Australia.

Finlayson, C.M. & Larsson, T. (eds.) 1991. *Wetland Management and Restoration*. Swedish Environmental Protection Agency Report No. 3992. Swedish Environmental Protection Agency, Solna, Sweden.

Finlayson, C.M. & Volz, J. 1994. A strategic action plan for the conservation of the wetlands of the Lower Volga, Russia. *In* W.M.J. Mitsch (ed.), *Global Wetlands – Old World and New*, pp. 729–736. Elsevier Science, Amsterdam, the Netherlands.

Finlayson, C.M. & van der Valk, A.G. (eds.) 1995. *Classification and Inventory of the World's Wetlands*. Advances in Vegetation Science No. 16. Kluwer Academic Publishers, Dordrecht, the Netherlands.

Finlayson, C.M., Davidson, N.C., Spiers, A.G. & Stevenson, N.J. 1999. Global wetland

inventory – status and priorities. *Marine and Freshwater Research* 50: 717–727.

Finlayson, C.M., Hollis, T. & Davis, T. (eds.) 1992. *Managing Mediterranean Wetlands and their Birds. Proceedings of an IWRB International Symposium, Grado, Italy, February 1992*. IWRB Special Publication No. 20. IWRB, Slimbridge, UK.

Finlayson, C.M., Volz, J. & Chuikow, Y. 1993. Ecological change in the wetlands of the Lower Volga, Russia. *In* M.E. Moser, R.C. Prentice & J. van Vessem (eds.), *Waterfowl and Wetland Conservation in the 1990s – A Global Perspective*, pp. 61–66. IWRB Special Publication No. 26. IWRB, Slimbridge, UK.

Forbes, N.T., Forbes, A.T. & James, B. 2020. Restoration of Lake St Lucia, the largest estuary in South Africa: historical perceptions, exploitation, management and recent policies. *African Journal of Aquatic Science* 45: 183–197.

Frederick, P.C., Morales, L.G., Spaans, A.L. & Luthin, C.S. (eds.) 1990. *The Scarlet Ibis (*Eudocimus ruber*): Status, Conservation and Recent Research*. IWRB Special Publication No. 11. IWRB, Slimbridge, UK.

Galbraith, C. & Holmes, J. 1993. International *Oxyura jamaicensis* workshop. *IWRB News* 10: 16.

Girard, O., Thal, J. & Niagate, B. 2004. The Antadis (Anatidae) wintering in the Inner Niger Delta. *Game and Wildlife Science* 21: 107–137.

Green, A.J. 1992. *The Status and Conservation of the White-winged Wood Duck* Cairina scutulata. IWRB Special Publication No. 17. IWRB, Slimbridge, UK.

Green, A.J. 1993. *The Status and Conservation of the Marbled Teal* Marmaronetta angustirostris. IWRB Special Publication No. 23. IWRB, Slimbridge, UK.

Grimmett, R.F.A. & Jones, T.A. 1989. *Important Bird Areas in Europe*. ICBP Technical Publication No. 9. International Committee for Bird Preservation, Cambridge, UK.

Hecker, N. & Tomàs Vives, P. (eds.) 1995. *The Status of Wetland Inventories in the Mediterranean Region*. IWRB Special Publication No. 38. IWRB, Slimbridge, UK.

Henderson, I. 2010. The eradication of Ruddy Ducks in the United Kingdom. *Aliens* 29: 17–24.

Hindle, E. 1964. International Wildfowl Research Bureau. *In* L. Hoffman (ed.), *Project Mar. The Conservation and Management of Temperate Marshes, Bogs and Other Wetlands. Proceedings of the Mar Conference Organised by IUCN, ICBP and IWRB at Les Saintes-Maries-de-la-Mer, November 12–16 1962*, pp. 461–468. IUCN Publications New Series No. 3. IUCN, Neuchatel, Switzerland.

Hoekstra, H.H. 1971. Towards saving Europe's wildfowl. *Biological Conservation* 3: 217–219.

Hoffman, L. 1964a. Wildfowl refuges in Europe and the Mediterranean – plans and needs for improvement and extension. *In* J.J. Swift (ed.), *Proceedings of the First European Meeting on Wildfowl Conservation; St. Andrews, Scotland, 16–18 October 1963*, pp. 161–168. Nature Conservancy & IWRB, London, UK.

Hoffman, L. (ed.) 1964b. *Project Mar. The Conservation and Management of Temperate Marshes, Bogs and other Wetlands. Proceedings of the Mar Conference Organised by IUCN, ICBP and IWRB at Les Saintes-Maries-de-la-Mer, November 12–16 1962*. IUCN Publications New Series No. 3. IUCN, Neuchatel, Switzerland.

Holdgate, M. 1999. *The Green Web: A Union for World Conservation*. Earthscan Publications, London, UK.

Hollis, G.E., Patterson, J., Papayannis, T. & Finlayson, C.M. 1992. Sustaining wetlands: policies, programmes and partnerships. *In* C.M. Finlayson, G.E. Hollis & T.J. Davis (eds.), *Managing Mediterranean Wetlands and their Birds*, pp. 281–285. IWRB Special Publication No 20. IWRB Slimbridge, UK.

International Wildfowl Inquiry 1941. *Factors Affecting the General Status of Wild Geese and*

Wild Ducks. International Wildfowl Inquiry, Volume I. Cambridge University Press, Cambridge, UK.

IWRB 1964. *Proceedings of the First European Meeting on Wildfowl Conservation; St. Andrews, Scotland, 16–18 October 1963*. Nature Conservancy & IWRB, London, UK.

IWRB 1966a. *Wildfowl Refuges in Europe, North Africa and the Middle East*. IWRB, Le Sambuc, France.

IWRB 1966b. *Legislative and Administrative Measures for Wildfowl Conservation in Europe and North Africa*. IWRB, Le Sambuc, France.

Kuivenhoven, P. & van Vessem, J. 1997. *Lead Poisoning in Waterfowl. International Update Report 1997*. Wetlands International, Wageningen, the Netherlands.

Lampio, T. 1974. Hunting rationalisation studies. *Finnish Game Research* 34: 4–13

Lampio, T. 1977. Changes in the protection of waterfowl in Europe in 1969–74. *Finnish Game Research* 36: 1–13.

Lampio, T. 1983. *Waterfowl Hunting in Europe, North America and some African and Asian Countries in 1980–81*. IWRB Special Publication No. 3. IWRB, Slimbridge, UK.

Larsson, T. & Mason L. 1996. *Relocation of Wetlands International Offices*. Swedish Environmental Protection Agency, Solna, Sweden.

Low, R. 2021. *Female Heroes of Bird Conservation*. Insignis Publications, Mansfield, UK.

Marchington, J. 1980. *The History of Wildfowling*. Adam & Charles Black, London, UK.

Matthews, G.V.T. 1969. The International Wildfowl Research Bureau. *Wildfowl* 20: 94–97.

Matthews, G.V.T. 1970. International co-operation in the conservation of wildfowl and wetlands. *In* N.M. Sedgewick, P. Whitaker & J. Harrison (eds.), *The New Wildfowler in the 1970's*, pp. 266–275. Barrie & Jenkins, London, UK.

Matthews, G.V.T. 1993. *The Ramsar Convention on Wetlands: its History and Development*. Ramsar Convention Bureau, Gland, Switzerland.

Matthews, G.V.T. & Isakov. Y.A. (eds). 1981. *Proceedings of the IWRB Symposium on the Mapping of Waterfowl Distributions, Migrations and Habitats. Alushta, Crimea, USSR, 16–22 November 1976*. USSR Ministry of Agriculture/ Academy of Sciences, Moscow, Russia.

Menzbier, M. 1886. Die Zugstrassen der Vögel in europaeischen Russland. *Bulletin de la Societe Imperiale des Naturalistes de Moscou* LXII(1): 291–369.

Miyabayashi, Y. & Mundkur, T. 1999. *Atlas of Key Sites for Anatidae in the East Asian Flyway*. Wetlands International, Tokyo, Japan.

Moser, M. & van Vessem, J. (eds.) 1993. *Wetland and Waterfowl Conservation in South and West Asia. Proceedings of a Conference held in Karachi, Pakistan, December 1991*. IWRB Special Publication No. 25/AWB Publication No. 85. IWRB, Slimbridge, UK.

Nicholson, E.M. 1980. Miss Phyllis Ida Barclay-Smith, CBE, MBOU (1903–1980). *British Birds* 73: 215–216.

Olney, P.J.S. & IWRB/Mar Bureau 1965. *Project Mar for the Conservation and Management of Temperate Wetlands. List of European and North African Wetlands of International Importance*. IUCN Publications New Series No. 5. IUCN, Neuchatel, Switzerland.

Pain, D.J. (ed.) 1992. *Lead Poisoning in Waterfowl. Proceedings of an IWRB Workshop, Brussels, Belgium, 13–15 June 1991*. IWRB, Slimbridge, UK.

Perennou, C. 1991. *Les Recensements Internationaux d'Oiseaux d'Eau en Afrique Tropicale*. IWRB Special Publication No. 15. IWRB, Slimbridge, UK.

Perennou, C., Mundkur, T. & Scott, D.A. 1994. *The Asian Waterfowl Census 1987–1991: Distribution, Status and Trends of Asian Waterfowl*. IWRB Special Publication No. 24. IWRB, Slimbridge, UK.

Ratcliffe, D.A. 1977. *A Nature Conservation Review. The Selection of Biological Sites of National Importance to Nature Conservation in Britain*.

Volume 1 & Volume 2. Cambridge University Press, Cambridge, UK.

Ridgill, S.C. & Fox, A.D. 1990. *Cold Weather Movements in Western Europe*. IWRB Special Publication No. 13. IWRB, Slimbridge, UK.

Rooth, J. & Scott, D.A. 1982. The introduction of exotic species. *In* D.A. Scott (ed.), *Managing Wetlands and their Birds. A Manual of Wetland and Waterfowl Management: Proceedings of the Third Technical Meeting on Western Palearctic Migratory Bird Management, Münster, Federal Republic of Germany, 12–15 October 1982*, pp. 279–282. IWRB, Slimbridge, UK.

Rose, P.M. & Scott, D.A. 1994. *Waterfowl Population Estimates*. IWRB Special Publication No. 29. IWRB, Slimbridge, UK.

Roux, F. & Jarry, G. 1984. Numbers, composition and distribution of populations of Anatidae wintering in West Africa. *Wildfowl* 35: 48–60.

Rüger, A., Prentice, C. & Owen, M. 1986. *Results of the IWRB International Waterfowl Census 1967–1983*. IWRB Special Publication No. 6. IWRB, Slimbridge, UK.

Salomonsen, F. 1958. The present status of the Brent Goose (*Branta bernicla* (L.)) in western Europe. *Videnskabelige Meddelelser fra Dansk naturhistorisk Forening i Kjøbenhavn* 120: 43–80.

Scott, D.A. (ed.) 1995. *A Directory of Wetlands in the Middle East*. IUCN Gland, Switzerland and IWRB, Slimbridge, UK.

Scott, D.A. & Carbonell, M. 1989. *A Directory of Neotropical Wetlands*. IUCN Cambridge, UK and IWRB, Slimbridge, UK.

Scott, D.A. & Rose, P.M. 1996. *Atlas of Anatidae Populations in Africa and Western Eurasia*. Wetlands International Publication No. 41. Wageningen, the Netherlands.

Scott, D.A. & Smart, M. (eds.) 1982. *Proceedings of the Second Technical Meeting on Western Palearctic Migratory Bird Management, Paris 11–13 December 1979*. IWRB, Slimbridge, UK.

Smart, M. (ed.) 1979. *Proceedings of the First Technical Meeting on Western Palearctic Migratory Bird Management, Paris 12–13 December 1977*. IWRB, Slimbridge, UK.

Smart, M. 1992. *St Lucia System, South Africa*. Ramsar Convention Monitoring Procedure Report No. 29. Ramsar Bureau, Gland, Switzerland.

Smit, C. & Piersma, T. 1989. Numbers, midwinter distribution, and migration of wader populations using the East Atlantic Flyway. *In* H. Boyd & J.-Y. Pirot (eds.), *Flyways and Reserve Networks for Water Birds*, pp. 24–63. IWRB Special Publication No. 9. IWRB, Slimbridge, UK.

Smith, G.C., Henderson, I.S. & Robertson, P.A. 2005. A model of ruddy duck *Oxyura jamaicensis* eradication for the UK. *Journal of Applied Ecology* 42: 546–555.

Stroud, D.A. 1992. *Greenland White-fronted Goose* Anser albifrons flavirostris *International Conservation Plan. Draft*. National Parks and Wildlife Service, Dublin, Ireland and International Waterfowl and Wetlands Research Bureau, Slimbridge, UK.

Stroud, D.A. 1993. The development of an international conservation plan for *Anser albifrons flavirostris,* the Greenland White-fronted Goose. *In* M. Moser, C. Prentice & J. van Vessem (eds.), *Waterfowl and Wetland Conservation in the 1990s – a Global Perspective*, pp. 142–148. Proceedings of an IWRB Symposium, St Petersburg Beach, Florida, USA, 12–19 November 1992. IWRB Special Publication No. 26. IWRB, Slimbridge, UK.

Stroud, D.A. 2015. Regulation of some sources of lead poisoning: a brief review. *In* R.J. Delahay & C.J. Spray (eds.), *Proceedings of the Oxford Lead Symposium. Lead Ammunition: Understanding and Minimising the Risks to Human and Environmental Health*, pp. 8–26. Edward Grey Institute, University of Oxford, Oxford, UK.

Stroud, D.A. & Davidson, N.C. 2021. Fifty years of criteria development for selecting

wetlands of international importance. *Marine and Freshwater Research* 73: 1134–1148.

Stroud, D.A., Pienkowski, M.W. & Mudge, G.P. 1990. *Protecting Internationally Important Bird Sites: a Review of the Network of EC Special Protection Areas in Great Britain*. Nature Conservancy Council, Peterborough, UK.

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA Network: its Scope and Content*. JNCC, Peterborough, UK.

Stroud, D.A., Boere, G.A., Galbraith, C.A. & Thompson, D.B.A.T. 2006. Waterbird conservation in a new millennium – where from and where to? *In* G.C. Boere, C.A. Galbraith & D.A. Stroud (eds.), *Waterbirds Around the World*, pp. 29–39. The Stationery Office, Edinburgh, UK.

Stroud, D.A., Madsen, J. & Fox, A.D. 2016. When the fox preaches, take care of your geese: the urgent need for international collaboration to manage migratory geese. *British Birds* 109: 70–72.

Stroud, D.A., Cromie, R.L., Finlayson, M., Lewis, M., Mundkur, T., Pritchard, D.E., Spray, C., Tasker, M.L., Tierney, N., Tierney, R.A. & Wilson, J.D. 2021. *International Treaties in Nature Conservation: a UK Perspective*. Biodiversity Press, Totnes, UK.

Stroud, D.A., Davidson, N.C., Finlayson, M.C. & Gardner, R. 2022. The development of the final text of the Ramsar Convention: 1965–1971. *Marine and Freshwater Research* 73: 1107–1126.

Tomàs Vives, P. (ed.) 1996. *Monitoring Mediterranean Wetlands: A Methodological Guide*. MedWet Publication. Wetlands International, Slimbridge, UK and ICN, Lisbon, Portugal.

US Department of the Interior 1964. The conservation of migratory birds and wetlands in the United States. *In* L. Hoffman (ed.), *Project Mar. The Conservation and Management of Temperate Marshes, Bogs and Other Wetlands. Proceedings of the Mar Conference organised by IUCN, ICBP and IWRB at Les Saintes-Maries-de-la-Mer, November 12–16 1962*, pp. 450–460. IUCN Publications New Series No. 3. IUCN, Neuchatel, Switzerland.

van Nugteren, J. 1977. *Dark-bellied Brent Geese* Branta bernicla bernicla. *Flyway Management Plan*. Ministry of Agriculture, Nature Management and Fisheries and Dutch Society for the Preservation of the Wadden Sea, Wageningen, the Netherlands.

van Vessem, J. 1992. Greenland White-fronted Goose workshop. *IWRB News* 8: 13.

Wells, D.R. & Mundkur, T. (eds.) 1996. *Conservation of Migratory Waterbirds and Their Wetland Habitats in the East Asian-Australasian Flyway: Proceedings of an International Workshop Held at Kushiro, Japan, 28 November–3 December 1994*. Wetlands International-Asia Pacific, Kuala Lumpur, Malaysia and International Waterfowl and Wetlands Research Bureau, Slimbridge, UK.

Wilson, A.M. & Moser, M.E. (ed.) 1994. *Conservation of Black Sea Wetlands. A Review and Preliminary Action Plan*. IWRB Publication No. 33. IWRB, Slimbridge, UK.

World Commission on Environment and Development 1987. *Our Common Future*. UN/Oxford University Press, Oxford, UK.

Wuczeticz, W. & Tugarinov, A. 1937. *Seasonal Distribution and Migration of Ducks (subfamily Anatinae) on the Basis of Bird Ringing in the USSR; the Mallard* Anas platyrhyncha. Central Bureau for Bird Ringing, Moscow, USSR.

Zorrilla-Miras, P., Palomo, I., Gómez-Baggethun, E., Martín-López, B., Lomas, P.L. & Montes, C. 2014. Effects of land-use change on wetland ecosystem services: a case study in the Doñana marshes in southwestern Spain. *Landscape and Urban Planning* 122: 160e174.

