Wetlands and Birds: Expected and Unexpected Changes in the Birdscape

Authors: Bijlsma, Rob G., Platteeuw, Maarten, and Eerden, Mennobart R. van

Source: Ardea, 98(3) : 259-263

Published By: Netherlands Ornithologists' Union

URL: https://doi.org/10.5253/078.098.0301

Preface

Wetlands and birds: expected and unexpected changes in the birdscape

Rob G. Bijlsma[1,2], Maarten Platteeuw[3] & Mennobart R. van Eerden[3]

[1]Centre for Ecological and Evolutionary Studies (CEES), University of Groningen, P.O. Box 11103, 9700 CC Groningen, The Netherlands; [2]Doldersummerweg 1, 7983 LD Wapse, The Netherlands (rob.bijlsma@planet.nl); [3]Rijkswaterstaat Waterdienst, P.O. Box 17, 8200 AA Lelystad, The Netherlands (mennobart.van.eerden@rws.nl)

Arriving at Schiphol Airport, Amsterdam, during daylight is a revealing experience. School books may speak of a small country below sea level whose people have bravely fought the sea for millennia and where pastures are so green that it hurts the eye, but actually witnessing this waterlogged speck from the air is something else entirely. Green indeed, and so much water in between the fields, cities, golf courses and roads. After many centuries of reclaiming land from sea and lakes, The Netherlands still has a lot of water left. In fact, 26% of the country lies below sea level, and a staggering 55% of the country runs the risk of becoming flooded during spring tide or excessive discharges of the main rivers Rhine and Meuse. About 16% of the 41,864 km^2 of the country is covered with fresh or brackish water, mainly former tidal areas (800 km^2), lakes larger than 50 ha (2500 km^2) and large rivers (330 km^2). In combination with brooks and streams (6200 km in length) and an intricate network of ditches (330,000 km) this makes for a country where every fieldbiologist and birder has made many an inadvertent dunk during his lifetime. This much water may be perceived as a threat, but it also is – and always has been – the natural habitat for a multitude of birds. Not surprisingly, the Dutch delta is extremely rich in waterbirds. In the 2000s, midwinter counts easily exceeded 5,000,000 waterbirds, of which 1.5–1.8 million geese. Waterbird numbers have been increasing since the mid-1970s, by about 2% per annum (van Eerden *et al.* 2005, van Roomen *et al.* 2007, Koffijberg *et al.* 2010). These birds compete for space and resources with the 16,661,348 Dutchmen (www.cbs.nl, 17 November 2010, 12.20 h) and their livestock (some 4 million cattle, 12 million pigs and 100 million chickens). A bit crowded, hence a scenario for conflict.

To make matters more complicated, changes in land use and climate affect the frequency and magnitude of river discharges. The Netherlands is part of the catchments of Rhine (covering 183,000 km^2 in 9 countries), Meuse (32,000 km^2, 5 countries), Scheldt (13,600 km^2, 3 countries) and Ems (23,260 km^2, for the greater part in Germany, some in The Netherlands). Over the centuries, floodings by sea or river have been an integral part of Dutch life (Tol & Langen 2000, van Heezik 2008), just as large rivers elsewhere in Europe have wreaked havoc in their respective histories (Tockner *et al.* 2009). The flooding of large parts of Central Europe in the summer of 2010 is still fresh on our minds, but was by no means exceptional. The *communis opinio* has it that the frequency and magnitude of river floodings have stepped up in the past few decades, mainly caused by factors upstream (intensification of drainage for agriculture) and by an increase in precipitation (Tu *et al.* 2005, Pinter *et al.* 2006). Whereas land cover is a local phenomenon, and its impact is therefore likely to correlate negatively with catchment size, climate change on the other hand occurs on a larger scale and should be apparent in large and small catchments (Blöschl *et al.* 2007). Despite an enormous amount of research focused on the prevention of disasters associated with high floods, the complex interactions between physical, ecological and biological processes are still poorly understood at the various scales of time and space (Hunt 2002). Although the number of actual river floodings have steeply declined in The Netherlands after the 17th century (Fig. 1), with the last great flood in 1926, near-floodings in the 1990s and 2000s led to large-scale evacuation (e.g. in 1995, with a flood as high as in 1926) and social unrest. The increasing human monopolisation of land in the course of the

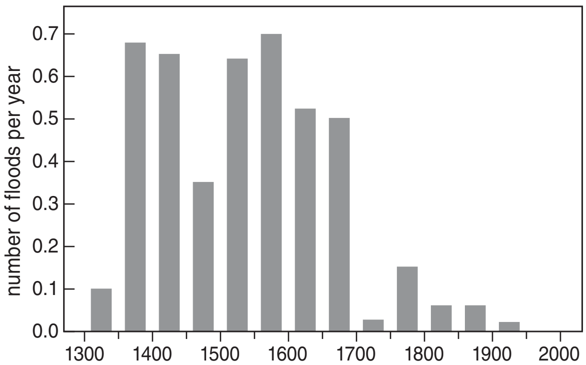

Figure 1. Average annual number of river floods per 50-year period in The Netherlands between 1300 and 2000 (modified after Tol & Langen 2000).

centuries has backfired on the natural processes in wetlands and floodplains of rivers. Since the early 1990s, in the wake of the (near-)disasters in the floodplains of several large European rivers and climate change, it has become evident that controlling rivers by building ever higher dikes and more sluices may not suffice to cope with flood risk caused by increasing discharge. This is exacerbated by the fact that atmospheric, land surface and oceanic phenomena occur on all scales, leading to intrinsic errors in predictive flooding models because the complex interactions are simplified or neglected. The resultant flood forecasts are short-term (a few days at most) and prone to error, especially under extreme events (Hunt 2002). In short, the time has come to consider alternative/additive options for water management, providing more room for water within the catchment area. This may prove a blessing in disguise for waterbirds (Platteeuw *et al.* 2010).

In past centuries, birds have suffered and profited from man's escapades on the waterfront. The Netherlands is a case in point (van Eerden *et al.* 2010, van Turnhout *et al.* 2010). Quantitative information on waterbirds is scarce from before the 19th century, but water management and land reclamation have been described in exquisite detail from the Middle Ages until the present (e.g. van de Ven 1994). These descriptions suffice to make the ornithologist's imagination soar. Between 800 and 1250 AD, sea breaches, peat extraction and river floods led to land loss on a large scale, and many freshwater lakes came into being. Only after windmills were invented and employed on a grand scale, the extent and number of lakes and marshes were successively reduced between 1600 and 1850, a period of high dynamics on the landscape level, and with its concomitant changes in birdlife (van de Ven 1994, van Eerden *et al.* 2010). Some waterbirds proliferated, others declined. This process continued at an increasing speed in the 19th and 20th century, eventually leading to the paradoxical situation that waterbirds never had been this abundant since at least the early Atlantic (7000 years BP), despite the overwhelming loss of marshlands, wetlands, peat bogs and tidal marshes. This apparent paradox is understandable when marsh- and waterbirds are differentiated according to feeding ecology. Most non-herbivorous waterbirds have steeply declined, whereas numbers of herbivorous waterbirds have increased almost sevenfold since the Middle Ages. This trend runs parallel to the increase in surface area of farmland (to the detriment of marsh- and wetlands), where at present high-quality crops produce a food bonanza of almost biblical proportions. It is therefore with mixed feelings that biologists look at the changing landscape and bird numbers. In fact, in recent decades much effort has been allocated towards the restoration of degraded marsh- and wetlands (e.g. Hosper 1997, Middleton 1999, Nienhuis & Gulati 2002, Bobbink *et al.* 2006). These attempts have had mixed fortunes, to say the least. In general, the effectiveness of restoration management has somewhat improved over the years (Nienhuis *et al.* 2002), but not by much. Many management decisions are still made *ad hoc*, are based on 'expert opinion' (without proper testing by science) or modelling (ignoring or simplifying the real world to such an extent that it is replaced by virtual reality, again rarely tested), lack the necessary scale for success to have a chance, cling desperately to the past without acknowledging changes and an unpredictable future, fall short of their target, or bog down in the morass of politics, 'multifunctionality' and other buzzwords (Sutherland *et al.* 2004, Goosen & Vellinga 2004, Choi *et al.* 2008, van der Windt & Swart 2008, Burgin 2010, Caro 2010).

Seen in this light, and strictly speaking of birds, it is a wonder that so many bird species seem to cope with, and even profit from, the rapidly changing landscape and ditto climate. It attests to the adaptability of birds, but also to the presence of larger-scaled wetlands, which have either been saved from destruction in the nick of time (e.g. Lake Naardermeer in 1905, by private initiative) or have been developed alongside the making of polders (Oostvaardersplassen in Flevoland). Large eutrophic wetland ecosystems often show a high resilience, bouncing back from serious degradation or desiccation as soon as conditions improve. A spectacular example is to be found in the Inner Niger Delta (Mali), where periods of droughts and wet years are superimposed on a within-year cycle of flooding alternated

Figure 2. Nest of White-tailed Eagle in the Oostvaardersplassen on 15 May 2008, with view across the marshes showing reedbeds and extensive die-back of willows. This third successful nest produced two fledglings. Photo by Leo Smits (Staatsbosbeheer).

by desiccation. Prolonged droughts have a profound negative impact on the survival of Palearctic migratory birds, but this is remedied as soon as rainfall improves (Zwarts *et al.* 2009). Similarly, the rehabilitation of the Waza Logone floodplains in northern Cameroon was accompanied by increasing numbers of waterbirds, although improved rainfall after the disastrously dry 1980s and colony protection also played a role in this development (Scholte 2006). Even more recently the Mesopotamian marshes of Iraq, once covering 15,000 km^2 of which in 2000 less than 10% remained, have shown a remarkable recovery after dikes were breached and a high volume of good-quality water from the Tigris and Euphrate reflooded 39% of the former marshes. Although it is still too early to celebrate the recovery of this mutilated marshland (and "the stillness of a world that never knew an engine" described in Wilfred Thesinger's *The Marsh Arabs* – based on his stay from the end of 1951 until June 1958 – is unlikely to return), the resilience shown by macroinvertebrates, macrophytes, fish and birds is promising (Richardson & Hussain 2006). Suchlike examples of rebouncing wetlands are known from all over the world, although they are offset by many more examples of loss (Boere *et al.* 2006).

Birds need a suite of suitable wetlands outside the breeding period, but the period of reproduction also imposes specific habitat requirements associated with safe nesting sites and food availability. In wetlands, either freshwater marshes, fens and wet meadows or bogs, this implies the presence of gradients in ecological conditions. To a certain extent, such conditions are still met in The Netherlands, where – despite being one of the densest populated countries of the world (some 500 people per km^2) – several marshland species maintain a stronghold within northwestern European populations, ranging from large species as Eurasian Spoonbill *Platalea leucorodia*, Purple Heron *Ardea purpurea* and Western Marsh Harrier *Circus aeruginosus* to reed-dwelling songbirds as Bearded Reedling *Panurus biarmicus*.

This special issue of Ardea has a long history. It dates back to a meeting on 16 September 1995, in Wageningen, The Netherlands. The meeting was organised in order to highlight current research, monitoring and management of typical Dutch wetland bird species. The focus was on the breeding period and/or on species considered characteristic of wetlands. The importance of habitat conditions as determinants of bird abundance was highlighted, as it directly hinges on habitat management, restoration and development.

One of the *a priori* factors that seemed important was scale. In a densely populated country as The Netherlands, where human exploitation of the environment is intense, it may not come as a surprise when wetlands – or even the country as a whole – are found to be too small for bird species to breed. Therefore, it was felt necessary to have a wider scope and include two papers from large wetlands in Poland (Dyrcz 2010) and France (Nager *et al.* 2010).

Although 15 years have passed since that meeting, the papers are still relevant to the theme of waterbirds, habitat scale and wetland protection. For instance, at the meeting the tentative establishment of a breeding population of Great Egret *Casmerodius albus* in Oostvaardersplassen was described (Voslamber *et al.* 2010). The present population is already estimated at more than 150 pairs, almost exclusively breeding in Oostvaardersplassen and only recently having colonised other large wetlands (like De Wieden, 1–4 pairs in 2003–2010; Brandsma 2010). The non-breeding population already exceeds 1600 birds (Klaassen 2009). The same holds for the White-tailed Eagle *Haliaeetus albicilla*. During the meeting, it was shown that Oostvaardersplassen was one of the few sites in The Netherlands where wintering occurred annually; the prospects for breeding in this large wetland were hinted at. Some ten years later, the first breeding pair settled in Oostvaardersplassen, returning ever since (Fig. 2, van Rijn *et al.* 2010). It is interesting to see that, fifteen years after the meeting, several suggested developments have materialised as anticipated.

Nature protection, restoration and amelioration – or whatever tag is in fashion – are firmly rooted in our society, but this by no means entails effective conservation. Moreover, governmental agencies and nature protection societies have focused their management on 'target species' and specific phases of habitats (e.g. under Natura 2000), thereby introducing the possibility of losing sight of non-target species. Furthermore, although this procedure helps to specify the management goals down to the level of species, numbers and area, it may lead to ignoring the role of natural dynamics, unforeseen processes and beyond-the-border phenomena. In general, the input of real data regarding habitat choice and habitat use, food, breeding success, survival and dispersal, and seasonal and annual variations therein, in (bird) conservation has been poor at best. This is true for the practical manager, as well as for the models proposed by biologists and ecologists. The papers presented in this Ardea are largely based on fieldwork, and this fact alone makes a time gap of 15 years irrelevant. Where appropriate, papers have been updated. Some papers presented at the meeting have already been published, viz. those on reproduction of Western Marsh Harriers in recently reclaimed polders (Dijkstra & Zijlstra 1997), the decline of the Great Reed Warbler *Acrocephalus arundinaceus* in relation to reed die-back and water level management (Graveland 1998), and the habitat-related breeding success of Black Terns *Chlidonias niger* (van der Winden *et al.* 2004). These papers can be downloaded from www.ardeajournal.nl. Two other papers have been added, i.e. on the dispersal of Great Reed Warblers in a fragmented landscape, and on flight paths of Dutch Purple Herons *Ardea purpurea* equipped with satellite transmitters (edited by Kees van Oers).

Several people were involved in the meeting and its aftermath. Mennobart van Eerden took the initiative for the meeting "Marshland birds and Management", which was organised by Rijkswaterstaat, Nederlandse Ornithologische Unie (NOU) and Instituut voor Bos- en Natuuronderzoek (IBN, now Alterra). The authors went out of their way to update their contributions, even after so long a period. We salute their patience. Two authors did not live to see the publication of this special. Heinz Hafner died on 26 October 2003; he spent his professional career as a research ornithologist at Station Biologique de la Tour du Valat, Le Sambuc in southern France, where he conducted studies on the behaviour and ecology of herons and egrets between 1962 and 2000. He was a dedicated conservationist, focusing on herons and wetlands (Isenmann 2004). Rudi Drent died on 9 September 2008. His influence in the field of what now is called evolutionary ecology was enormous. Together with his students he studied – among many other subjects – breeding energetics of Arctic geese, their stopover ecology and energetics of migration, as well as various aspects of their foraging ecology (Tinbergen 2009). His legacy is epitomised in the Festschrift *Seeking Nature's Limits* (Drent *et al.* 2005), and no less than four authors in the present volume of Ardea did their PhD under his supervision. Jan Veen helped during the first stages of editing, as Jouke Prop did during the final stages. Dick Visser prepared all figures, meticulously as ever. Financial support to the organisation of the meeting and this publication was given by Rijkswaterstaat.

REFERENCES

Blöschl G., Ardoin-Bardin S., Bonell M., Dorninger M., Goodrich D., Gutknecht D., Matamoros D., Merz B., Shand P. & Szolgay J. 2007. At what scales do climate variability and land cover change impact on flooding and low flows? Hydrolog. Process. 21: 1241–1247.

Bobbink R., Beltman B., Verhoeven J.T.A. & Whigham D.F. (eds) 2006. Wetlands functioning, biodiversity conservation, and restoration. Ecological Studies 191. Springer-Verlag, Berlin.

Boere G.C., Galbraith C. & Stroud D. (eds) 2006. Waterbirds around the world. The Stationery Office, Edinburgh.

Brandsma O. 2010. Broedende Lepelaars en Reigers in de Hoogwaterzone (De Wieden) in de periode 1989–2010. Vogels in Overijssel 9: 3–11.

Burgin S. 2010. 'Mitigation banks' for wetland conservation: a major success or an unmitigated disaster? Wetlands Ecol. Manage. 18: 49–55.

Caro T.M. 2010. Conservation by proxy: Indicator, umbrella, keystone, flagship, and other surrogate species. Island Press, Washington.

Choi Y.D., Temperton V.M., Allen E.B., Grootjans A.P., Halassy M., Hobbs R.J., Naeth M.A. & Torok K. 2008. Ecological restoration for future sustainability in a changing environment. Ecoscience 15: 53–64.

Dijkstra C. & Zijlstra M. 1997. Reproduction of the Marsh Harrier *Circus aeruginosus* in recent land reclamations in The Netherlands. Ardea 85: 37–50.

Drent R., Bakker J.P., Piersma T., Prins H.H.T., Tinbergen J.M. & Zwarts L. (eds) 2005. Seeking nature's limits: Ecologists in the field. KNNV Publishing, Zeist.

Dyrcz A. 2010. Polish wetlands and marshland birds: looking for undisturbed references. Ardea 98: 301–308.

Goosen H. & Vellinga P. 2004. Experiences with restoration of inland freshwater wetlands in the Netherlands: lessons for science and policy-making. Reg. Environ. Change 4: 79–85.

Graveland J. 1998. Reed die-back, water level management and the decline of the Great Reed Warbler *Acrocephalus arundinaceus* in The Netherlands. Ardea 86: 187–201.

Hosper H. 1997. Clearing lakes: an ecosystem approach to the restoration and management of shallow lakes in the Netherlands. PhD thesis, Wageningen University, Wageningen.

Hunt J.C.R. 2002. Floods in a changing climate: a review. Phil. Trans. R. Soc. Lond. A 360: 1531–1543.

Isenmann P. 2004. In Memoriam: Heinz Hafner 1940–2003. Alauda 72: 66.

Klaassen O. 2009. Slaapplaatstellingen van Grote Zilverreigers. SOVON-Nieuws 22(2): 10–11.

Koffijberg K., Beekman J., Cottaar F., Ebbinge B., van der Jeugd H., Nienhuis J., Tanger D., Voslamber B. & van Winden E. 2010. Doortrekkende en overwinterende ganzen in Nederland. Levende Natuur 111: 3–9.

Middleton B. 1999. Wetland restoration, flood pulsing, and disturbance dynamics. John Wiley and Sons, Inc., New York.

Nager R.G., Hafner H., Johnson A.R. & Cézilly F. 2010. Environmental impacts on wetland birds: long-term monitoring programmes in the Camargue, France. Ardea 98: 309–318.

Nienhuis P.H., Bakker J.P., Grootjans A.P., Gulati R.D. & de Jonge V.N. 2002. The state of the art of aquatic and semiaquatic ecological restoration projects in the Netherlands. Hydrobiologia 478: 219–233.

Nienhuis P.H. & Gulati R.D. (eds) 2002. Ecological restoration of aquatic and semi-aquatic ecosystems in the Netherlands (NW Europe). Hydrobiologia 478: 1–233.

Pinter N., van der Ploeg R.R., Schweigert P. & Hoefer G. 2006. Flood magnification on the River Rhine. Hydrolog. Process. 20: 147–164.

Platteeuw M., Foppen R.P.B. & van Eerden M.R. 2010. The need for future wetland bird studies: scales of habitat use as input for ecological restoration and spatial water management. Ardea 98: 403–416.

Richardson C.J. & Hussain N.A. 2006. Restoring the Garden of Eden: An ecological assessment of the marshes of Iraq. BioScience 56: 477–489.

Scholte P. 2006. Waterbird recovery in Waza-Logone (Cameroon), resulting from increased rainfall, floodplain rehabilitation and colony protection. Ardea 94: 109–125.

Sutherland W.J., Pullin A.S., Dolman P.M. & Knight T.M. 2004. The need for evidence-based conservation. Trends Ecol. Evol. 19: 305–308.

Tinbergen J.M. 2009. Rudolf Herman Drent (1937–2008). Ardea 97: 1–6.

Tockner K., Robinson C.T. & Uehlinger U. (eds) 2009. Rivers in Europe. Academic Press, London.

Tol R.S.J. & Langen A. 2000. A concise history of Dutch riverfloods. Climate Change 46: 357–369.

Tu M., Hall M.J., de Laat P.J.M. & de Wit M.J.H. 2005. Extreme floods in the Meuse river over the past century aggravated by land-use management? Physics and Chemistry of the Earth, Parts A/B/C 30: 267–276.

van de Ven G.P. (ed.) 1994. Man-made lowlands. History of water management and land reclamation in the Netherlands. Uitgeverij Matrijs, Utrecht.

van der Winden J., Beintema A.J. & Heemskerk L. 2004. Habitat-related Black Tern *Chlidonias niger* breeding success in The Netherlands. Ardea 92: 53–61.

van der Windt H.J. & Swart J.A.A. 2008. Ecological corridors, connecting science and politics: the case of the Green River in the Netherlands. J. Appl. Ecol. 45: 124–132.

van Eerden M.R., Drent R.H., Stahl J. & Bakker J.P. 2005. Connecting seas: western Palaearctic continental flyway for waterbirds in the perspective of changing land use and climate. Global Change Biol. 11: 894–908.

van Eerden M.R., Lenselink G. & Zijlstra M. 2010. Long-term changes in wetland area and composition in The Netherlands affecting carrying capacity for wintering waterbirds. Ardea 98: 265–282.

van Heezik A. 2008. Battle over the rivers: two hundred years of river policy in the Netherlands. Ministry of Transport, Public Works, and Water Management, Haarlem/The Hague.

van Rijn S., Zijlstra M. & Bijlsma R.G. 2010. Wintering White-tailed Eagles *Haliaeetus albicilla* in The Netherlands: aspects of habitat scale and quality. Ardea 98: 373–382.

van Roomen M. *et al.* 2007. Watervogels in Nederland in 2005/2006. SOVON-monitoringrapport 2007/03. SOVON Vogelonderzoek Nederland, Beek-Ubbergen.

van Turnhout C.A.M., Hagemeijer E.J.M. & Foppen R.P.B. 2010. Long-term population developments in typical marshland birds in The Netherlands. Ardea 98: 283–299.

Voslamber B., Platteeuw M. & van Eerden M.R. 2010. Individual differences in feeding habits in a newly established Great Egret *Casmerodius albus* population: key factors for recolonisation. Ardea 98: 355–363.

Zwarts L., Bijlsma R.G., van der Kamp J. & Wymenga E. 2009. Living on the edge: Wetlands and birds in a changing Sahel. KNNV Publishing, Zeist.