

Sentinel Birds

The sound and science of Bird migration

Theunis Piersma, with Sytze Pruiksmā

At a moment like this, I have to think about the words of the writer Belcampo, who worked here in Groningen as a student doctor. '*Je wordt geboren, je leeft een tijdje, je begrijpt er geen bliksem van, en je gaat dood*'. 'One is born, one lives a little while, one can't make sense of it, and then one dies'. The birds in my two hands possess greater knowledge and insight than all of us here united in this church.

This is a bar-tailed godwit, *een rosse grutto*. It is a wader, *een steltloper*, a *stilt walker*. Why we call it a *stilt walker* is shown by its long legs. These godwits breed on the endless tundra of central Siberia, 5000 kilometres northeast from here. They breed in areas without any human beings. And this a black-tailed godwit, *een grutto*. It is long-legged too, but its breeds here, with us. It is now the national bird of The Netherlands, and it is, in some ways, a creation of the Dutch dairy farmers. Black-tailed godwits are as much a cultural legacy of our country as are the canals of our old cities and the Rembrandts in the Rijksmuseum. *Grutto's* are also the birds of my childhood. In early spring they showed up around my village as if by magic. With their aerial songs they announced a new spring, a new summer. However beautiful and mysterious, black-tailed godwits were also very common in most of The Netherlands¹. For this reason, most people took them for granted, but I remember being impressed with them.

As a teenage boy I dreamed of studying their biology for a living. I wonder, do you recognise this? Of course you remember your intense curiosity as a child. In any case, I was most of all concerned that I had the talents of a zookeeper, not the talents of a scientist. I did start my biology study here in Groningen. I had the good fortune to meet like-minded people. I also wanted to travel and wondered how this could be combined with my studies. In 1980, I was 21 and still a biology bachelor, together with three fellow students I organized an exotic expedition to Mauritania, here in West Africa. We spent two months there and were the first to count the birds of the beautiful little sister of our Wadden Sea, the Banc d'Arguin². It changed my life.

We counted half a million bar-tailed godwits on the Banc d'Arguin, but we did not know where all these birds came from. So we ringed them, and eventually put little satellite transmitters on them. This is such a tiny transmitter. It weighs five grams, and it is powered by a small solar panel to "talk" with the satellites. We found out that the bar-tailed godwits, the *rosse grutto's*, fly from Mauritania to the Dutch Wadden Sea. On average they arrive on what was the Queen's Birthday, the 30th of April. They do this migration in one nonstop flight of 5000 kilometres. They fly continuously for three days and four nights.

Then, in the Wadden Sea, they feed as long and as fast as they can. They feed on worms, mostly lugworms, the kind of worms that fishermen love for angling. Feeding day and night, in five weeks they double their weight before leaving the Wadden Sea again³. This fast weight gain is not trivial. In my case it would mean that I have five weeks to morph into a Sumo wrestler of 180 kilograms. Our satellite-tracked godwits showed that, packed with this fat, they leave on the 1st of June for another direct flight to the tundra's of central Siberia. For the second time, they fly 5000 kilometers nonstop.

As a research group, we assembled the data on godwit migration from everywhere along the flyway, from Mauritania to the Siberian tundra. We have been pondering these data now and realized three things. First of all, we saw that over the last 20 years there has been no change in the time that godwits arrived in The Netherlands: they still arrive on the celebration day of our Queen mother, the 30th of April. Secondly, the data collected by our Russian colleagues showed that godwits now arrive on the tundra two weeks earlier than 20 years ago. Given that they don't stop during the flight, they now leave two weeks earlier from the Wadden Sea too. This means that the godwits no longer have five weeks to shape into Sumo wrestlers, but only three. This leads to the third observation, which is that over the years the survival of the godwits declined. Only in years with lots of food in the Wadden Sea, the godwits were able to gain weight fast enough to leave early and in good condition. In most years, the three weeks of today are not enough⁴. But why do bar-tailed godwits leave, even when they risk dying on their way to the tundra?

Well, the godwits have to! When we analysed changes in snow melt across the whole Arctic, and we can do this with satellite images, we saw that around the North Pole, every year the snow melts one day earlier⁵! Over 20 years, this pushed the insects, the food for the chicks, two weeks forward. Godwits risk their lives to ensure that their children can grow up. This brings home the fact that the dire forecasts of climate modellers were correct. The behaviour of the godwits shows us that, indeed, climate warming is fastest in Siberia. It is happening before our very eyes. And the bar-tailed godwits tell the story.

Putting all this evidence together gave us something that comes close to a physical experience. Good grief! The climate of the Earth is changing fast! This story of the godwits, at least for me, led to greater engagement. Many of you will probably recognize such feelings of engagement, yes sometimes activism, that come with new insight. Scientific knowledge breeds engagement. In my case, stories like the one of the bar-tailed godwits make me worry about our planet. This was the hottest summer ever measured. You can't open a newspaper, you can't watch television, you can't speak to your neighbours, without having this dry summer discussed. Forest fires in Sweden, Germany, Greece, Portugal, Canada, California. The smallest extent of the North Polar Ice sheet. A new break in the Antarctic Ice Cap. Since the peak of the last Ice Age, now 20,000 years ago, the world has never been so hot.

Wow, this is big! So, let's try to make the problem smaller. Let's get back to the bird of my youth, *de grutto*, the black-tailed godwit. As we will see in a minute, they may know the way forward. Right now, our *grutto's* are in deep trouble. They are in trouble because our meadows are very green, but no longer have flowers with insects. Young godwits have nothing to eat and simply don't grow up⁶. This situation has come about because the Dutch dairy industry is competing on the world market. We compete with countries where real estate and labour are much cheaper than here. To maintain a position in this economic rat race, to maximise the yield of milk for the lowest price, we force our farmers to maximise the yield of grass. This past summer, dairy farmers have suffered. Their grass did not grow. So what have our *grutto's* tried to tell us about this dry summer?

As a research team, we were surprised how well the godwits knew what they were doing. In southwest Friesland, *grutto's* selected the very parts of farmland which later in summer showed the least effects of drought! The areas they chose, long before it was becoming so dry, were the areas that remained greenest, even in August⁷. These godwits, we believe, show us areas with intact, 'working', soils. Such soils still act like sponges and, even when the land dries up, the groundwater can still reach the plants. Now that our summers are getting dryer, hotter and

longer, we desperately need these kinds of soils⁸. Soils where the farmers don't capitalise on the early growth of grass, but where farmers give nature the time and take the benefit of later growth.

So, *grutto's* may show us the way, just as *rosse grutto's* pulled our attention to the rapid heating of the northernmost land on Earth. But other birds have their stories too. The elegantly flying Montagu's harriers or *grauwe kiekendieven*, for example. The harriers whom the farmers of the Sahel call '*the birds that dance like our women*'. Montagu's harriers are intensely studied and protected here in Groningen⁹. They very precisely indicate the places where arable farming, *akkerbouw*, allows some supporting biodiversity. And what is true for Groningen, is true for the Sahel. Tracked by satellite, the Montagu's harriers, the *kiekendieven*, travel to areas in West Africa where livestock systems are still intact, where a diversity of grasshoppers reflects ecological common sense¹⁰. In similar ways, our *grutto's* signal the same for the wet parts of West Africa. These godwits, also tracked by satellite¹¹, go to the low intensity rice farmers and the rare waterbodies that sustain agriculture¹². Godwits indicate West Africa's rarest resource.

Africa's rarest resources, just like ours, are now under threat from the exploitative fashion of today: capital- and energy-intensive agriculture. Should we not listen to the birds? Not only listen to their singing, but scientifically listen to their stories as well? Let me finish as an inspired citizen rather than as a concerned university professor. Let me ask a rhetorical question. As a university community, should we, should you, not unite in greater engagement with our fellow beings, and consider their stories regardless of whether you are biologists, economists, chemists, lawyers, medical scientists, planners, philosophers or historians? After all, the birds show us how everything is connected. The bar-tailed godwits alerted us that the predictions about rapid climate change are true, the black-tailed godwits express a deep concern about our soils. They may even hint at solutions.

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Sytze Pruikma (www.sytzepruikma.com) is an independent sound artist and composer of '*Conference of the Birds*', the July 2018 outdoor spectacle on the occasion of Leeuwarden as Cultural Capital of Europe 2018 (www.conferenceofthebirds.nl). Theunis Piersma occupies the Chair in Global Flyway Ecology at this university (with support from WWF-Netherlands and Vogelbescherming-Nederland), a task shared with being a senior scientist at the NIOZ Royal Netherlands Institute for Sea Research (www.teampiersma.org). Piersma just published a book with RUG graduate Thomas Oudman. Called '*De Ontsnapping van de Natuur*' (Athenaeum, Amsterdam, 2018), the book celebrates the unknown and presents their new view on the nature of science. Over the past seven years, the work of 'Team Piersma' at RUG and NIOZ was supported by the Netherlands Organisation for Scientific Research NWO (TOP-project 'Shorebirds in space' and the Spinoza Premium 2014), by Waddenfonds (project 'Metawad') and by the Province of Fryslân (demography of black-tailed godwits), with new partial funding now coming from Gieskes Strijbis Fund.

Sytze and Theunis are among the cofounders of the Frisian citizen initiative *Kening fan 'e Greide* (www.kingofthemeadows.eu). Over the last 10 years, this group of concerned artists, farmers, scientists, entrepreneurs, interested laypersons and conservationists has united in strength to tell about the plight of our birds, our countryside and, indeed, our planet. Following up from the 2017 Oerol hit TRACKS, this afternoon Sytze and Theunis shared their latest news in '*Sentinel Birds*'.

Notes:

¹Kentie, R., Senner N.R., Hooijmeijer J.C.E.W., Márquez-Ferrando R., Figuerola J., Masero J.A., Verhoeven M.A. & Piersma T. (2016) Estimating the size of the Dutch breeding population of Continental Black-tailed Godwits from 2007–2015 using resighting data from spring staging sites. *Ardea* **114**, 213–225.

²Altenburg, W., Engelmoer, M., Mes, R. & Piersma, T. (1982). *Wintering waders on the Banc d'Arguin, Mauritania. Report of the Netherlands Ornithological Mauritanian Expedition 1980*. Leiden: Stichting Veth tot steun aan Waddenonderzoek. Available at www.teampiersma.org/home/publications/.

³Piersma, T. & Jukema, J. (1990). Budgeting the flight of a long-distance migrant: changes in nutrient reserve levels of Bar-tailed Godwits at successive spring staging sites. *Ardea* **78**, 315-337.

⁴Rakhimberdiev, E., Duijns, S., Karagicheva, J., Camphuysen, C.J., VRS Castricum, Dekinga, A., Dekker, R., Gavrilov, A., ten Horn, J., Jukema, J., Saveliev, A., Soloviev, M., Tibbitts, T.L., van Gils, J.A. & Piersma, T. (2018) Fuelling conditions at staging sites can mitigate Arctic warming effects in a migratory bird. *Nature Communications*, final revision requested.

⁵Rakhimberdiev, E. & Piersma, T. (unpublished data).

⁶Kentie, R., Hooijmeijer, J.C.E.W., Trimbos, K.B., Groen, N.M. & Piersma T. (2013). Intensified agricultural use of grasslands reduces growth and survival of precocial shorebird chicks. *Journal of Applied Ecology* **50**, 243-251.

⁷This is based on recent analyses by Dr Ruth A. Howison. See our blog at <https://teampiersma.org/2018/09/02/black-tailed-godwits-signal-drought-resistant-meadows-in-the-hot-summer-of-2018/>.

⁸Kentie, R., Coulson, T., Hooijmeijer, J.C.E.W., Howison, R.A., Loonstra, A.H.J., Verhoeven, M.A., Both, C. & Piersma, T. (2018) Warming springs and habitat alteration interact to impact timing of breeding and population dynamics in a migratory bird. *Global Change Biology*, [doi:10.1111/gcb.14406](https://doi.org/10.1111/gcb.14406)

⁹Schlaich, A.E., Klaassen, R.H.G., Bouten, W., Both, C. & Koks, B.J. (2016) Testing a novel agri-environment scheme based on the ecology of the target species, Montagu's Harrier *Circus pygargus*. *Ibis* **157**, 713-721.

¹⁰Schlaich, A.E., Klaassen, R.H.G., Bouten, W., Bretagnolle, V., Koks, B.J., Villers, A. & Both, C. (2016) How individual Montagu's Harriers cope with Moreau's Paradox during the Sahelian winter. *Journal of Animal Ecology* **85**, 1491-1501.

¹¹The satellite-tagged individual black-tailed godwits can be followed at <http://volg.keningfanegreide.nl/king-of-the-meadows-transmittersite/>.

¹²Howison, R.A., Hooijmeijer, J.C.E.W. & Piersma, T. (unpublished data).