AI-generated images and their impact on birding

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All but one of the images in this article have been generated by, manipulated by or edited using AI.

Whether we like it or not, AI is everywhere these days – from (mis)predicting what you were trying to type in a text on your smart phone to assisting doctors with detecting cancerous masses on scans. It has even made its way into birding. One rather subtle use is enhancing photographs – several pieces of software now use AI to remove noise and enhance the sharpness of images. Perhaps, though, the most widespread and well-known use of AI in birding is in software, such as Cornell University's *Merlin* app, which allows users to identify birds from images or sound recordings. The pros and cons of such apps have been discussed widely online and this topic is perhaps worthy of its own *BB* eye in the future; however, in this *BB* eye, I've focused instead on the ever-improving capabilities of AI to generate or heavily manipulate images and what that means for birding.

A little while ago, a photo was doing the rounds on social media of a 'baby Peacock' *Pavo cristatus* – tiny, in the palm of someone's hand, with a full set of glossy, blue feathers and big, endearing eyes. For anyone who knows anything about birds, the photograph is clearly a fake – but for those who don't, it was captivating and attracted thousands of comments stating how beautiful the bird was. The issue is, AI-generated images are getting harder and harder to spot, with almost daily improvements in what AI software can generate and how easy it is for members of the public to generate their own images. While an atypically well-feathered and oddly proportioned 'baby Peacock' might set alarm bells ringing, many images produced these days are a lot more subtle. Indeed, it might come as a surprise to many readers just how realistic some AI-generated images can be.

Conjuring species out of thin air

The latest version of Adobe Photoshop allows for the use of a reference photograph that the AI will use when generating the AI image to increases the realism – textures, colours etc – of the image generated. Using a reference photograph of a Common Sandpiper *Actitis hypoleucos*, I instructed Photoshop to create an image of 'a wading bird with a crest, rendered in a realistic style'. The result (plate 267) is, if you can overlook the fact that it doesn't match any real species, alarmingly realistic. The feathers are all more or less in the right place and the pattern and coloration of the plumage is close to many species in real life. I suspect that many of us wouldn't bat an eyelid if we were flicking through a guide to a part of the world we'd never been to and we saw this bird depicted amongst the *Tringa* sandpipers; and, although it's unlikely that one of these AI-generated 'species' would ever be accepted as real from a single photograph, the images certainly have the potential to set birders scratching their heads as they try and work out exactly what the bird portrayed is.

267. An AI-generated image of a wader, based on a reference image of a Common Sandpiper *Actitis hypoleucos* and with the prompt to create an image of 'a wading bird with a crest, rendered in a realistic style'.

Even without a reference image, Photoshop's AI can generate something extremely lifelike. To create plate 268, I asked Photoshop to generate an image of 'a flock of finches feeding on sunflowers on a rainy day'. Keep in mind that not only are the birds being generated from scratch here, but the entire image is. Again, although the birds don't match any particular species, their overall shape and set of plumage characteristics (white wing-bars and a convincing plumage of browns, greys and pinks) are a good approximation of a finch. On closer inspection, the bird behind the individual that's second from the left is nothing more than an ill-formed mush, the bird on the left must be pretty uncomfortable with its left leg at such an angle, and the position of the sunflower heads in relation to the stems doesn't really work – but, overall, Photoshop has generated an image that could pass for a real photograph if you weren't looking at it with a critical eye.

268. AI-generated image of 'a flock of finches feeding on sunflowers on a rainy day'. Although the finches don't match any particular species, the AI has correctly shown them on sunflower heads that have gone to seed.

Faking it

The examples so far are perhaps quite extreme, but AI tools can be used for 'softer' manipulation of images, too. Starting with an image of a Red-footed Booby *Sula sula* that I had photographed at sea off eastern Australia, I used Photoshop's 'generative expand' tool to place the bird in front of the 'White Cliffs of Dover' (plate 269a) and 'Blackpool skyline' (plate 269b). Such manipulated images have, of course, been possible since the creation of editing software (and even before that, with a sharp scalpel and a steady hand) but, with AI editing, adding in such a fake background takes around 15 seconds – even if the rendition of the bird flying past Blackpool is unlikely to convince any records committee.

269. Red-footed Booby *Sula sula*. The image of the bird was taken at sea off Australia in February 2024 (*Stephen Menzie*); the backgrounds were generated by AI in Adobe Photoshop using the prompts **a)** 'White Cliffs of Dover' and **b)** 'Blackpool skyline'.

Making more specific manipulations in Photoshop is – for the time being, at

least – more difficult, though, and AI still struggled with recreating exact species or locations. The image generated when Photoshop was asked to render an image of 'a Sharp-tailed Sandpiper [*Calidris acuminata*] on the fresh marsh at Titchwell being watched by birdwatchers' was unconvincing for multiple reasons (plate 270).

270. AI-generated image, with the prompt 'a Sharp-tailed Sandpiper on the fresh marsh at Titchwell being watched by birdwatchers'. Although the image is extremely realistic, it depicts neither a Sharp-tailed Sandpiper *Calidris acuminata* (or a real species, for that matter) nor Titchwell.

Subtle but significant changes

While it's apparent that AI-generated images don't (yet) have the sophistication to create convincing images of rarities at famous locations, they *do* have the ability to alter things just enough that they're no longer

accurate but not so much that we immediately notice.

One particularly useful tool in Photoshop is 'generative fill' – great if you have a branch that needs getting rid of or some unsightly bits of muck on the bird's perch. Again, this sort of manipulation isn't new – with a lot of patience, the same could be done using the clone tool – but removing an entire object from an image now takes just a few seconds. This becomes something of a moral grey area. In plate 271, I used AI editing tools to remove two small but distracting branches – and I suspect that nearly everyone would agree that this is perfectly fine. In plate 275, I asked Photoshop to remove the rock so that we could see the lower half of the depicted Black Redstart *Phoenicurus ochruros*. The AI software has done a remarkably convincing job – certainly, the rock itself is perfect and the bird looks, to the untrained eye, very good... until you notice that they're not the undertail-coverts of a Black Redstart. And herein lies the problem. Imagine you're browsing online photographs assessing the degree of red on the undertail-coverts of Black Redstarts. You find this image and, wow, what a striking bird – how common is it for a Black Redstart to show a total lack of red on the undertail? Is this just a single aberrant individual, or is this a localised population? Perhaps even an undescribed subspecies? Many photographers keep these bits of 'tidying up' of their photograph quiet (myself included, when it's just a branch or a couple of leaves) – but it makes it increasingly difficult to know if the entirety of the photograph is true to life.

271. Velvet-purple Coronet *Boissonneaua jardini*, Ecuador, December 2023. Circles indicate where AI software has been used to remove small branches.

Stephen Menzie

272. Male Black Redstart *Phoenicurus ochruros*, Azerbaijan, November 2023. **a)** The original image; **b)** an AI-edited copy of the image, where Photoshop was asked to remove the rock to show the lower half of the bird. The chick to the left of the redstart is an unexpected addition to the image from the AI software.

There is, of course, one major clue that plate 272 has been manipulated – for reasons unknown, the AI has inserted a rather realistic but entirely out of place chick to the left of the Black Redstart! Odd results like this pop up not infrequently and, while it would take just a few seconds to remove the chick in this case, it was left in here to illustrate the unexpected behaviour that occasionally occurs... and for amusement value.

Similarly, AI tools now allow for photographs where the bird was slightly out of frame to be 'fixed'. Photoshop gives three options to choose from every time AI is used to generate an image or part of an image, and plates 273a–c show the three variations presented by the software when I asked it to expand an image of a European Honey-buzzard *Pernis apivorus* that I'd

deliberately cropped such that the bird's right wing-tip had been clipped off. At first glance and in isolation, all could pass as being real, and it really is remarkable how close the AI can get to a real bird's wing. The differences from the 'real' wing of a European Honey-buzzard become immediately obvious when you compare the bird's AI-generated right wing to its (unaltered) left wing. The bird in plate 273a is arguably the most realistic, although the primaries are held in a slightly odd, swept-forward pose. In 273b, the AI has made the barring on the underside of the primaries much stronger than in real life. Most concerningly for anyone interested in the finer details of feather-level identification, the AI has given the bird an extra 'finger' in 273c, leading it having a broader 'hand', reminiscent of Crested Honey-buzzard *P. ptilorhynchus*.

273a–c. European Honey-buzzard *Pernis apivorus*, Falsterbo, Sweden. The areas left of the dotted red line were generated by AI in Adobe Photoshop. In 273c, the software has given the bird an extra primary, and thus a broader 'hand', similar to Crested Honey-buzzard *P. ptilorhynchus*.

Stephen Menzie

The future

As with just about every AI tool available to us, the future direction of AI-generated images in birding very much depends on how the technology is used. The quality and accuracy of AI-generated and AI-manipulated images has increased exponentially over just the past year or two, and this rate of improvement shows no rate of slowing. Indeed, although all the images in

this article have relied only on AI, a combination of AI and traditional photo-editing techniques can soon produce even more realistic photographs – it wouldn't, for example, take too much work to place an AI-generated bird into a real-life location. Very soon, it will be impossible to tell a fake image from a real photograph on quality and style alone. My prediction is that it will take a little longer before images of specific species of birds in real locations can be generated with ease without having pre-existing reference material at hand – but we will, for sure, get there sooner rather than later.

If this technology is used for bad intent (faking sightings, creating images of fanciful species to mislead members of the public, etc.), we will face a real problem. How will we know which images to believe? How will people know what is a real bird and what has been generated by AI? Will humanity start to lose an appreciation for real nature knowing that we can simply replace and (re)generate what we've lost with a descriptive sentence or two (plate 274)? Indeed, it's often common to see AI-generated or manipulated images online gathering more likes and comments than photographs of real birds, which often look less striking, less 'cute' and generally more boring in comparison. On the flip side of this, I have seen comments on photographs of some of the world's gaudier birds – such as the Rufous-crested Coquette *Lophornis delattrei* – accusing the photographer of using AI to generate the image! Certainly, the boundaries between what we can and can't believe are already becoming blurred.

AI generated

274. 'A black oystercatcher on a lava beach in front of a volcano' – Canary Islands

Oystercatcher *Haematopus meadewaldoi* back from the dead thanks to generative AI? The entire image was generated using AI in Adobe Photoshop.

Most people will, I suspect, agree that the creation of images from scratch using AI has the potential to be misleading but that smaller edits to real photographs are more of a grey area. For many photographers, an aesthetically pleasing photograph trumps worrying about minor technical details that a small edit might affect; few photographers and even fewer of those viewing the photographs are going to be concerned about the exact spacing of the primaries on a bird if a small branch crossing the bird's wing-tips has been edited out. For those using the images for research purposes, though, these details might prove to be critical.

A good starting point, I think, is for photographers to openly declare their edits. Have the wing-tips been generated by AI? Was a leaf removed from in front of the tail? At least that way the remarkable power of AI editing tools can continue to help create extraordinary images without us losing faith in which photographs we can take as representing real life. Regardless, we're likely to see some pretty wild things over the coming years – some of which may be obviously fake (plate 275), others of which might be harder to detect (plate 276).

AI generated

275. From the sublime to the ridiculous: an AI-generated image of 'a Chaffinch [*Fringilla coelebs*] driving a red sports car'. This image was generated entirely by Photoshop's

generative AI in around 20 seconds.

276. A 'note to *BB'* – Golden Eagle *Aquila chrysaetos* eating popcorn? No, just another AI-generated image...

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