Fantastic lost birds and how you can help find them: an updated gap analysis for the Neotropical avifauna

John C. Mittermeier, Cameron L. Rutt, Roger Safford, Barney Long, Cullen Hanks and Daniel J. Lebbin

Despite increasing numbers of birders in the Neotropics, some species continue to evade detection – and remain 'lost'. A new partnership seeks redress, and this article represents a call to action: readers, go forth and refind our region's missing birds!

On the afternoon of 11 May 2021, David Ascanio found himself in a patch of mid-montane forest in the mountains of northern Venezuela, not far from the town of Caripe. He was searching for Urich's Tyrannulet *Phyllomyias urichi*, an Endangered bird that had only been seen once since the 1940s. Ascanio had been thinking about Urich's Tyrannulet for years, so it was no coincidence that he was here. In fact, he and a colleague, Mark Sokol, were responsible for the lone modern observation back in 2005. But rather than celebrating that rediscovery, Ascanio had been left feeling disappointed that he had not been able to secure better documentation of the tyrannulet that day. The digital camera he owned then was not particularly good and the images of the tyrannulet – a blurry view from below – were sufficiently unclear that people had questioned the identification. The fact that no one had seen the species since only seemed to compound this frustration.

1 Bachman's Warbler *Vermivora bachmani*, near Charleston, South Carolina, USA, 1958 (Jerry A. Payne/ USDA Agricultural Research Service: bugwood.org, held on forestryimages.org; reproduced under a Creative Commons Attribution 3.0 License, CC BY 3.0: creativecommons.org/licenses/by/3.0/us/). This species reached the Neotropical region as a wintering bird in Cuba. However, with more than 60 years passing since the last media documentation, Bachman's Warbler qualifies as a lost species in the Critically Endangered (Possibly Extinct) category on our list.

While searching for Urich's Tyrannulet had been a multi-year aspiration for Ascanio, the circumstances surrounding that May afternoon were uniquely contemporary. He had found this particular patch of forest, Yucucual–Mata de Mango, by way of a post on Instagram – a platform that only came into existence five years after his 2005 sighting. And the new digital camera he carried ensured that any photos would be much better this time around, if he was so lucky. Furthermore, his visit was being supported through funding from the American Bird Conservancy, which alongside Re:wild and BirdLife International, had identified the tyrannulet as 'lost' using data from eBird, a platform that in 2005 had few enough observations of South American birds that it would have been of little use in distinguishing species that were genuinely lost.

Around 16h30, two small flycatchers flew down to investigate Ascanio's pygmy-owl calls. Ascanio recognised them at once: "Urich's Tyrannulet!" A few minutes and many dozens of digital images later, Urich's Tyrannulet had been officially documented for the first time in 16 years and clearly photographed in the wild for the first time ever. "I was so excited, I was literally jumping up and down," Ascanio recalls.

There's something about lost birds that captures the imagination. These species often feel like the ornithological equivalent of hidden treasure, and their brief accounts in field guides – often filled with more questions than facts – seem to beckon the reader to remote mountain ranges or rarely visited swaths of forest. As Balchin (2007) noted in this magazine "the rediscovery of a lost species is arguably more important than the discovery of a new species, though finding either is the dream of many birders and ornithologists."

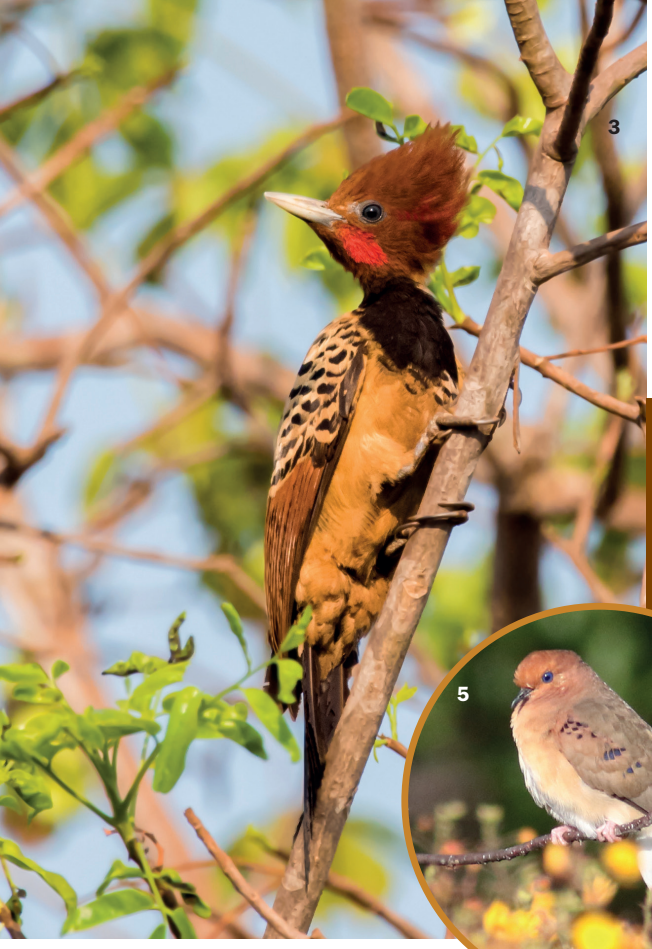
With Balchin's article about birds 'back from the dead', plus one in the preceding issue (*Neotropical Birding* 1), offering a 'gap analysis' of 'lost and found' Neotropical birds (Tobias *et al.* 2006), the subject of lost birds will be familiar to readers of *Neotropical Birding*. In addition to capturing the excitement around lost species, the authors of both articles took care to emphasise the conservation and research value of searching for these birds. Lost species are, by definition, among the most poorly known species on earth, and efforts to rediscover them, whether successful or not, can generate valuable insights for conservation and science.

Fifteen years later, the points made in these articles still ring true. As Ascanio's rediscovery of Urich's Tyrannulet illustrates, however, many of the tools and resources available to search for lost birds have changed dramatically. Social media facilitates rapid sharing of information amongst birders, digital photography and sound recording have improved in quality and diminished in cost, and Google Earth and other online sources provide satellite imagery of habitat patches waiting to be explored. There has also been an explosion of information available to birders through platforms such as Xeno-canto, WikiAves and eBird. This new ecosystem of information and technological tools offers an opportunity to reevaluate how we define and assess lost species and opens up novel pathways for birders to contribute data.

These opportunities helped inspire us to develop a 'Search for Lost Birds' partnership between American Bird Conservancy, BirdLife International and Re:wild (as part of their broader 'Lost Species' program), with data support from the Cornell Lab of Ornithology. The aim of this partnership is to present a clear list of target lost birds, encourage collaborative searches, provide updates and media support for expeditions and, where possible, advance these projects with funding contributions. With the resources now available to birders, there has never been a better time to search for these missing species. And with the rapid loss of species and habitats around the world, the need to find them and protect the places where they occur has never been more urgent.

In this article, we revisit the species highlighted by Tobias *et al.* (2006) to see how they have fared in the intervening years. We then introduce the potential to use online citizen science platforms like eBird to define which birds are lost and

2 Urich's Tyrannulet *Phyllomyias urichi*, near Caripe, Monagas, Venezuela, May 2021 (David Ascanio: @ @abtbirds). When David Ascanio located this Endangered species in May 2021, it provided the first documentation for 16 years.



In this magazine, a little over 15 years ago, Tobias *et al.* (2006) identified 20 species as lost. Of these, four have been rediscovered subsequently, including: **3** Kaempfer's Woodpecker *Celeus obrieni* (Vulnerable), Reserva Particular do Patrimônio Natural Canguçu, Tocantins, Brazil, September 2015 (Claudia Brasileiro: @claubrasileiro); **4** Tachira Antpitta *Grallaria chthonia* (Critically Endangered), Parque Nacional El Tamá, Táchira, Venezuela, June 2016 (Jhonathan Miranda; @jhonathanmiranda); and **5** Blue-eyed Ground Dove *Columbina cyanopis* (Critically Endangered), Parque Estadual de Botumirim, Minas Gerais, Brazil, June 2019 (Daniel Branch: danielbranchbirding.blogspot.com).

present a revised list of lost birds from the Neotropical region, derived from these methods. Finally, we consider what goals the birding community can aim for during the next decade and a half of lost birds.

Fifteen years of lost birds

Tobias *et al.* (2006) identified 20 species as lost. A little over 15 years later, 13 of these remain lost with no confirmed records since 2006, three are no longer considered species (having been reassessed as either hybrids or subspecies), and four have been found: Kaempfer's Woodpecker *Celeus obrieni* in 2006 (Prado 2006; now considered Vulnerable); Carrizal Seedeater *Amaurospiza carrizalensis* in 2009 (Miranda 2009; not recognised as a species by BirdLife International); Blue-eyed Ground Dove *Columbina cyanopis* in 2015 (Gaworecki 2016; Critically Endangered); and Tachira Antpitta *Grallaria chthonia* in 2016 (Gilman 2017; Critically Endangered).

At first glance, rediscovery for four of 20 lost species might seem like a poor success rate, but considered more closely, these changes represent considerable progress. Lost species are by definition exceedingly difficult, if not impossible, to find. Of the 13 species that remain lost, eight were already considered possibly extinct in 2006. Finding them was thus extremely unlikely from the outset. Similarly, lost 'species' that are later revealed to be hybrids may not be discoverable in the field, especially if that hybrid combination was rare or if the two parental species no longer come into contact.

Another way to assess progress for lost species is to evaluate our improvements in knowledge. Revisions to a species' taxonomic rank and clarifications to its IUCN Red List status both serve as a useful shorthand for improved knowledge. By this metric, nine of the previous 20 lost species have seen improvements in knowledge through a resolution of taxonomic status (three species), additional fieldwork clarifying their absence (two), or a rediscovery in the field (four). Again, in 2006, seven of the 11 species without an improvement were already considered possibly extinct – formally, 'Critically Endangered (Possibly Extinct)' – a category where we would anticipate a species to linger. That leaves only four species where we might have reasonably expected an improvement, but whose status has remained unchanged in the last 15 years: Semper's Warbler *Leucopeza semperi* (still Critically Endangered), Rio de Janeiro Antwren *Myrmotherula fluminensis*

(still a Critically Endangered species in some taxonomies though no longer a valid species in others), Cayenne Nightjar *Setopagis maculosa* and Coppery Thorntail *Discosura letitiae* (both still Data Deficient).

Finally, focusing only on the positive results misses the many important insights that can be gained from searches that do not find lost species. For instance, fieldwork to look for the Sinu Parakeet *Pyrhurra picta subandina* (Critically Endangered) in northwestern Colombia in 2021, led by Sociedad Ornitológica de Córdoba, Asociación Calidris and Parques Nacionales Naturales de Colombia, resulted in new departmental records of close to 30 species, as well as new distributional information for Blue-billed Curassow *Crax alberti* (Critically Endangered) and Colombia's first nesting record of Crested Eagle *Morphnus guianensis* (Near Threatened).

Before moving on, it is worth touching on another 'lost and found' category in Tobias *et al.* (2006): nine species that were previously considered lost but as of 2006 had recently been rediscovered. Like the 20 lost species, there has been a general trend of improved knowledge for these birds too. Six of the nine have changes in Red List status that reflect increased knowledge of their distribution and conservation, and four are now considered less threatened than they were 15 years ago. Only one, Kinglet Calyptura *Calyptura cristata* (Critically Endangered), has not been seen again. Clearly, there can be hopeful outcomes for birds that are rediscovered and, just because a species was once lost, it does not mean it should be considered doomed.

Crowdsourcing the lost birds list

David Ascanio's rediscovery of Urich's Tyrannulet illustrates some of the novel resources available to people looking for lost birds today, such as social media and digital photography. It also highlights the potential to use platforms such as eBird to identify priority species in the first place. These developments provide an opportunity to both clearly define what species should qualify as 'lost' and also to use a systematic and data-driven approach to identify which species fit the necessary criteria.

Tobias *et al.* (2006) observed that "drawing lines between birds included and not included in this article was rather difficult". Where the boundaries lie between lost versus seldom-seen can be hard to define. Urich's Tyrannulet, for example, was long considered conspecific with Greenish Tyrannulet *Phyllomyias virescens* and Reiser's Tyrannulet *P. reiseri*, and thus received less attention, essentially slipping through the cracks as a result of its prior taxonomic status.

Since 2017, Re:wild has led a Search for Lost Species programme and, in doing so, has developed a clear definition of what qualifies a species as 'lost': *a lost species is one that has no observations in ten or more years that have been confirmed by photographs, audio or genetic information.* The photographic and audio components of this definition are particularly useful for birds. Unlike some other taxonomic groups, the vast majority of birds on earth have recent media documentation, and much of this documentation is publicly available through online platforms. For birds, it is increasingly true that if a species does not have photographs or sound recordings online, it is likely to genuinely be a lost species.

To identify lost birds across the Neotropical region, we applied Re:wild's definition to records of birds in citizen science platforms, published literature, blogs and web pages. Because eBird is the largest archive of avian biodiversity records, with more than 1 billion records (Team eBird 2021), we used it as our starting point. We extracted observation data from eBird together with media holdings from Cornell's Macaulay Library and identified species that had no observations with media documentation in the past ten years (2012–21). We additionally considered birds elevated from subspecies to species level by BirdLife, but not recognised as such by eBird, by extracting data for the corresponding form or subspecies group in eBird. For all species lacking media documentation in eBird, we then searched for records in other platforms by checking Xeno-canto, WikiAves, iNaturalist and Google Scholar as well as a general Google search. Together, this combination of platforms captures citizen science observations (eBird, Xeno-canto, WikiAves, iNaturalist), published literature (Google Scholar), and blogs and news stories (Google). If these searches turned up verifiable photos, sound recordings or a record of genetic material for any bird, we removed it from our lost species list.

It's worth noting that using eBird as a starting point means that our approach relied on the accuracy of the eBird review system. For example, if a species that should qualify as lost had misidentified media from the past ten years, then it would be incorrectly left off the list. While there are undoubtedly misidentifications that persist in eBird, media for very poorly documented species (such as the only known photographs in a decade) are likely

to receive higher scrutiny from the community. Thus, we felt that this scenario was unlikely (though possible). eBird documentation for subspecies groups is often less complete than for species and so any errors of this type that did occur were more likely for species recognised only by BirdLife (i.e., rather than most or all taxonomic authorities). By highlighting the importance of records for rarely documented species, we hope to encourage eBird users to carefully check these observations.

Our method returned a total of 32 birds from the Caribbean, Central America and South America that met our criteria for being lost. Some of these will be familiar (15 are carry-overs from the 2006 article), while others might be a surprise. Either way, we hope they provide an exciting starting point to trigger discussion and searches. Perhaps you may even have a photo or sound recording of one of these species tucked away on a hard drive that is just waiting to be uploaded!

Lost birds of the Neotropics, version 2022

Arranging our 32 lost species by their Red List status provides insights into both why a species lacks recent observations, and what the urgency and probability is for its rediscovery. Using this approach, the birds on our list can be divided into four groupings: 'geographic gaps' (not globally threatened species), Critically Endangered, Possibly Extinct, and 'mysteries' (Data Deficient species). For each lost species in the list, we have included a brief description of its distribution, the date and online location of the most recent media documentation (found in our search), and, for species in the last three groups, the date of the most recent observation listed by BirdLife.

Geographic gaps

The first category consists of species that are either Least Concern or Near Threatened on the Red List (i.e., not globally threatened with extinction). These species are "lost" by virtue of living in regions that are inaccessible or seldom visited by birders (i.e., there is a 'geographical gap' impeding their recording). None of these species was included in Tobias *et al.* (2006), and it could be argued that it would be more appropriate to categorise these species as 'overlooked' or 'unsearched for' rather than truly 'lost'. Despite this, we believe they are worth highlighting. These are little-known species that present ripe opportunities for basic discoveries about their ecology and natural history. All are restricted to small geographic areas and isolated habitats; environments that in some cases could be at risk as climate change accelerates. Furthermore, if the right habitat can be accessed within the species' limited range, it should be possible to find them. It is, however, worth keeping in mind that many of these geographic gaps are there for good reason: permission and safety concerns may limit access, so any prospective searches need to carefully take these considerations into account.

Six species made our list in this category. At the time of writing, BirdLife's Data Zone did not list the most recent observation dates for any of these species.

- Scarlet-banded (Sira) Barbet *Capito (wallacei) fitzpatricki* (Peru; most recent media in Macaulay Library comes from 2008);
- Rufous-brown (Peruvian) Solitaire *Cichlopsis (leucogenys) peruviana* (Peru; no media records in our search);
- Vilcabamba Brushfinch *Atlapetes terborghi* (Peru; no media records in our search);
- Selva Cacique *Cacicus koepckeae* (Peru; most recent media in Macaulay Library 2004);
- Saffron-breasted Redstart *Myioborus cardonai* (Venezuela; no media records in our search);
- White-faced Redstart *Myioborus albifacies* (Venezuela; no media records in our search).

Critically Endangered

The second group is composed of Critically Endangered species. The combination of extremely high threat and no confirmed observations makes these species the most urgent priorities for searches. Their prospects for rediscovery vary. Reported observations of Zapata Rails *Cyanolimnas cerverai* in 2014 (Birdguides 2015), for example, suggest that this species should be a strong candidate for further sightings and documentation. In contrast, species such as the Ivory-billed Woodpecker *Campephilus principalis* and Cozumel Thrasher *Toxostoma guttatum* may soon warrant being reclassified as Critically Endangered (Possibly Extinct) or even Extinct.

Eleven Critically Endangered species made our list. Among these are five with taxonomic differences between BirdLife and eBird: Hook-billed (Cuban) Kite *Chondrohierax (uncinatus) wilsonii* and Guanacaste Hummingbird *Saucerottia alfaroana* are only considered species by BirdLife while Black-capped (Jamaican) Petrel *Pterodroma (hasitata) caribbaea*, Rio de Janeiro Antwren and Carrizal Seedeater are only considered species by eBird. We included the latter two birds in this group on the basis that both were

listed as Critically Endangered when they were previously considered valid species by BirdLife. The seedeater was sound recorded in 2009 (Miranda 2009), but has not been documented since, making it the only species from the 2006 list to have been rediscovered, then lost again.
The eleven species are:

- Purple-winged Ground Dove *Paraclaravis geoffroyi* (primarily Brazil; last specimen 1985 *per* Lees *et al.* 2021; last report in BirdLife Data Zone 2007);
- Santa Marta Sabrewing *Campylopterus phainopeplus* (Colombia; most recent media 2010 in Macaulay Library; last report 2010);
- Guanacaste Hummingbird *Saucerottia alfaroana* (Costa Rica; no media in our search; known only from the holotype collected in 1895);
- Zapata Rail *Cyanolimnas cerverai* (Cuba; no media in our search; last report 2014);
- Hook-billed (Cuban) Kite *Chondrohierax (uncinatus) wilsonii* (Cuba; last report 2010);
- Ivory-billed Woodpecker *Campephilus principalis* (United States and Cuba; most recent media 1968 in Macaulay Library; last report 1987);
- Rio de Janeiro Antwren *Myrmotherula fluminensis* (Brazil; no media in our search; not a species according to BirdLife);
- Kinglet Calyptura *Calyptura cristata* (Brazil; no media in our search; last report 1996);
- Cozumel Thrasher *Toxostoma guttatum* (Mexico; most recent media 1994 on Xeno-canto; last report 2004);
- Semper's Warbler *Leucopeza semperi* (Saint Lucia; no media in our search; last report 1961);
- Carrizal Seedeater *Amaurospiza carrizalensis* (Venezuela; most recent media 2009 in Macaulay Library and Xeno-canto; not a species according to BirdLife).

Critically Endangered (Possibly Extinct)

The third group also contains Critically Endangered species, but ones that have additionally been tagged as 'Possibly Extinct' by BirdLife (i.e., formally becoming 'Critically Endangered (Possibly Extinct)', following the Red List guidelines and building on the recommendations of two papers by Butchart *et al.* (2006, 2018). While descriptions such as 'likely extinct' or 'possibly extinct' were applied to species prior to 2006, Butchart *et al.* (2006) created a more objective definition and framework that takes into account factors such as recent survey efforts, potential threats, and the biological and ecological attributes of a species, and, in doing so, established the 'Critically Endangered (Possibly Extinct)' category on the Red List. Prior to Butchart *et al.* (2006), a number of birds worldwide had been rediscovered after being considered extinct or likely extinct (e.g., Cerulean Flycatcher *Eutrichomyias rowleyi* and Cebu Flowerpecker *Dicaeum quadricolor*), but only one, Madagascar Pochard *Aythya innotata*, has been found after being classified as Critically Endangered (Possibly Extinct).

Eleven species made our list as Possibly Extinct, including one, the newly split St. Kitts Bullfinch *Melopyrrha grandis*, which is not currently considered a species by BirdLife. The bullfinch may already be extinct, but we included it here based on the slim possibility that a population could still survive (Gerbracht 2021). Clearly, all these species are longshots for rediscovery and finding any of them would be truly spectacular.
The eleven species are:

- Jamaican Pauraque *Siphonorhis americana* (Jamaica; no media in our search; last report 1860);
- Turquoise-throated Puffleg *Eriocnemis godini* (Ecuador; no media in our search; last report 1850);
- Eskimo Curlew *Numenius borealis* (Canada to Argentina; last media 1962 from Google search; last report 1963);
- Guadalupe Storm-Petrel *Hydrobates macrodactylus* (Mexico; no media in our search; last report 1912);
- Black-capped (Jamaican) Petrel *Pterodroma* (*hasitata*) *caribbaea* (Jamaica; no media in our search; last report 1879);
- Pernambuco Pygmy-Owl *Glaucidium mooreorum* (Brazil; last media 1990 on Xeno-canto; last report 2001);
- Imperial Woodpecker *Campephilus imperialis* (Mexico; last media 1956 in Macaulay Library; last report 1956);
- Painted (Sinu) Parakeet *Pyrrhura (picta) subandina* (Colombia; no media in our search; last report 1949);
- Glaucous Macaw *Anodorhynchus glaucus* (Paraguay, Argentina and Brazil; no media in our search; last report 2001);
- Bachman's Warbler *Vermivora bachmanii* (United States and Cuba; last media 1959 in Macaulay Library; last report 1988);
- St. Kitts Bullfinch *Melopyrrha grandis* (Saint Kitts and Nevis; no media in our search; last report 1929).

Mysteries

The final group consists of four birds classified as Data Deficient. These species are mysteries, each known only from a small number of specimens with vague or incomplete accompanying information. In addition to fieldwork, resolving the status of these species will require museum or archival research to better understand their taxonomic status and geographic origins. As with past lost species that are Data Deficient, it is possible that they could be revealed to be hybrids or subspecies (indeed, White-tailed Tityra *Tityra leucura* is considered a species by BirdLife but not eBird). Until then, these lost birds remain some of the biggest puzzles in Neotropical birding.

- Cayenne Nightjar *Setopagis maculosa* (French Guiana; no media in our search; known from a single specimen from 1917);
- Coppery Thorntail *Discosura letitiae* (Bolivia; no media in our search; known only from specimens taken prior to 1852);
- White-tailed Tityra *Tityra leucura* (Brazil; no media in our search; known from a single specimen collected in 1829 and a sight record from 2006);
- Duida Grass-Finch *Emberizoides duidae* (Venezuela; no media in our search; last documented in the 1950s).

Aspirations for the future of lost birds in the Neotropics

Our updated list of lost Neotropical birds provides a ready-made tool for regional birders to begin addressing these 32 knowledge gaps by entering data – including negative data – into eBird, WikiAves, Xeno-canto and other platforms. Furthermore, by developing a data-driven approach to identify lost birds, the process of determining which species qualify as lost will be repeatable, allowing future investigators to regularly revisit and update our list. With the growing number of birders armed with powerful digital resources at their disposal, our hope is that the coming years will see even more progress towards resolving this list of knowledge gaps.

What targets should we set for the next decade and a half of searching for lost birds in the Neotropics? In the short term at least, it is likely that there will continue to be some lost species. New splits of poorly documented populations or subspecies, reassessments of past records and the passage of time for species that are currently close to the 10-year threshold will likely result in at least a few additional species qualifying as lost. And given how exceedingly difficult it is to prove an absence, some species will, and should, linger in the Possibly Extinct category, following the precautionary approach of the IUCN in listing species as Extinct.

While it may be too much to hope for a world without lost species, we can aspire to a substantially different distribution of birds across our four categories. With few exceptions (off-limit areas for political or security reasons, for example), it should be possible to find all species in the 'geographic gap' category. With the growing power of the birding community, it seems within reach that every living species with a known distribution should be documented at least once per decade. Likewise, there should be no Critically Endangered lost species. Additional field surveys are sorely needed for every species in this category; prioritising and conducting this work should either result in these species being found and appropriate conservation action taken, or being reclassified as Critically Endangered (Possibly Extinct). The four 'mysteries' present real challenges, but these should not be intractable, particularly with advances in genetic sampling of museum skins.

So what would we imagine for the next review of lost species? In an ideal world, all 'geographic gap', Critically Endangered and 'mystery' lost species will have received sufficient attention to have been rediscovered, clarified in taxonomic status, or reclassified on the Red List. This would leave the next iteration of lost birds as a reduced set of species in the Critically Endangered (Possibly Extinct) category, where, given the precautionary principle, some species may remain for quite some time until sufficient evidence mounts for them to be declared extinct (or just maybe rediscovered!).

More broadly, lost species are just the tip of the iceberg for our collective knowledge gaps about Neotropical birds. There is a wide array of other limits to our understanding: lost subspecies or populations (some of which could be candidates for future species status), undescribed nests and nesting locations for seabirds, undocumented vocalisations, and distributional gaps, to name just a few. The birding community has an incredible capacity to address these in ways that can benefit both science and conservation. Fifteen years from now, we can imagine the reduced list of lost species being supplemented with a refined set of knowledge targets to capture the imagination of the birding community (the last remaining species without documented nests? Or the last species with unknown vocalisations?). And of course, hopefully that future paper will include accounts

of multiple thrilling rediscoveries similar to David Ascanio's experience with Urich's Tyrannulet.

To learn more about the Search for Lost Birds partnership, visit relevant pages on the partner websites (rewild.org/lost-species and abcbirds.org/birds/lost-birds) plus iucnredlist.org and datazone.birdlife.org, or contact the authors. Finally, be on the lookout for a standalone website for the partnership, which will soon be available online.

ACKNOWLEDGEMENTS

Chris Balchin suggested the initial idea for this article and Stuart Butchart provided comments on the manuscript. Claudia Hermes, David Ascanio (@abtbirds), Fernando Angulo, Marshall Iliff and Glenn Seeholzer offered insights on particular species. Jasdev Imani provided critical help with access to the eBird database. We thank David Ascanio, Daniel Branch (danielbranchbirding.blogspot.com), Claudia Brasileiro (@claubrasileiro), Jhonathan Miranda (@jhonathanmiranda1) and Joe Tobias for the use of their photographs, and the Natural History Museum (Tring, UK) for allowing Joe to photograph the type specimen of Coppery Thorntail *Discosura letitiae*. The Bachman's Warbler photo (by Jerry A. Payne/USDA Agricultural Research Service; bugwood.org, held on forestryimages.org) is reproduced under a Creative Commons Attribution 3.0 License (CC BY 3.0: creativecommons.org/licenses/by/3.0/us/).

REFERENCES

Balchin, C. (2007) Back from the dead! A potpourri of recent rediscoveries in the Neotropics. *Neotrop. Birding* 2: 4–11.

BirdGuides (2015) Zapata Rail rediscovered after 40 years? Accessed from birdguides.com (tinyurl.com/bg-zapata) on 20 February 2022.

Butchart, S. H. M., Stattersfield, A. J. & Brooks, T. M. (2006) Going or gone: defining 'possibly extinct' species to give a truer picture of recent extinctions. *Bull. Brit. Ornithol. Club* 126A: 7–24.

Butchart, S. H. M., Lowe, S., Martin, R. W., Symes, A., Westrip, J. R. S. & Wheatley, H. (2018) Which bird species have gone extinct? A novel quantitative classification approach. *Biol. Conserv.* 227: 9–18.

Gaworecki, M. (2016) "Species X": the blue-eyed dove rediscovered in a global reforestation hotspot. Accessed from news.mongabay.com (tinyurl.com/mongabay-bedove) on 20 February 2022.

Gerbracht, J. (2021) St. Kitts Bullfinch (*Melopyrrha grandis*), version 1.0. In: Gerbracht, J. (ed.) *Birds of the World*. Ithaca, NY: Cornell Lab of Ornithology.

Gilman, S. (2017) Lost to science for 60 years, Táchira Antpitta is rediscovered in Venezuelan Andes. Accessed from allaboutbirds.org (tinyurl.com/tachira2017) on 20 February 2022.

Lees, A. C., Devenish, C., Areta, J. I., Barros de Araujo, C., Keller, C., Phalan, B. & Silveira, L. F. (2021) Assessing the extinction probability of the Purple-winged Ground Dove, an enigmatic bamboo specialist. *Frontiers Ecol. & Evol.* 9: 624959.

Miranda, J. (2009) Carrizal Seedeater *Amaurospiza carrizalensis* ML237076531. Accessed from macaulaylibrary.org/asset/237076531 on 20 February 2022.

Prado, A. D. (2006) *Celeus obrienii*: 80 anos depois. *Atualidades Ornitol.* 134: 4–5.

Team eBird (2021) eBird passes 1 billion bird observations. Accessed from ebird.org (tinyurl.com/ebird-billion) on 20 February 2022.

Tobias, J. A., Butchart, S. H. M. & Collar, N. J. (2006) Lost and found: a gap analysis for the Neotropical avifauna. *Neotrop. Birding* 1: 4–22.

6

Our final group of lost birds consists of four species classified as Data Deficient. These species are mysteries, each known only from a small number of specimens with vague or incomplete accompanying information. Their number includes **6** Coppery Thorntail *Discosura letitiae*, for which this is the adult male type-specimen, housed in the Natural History Museum in Tring, UK (Joe Tobias; © Natural History Museum). The locality was given simply as "Bolivia?" Only one other specimen is known, and the species has not been seen since 1852.

JOHN C. MITTERMEIER , CAMERON L. RUTT & DANIEL J. LEBBIN
American Bird Conservancy, 4301 Connecticut Ave, NW Suite 451, Washington, D.C. 20008, USA.
✉ jmittermeier@abcbirds.org; crutt@abcbirds.org; dlebbin@abcbirds.org

ROGER SAFFORD
BirdLife International, The David Attenborough Building, Pembroke Street, Cambridge, CB2 3QZ
✉ roger.safford@birdlife.org

BARNEY LONG
Re:wild, PO Box 129, Austin, TX, 78767, USA.
✉ blong@rewild.org

CULLEN HANKS
Macaulay Library, Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, NY, 4850, USA.
✉ cullen.hanks@cornell.edu