The Rufford Foundation
Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	José Tomás Ibarra
Project title	Ecology and conservation of the cavity-nesting community in temperate forests of South America
RSG reference	14397–2
Reporting period	1 August 2015 – 31 July 2016
Amount of grant	£4930
Your email address	jtibarra@uc.cl
Date of this report	31 July 2016

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
1. Describe and monitor the composition and structure of the cavity-nesting community			x	In our study of the cavity-nesting community from southern temperate forests, we have found 626 nests 29 bird species nesting in tree cavities, belonging to six orders and 16 families. Here I report preliminary results for 265 nests. Furnariidae was the most represented family with five species. Cavity-nesting bird species comprise 57% of the avian community in South American temperate rainforests. Twenty-five (86.2%) species were secondary cavity nesters (SCNs) and four (13.8%) were primary cavity nesters (PCNs). From the total species, nine (31%) were endemic to southern temperate rainforests. Two passerines (*Zonotrichia capensis* and *Spinus barbata*) were not previously described using cavities for nesting.
2. Assess nest-site requirements for vulnerable cavity-nesters			x	*Nothofagus dombeyi* was the main tree species used for nesting. However, we did not find a preference for its utilisation ($X2 = 0.46$; $p = 0.50$). The same pattern was found for *E. cordifolia* ($X2 = 0.07$; $p = 0.79$). In contrast, *L. obliqua* was utilised disproportionally less in relation to its availability (avoided, $X2 = 19.28$; $p < 0.01$). We found a preference for *N. pumilio* ($X2 = 8.65$; $p < 0.01$) and *G. avellana*

				(X2 = 7.48; $p < 0.01$), as they were utilised disproportionally more than their availability (Fig. 4A). Seventy-nine percent of the cavity nests present in *G. avellana* belonged to either *Troglodytes aedon* (16 nests) or *Aphrastura spinicauda* (11 nests). Birds used trees ranging from 11.6 to 193.8 cm DBH. *Colaptes pitius*, *Pteroptochos tarnii*, and *Glaucidium nana* used the largest trees, while *Veniliornis lignarius*, *P. albogularis*, and *T. aedon* used the smallest trees. Mean DBH of nest-trees differed significantly between nesting bird species ($F = 4.40$; $p < 0.001$). Trees used for nesting were significantly larger (mean DBH ± SD = 57.26 ± 34.88 cm) than those available in their stands (mean ± SD = 26.11 ± 19.99 cm; $F = 350.80$; $p < 0.01$). We found that DBH for all trees used for nesting were larger than those available in their stands: *N. dombeyi* (mean DBH = 79.4 vs. 29.4 cm; $F = 325.49$; $p < 0.01$), *L. obliqua* (mean DBH = 39.9 vs. 25.9 cm; $F = 29.38$; $p < 0.001$), *G. avellana* (mean DBH = 21.4 vs. 14.8 cm; $F = 75.56$; $p < 0.001$), *N. pumilio* (mean DBH = 60.2 vs. 46.5 cm; $F = 9.33$; $p < 0.01$), and *E. cordifolia* (mean DBH = 42.8 vs. 21.5 cm; $F = 34.73$; $p < 0.001$) (Fig. 4B). The mean diameter of fallen trees used for nesting was 66.12 ± 39.33 cm. Snags and fallen trees were the most common nest substrate (58%) and were strongly preferred over living trees (X2 = 327.97; $p < 0.0001$). Birds showed a strong preference for the two most advanced stages

				of tree decay: old dead trees ($X2 = 539.47$; $p < 0.0001$) and fallen trees ($X2 = 33.82$; $p < 0.0001$). For example, *Scelorchilus rubecula* and *Scytalopus magellanicus* nested in cavities available chiefly in fallen trees (91%). Both recently dead trees and live unhealthy trees showed a proportional use in relation to their availability ($X2 = 0.45$; $p = 0.50$ and $X2 = 0.71$; $p = 0.40$, respectively). For example, *P. tarnii* nested in cavities available mostly in large live unhealthy trees (86%). Live healthy trees were the most abundant tree decay class in the area, but were used for nesting only once out of 263 nests (avoided, $X2 = 204.70$; $p < 0.0001$). Most birds nesting in live trees used a dead section of the main trunk or a dead branch as nest substrate.
3. Determine the potential keystone role of the endemic White-throated treerunner as cavity-facilitator			x	One and hundred fifty eight (75%) nests of SCNs (non-excavators) were in cavities produced by decay processes (e.g. crevices, decay wood, broken branches). The remaining 25% were excavated cavities. Eleven out of the total of 18 SCNs (61%) never used excavated cavities for nesting. Furthermore, none of the SCN species nested exclusively in excavated cavities. Only three species of SCNs used excavated cavities as their main (>50%) nesting substrate. All excavator species produced cavities that were used later by secondary cavity nesters. Within excavated cavities, those excavated by *Pygarrychas*

				albogularis and *Campephilus magellanicus* were the most used by secondary cavity nesters for nesting. Twenty-one (68%) cavities used by breeding *Tachycineta meyeni* were produced by excavator species. From this, 18 (86%) nests were in cavities excavated by *P. albogularis*. Three nests (60%) of *Strix rufipes* and 31 nests (57%) of *Enicognathus ferrugineus* were located in cavities produced by *C. magellanicus* (from literature review).
4. Prepare education material for reducing the removal of habitat legacies.			x	In our project we determined the importance of standing dead trees (snags) as nesting substrates for cavity nesters. Indeed, snags and fallen trees were the most common nest substrate (58% of nests) and were strongly preferred over living trees. We gave public talks and created and distributed Wildlife Tree signs that will be placed on trees with important features for cavity nesters. We are currently working with the Chilean Forestry Service in order to deploy these signs ("Wildlife Trees") in both public and private lands. The final goal is that forest management schemes consider the protection of snags, but also ensure the retention of all classes of tree decay, including fallen trees. This consideration will secure a continuous supply of cavities from trees that currently have many cavities to trees that will provide many cavities in the future. We prepared three types of Wildlife Tree signs with three "charismatic"

				and "ecologically-relevant" cavity-nesting species. These species included the Magellanic woodpecker (Fig. 1), rufous-legged owl (Fig. 2) (the two species studied in our Rufford project #1), and the white-throated treerunner (Fig. 3; the species identified as an important facilitator because it generates many cavities that are used by other species for nesting, including mammals and birds).  Fig 1  Fig 2

				 Fig 3

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

In general, we did not experience any unforeseen difficulty. Working in private lands has always been a challenge in southern Chile. Although we conduct part of our research in public protected areas, we give priority to work in areas where forestry and agricultural activities take place. When working in private lands, sometimes becomes hard to get permission to visit the property throughout a field season. However, after building trust with landowners, usually they become interested in the study. Furthermore, some may even become excited about having ecologically-relevant and threatened species in their lands. We believe that understanding local-social contexts, beyond protected areas, for the effective conservation of cavity-nesting communities is definitively the next step (details below).

3. Briefly describe the three most important outcomes of your project.

(a) Original research on a poorly known tree-dependent community:
The following scientific papers have been published or submitted during this project:

PUBLISHED:

- Ibarra, J.T. & K. Martin. 2015. Biotic homogenization: loss of avian functional richness and habitat specialists in disturbed Andean temperate forests. Biological Conservation 192: 418-427.

We assessed the species richness-functional diversity relationship and the potential effects of deforestation and degradation on functional diversity of avian assemblages in a biodiversity hotspot, in southern Chile. We found a non-saturating relationship between species richness and both functional richness and community-weighted specialisation, suggesting low functional redundancy. Deforestation led to a decrease in both functional richness and community-weighted specialisation, particularly precluding the persistence of specialised species in disturbed forests. The fact that community-weighted specialisation decreased linearly under deforestation serves as evidence of functional biotic homogenization processes (“loser” specialists being replaced by “winner” generalist species) in a biodiversity hotspot

- Altamirano, T.A., J.T. Ibarra, M. de la Maza, S. Navarrete & C. Bonacic. Reproductive life-history variation in a secondary cavity-nester across an elevational gradient in Andean temperate ecosystems. The Auk: Ornithological Advances 132(4): 826-835.

For the first time for southern temperate ecosystems, we studied whether the breeding strategy of a secondary cavity-nester varied along an elevational gradient in Andean temperate forests, Chile. As predicted, the breeding season was shorter in highland forests compared to lower elevations by 28% and 55% over the two successive seasons. We found smaller clutch sizes (average 4.1 vs. 4.5) and a fewer number of nestlings per clutch (average 3.5 vs. 4.2) at higher altitudes. The extent of parental care, expressed as the duration of the nestling period, was slightly but significantly longer in highland than lowland forests (22.2 vs. 21.6 days). Our findings suggest that Rayaditos may change their reproductive strategy along elevational gradients to a slower one.

- Ibarra, J.T. & K. Martin. 2015. Beyond species richness: an empirical test of top predators as surrogates for functional diversity and endemism. Ecosphere 6(8): 142.

We compared the surrogacy reliability of the habitat-specialist rufous-legged owl (*Strix rufipes*) and the habitat-generalist austral pygmy-owl (*Glaucidium nana*), and we examined potential underlying mechanisms for surrogacy relationships in Andean temperate forests. The habitat-specialist *S. rufipes* was a reliable surrogate for all avian biodiversity measures, including avian endemism and functional diversity measures (degree of community specialization and density of large-tree users, understory users, and cavity-nesters). On the contrary, the habitat-generalist *G. nana* did not function as a surrogate. These results suggest that management actions tailored to promote occurrence of habitat-specialist owls, such as the *S. rufipes*, may result in enhanced density of endemic species, specialised communities, and likely ecosystem stability.

IN PRESS:

- Novoa, F. T.A. Altamirano & J.T. Ibarra. 2016. Consumption of southern lapwing (Vanellus chilensis) by Magellanic horned owl (Bubo magellanicus) in Andean temperate forests of the La Araucanía Region, Chile: ¿Depredation or scavenging? Revista Chilena de Ornitología 22(2): In Press.

We report the first record of the largest owl in Chile consuming a relatively large (35-37 cm) avian species and describe each visit of the Magellanic horned owl to the southern lapwing carcass in an Andean temperate forest site.

- Honorato, M.T., T.A. Altamirano, J.T. Ibarra, M. de la Maza, C. Bonacic & K. Martin. 2016. Composition and preferences of nest materials by cavity-nesting vertebrates in Andean temperate forests of Chile. Bosque 37(3): In Press.

We studied the composition and preferences of nest materials used by cavity-nesters (three birds and four mammals) in Andean temperate forests, southern Chile. The predominant and preferred leaf in the nests was from bamboo *Chusquea* sp. *A. spinicauda* avoided the leaves of *Lophozonia obliqua*, whereas *D. gliroides* avoided vines. The thick matted nests and the acidic pH of the *Chusquea* leaves, may provide protection from predators and have a biocidal effect on pathogens.

UNDER REVIEW:

- Ibarra, J.T., M. Martin, K.L. Cockle & K. Martin. Functional responses of cavity-nesting communities to logging in temperate forests of the Americas. (In Revision).

We assessed how uncut, partially-logged, and clearcut sites influence taxonomic and functional diversity of cavity-nesting birds in Canada and Chile. Species richness declined under clearcutting only in Chile. Clearcutting reduced functional richness (amount of functional niche occupied by species) and community-weighted body mass (average mass values, weighted by species densities) in both systems. The retention of key habitat structures (excavated holes in decaying aspen) in Canada likely buffered shifts in functional diversity. Key structures in Chile (non-excavated holes in large-decaying trees) are not retained, with more consequent changes in biodiversity.

- Ibarra, J.T., T.A. Altamirano, A. Vermehren, F.H. Vargas & K. Martin. Intraguild predation: consumption of rufous-legged owl nestling by chimango caracara in a tree cavity-nest in Andean temperate forests. (In Revision).

We provide new information on the breeding ecology of the rufous–legged owl, a species with the highest conservation priority in southern temperate forests. Further, we suggest that Chimango Caracaras delayed their predation activity until the nestling was 9 days old and thus deferred the short–term energetic benefits (associated with immediate predation of the owl nest) that are generally expected to guide feeding decisions of predators.

- Altamirano, T.A., J.T. Ibarra, A. Vermehren, K. Martin & C. Bonacic. Roosting record of Histiotus magellanicus in a tree-cavity excavated by Pygarrhichas albogularis in Andean temperate forests of southern Chile. (In Revision).

We document the first record of a bat species roosting in a tree-cavity excavated by *Pygarrhichas albogularis* on a standing dead tree in Andean temperate forests, southern Chile. The co-occurrence of "roosting facilitator species" (e.g. cavity excavator) and standing dead trees may be important for the persistence of bats in disturbed forests.

- Caviedes, J. & J.T. Ibarra. Influence of anthropogenic disturbances on stand structural complexity in Andean temperate forests: implications for managing key habitat for biodiversity. (In Revision).

We developed an index of stand structural complexity and show how anthropogenic disturbances, namely fire, logging, livestock, and their combined presence, affect stand structural complexity in a southern global biodiversity hotspot. The lowest values for the index were measured in plots combining fire, logging, and livestock. Undisturbed plots and plots with the presence of relatively old fires (> 70 years) showed the highest values for the index of stand structural complexity. Our results suggest that secondary forests >70-year post-fire event, with the presence of habitat legacies (e.g. snags and CWD), can reach a structural complexity as high as undisturbed plots.

- Altamirano, T.A., J.T. Ibarra, K. Martin & C. Bonacic. Cavity-nesting bird community in South American temperate rainforests: tree decay processes as a key driver structuring nest webs. (In Revision).

We studied the cavity-nesting community in temperate rainforests of Chile. We found the highest reported proportion of cavity nesters (n=29 species; 57% of the bird community) for any forest system. Four species were excavators and 25 were secondary cavity nesters (SCNs). Recorded nests were mostly located in cavities produced by tree decay processes (n=158, 75%) and the remaining 25% were in cavities excavated mainly by *Pygarrhichas albogularis* and *Campephilus magellanicus*. To maintain this cavity-nesting community, our results reveal that retaining large (live and dead standing) trees with mean DBH of 57.3 cm and keeping fallen trees as large as possible (mean diameter ~66.1 cm) should be a priority for forestry schemes in this global biodiversity hotspot.

- Petitpas, R., J.T. Ibarra, M. Miranda & C. Bonacic. Spatial patterns in a 24-year period show a case of increase native vegetation cover and decrease fragmentation in Andean temperate landscapes, Chile. (In Revision).

Using 1983 and 2007 aerial photographs, we created land use/land cover maps for an Andean zone of the La Araucanía region, southern Chile. We then quantified changes in composition and configuration using landscape metrics and an adjacency matrix. By 2007, the dominant land cover changed from agriculture to native vegetation. Native vegetation increased in 375 ha, but the number of patches decreased by 45% and mean patch area increased by 124%, thus fragmentation decreased. This research is a first approach to understand specific cases of native vegetation recovery and decrease fragmentation in this eco-region.

(b) Conservation and capacity building:

- Student theses: Two students conducted their thesis supported by this project. One has already submitted a scientific paper and the other is formatting her thesis for a scientific journal. The thesis titles are the following:
  - Hajjard, H. 2016. Supply and occurrence of tree cavities in Andean temperate forests of the La Araucanía Region, Chile. Double Program: Diplome d'Ingenénieur Agronome, École Supérieure d´Agriculture, République française. Agricultural Engineering, School of Agriculture and Forest Sciences, Pontificia Universidad Católica de Chile, Santiago, Chile.
  - Caviedes, J. 2015. Influence of anthropogenic disturbances on stand-structural complexity in Andean temperate forests. Master of Science Thesis in Conservation Biology, University College London, London, United Kingdom. Co-supervised with Dr. Jan Axmacher

- Research opportunities: five volunteers participated as field assistants during this project.

- Wildlife Tree signs: as detailed above, we created Wildlife Tree signs that will be placed on trees with important features for cavity nesters. We are currently working with the Chilean Forestry Service in order to deploy these signs (”Wildlife Trees”) in both public and private lands.

  - Field course: In December 2015, researchers from the Centre for Local Development (CEDEL, Campus Villarrica) and the Department of Ecosystems and Environment, both from the Pontificia Universidad Católica de Chile (PUC), co-organised a 6-day field course in southern Chile. The course, supported by the PUC and the Rufford Small Grants for Nature Conservation, was entitled “Field techniques for the conservation of temperate forests of southern Chile” with a special focus on the ecology and conservation of cavity-nesting communities inhabiting these ecosystems. The field course was held in the “Kodkod: Lugar de encuentros” and "The Cañi Sanctuary" (Private Protected Area managed by the local community), both located in the locality of Pichares, a magnificent area of native forests in the La Araucanía Region, Andean Temperate forests of Chile. The activities included both theoretical and practical elements of study design, methods and analysis for studying forest ecology and cavity-nesting communities. A review of methods for studying habitat-relationships, breeding ecology and environmental education was included in the topics covered during the course. The participants included eight instructors from the PUC and 20 students, including one from Venezuela, one from Bolivia, three from Peru, two from Ecuador, one from Brazil and 12 from Chile.

(c) Communication and outreach:

- *Araucaria* workshop: On September 10th and 11th 2015, the Workshop "Scientific bases for the management and protection of araucaria ecosystems" was held in Aluminé, Argentina.
  This workshop was organized by the Lanín National Park (Argentina) in order to open spaces for the reciprocal learning and for finding the best approaches for the conservation of *Araucaria* (monkey-puzzle tree, *Araucaria araucana*) trees and biodiversity inhabiting these forests. Our Rufford Small Grant project (14397-2) collaborated in the preparation of a talk on the ecology and conservation of cavity-nesting vertebrates (including birds and mammals) that inhabit these forests. We talk was led by Dr Javier Sanguinetti (Department of Conservation and Management, Lanín National Park).

- Public talk on the ecology and conservation of cavity nesters from Chilean temperate forests: we gave a public talk about the ecology and conservation of the cavity-nesting community in Villarrica. This public talk was given in the context of the series "Research Dialogues" from the Pontificia Universidad Católica de Chile.

- El Mercurio, the largest national newspaper in Chile, prepared and published a report on our research project:

VIDA • CIENCIA • TECNOLOGÍA A 9

Estudio en la Reserva de Biósfera Araucarias:

Las aves del bosque chileno cooperan entre sí reciclando sus nidos

Mientras que solo unas pocas especies pueden tallar una cavidad en un árbol para crear su nido, son varias las que los reutilizan luego de ser abandonados por el primer dueño.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

Local inter-institutional collaborations: We have collaborated closely with the Chilean Forestry Service (CONAF). In this particular case, we are have created Wildlife Tree signs, have worked hand to hand with park guards from protected areas and are committed to participate in a workshop that CNAF is organising in the context of the National Strategy for the Conservation of Magellanic woodpeckers.

Environmental education, and local students and volunteers' involvement: We have collaborated with local landowners from the beginning of our work. Some of them even participated in field work activities and have shown their interest in our study to continue in their properties. As we detailed above, we have co-organised and participated in workshops, a field course and a public talk. Furthermore, students and other local people participated as field assistants during the field season. Two of these students conducted their thesis in our project.

5. Are there any plans to continue this work?

Yes, this project is part of our long-term commitment to Andean temperate forest and their local biodiversity. Here, we have worked with local communities and research institutions for years and we hope to continue with a philosophy of long-term applied research and environmental education for biodiversity conservation and sustainable forest management in the southern Andes in the following years and decades. For this, we are currently seeking funding to continue with our scientific and conservation project.

6. How do you plan to share the results of your work with others?

We have shared our project results in different ways. These include scientific papers, conference presentations, graduate theses, public talks, workshops, field course, education material (Wildlife Tree signs), and reports in national news. Furthermore, we will continue to generate scientific and conservation outcomes from this project (all the details have been provided throughout this final report). We will share these products with the RSGF as soon as they become available.

7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?

The RSG was used between August 2015 and July 2016. However, most of the expenditure of the funds occurred between October 2015 and March 2016, where most of the fieldwork activities were conducted.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Accommodation	£1,360	£1,700	£-240	Because we work in a highly touristic area, one of the price of the rented cabin for the field crew increased without prior notice.
Food and subsistence	£2,070	£2,500	£-430	We increased the number of volunteers and students working in the field, and thus we spent a higher amount from what we originally planned
Equipment	£670	£580	£+90	One of the DBH measure tapes that we planned to purchase was provided by our project partner the University of British Columbia
Expendable supplies/materials	£85	£100	£-15	
Communications	£90	£20	£70	We did not purchased a cell phone as we originally planned
Travel	£655	£600	£55	We spent much more than 600 in travel, but a great part of the funding for this was provided by other research partners (Pontificia Universidad Católica de Chile and the University of British Columbia)
TOTAL	£4,930	£-470	In general, we think that we made an efficient use of the financial resources	

			provided by the RSGF. We conducted a sound scientific research, along with the support of many people, and international and local institutions. This project is has produced several scientific and conservation outcomes already, and likely these will increase during the upcoming years.

9. Looking ahead, what do you feel are the important next steps?

Our two Rufford Small Grants projects have taught us that, in order to promote an effective conservation of forest wildlife and sustainable forest management, we need to understand local socio-cultural contexts where our scientific and conservation efforts take place. We feel that future conservation endeavours in Andean temperate ecosystems should catalyse, facilitate and empower local stakeholders to manage and conserve natural resources within their social, cultural, and economic contexts. For this, we suggest that a further project should use an "Ecosystem Approach", which generally consider three objectives: conservation of biodiversity, sustainable use of forests, and equitable sharing of benefits arising from the utilization of forests. The "Ecosystem Approach" is the primary implementation framework of the Convention on Biological Diversity (CBD). We acknowledge the complexity of achieving these three objectives, and thus we suggest that viewing this challenge and, more generally, viewing forests through the lens of complex systems science (where physical, biological, and socio-cultural components of forests are understood in an integrative approach) can help facilitate these important objectives in the long-term.

We are especially concerned about the current status and potential fate of *Araucaria araucaria* (monkey-puzzle tree) and the forests where this species is the dominant tree. This species is considered as Threatened by the IUCN and it harbours many of the wildlife present in Andean temperate forests, including most cavity-nesters. Currently, however, national news media have shown that many hectares of these trees are dying. Nobody knows exactly what the major driver of Araucaria massive death is. Some parties suggest the main reason of this process is climate change, while others have mentioned exotic species (wild boar, cows), over-exploitation of the seed by supermarkets, an unexpected disease, etc. We suggest that urgent conservation-oriented studies are need, but understanding this research should approach this species as a complex system itself. Araucarias are likely the most iconic tree species in southern South America and it has strong ecological and cultural associations with broader forest biodiversity and local indigenous people, the Mapuche-Pewenche.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

Yes. We gave talks, participated in an international workshop, and created three Wildlife Tree signs that will be placed on trees with important features for cavity nesters. In all these materials, the RSGF received publicity. Furthermore, all scientific papers, conference presentations, and thesis produced and in progress, acknowledge the support from the Rufford Small Grants for Nature Conservation.

11. Any other comments?

As done in the past, we would like to thank the support from the Rufford Foundation. We feel that we have been successful in our two RF projects, but there is still a lot to do in order to secure forest biodiversity conservation, but understanding and revitalising local social-ecological systems in our study area in the southern Andes of Chile. In the future, we would like to apply for a Booster Grant in order to answer novel research questions and to address the conservation challenges identified during our project and detailed above. We will send you further research updates and products as soon as they become available.