Report on the first trial of remote camera monitoring for the Abrolhos Painted Button-Quail (*Turnix varius scintillans*)

Abrolhos Painted Button-quail captured on a remote camera on East Wallabi Island, 25/2/2020.

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Introduction

The critically endangered Abrolhos Painted Button-quail is confined to the Abrolhos islands near Geraldton, WA. The species is already the subject of an interim recovery program which has reviewed existing information and threats (DBCA, 2018). Geyle *et al*. (2018) quantified the extinction risk for Australian fauna and listed the Abrolhos Painted Button-quail at number 5 on a ranking of the most imperilled fauna, with a 71% chance of extinction in the next 20 years. As part of addressing actions identified in the interim recovery plan and in the context of proposed developments for the new national park in the Abrolhos Islands, including some future infrastructure on East Wallabi Island (Govt of WA 2020), a monitoring program was initiated for the Abrolhos Painted Button-quail.

The Abrolhos Painted Button-Quail has previously been recorded from seven islands in the Houtman Abrolhos group – North Island, East and West Wallabi Islands and the smaller Oystercatcher, Turnstone, Seagull and Pigeon Islands (DBCA, 2018). It is suggested that the small islands act as parts of a metapopulation or refugium for the species and they are unlikely to exist solely on these islands due to their small size (1-7.7 ha). The current extent of occurrence is only 20 km^2 with an area of occupancy of <12 km^2, but it is considered that there are insufficient data to accurately determine population trends (R. Davis *et al*. unpubl.; Barnes *et al*. in press). It has been suggested that the population on North Island is very small or extinct and at risk from habitat modification and was not found in surveys in 2013 and 2017 (DBCA, 2018). The surveys by Newell *et al*. (2017) could provide an estimate of population trend, but no surveys to date have employed a systematic survey approach that has permitted accurate estimates of population size, density or relative abundance. The current estimate of 550 mature individuals is considered of low reliability (Barnes *et al*. in press).

In this context, the primary objective of the monitoring program was to trial a deployment of infra-red camera traps to assess the viability of this technique for generating an index of abundance for this cryptic and low density species. Previous studies on ground-dwelling species such as the Andalusian Button-quail (*Turnix sylvaticus sylvaticus*) and Eastern Partridge Pigeon (*Geophaps smithii smithii*), have used camera traps successfully to undertake occupancy analysis and have generated probabilities of occurrence in different habitats (Davies *et al*., 2019; Gutierrez-Exposito *et al*., 2019).

Methods

Two different methods were trialled. For the first, DBCA deployed ten cameras on East Wallabi Island from March 2018 until June 2020. These cameras were not organised into a grid system but rather targeted the coastal habitats on the north-eastern portion of the island. These data were used to generate information on the temporal and seasonal trends of button-quail.

For the second method, we wanted to investigate the potential of the cameras to generate estimates of occupancy or other quantitative measures of abundance. The location of cameras was chosen by laying a grid of points 250 m apart across the entire island (Figure 1). Any points in the ocean were eliminated. The grid was based on UTM Zone 49J.

A total of 44 Reconyx PC900 Professional trail cameras were deployed on East Wallabi island from January 16 to March 17 2020. Cameras were set to take a burst of 3 pictures on activation and were equipped with infrared motion activated triggers and a red flash for low light conditions. The habitat around each camera was photographed and each camera and card were assigned a unique identifier.

After collection, all photographs were scanned by trained personnel. All obvious fauna species detected were recorded. For the purposes of data analysis, a burst of 3 images that were clearly of the same individual(s) was counted as a single capture event. The number of individual capture events was tallied and a hotspot map was created of Abrolhos Painted Button-quail density in relation to the geographical location of the camera.

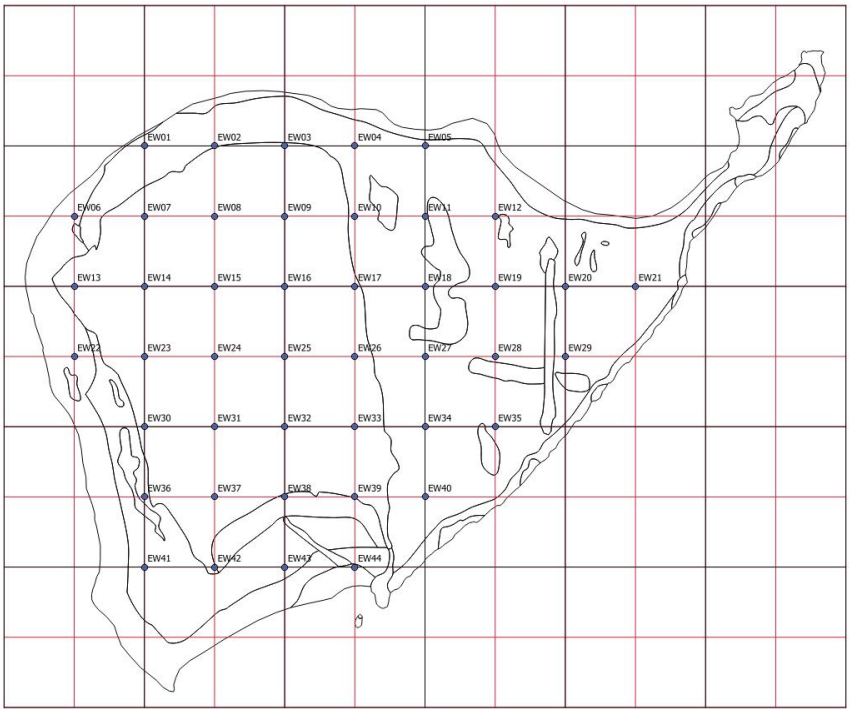

Figure 1: Pre-deployment camera locations situated 250m apart on East Wallabi Island, using a grid based on UTM Zone 49J. The background map layer is the vegetation map of Harvey *et al*. (2001).

Results

2018-2020 sample

For the ten cameras, a total of 71 triggers for Abrolhos Painted Button-quail were observed from March 2018 to June 2020 with 97 individuals detected (Table 1). The majority of these were from sites on the northern coast of the island on the coastal dune habitat (Figure 2). The number of individuals detected in single capture events ranged from 1 to 4 individuals, including a male and three young (Table 1).

Table 1. Summary of Abrolhos Painted Button-quail detections for 2 year deployment on East Wallabi Island

Location	# individual PBQ detected	Highest number of PBQ in single capture
C102	25	3
C103	16	3
C105	1	1
C107	45	4 (male and 3 young)
C119	7	3
C120	3	1

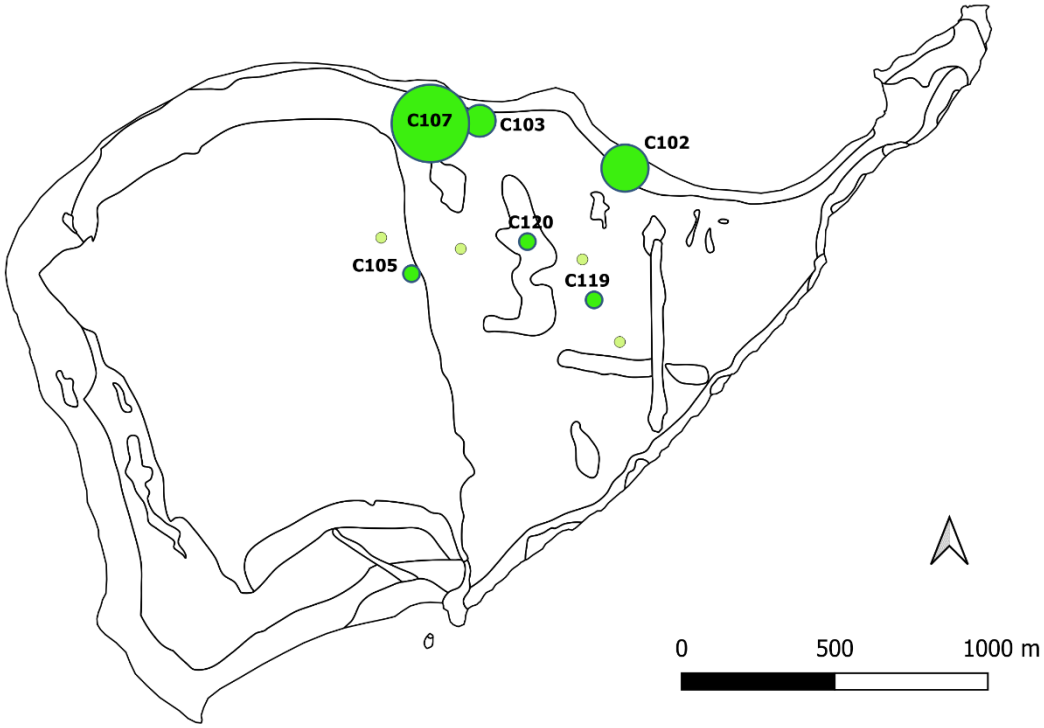

Figure 2: Number of captures of Painted Button-quail during the 2018-20 sample period on East Wallabi Island (range = 1-33) in five equal-interval classes. The smallest (light green) circles denote camera positions where no button-quail were detected. The background map layer is the vegetation map of Harvey *et al*. (2001).

Captures showed considerable temporal variation, with the highest number of captures observed in 2018 compared to the other years (Figure 3). In these years, the peak in detections was during September and October (Austral spring). Although detection rates were low, there was consistent evidence of button-quail presence throughout the year, with a trend to low detectability in March-June (Figure 3).

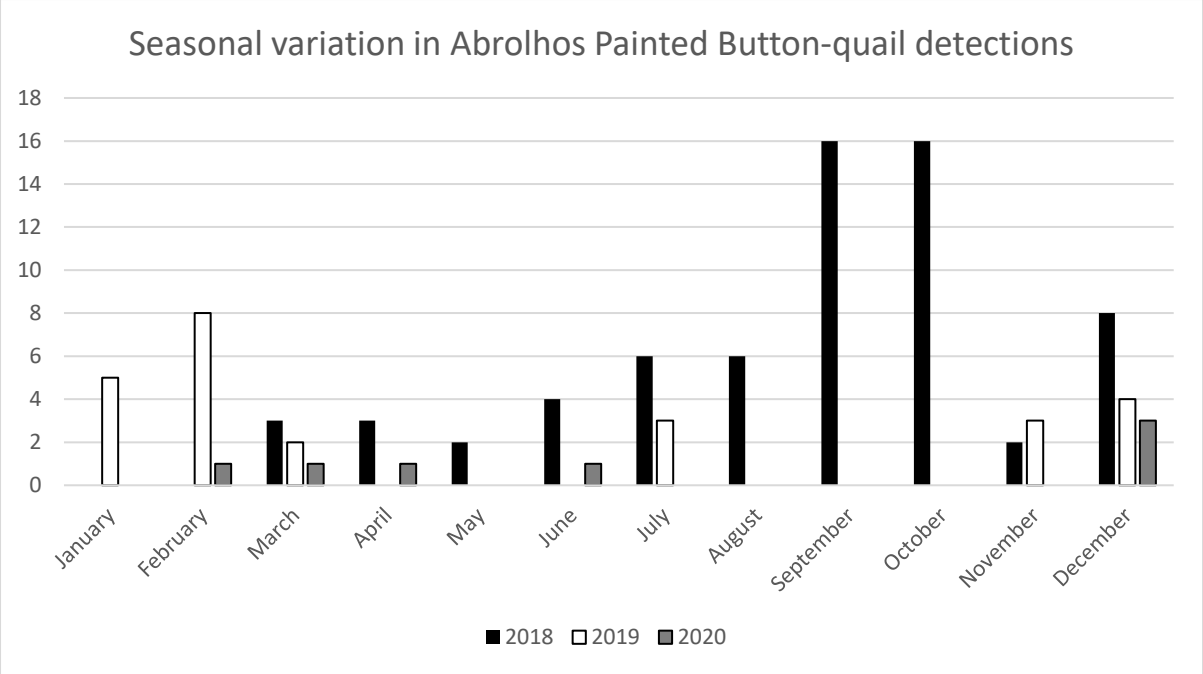

Figure 3: Seasonal variation in the number of individuals of Abrolhos Painted Button-quail detected on ten camera traps deployed on East Wallabi Island from March 2018 to June 2020.

2020 sample

In total, 26 detections of Painted button-quails were recorded for the two month deployment (Table 2). The highest number captured on one image was three individuals (Table 2). The location EW05 (see Fig. 4) had overwhelmingly the greatest number of detections. All detections were in visible light conditions with the earliest being at 0552 and the latest at 1912.

Table 2. Summary of Abrolhos Painted Button-quail detections for two month deployment

Location	Camera	Card	# PBQ Detections	Highest number of PBQ in single capture
EW02	94	MA009A	2	1
EW04	195	EW015	1	1
EW05	93	MA132B	15	3
EW10	208	EW011	1	1
EW21	85	LG056	2	2
EW34	107	EW004	3	3
EW38	86	MA127A	1	1
EW41	70	EW012	1	1

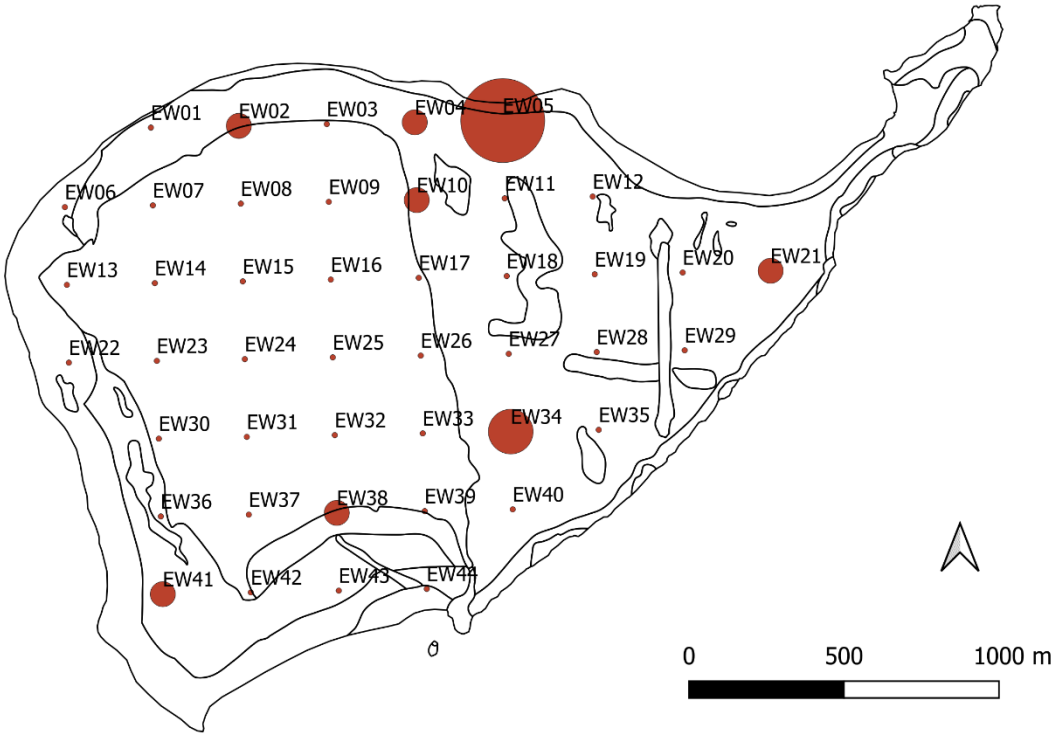

Figure 4: Number of detections of Painted Button-quail during the 2020 sample period on East Wallabi Island (max = 15) in five classes (0, 1-2, 3-8, 9-12, >12; see Table 2 for actual data).

All but two of the 26 detections (Figure 4) were in one of one of the two main vegetation associations on the island mapped by Harvey *et al.* (2001) – Thicket/Heath dominated by *Capparis* or *Acacia*, plus other species, on shallow sands or dunes. One of the other detections (at EW38) was in an area mapped as Thicket of *Grevillea*, *Hibbertia* and *Westringia* and the other (at EW41) was in Heath of *Myoporum*, *Olearia* and *Westringia*. No detections were found in the second most common vegetation type, which is Open scrub of *Diplolaena* and *Pittosporum* over Dwarf scrub of *Capparis* and other species on limestone pavement.

Discussion

This exercise demonstrated the success and utility of cameras for determining patterns of occurrence and relative abundance of the Abrolhos Painted Button-quail. Detection rates were relatively low, but we were able to identify key areas of occupancy. These seem to be focussed on near shore portions of the island, particularly in the north and in areas to the south-west of the airstrip. Previous research has identified *Spinifex longifolius* as a preferred habitat for this species (DBCA, 2018) and the major hotspot on the north of the island was in this habitat. Almost all detections were in areas with a sandy substrate, and the birds were only occasionally detected on or near the limestone plateau areas. This could be due to differences in the availability of food plants in the different areas, but we do not have detailed vegetation (or diet) data to test this.

Our broad-scale study only took place in one month in summer and is thus unable to draw any inferences about habitat use and movements in other seasons. However, results of the longer-term sampling (2018-20) suggest that, while there is considerable temporal and spatial variation in both distribution and abundance, it is likely that the limestone surfaces are rarely occupied at any time. Nevertheless, the data do suggest significant mobility at the local scale, but whether this extends to inter-island movements is unknown.

Further ongoing monitoring is required to generate more robust occupancy estimates and further determine detailed habitat use. Radio-tracking of known individuals would also be useful in this context, as it could be

used to test hypotheses relating to possible intra- and inter-island movements. We recommend the following priorities:

1) Undertake a detailed camera monitoring study to estimate the relative use and importance of different habitats on East and West Wallabi Islands.
2) Undertake radio-tracking or colour banding to determine whether the East and West Wallabi island populations are connected by dispersing individuals.

References

Barnes, M., Desmond, A., Carter, R., Newell, J., Davis, R., Clarke, R. H., Burbidge, A. H., and Garnett, S. T. (in press - 2021). Houtman Abrolhos Painted Button-quail *Turnix varius scintillans*. In 'Action Plan for Australian Birds 2020'. (Eds S. T. Garnett and G. B. Baker.) pp. xxx–xxx. (CSIRO: Melbourne, Victoria.)

Davies, H.F., Rioli, W., Puruntatameri, J., Roberts W., Kerinaiua, C., Kerinauia, V., Womatakimi, K.B., Gillespie, G.R. and Murphy, B.P. (2019). Estimating site occupancy and detectability of the threatened partridge pigeon (*Geophaps smithii*) using camera traps. *Austral Ecology* 44, 868-879.

DBCA (2018). Abrolhos Painted Button-quail (*Turnix varius scintillans*) Interim Recovery Plan. Wildlife Management Program No. 63. Department of Biodiversity, Conservation and Attractions, Perth.

Geyle, Hayley M., Woinarski, John C. Z., Baker, G. Barry, Dickman, Chris R., Dutson, Guy, Fisher, Diana O., Ford, Hugh, Holdsworth, Mark, Jones, Menna E., Kutt, Alex, Legge, Sarah, Leiper, Ian, Loyn, Richard, Murphy, Brett P., Menkhorst, Peter, Reside, April E., Ritchie, Euan G., Roberts, Finley E., Tingley, Reid, Garnett, Stephen T. (2018). Quantifying extinction risk and forecasting the number of impending Australian bird and mammal extinctions. *Pacific Conservation Biology* 24, 157-167.

Government of Western Australia (2020). State Budget continues investment in Plan for Our Parks. (Press release, 12 October 2020). Available at https://www.dbca.wa.gov.au/index.php/news/state-budget-continues-investment-plan-for-our-parks-0

Gutierrez-Exposito, C., García-Gorria, R., Qninba, A, Clavero, M. and Revilla, E. (2019). The farmland refuge of the last Andalusian Buttonquail population. *Global Ecology and Conservation* 17, e00590. https://doi.org/10.1016/j.gecco.2019.e00590

Harvey, J. M., Alford, J. J., Longman, V. M., and Keighery, G. J. (2001). A flora and vegetation survey of the islands of the Houtman Abrolhos, Western Australia. *CALMScience* 3(4), 521–623.

Newell, J., Gray, M. and Desmond, A. (2017). Surveying for the Abrolhos Painted Button-quail. *Western Australian Bird Notes* 16, 27-28.