

First breeding record of Javan Plover *Anarhynchus javanicus* (Charadriiformes: Charadriidae) in Flores, East Nusa Tenggara, Indonesia

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Received 1 June 2025 | Accepted by *M. Iqbal*: 16 June 2025 | Published online 27 June 2025.

Abstract

The Javan Plover *Anarhynchus javanicus* is a range-restricted shorebird endemic to the Indonesian archipelago. While long considered resident in Java and nearby islands, its status on the island of Flores has remained poorly understood, with no previously documented breeding records. In March and April 2025, we conducted targeted field surveys in the Labuan Bajo region of western Flores to search for potential breeding activity. Two active nests were located with a minimum population of five territorial pairs at Sawah Kaca Mese, 6 km south of Labuan Bajo. This constitutes the first confirmed evidence of breeding by *A. javanicus* on Flores. These observations underscore the need for further surveys across Flores to reassess the species' distribution, population size and breeding status.

Keywords: *Anarhynchus javanicus*, breeding, Javan Plover, Labuan Bajo, Lesser Sunda Islands.

Introduction

The Javan Plover *Anarhynchus javanicus* is a small, range-restricted shorebird endemic to the central region of the Indonesian Archipelago, with its distribution now known to extend from southern Sumatra in the west to Timor in the east and northwards to Sulawesi and northern Borneo (Iqbal *et al.* 2013; Setiawan *et al.* 2019; Taufiqurrahman *et al.* 2022). Recent taxonomic clarification and conservation interest in this species, combined with improved understanding of the species' habitat preferences has led to its recent discovery on many islands beyond Java, Madura Kangean and Bali – an assumed core range within which it was thought largely confined until relatively recently (MacKinnon & Phillipps 1993; Piersma & Wiersma 1996; Collar *et al.* 2001; Centurioni 2010).

On the island of Flores, located in the Lesser Sunda Islands (East Nusa Tenggara Province), *A. javanicus* was first documented in 1999, with early records limited to the vicinity of Labuan Bajo at the island's western extremity (Schellekens & Trainor 2016). It remains uncertain whether the species has been long established on Flores but previously overlooked, or if it has only recently colonised the island, possibly from the larger population on Sumbawa. Since 2015, additional records have emerged from other parts of Flores, including Riung and Reok on the northeastern coast (Shapiro 2015; Jehabut 2021), and near Ende on the central southern coast (Crutchley & Crossland *pers. obs.*).

While Schellekens & Trainor (2016) considered *A. javanicus* a resident species on Flores, they did not provide evidence of breeding, and no such records appear to exist in the published literature or online databases. Their recommendations for future shorebird research on Flores included targeted surveys to estimate the local population size of the species around Labuan Bajo. This study aimed to address the current gaps in data by searching for the presence of breeding activity by *A. javanicus* in the Labuan Bajo area during March and April 2025.

Methods

Throughout its range, *A. javanicus* has been observed exhibiting breeding behaviours - including courtship, nest construction, incubation, and chick-rearing - across both wet and dry seasons (Taufiqurrahman & Subekti 2013; Febrianto *et al.* 2016). In the Labuan Bajo area of Flores, more than 50 sightings of *A. javanicus* have been submitted to eBird over the past two decades (eBird 2025), with additional observations dating back to 1999 (Simay *et al.* 2009; Schellekens & Trainor 2016). Most of these records were concentrated between June and November (especially in September and October) but none of these had reported nesting activity or sightings of chicks. Only a very small number of sightings has been reported during February (2), April (2), and May (1) with no reports to date from December, January or March. We therefore reasoned that if breeding does occur in the Labuan Bajo area it must be during this period when few ornithologists have visited.

Given that March-April is the transition period from the wet season to the dry on Flores, we decided to focus our search for breeding *A. javanicus* in these months. Surveys were carried out during two periods: 23–26 March and 3 April 2025. Site selection was guided by Google Earth imagery and historical eBird records, focusing on coastal habitats south of Labuan Bajo where previous sightings had occurred. Particular attention was paid to a large area of bare muddy substrate - approximately 110 hectares in extent - located east of the Sawah Kaca Mese rice fields near Simpang Menjaga. Adverse conditions during the initial visit in late March rendered the site inaccessible due to flooding and soft mud, but by 3 April the area had dried sufficiently to allow access via an existing vehicle track.

At each survey site, searches were conducted for *A. javanicus* and other shorebird species. Both authors have extensive experience in locating and monitoring nests of small plover species, and one author (AC) has previously conducted studies on the breeding ecology of *A. javanicus* in Java (Crossland *et al.* 2014; Crossland & Sitorus 2018). When *A. javanicus* were located their behaviour and calls were assessed for indicators of nesting or chick-guarding and a quick search made of surrounding habitat to identify potential nest sites.

Results and Discussion

In four days of searching from 23-26 March we visited beaches, fishponds, rice fields, flooded pasture and the open edges of marshes in the area at sites south-west of Labuan Bajo where *A. javanicus* had previously been reported (Schellekens & Trainor 2016; eBird 2025). Daily heavy rainfall during the survey period rendered the landscape extensively wet and muddy, significantly limiting accessibility. No individuals of *A. javanicus* were observed during this initial survey. However, several migratory shorebird species were recorded, including Common Sandpiper *Actitis hypoleucos*, Wood Sandpiper *Tringa glareola* and Pacific Golden Plover *Pluvialis fulva*.

We returned on 3 April 2025, following an 8-day period of dry weather, which markedly improved site accessibility due to drying of the terrain and passable tracks. We found no *A. javanicus* on a repeat search of beaches, fishponds and rice fields along the main road south of Labuan Bajo, but we did find the species on the large expanse of bare muddy habitat west of the Sawah Kaca Mese rice fields near Simpang Menjaga (08°33'14"S, 119°51'13"E, Fig. 1). This site is 6 km SSW of Labuan Bajo and comprises a large extent of open, muddy ground that appears to be cleared former mangrove forest. We found 14 *A. javanicus* at this site, with at least 10 of them (5 pairs) exhibiting behaviours indicative of breeding. This included territorial interactions between neighbouring pairs, courtship behaviour and intruder distraction displays.

We found two nests, one containing two eggs and the other containing three (Fig. 2). They were found relatively quickly by scanning the bare ground and spotting the distinctive nest scrapes lined with small stones which stood out as being much brighter than the base substrate. Scrape morphology varied slightly in diameter and composition but shared key characteristics: both were situated in shallow depressions and partially sheltered by larger stones or woody debris. The nests primarily consisted of small angular stones, supplemented by fragments of wood and root material.

The behaviour of adult *A. javanicus* was consistent with that previously recorded by the lead author at two breeding locations in Java and reported by others (Taufiqurrahman & Subekti 2013; Febrianto *et al.* 2016; Crossland & Sitorus 2018). At the time of nest discovery, females were observed incubating at both nests. Following the brief disturbance caused by the observers, a female returned to one nest and a male to the other. Both individuals resumed nest attendance within four minutes after the observer retreated to a distance of approximately 30m, while remaining fully visible on the open terrain (Fig. 5). At the time of observation, ambient air temperature was approximately 30 °C and wind

conditions were calm. Under these thermal conditions, both adults adopted a postural behaviour consistent with thermoregulatory nesting strategies: rather than settling fully onto the eggs in a typical incubation posture, the adults crouched over the clutch to provide shading and promote cooling (Fig. 6).

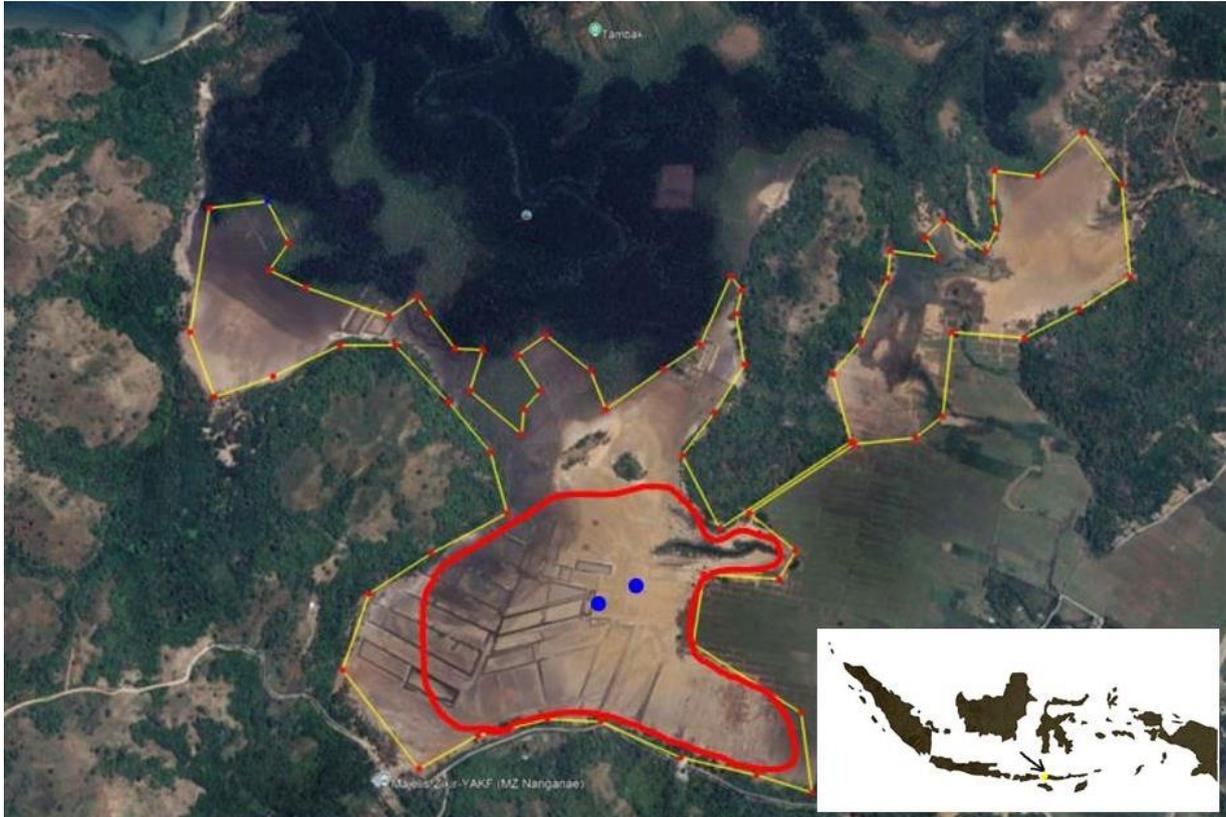


Figure 1. The c.110 ha extent of open muddy habitat west of Sawah Kaca Mese rice fields. The total extent is shown in yellow; the portion surveyed in red; and the location of *A. javanicus* nests in blue. Inset showing the study area arrowed relative to a base map of Indonesia (source image © Google Earth, 2025).



Figure 2. Two *A. javanicus* nest scrapes located near Labuan Bajo, Flores, 3 April 2025 (Photographs: Andrew Crossland)



Figure 3. *Anarhynchus javanicus* nest scrapes (arrowed) shown in the context of surrounding habitat. Note their conspicuousness as bowls of pale stones contrasting with the darker base substrate (Photograph: Andrew Crossland).



Figure 4. Another *A. javanicus* nest scrapes (arrowed) shown in the context of surrounding habitat. Note conspicuousness as bowl of pale stones contrasting with the darker base substrate (Photograph: Andrew Crossland).



Figure 5. A female *A. javanicus* returning to the nest four minutes after the observer retreated to 30 m distance (Photograph: Andrew Crossland).



Figure 6. A parent *A. javanicus* crouching over the two-egg nest scrape, shading the clutch (Photograph: Andrew Crossland).

The observations presented here confirm that *A. javanicus* is a resident breeding shorebird in the Labuan Bajo area, and, to our knowledge, represent the first documented evidence of breeding by this species on the island of Flores. Our fieldwork coincided with the local breeding season, in contrast to the timing of most previous visits by ornithologists which have been at different times of year. Despite focused search effort over five full field days, we failed to find any *A. javanicus* elsewhere at sites where they've been regularly recorded over multiple years. We therefore hypothesize that the local population may aggregate in the Sawah Kaca Mese area during the breeding season, attracted by the availability of expansive, undisturbed habitat. This site likely provides a refuge from the elevated levels of human disturbance characteristic of more constrained environments such as fishponds, rice paddies, flooded pastures, and coastal habitats in proximity to settlements and along the main road.

Although not explicitly mentioned in the review of shorebird habitats on Flores (Schellekens & Trainor (2016), the Sawah Kaca Mese site was encompassed within their broader assessment of the Labuan Bajo region. Analysis of historical satellite imagery via Google Earth reveals that this habitat has been present since at least 1985, suggesting that it may have served as a significant shorebird site for several decades. Including the 14 *A. javanicus* described above, we counted 82 shorebirds of eight species on the portion of the site that we surveyed (Fig.1). Based on the extent of unsurveyed habitat at the site, as well as habitat available in the adjacent mangrove forest and rice fields, we estimate that the broader area may support in excess of 200 individual shorebirds. This represents a notable concentration within the context of Flores and warrants a revised estimate of the total shorebird population occurring in the wider Labuan Bajo area, estimated at 180 birds by Schellekens & Trainor (2016).

We encourage further investigation into the abundance, distribution and breeding status of *A. javanicus* in Flores and elsewhere in Nusa Tenggara. From review of maps and views we've made from aircraft, there seem to be many unsearched coastal wetland areas on the north-western and central coasts that have pockets of habitat similar to that found Sawah Kaca Mese. Ornithological surveys of these areas may well yield scattered populations of *A. javanicus*.

Acknowledgments

We thank local landowners in the Labuan Bajo and Simpang Menjaga area for sharing local knowledge and allowing access to some of the sites on private land which we visited. Thanks also to the editor of *Bio Palembanica* and anonymous referees who reviewed and provided valuable suggestions for the improvement of this paper.

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