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## SHORT NOTE

### Notes on New Zealand pipit (*Anthus n. novaeseelandiae*) home range, parental care, and the behaviour of dependent young

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New Zealand pipits (*Anthus n. novaeseelandiae*) were apparently common in the open landscapes of the last glacial period (Worthy & Holdaway 1996). Before humans arrived, there were no mammalian

predators in New Zealand but the pipit was an important food of the New Zealand falcon (*Falco novaeseelandiae*) and the laughing owl (*Sceloglaux albifacies*) (Worthy & Holdaway 2002). New Zealand pipits would have been likely to increase as more open habitats developed during the

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700 years since Polynesian settlement, because their close relatives on continents live with mammalian and avian predators (Sibley & Ahlquist 1990), and New Zealand pipits have an 8-month (Aug-Mar) breeding season during which multiple clutches of 1-4 are raised (Heather & Robertson 1996). Pipits did apparently initially increase in numbers during the phase of forest and scrub clearance following European settlement (Buller 1888, Guthrie-Smith 1927), but no recent studies have found pipits in high densities in any habitat (Beauchamp 1995). The factors that could be controlling pipit numbers include the deteriorating quality of open habitats (Lovegrove 1980), and high levels of predation by endemic avian and introduced mammalian predators (Wilkinson & Wilkinson 1952).

New Zealand pipits nest on the ground at the base of grass clumps, under overhanging leaves (Guthrie-Smith 1927). Incubation takes 14-15 days and the young stay in the nest for 14-16 days (Wilkinson & Wilkinson 1952; Wilkinson 1957). The fledglings then move about near the nest and leave the nest area with their parents when they start to fly. Guthrie-Smith (1927) and Wilkinson & Wilkinson (1952) suggested that the final stage of nest occupancy and early phase of post-fledging dependence (weeks 3-6) are when pipits are likely to be most vulnerable to predators, because the nestlings are noisy (Guthrie-Smith 1927) and they fly poorly post-fledging making them vulnerable to harrier hawks (*Circus approximans*) (Wilkinson & Wilkinson 1952). The problem is, however, to decide when the predation risk is because there are no detailed descriptions of the behaviour of adult or young New Zealand pipits during the late nesting and dependent fledging time. In this note I provide information on nest locations, calls of adults and young, and behaviour at nest sites at Whananaki (NZ map grid 2643790E, 6626615N), and Limestone Island (2633085E, 6600870N), Northland New Zealand. I also give observations of the post-fledging stage of 6 broods at Whitikau Valley, near Opotiki (2905720E, 6326500N), Ormiston Road, (2634070E, 6586345N), and Mangawhai (2654095E, 6588630N) in Northland I and then re-assess the vulnerability of New Zealand pipits to predation during breeding.

On 26 Oct 2004, Richard Parrish (RP) found a nest on the Whananaki Walkway when an incubating bird flew from the top of a 1.7 m bank covered in 0.3 m-high stringy kikuyu (*Pennisetum clandestinum*). The nest contained 3 eggs and RP marked the site with a rock on the side of the track so I could relocate it. I visited the site at 1730 h on 2 Nov 2004, but, no birds left the site when I passed 3 times 2 m below it on the walkway. I stood 15 m from the site for 20 min without seeing any activity, and then searched for the nest: it was empty, constructed of

fine grass with an outer margin of yellowish green moss (*Brachythecium salebrosum*), and there were no egg fragments or bird remains in the nest material.

As soon as I left the nest a pipit appeared above in a "wing arch" display and singing the ..tsjzrrrr..and ..tjws..ooet song (Oliver 1955). It then disappeared over a ridge and returned 10 min later and sang again above 5 ha of the spur and valley. It landed and continued to give the ..tsjzrrrr.. call while walking over grazed pasture 30 m below the nest site. It then walked, still calling, up onto the bank 20 m west of the nest. No other bird was seen or calls heard. The pipit then flew over the spur to the road and foraged silently on foot, covering 150 m of open ground in 15 min, before flying off at least a further 300 m from the nest site.

A further nest was discovered by Sasha Collecutt on 4 Nov 2004 when a pipit flew from it. The nest was again in kikuyu, 2 m up a bank and 1.8 m above the tide line on a coastal cliff on the south-western tip of Limestone I (2633070E, 6600875N). It was inspected by Colin Bishop (CB) on 8 Nov 2004, when it contained 3 eggs. I visited on 16 Nov 2004; when 3 nestlings with tufts of feathers on the head, bare flanks, remiges just breaking pin, and no tail development were c.5-7 days old (Norment & Green 2004). An adult flew from the nest without calling as I passed it, and settled 70 m farther along the coastline where it fed briefly before flying onto the island. I walked 30 m beyond the nest and observed it for 30 min before moving in to band the young. During this time 6 of 7 food delivery visits each involved the bird walking 10+ m to and up a bank, onto a rock, then a hop up to 0.5 m above the nest, thence down to the nest. On the 7th visit 'the bird involved flew directly to the top of the rock and then followed the same route onto the nest. The adults were silent throughout, and the 3 young were quiet until food was delivered. During and after each delivery of food, the young were heard clearly from 30 m upwind (3.5 ms<sup>-1</sup> gusty northwesterly wind) for 12-18. s. During banding, the 3 young remained quiet and the adults remained within 20 m of the nest, flying above it giving ..tjws..it..ititit.. calls.

During 1200-1700 h on 16 Nov, 2 young roosted together for 12 min but for the rest of the time the 3 young birds were alone and scattered over 3.6 ha. The parent who was attending 2 of the young gave ..tjsw..ititit.. calls from gate posts, track markers, and the tops of kikuyu-covered dunes, while its partner gave similar calls from sand mounds covered in kikuyu 40 - 150 m away.

The parent attending 2 young alternated food delivery between them every 20-30 min. It flew directly to each young bird and located it during flight with ..tjwsee.. and ..tjwsit.. calls. These calls were answered by the young with repeated ..zhep.. calls. The calling was maintained only while the

adult was visible to the juvenile, or the adult was calling to move them using *..tjsw..tjstwe..* calls. Food was delivered when the adult had gathered multiple food items. Food items were placed into the fully opened upright gape in a single action or with multiple actions if items fell out. Most food items were flying insects, including large crane flies (Tipulidae), and all were foraged from pasture, or sand dunes that were covered with yellow sordella (*Ornithopus pinnatus*). The young remained stationary ( $n = 12$ ) or walked less than 5 m ( $n = 8$ ) between parental visits. All roosts were open to the sky but < 1 m from potentially concealment in grasses and sedges. The young moved to new locations > 5 m from their former roost site when with the adult or when called by the adult. Young flew weakly 20-30 m ( $n = 5$ ) either horizontally or downhill to adults. Their flight abilities were poor and they would have been easy for predators to catch.

The older juvenile resembled the parent in its over-coverts and breast but was slimmer. They foraged within 6 m of each other in yellow sordella and the parent gave *..tjwsee..* calls while the young gave repeated *..tsrr..* calls when they were within 2 m of each other. The parent used *..tjwsee..* calls to find the young after they were separated and they both flew off together at least 300 m onto farmland after foraging on the beach for 2.4 h.

I returned to the Mangawhai site on the 6 Nov 2004, when I expected the 3 younger pipits to be completely mobile. I spent between 1500 h and 1700 h trying to find the adults and 3 juveniles within the 3.6 ha area and its immediate surround (c. 6 ha). There were 3 independent pipits in the area. An adult and 1 juvenile were 30 m from the western margin of the home range of 31 Oct 2004. The adult foraged on its own and gave *..tjws.it..ititit..* calls from the ground. The young bird gave repeated *..tjse..tjse..* calls and stayed in cover beside a bank and 0-20 m from the adult. It approached the adult with a fully-open gape when the adult appeared with food in its bill. The adult attacked and chased 1 of the 3 independent pipits after it approached to within 3 m of the juvenile it was feeding. The adult and juvenile then flew together at least 250 m inland.

These observations were similar to more extensive records that I had made of birds in similar plumage stages at Ormiston Road, near Waipu Caves on 5 and 12 Mar 2000, 30 Dec 2001, and 16 Feb 2002.

On the 5 Mar 2000, a pipit with 2 dependent juveniles with almost fully-developed tails also gave the *..tjwse.it.ititit..* and *..tjw..eeoot..* calls when flying from the young and within its breeding area. The adults and 1 juvenile walked and flew 300 m within a 4 ha area during 1630-1700 h. The young made *..zhep..* calls every 10 s while the adult was foraging away from it and out of sight, and the

adult gave an occasional *..tjwsee..* call and *..tzree..* call when contact with young had been lost. The juvenile did not forage on its own between 1630 and 1720 h, and a sibling sat silently on the side of the road for > 40 min. On 12 Mar 2000, what could have been (because of site proximity and plumage development) the same juveniles were sedentary and quiet there during the late afternoon, and adults were feeding them. They later formed a mixed flock with the adults and other pipits; the group engaged in group chases.

On 16 Feb 2002, between 1605 h and 1628 h, 2 fully-tailed juveniles were seen with a parent. The young were left alone and apart beside a landslide. An adult delivered crickets (*Nenobius* spp.) to the juveniles, silently, after flying directly to them. The adult gave *..tjwsee..* and *..tjwsit..* calls on posts, and loud *..tzree..* calls when it chased another pipit from near the 2 juveniles. It later became involved in a complex series of chases when 4 adults or independent young moved into the area. The 2 juveniles remained still on the ground still within 5 m of me, in a situation where an adult would have moved away.

On 30 Dec 2001 at 1605 h, I found 2 fully-feathered juveniles and an adult in a 3 ha newly-harrowed field. The adult flew in a wing arch and sang (the *..tzju.eeoot..* phrase) over the field. The 2 juveniles and the adult fed themselves within 5 m of each other in the field for 20 min. The only communication call was a *..tzree..* from the adult as it, and then the young, flew to a fence and then off further away chasing each other for at least 300 m. The young remained silent throughout the 38 min that I watched them. Two days later I could not find these birds despite an extensive search of the farmland and roads surrounding the field.

I also observed between 1250 and 1412 h on 25 Feb 1998 in sheep- and cattle-pasture in the Whitiakau Valley, Opotiki, 4 juvenile pipits that, from their flight ability, were probably the same age as the young birds seen on 30 Dec 2001 or slightly older than all those young followed in Northland. All could fly well and twice all 4 and then 3 rose and chased each other. Some of the 4 young were still being fed by parents 2-3 times  $\text{h}^{-1}$  on flies, grass moths (*Crambus flexuosellus*), and blue butterflies (*Zizina otis*). Two young pursued adults and were fed more frequently and 3 of the young foraged for their own food. The adults appeared to know where all the young birds were, and an adult flew to a juvenile that had remained stationary for 22 min and fed it, despite being another juvenile having constantly been pursued by another juvenile begging for food.

These observations of adult pipits and their 5-30-day-old dependent young suggest that some behaviours could help mammalian predators find

nests and individual young. The highest risk of predation is probably during the later stages of nest occupancy. Adults repeatedly used the same routes, and nestlings were noisy during food delivery and after adults left the nest. The calls of nestlings could attract rats (*Rattus* spp.), stoats (*Mustela erminea*), weasels (*M. nivalis*), ferrets (*M. furo*), or cats (*Felis catus*), and could potentially lead harriers (which hunt at least partly by sound) to nests. All of the nests seen were accessible to mammalian predators. The period after fledging was also risky because the juveniles could not fly well until their tails exceeded 75% of adult tail length. However, the dispersion of dependent young over a significant area (several ha) may lower the risk of losing a complete brood to a single predator at one time. When juvenile tail length exceeded 75% of adult tail length, the juveniles could follow adults over considerably greater distances, and away from the natal home range. Conceivably, the risk of predation then diminishes.

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