

## Understanding banded rail habitat use in Aotearoa's mangrove forests

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The management of Aotearoa New Zealand's expanding mangrove forests has drawn close attention from local communities and researchers alike. The removal of large areas of mangroves to restore coastal sandflats has sparked debate, not least because of the ecological uncertainties surrounding this management approach. Of particular concern is understanding the role mangroves play as habitats, including their importance to native avifauna. Thus, elucidating mangrove-avifauna relationships is key creating more holistic mangrove management strategies.

The bird species most referred to in association with Aotearoa's mangroves is the moho pererū or banded rail (*Gallirallus philippensis assimilis*); an estimated 80-90% Aotearoa's banded rail population is found within estuaries in the upper North Island, primarily in and around saltmarsh-mangrove habitats. Limited evidence suggests that mangrove habitats are important foraging grounds to banded rails, but this ecological relationship is poorly understood; banded rails are cryptic and difficult to study, while mangrove avifauna have received little scientific attention both locally and globally.

To address Aotearoa's mangrove-avifauna knowledge gap, our research project made use of multiple techniques over several field seasons to shed light on the habits and habitat use of the moho pererū in estuarine environments. As banded rails are ground foragers, they leave distinguishable footprints in their wake in muddy substrates. These footprints represent valuable data points, providing insight into their habitat use and selection patterns. Over the course of our study, we've gathered footprint and micro-scale environment data from almost 450 quadrats over more than 400,000 square-meters of mangrove forest in two estuaries. While we are still analysing these data, initial results indicate that banded rails prints are found with significantly higher frequency within mangroves stands than along their seaward edges or in adjacent unvegetated habitats (such as mudflats). Ongoing analyses seek to answer questions around mangrove selection at highly localised scales, to determine whether banded rails show preferences for mangrove patches based on their density, structure, size, or prey availability.

While footprint surveys are highly practical, they are limited to certain substrates, habitats, tidal cycles, and times of day. To address these shortcomings, we teamed up with DOC to capture, GPS-tag, and track six banded rail individuals in Mangawhai estuary in 2020 and 2021. To do so, we designed custom-built double-door cage traps and an adjustable GPS backpack system weighing less than six grams. Despite Covid19 interruptions, we collected thousands of GPS locations over two two-week periods, showing banded rail movement in twenty-minute intervals. Initial analyses indicate that banded rails spend their diurnal hours foraging within mangrove stands, returning to saltmarsh to roost for the night or at high tide peaks. However, several birds were observed to roost in mangrove stands overnight on occasion. Preliminary analyses indicate home range sizes of ca. 1.6 hectares, although this varies by location and individual. Upcoming analyses include modelling individual habitat selection and the interactions of individuals using the same mangrove stands at the same time.



*Image:* Jacques de Satgé carefully fitting an adult banded rail with a GPS backpack, under the supervision of DOC's Sarah Wills.