Supplementary material

Appendix S1. Silver Stream and Orokonui kakaruai (*Petroica australis*) nest survival data.

Appendix S2. Silver Stream and Orokonui kakaruai (*Petroica australis*) adult survival data.

Appendix S3. Literature review of historic studies and population surveys of kakaruai (*Petroica australis*) at Silver Stream.

Appendix S1. Nest survival data based on literature review with data source in parentheses. Sample size (*n*) refers to number of nests monitored that year.

	Estimated nest survival (%)	
Year	Silver Stream	Orokonui
2010/11	13.34 (*n* = 16; Jones 2016)	64.28 (*n* = 18; Jones 2016)
2011/12	2.69 (*n* = 12; Jones 2016)	77.01 (*n* = 29; Jones 2016)
2012/13	4.79 (*n* = 11; Jones 2016)	72.12 (*n* = 70; Jones 2016)
2013/14	10.36 (*n* = 18; Jones 2016)	72.95 (*n* = 68; Jones 2016)
2014/15	12.71 (*n* = 29; Jones 2016)	-
2015/16	21.38 (*n* = 24; van Heezik et al. 2020)	-
2016/17	22.71 (*n* = 21; van Heezik et al. 2020)	-
2022/23	Sample size too small	31.5 (*n* = 14; this study)

Appendix S2. Adult survival data from Silver Stream and Orokonui. All data sourced from Jones (2016).

	Estimated adult survival (%)	
Year	Silver Stream	Orokonui
2009	80.8	-
2010	83.3	85.4
2011	84.9	87.2
2012	86.8	88.7
2013	88.4	90.1
2014	89.8	-

Appendix S3.

The first Ornithological Society of New Zealand (OSNZ) Bird Atlas, covering data collected between 1969–1979, recorded kakaruai in three 10 000 yard squares in Dunedin (Bull et al. 1985). Between 1992–1994, OSNZ carried out pilot surveys for kakaruai at Silver Stream, recording individuals in exotic conifer plantations at Flagstaff (now cleared), and the native forests of Silver Stream (Efford & Dawson 2008; Parker 2013). Peat and Patrick (1995) described Silver Stream as a "refuge for robins".

From 1995–1999, OSNZ then began catching and banding kakaruai at both Flagstaff and Silver Stream (Parker 2013). The highest abundance of kakaruai was reported to be in the Douglas fir sections of Flagstaff, more so than in the adjacent native forest of Silver Stream (Schweigman 2002). Over this period, 50 individuals were banded in the Douglas fir sections. After 35 hectares of mature Douglas fir was harvested, all kakaruai in these sections were lost, and the banding program was abandoned (Schweigman 2002). Interestingly, the population at Silver Peaks seems to have been established in response to this clearing, with the first sightings at the Silver Peaks occurring in 2000 (Efford & Dawson 2008).

In the first standardised survey of the Stream population, Webb and Duncan (1998) used playback to attract males and made 74 unique sightings across three different habitat types (native forest, Douglas fir, and Monterey pine). Duncan et al. (1999) suggested that the distribution of kakaruai was heavily influenced by the abundance of ground-dwelling invertebrates. Following the same methodologies used by Duncan et al. (1999), Borkin (2007) also detected kakaruai at a significantly greater rate in Douglas fir than in the native forested areas of Silver Stream.

In 2008, a Birds New Zealand survey was conducted to improve conservation management of the Silver Stream population, and reported “no evidence for population decline” (Efford & Dawson 2008). Within the Silver Stream catchment area, 34 individuals were identified, and the authors assume a total population size (combined with the Silver Peaks population) exceeding 100 birds. A 500 ha area was surveyed through 2 minute surveys using playback to attract territorial males. The report states that most observations were of adult males. However, the report acknowledges that this survey was not designed to measure population size, and that no effort was made to obtain a complete count of robins or to estimate the proportion of birds missed (Efford & Dawson 2008).