

Observations and Considerations on Appropriate Buffer Zones and Limiting Disturbance to Nesting Killdeer (*Charadrius vociferus*) during a Large-Scale Construction Project

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When nesting birds are present, it is important to establish buffer zones around bird nests that appropriately reflect different levels of human disturbance. In general, buffer zone size will depend on the bird species, the amount of time and level of disturbance intensity to which a nest will be exposed (Blumstein et al. 2003, 2005) and, in some cases, the professional judgement of the environmental professional on a project. A survey of the literature can provide examples of varying buffer zone distances for the same species (Stantec Consulting Ltd. 2013), but limited information exists on the success of different buffer zone distances by species on hatching success.

The killdeer (*Charadrius vociferus*) is a medium-sized plover found in British Columbia during the spring and summer, when it migrates north to nest (Campbell et al. 1997). The species is a ground-nester in varied habitats that are often highly susceptible to disturbance. One typical location is on gravel bars along watercourses where the eggs are camouflaged in the nest (see Photo 1), and the adults have quick access to foraging locations. As a ground-nester, killdeer nests can be highly susceptible to disturbance, and noted impacts to ground-nesters include road construction (Forman & Alexander 1998), agricultural practices (Shuttler et al. 2000), and physical disturbance of the nest site by humans and animals in proximity to the nest (Langston et al. 2007).

Photo 1: Killdeer eggs



Source: James Baxter

Flow regulation on the Columbia River downstream of Hugh Kennleyside Dam near Castlegar can dewater stream habitat and strand fish when discharge reductions are made (Irvine et al. 2014). To avoid this in one area of high fish stranding, a gravel bar re-contouring project began in April, 2015. It was at this time that a killdeer nest was observed. In consultation with a wildlife professional, a 1.8 m diameter buffer zone around the nest was established. Exclusion fencing (1.0 m high non-see through black silt fencing) was placed around the nest location at the 1.8 m buffer to provide visual isolation of the nest from the majority of the construction work, while still allowing the female access to the nest (see Photo 2). After exclusion of the nest, the project continued with the use of heavy machinery to move substrate within the study area.

Photo 2: Enclosure



Source: James Baxter

The presence of the female on the nest was noted throughout each day of the project. I also measured the distances (in metres) at which disturbances in proximity to the nest by either humans (i.e., an environmental monitor) or heavy machinery caused the female to be displaced from the nest, both with exclusion fencing in place or removed. At the end of the project, the exclusion fencing was removed, and a 5 m diameter “island” of undisturbed habitat was left that surrounded the nest. Hatching success was determined by documenting the presence of eggs or young in the nest, or in proximity to the nest, after project completion.

Table 1: Average nest displacement distance of a killdeer (*Charadrius vociferus*) on the Columbia River by two types of disturbances, with and without exclusion fencing in place, April 27–29, 2015.

Disturbance type	Average nest displacement distance (m) with exclusion fencing	Average nest displacement distance (m) without exclusion fencing
Human	3.3 m (<i>n</i> = 4)	23.4 m (<i>n</i> = 6)
Heavy machinery	Not disturbed	Not disturbed

After the nest was isolated with exclusion fencing, the female immediately returned to the nest site and typically remained on the nest throughout the 3-day project. Although the female was not displaced from the nest by the heavy machinery, it was displaced by human presence (average distance of 3.3 m, $n = 4$; Table 1). This occurred when the nest was approached from the backside of the enclosure to determine whether the female was present. When the exclusion fencing was removed to allow work in proximity to the nest, the female did not seem disturbed by the machinery, even when it was close to the 5 m zone of undisturbed habitat (see Photo 3); however, the female was disturbed by human presence (average distance of 23.4 m, $n = 6$). In general, after the enclosure was removed, female killdeer behaviour was more focused on the presence of humans than machinery.

The nest site was visited for 19 days post-construction until eggs were not observed; based on observations of chicks at the site, it is believed that all eggs hatched (Table 2).

Photo 3: Heavy machinery working with Killdeer on nest.



Source: James Baxter

Table 2: Status of eggs of a killdeer (*Charadrius vociferus*) on the Columbia River following a large-scale construction project and disturbance by human and heavy machinery, April 27–29, 2015.

Days after construction	Female on nest	Eggs present
0	Yes	Yes
2	Yes	Yes
5	Yes	Yes
9	Yes	Yes
12	No	No
15	No	No (egg fragments found)
19	No	No (3 chicks and 2 adults in proximity)

Killdeer are a common ground-nesting bird species encountered in British Columbia during road and transmission line construction projects. The basic observations outlined here provide some helpful insights into managing the impacts of large-scale construction projects on this species and potentially other ground-nesters. Although the buffer zone around the nest was considerably smaller than typically recommended for this species (Bureau of Environmental Services 2010), use of exclusion fencing appeared to successfully isolate the nest and the female from disturbance when both heavy machinery and humans were in close proximity. Perhaps more interesting is that after the fencing was removed, the killdeer seemed to perceive human disturbance as more of a threat than the heavy machinery, and at a far greater distance. The fact that the female remained on the nest when the heavy machinery was as close as 5 m suggests that this species may be tolerant of an intense level of disturbance, at least for short periods of time, and that buffer zones can be modified in certain situations; however, as only one nest site was encountered during this project, these results should be treated with caution. At a minimum it appears that visual exclusion barriers have the potential to offer significant benefits for similar types of work. This is supported by work on other species (see Ikuta & Blumstein 2003).

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LIMITING
DISTURBANCE
TO NESTING
KILLDEER

Baxter

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