

Extraordinary concentration of wintering American Dippers in the Coast Range, British Columbia

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Abstract: We examined the seasonal fluctuations in numbers of American Dippers (*Cinclus mexicanus*) on three watercourses near Lillooet, British Columbia. Monthly surveys were carried out between December and August over three consecutive years (2000-2002) on a 10.6 km survey route. Dipper densities peaked in winter, achieving maximum densities of 10.8 birds per km of stream channel in December. Summer densities were up to 50-fold lower, ranging from 0.2 to 0.5 birds per km. All three watercourses were influenced by hydroelectric generation facilities but birds avoided the least natural watercourse, using the power canal only when numbers in the survey area exceeded 90 individuals. Our study indicates that this area is an important wintering ground for dippers and it demonstrates the importance of using multi-season surveys for assessing true habitat value for resident and migratory birds.

Key words: American Dipper, *Cinclus mexicanus*, winter density, season, riverine bird surveys, Coast Mountains, British Columbia

Introduction

The American Dipper (*Cinclus mexicanus*) belongs to the Cinclidae, a family of aquatic passerines specially adapted to turbulent mountain rivers and streams (Kingery 1996). These adaptations include a low metabolic rate, a high oxygen-carrying capacity of the blood and a very dense plumage that is impermeable to water and is maintained by regular bouts of preening. Dippers feed on aquatic macroinvertebrate larvae such as caddisflies and mayflies and they also opportunistically consume fish roe (Morrissey *et al.* 2004; Obermayer *et al.* 1999) and even small fish (Burcham 1904).

In most portions of its range the dipper is considered a resident species; as long as a stream supports patches of open water and an adequate food supply, it can remain throughout the year. As a rule, dipper densities are considerably higher in winter on suitable unfrozen watercourses than during the breeding season (Morrissey *et al.* 2004; Kingery 1996). Distinct altitudinal migrations have been found between the breeding and wintering grounds (Morrissey *et al.* 2004; Kingery 1996). Long-range latitudinal migrations have been speculated for some northern populations (Campbell *et al.* 1997), but this has not been confirmed.

In this paper we report on seasonal surveys of dippers near Lillooet, British Columbia.

Methods

Surveys were carried out near the town of Lillooet (50°41'N, 121°55'W), in the southern interior of British Columbia (Figure 1). Lillooet lies within the climatic rain shadow of the Coast Mountains and experiences low an-

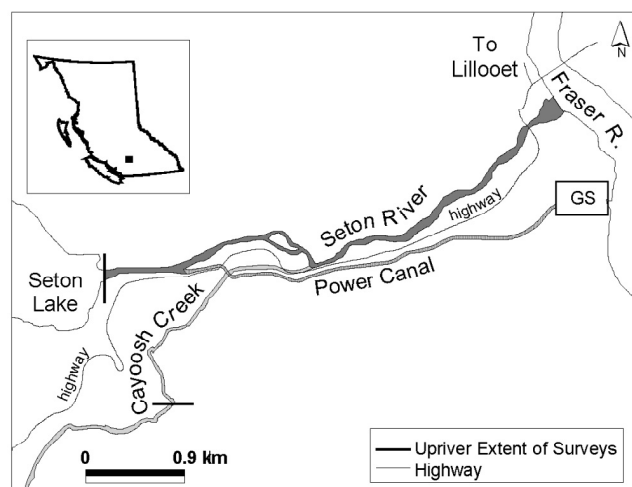


Figure 1. Seton River study area, Lillooet, British Columbia. "GS" refers to the Seton Generating Station. The black square in the inset map shows the location of Lillooet within British Columbia.

nual precipitation levels. The following three watercourses were surveyed: Seton River, Cayoosh Creek, and BC Hydro's Seton Canal (a hydroelectric power canal). These watercourses are all regulated by hydroelectric generation facilities.

Flowing out of Seton Lake Reservoir, the Seton River runs for 4.8 km before merging with the Fraser River (Fig. 1). Stream habitat consists of short riffles and cascades separated by long glides. On Cayoosh Creek, we surveyed upstream from the Seton River confluence for 2.3 km, at which point the creek becomes confined in a narrow gorge. Cayoosh Creek is characterized by a continuous riffle with only a few glide and pool sections. Riparian vegetation along the Seton River and Cayoosh Creek consists of a well-developed border of black cottonwood (*Populus trichocarpa*) with patches of red alder (*Alnus rubra*), red-osier dogwood (*Cornus stolonifera*), and willow (*Salix* sp.). Situated adjacent to the Seton River, the concrete-lined Seton Canal flows for 3.5 km to the Seton Generating Station beside the Fraser River. With a low gradient, the canal mimics a long deep glide. Constructed in 1956, the canal is devoid of riparian vegetation and lacks the natural instream habitat features that characterize the other two watercourses.

We conducted four surveys in 2000, seven in 2001, and four in 2002. For all surveys, one or two observers hiked upstream along the banks of each watercourse following established techniques for surveying dippers (Resources Inventory Committee 1998). Equipped with 8 X 30 binoculars, observers detected dippers by carefully scanning both shorelines and instream habitat features such as rocks and ice. The maximum distance between scans was 50 m. Dippers typically only flushed short distances (<50 m) in response to the observers' approach. To avoid double counting, birds were carefully monitored until they were either parallel or downstream of the observers. Based on the con-

spicuous nature of dippers and their tendency to fly when disturbed, we feel that our numbers reflect a reasonable estimate of dipper numbers on these watercourses.

We plotted bird densities for each month for which data were available. We performed a repeated-measures ANOVA to compare numbers in the different reaches. To put our results in a broader context, we reviewed literature containing similarly collected data from other rivers across western North America for surveys that were at least two km in length.

Results

We conducted a total of fifteen surveys between 2000 May and 2002 December. The seasonal pattern is consistent over the three years (Figure 2). In winter months (December to March) dipper numbers were up to 50 times higher than during the breeding season, reaching a peak of 10.8 birds per km in 2002. Dipper densities were very low during our five May and June surveys, and we did not observe any dippers during four surveys in July and August. Dippers used the three river sections differently ($F_{2,9,18} = 8.825$, $P < 0.003$). For all seasons combined, Cayoosh Creek had the highest density of dippers (8.1 birds/km), followed by the Seton River (4.4 birds/km). The Seton Canal (0.8 birds/km) was only used when dipper numbers exceeded 90 individuals in the study area. The Seton River area supports an unusually high density of wintering dippers, matched only by dipper densities in the Chilliwack watershed (Table 1).

Discussion

Seasonal fluctuation in the abundance of dippers in the Seton River is consistent with that documented in other southern British Columbia watersheds (Morrissey *et al.* 2004; Campbell *et al.* 1997; Cannings *et al.* 1987; King *et al.* 1973). These reports showed that dipper numbers increased from October until January, and most birds dispersed to breeding areas by mid-March. Our data show that dipper numbers in the Seton River area follow the same pattern, with peak numbers in December and January. Lacking autumn surveys, our densities may underestimate the wintering population, since Morrissey *et al.* (2004) found November to be the peak month on the Chilliwack River.

The surprising aspect of our results was not the seasonal shift in dipper numbers, but the extraordinarily high densities of birds in winter compared to the breeding season, with winter densities over 50 times greater. Morrissey *et al.* (2004) found similar peak winter densities (7.2-11.6 birds per km) but increases in winter were only five times higher than summer densities. Dawson (1923) reported winter densities of 9.0 dippers/km on the Chelan River in

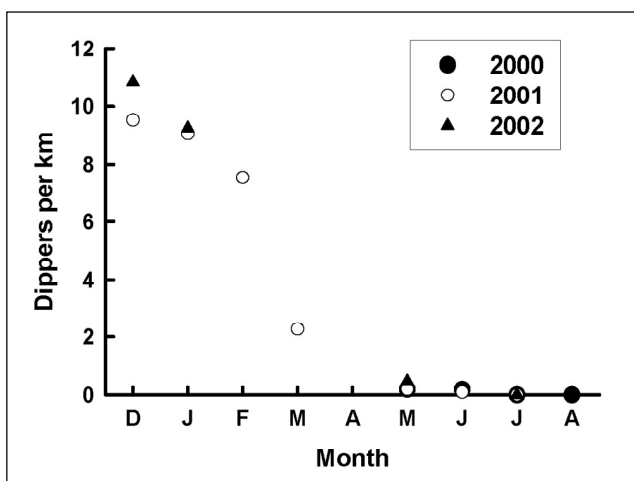


Figure 2. Seasonal densities of dippers at the Seton study area for 2000, 2001 and 2002. Densities are totalled for all three watercourses.

Table 1. Maximum densities of American Dippers in summer and winter. Only studies which surveyed 2 km or more of stream channel are included.

| Location | Year | Linear distance surveyed (km) | Summer density (birds/km) | Winter density (birds/km) | Source |
|---------------------------------|-----------|-------------------------------|---------------------------|---------------------------|---|
| Seton River, Lillooet, B.C. | 2002 | 10.6 | 0.5 | 10.8 | This study |
| Seton River, Lillooet, B.C. | 2001 | 10.6 | 0.2 | 9.5 | This study |
| Seton River, Lillooet, B.C. | 2000 | 10.6 | 0.2 | 9.0 | This study |
| Chilliwack River, B.C. | 1999-2002 | 16 | 2.1 ± 0.3 | 9.8 ± 1.4 | Morrissey <i>et al.</i> (2004) ¹ |
| Bridge River, B.C. | 1999 | 40 | 0.4 | 2.1 ² | Wright and Walton unpublished data |
| Squamish/Cheakamus Rivers, B.C. | – | 12 | – | 4.2 | R.J.Cannings <i>pers.comm.</i> ³ |
| Skagit River, B.C. | 1971 | 30 | 0.1 | 1.2 | King <i>et al.</i> (1973) |
| Gardiner River, Wyo. | 1922 | 10 | 1.0 | 7.5 | Skinner (1922) |
| Chelan River, Wash. | 1921 | 3 | – | 9.0 | Dawson (1923) |
| Boulder Creek, Colo. | – | – | – | 4.7 | Price and Bock (1983) |
| Rattlesnake Creek, Mont. | 1956 | 21.7 | 1.2 | 1.9 | Bakus (1959) |

¹ Means (± 1 SE) are reported. Summer densities are from early July.

² Helicopter survey conducted by the authors in March. Probably an underestimate of maximum winter density.

³ Cited in Campbell *et al.* (1997).

Washington, but this was only over a 3 km stretch and summer densities were not reported. Skinner (1922) reported a density of 7.5 birds/km on the Gardiner River in Yellowstone National Park, Wyoming, and densities may have been even higher in severe winters along the Park's low-elevation geothermal rivers (Terry McEneaney, Yellowstone National Park ornithologist, *pers. comm.*). The highest recorded density is a report of 35 birds observed on a 1 km section of the Okanagan River, 230 km southeast of our study area (Cannings *et al.* 1987). However, this observation was over a very short distance and was linked to a specific geographical feature in a location where natural low-elevation watercourses are scarce. Like the Chilliwack River, the Seton River area supports an unusually high concentration of dippers in winter. Unlike the Chilliwack River, however, the Seton River supports very low densities of dippers during the breeding season, suggesting its main significance is as a wintering ground.

Why does this area support such a high wintering concentration? One unusual feature of the Seton area is the close proximity of three watercourses which support different habitats. All three watercourses are controlled by hydroelectric facilities upstream. In Colorado, Price and Bock (1983) noted that birds used streams kept ice-free by hydroelectric plants in winter. For the most part, the Seton watercourses do not completely ice over in winter. The Seton power canal, the least "natural" watercourse, was only used when densities on the site were very high, and when part of Cayoosh Creek was frozen. This observation suggests that dippers show a preference for more natural reaches.

High densities of dippers might also be related to winter food availability. The Seton River supports a high concentration of spawning salmon, and dippers undoubtedly ex-

ploit the highly nutritious salmon eggs in autumn and winter (Morrissey *et al.* 2004; Obermeyer *et al.* 1999). The presence of thousands of salmon carcasses may also serve as a form of nutrient enrichment, stimulating the macroinvertebrate community (Wipfli *et al.* 1998).

Campbell *et al.* (1997) suggested that some dippers may migrate from more northern parts of British Columbia, similar to migration patterns documented for the White-throated Dipper (*Cinclus cinclus*) in Europe (Kingery 1996). To date, no long-distance migrations have been recorded for the American Dipper. The work of Morrissey *et al.* (2004) on the Chilliwack River suggests that altitudinal migrations are most typical. With overall numbers increasing from 0-5 birds in summer to 95-115 birds in winter, the Seton area may draw dippers from more than one watershed. Regardless of their source, this relatively unimportant summer breeding habitat becomes a very important wintering area for dippers. The disparity between summer and winter densities points to the importance of conducting multi-season surveys when assessing habitat value for resident species. Based on summer surveys alone, this area would have been incorrectly classified as marginal dipper habitat.

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