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# Measuring Sugar Water Consumption to Monitor Fluctuations in Hummingbird Abundance

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## INTRODUCTION

In a previous paper (Yunick, R.P. 1978. The balance at the feeder. *No. Amer. Bird Bander* 3:48-51), I described how measuring seed consumption at a bird feeder augmented capture data to define seasonal changes in bird abundance. In that study, the consumption of sunflower seed was used to measure changes in winter abundance of Black-capped Chickadees (*Parus atricapillus*) and Red-breasted Nuthatches (*Sitta canadensis*) at a feeder. Here I report on similar results using consumption of sugar water to determine seasonal variation in abundance of Ruby-throated Hummingbirds (*Archilochus colubris*), spanning spring arrival, breeding, and summer departure. Also, I compare these variations from one year to the next.

## METHODS

At a summer cottage at Jenny Lake, 7 km west of Corinth, Saratoga County, New York, I used three Perky-Pet brand "Four Fountains" feeders (8 fl oz capacity, Cat. No. 203-CP). Each feeder had a glass bottle reservoir for sugar water, four red plastic flowers with bee guards through which sugar water was dispensed, and a feeding perch at each flower. These feeders hung from the cottage roof overhang; all 1 to 2 m above ground level. Two were on the north side, 1.1 and 0.7 m from the northeast corner of the cottage (where typically a potted fuschia or similar plant hung), and one on the east side, 0.7 m from the same corner.

Sugar water was made from granulated cane sugar (sucrose). A plastic cup of 2 oz volumetric capacity was overfilled with sugar and scraped level with a wooden tongue depressor to deliver 49 g of cane sugar which was dissolved in 5 to 6 oz of well wa-

ter. The solution was put in the glass reservoir of the feeder which was then filled to the top with more well water, inverted several times to mix the contents, then reattached to the feeder. The resultant solution was 18.2 wt-percent cane sugar (sucrose).

The filled feeder was weighed to the nearest g with a Pesola scale and hung in place. At intervals of 6 to 13 days (70 percent were six to eight days), each feeder was weighed to determine the amount of sugar water used during the interval, and the collective amount was divided by the number of elapsed days to determine the average total use per day. Feeders were cleaned and refilled with fresh solution as needed, mostly every six to eight days. The data reported here come from the time periods 30 April - 7 October 1995 and 5 May - 12 October 1996.

Mist nets placed at these feeders, as well as at nearby seed-dispensing feeders, were used to capture hummingbirds for banding.

## RESULTS AND DISCUSSION

The following figure shows the amounts of sugar water consumed during 1995 and 1996. The results for 1995 show a gradual increase in usage, peaking in late May, coinciding with the arrival and spring migration of this species through the area. Consumption declined sharply thereafter as breeding of the resident population commenced. Another peak occurred in July coinciding with the increased demand upon parents to feed nestlings. New fledglings typically appeared at the mist nets in very late July or, more commonly, early August, just following this feeding peak.

The decline after the July consumption peak was less extensive than that following the May migration peak, because newly fledged birds increased the total population of hummingbirds using the feeders. Another peak in late August represented the passage of southward migrants through the area. It was followed by another sharp decline as hummingbirds departed from the area by late September. In fact, they were seen only rarely after early September. The low consumption rates in early October at a time when hummingbirds were not normally seen may represent evaporative losses from these feeders.

By comparison, 1996 data were different from 1995 data in several respects. Casual observations of hummingbirds at Jenny Lake indicated that they seemed fewer in number and later than usual in arrival in 1996. Both of these observations were corroborated by sugar water consumption. Peak usage associated with spring migration in 1996 occurred in early June, compared to late May in 1995; and peak use was about 55 g/day compared

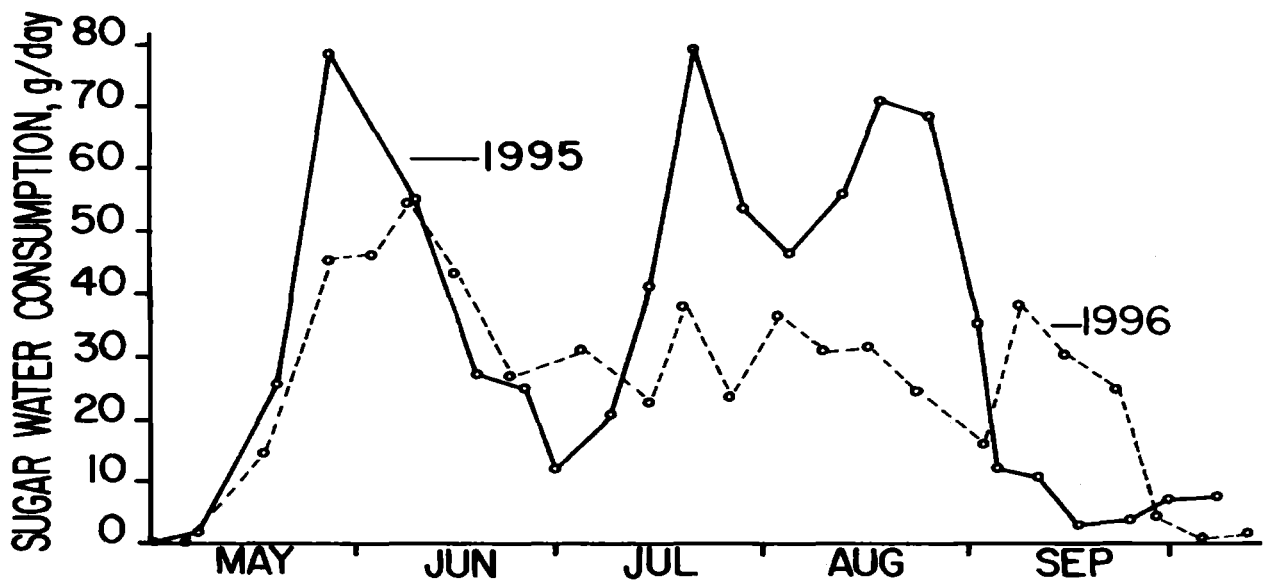
to about 78 g/day in 1995. Also, the number of May-June bandings in 1996 was fewer than in 1995 (four vs seven).

In 1996, the feeding peak during nesting was irregularly defined compared to that in 1995. The 1996 peak coinciding with fall migration occurred in early September, later than the late August peak in 1995.

Since these feeders were present and in use every day, though I was not, they functioned as useful surrogates for gathering data in my absence. Collecting these food consumption data helped to quantify fluctuations in the hummingbird population which used these feeders.

#### ACKNOWLEDGMENT

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Average daily use of sugar water by Ruby-throated Hummingbirds at Jenny Lake, New York, for 30 April - 7 October 1995 and 5 May - 12 October 1996. Data for 1995 are represented by solid line; 1996 by dashed line.