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Predation of Mist Net Birds and an Investigation of a Solution

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ABSTRACT

Predation of birds in mist nets can become a problem during banding efforts, especially at long-term, year-round, banding stations. The San Francisco Bay Bird Observatory started patrolling net lanes between net runs to deter grey fox (Urocyon cinereoargenteus) and house cats (Felis catus) from taking birds captured in the nets. We compared two years of capture data pre-predator patrol with two years of data during predator patrol to investigate the effect of an increased human presence on the capture rates at the banding station. We used four resident species: Bushtit (Psaltriparus minimus), Chestnut-backed Chickadee (Poecile rufescens), Common Yellowthroat (Geothlypis trichas), and Song Sparrow (Melospiza melodia) because resident species should better demonstrate potential year-round effect from predator patrolling should they occur. There was no significant difference found in the capture rates pre- and during predator patrol for these four species. Also, no change was observed in the long-term nine-year trend in capture rates for the four species after predator patrol was initiated. Our results suggest that an increased human presence at net lanes may be useful in deterring predators at banding stations, while not affecting capture rates at the nets.

INTRODUCTION

Mist nets are a tool commonly used in ornithological research (Low 1957; Keyes and Grue 1982; Ralph et al. 1993). Literature on the survival rate of birds in mist nets estimate mortality rates at less than 1% (Low 1957; Keyes and Grue 1982; Ralph et al. 1993). Although mortality rates are low, any reduction in this rate would be an improvement as guided by the North American Banding Council (2001:3, 44-45). Humans cause a majority of the mortalities through banding injuries (Keyes and Grue 1982), but other causes include extensive entanglement (Keyes and Grue 1982) and predation during capture (Freer 1973; Barclay 1977; Allen 1978).

The San Francisco Bay Bird Observatory (SFBBO) runs a long-term banding station where predation by grey fox (*Urocyon cinereoargenteus*) and house cats (*Felis catus*) became a problem in the winter of 2001, when it became evident that predators learned the mist nets provided an easy meal. In January 2002, we closed all nets for a three-month period while we considered potential solutions to stop the predations. For about a month leading up to January 2002, there was an average of one bird/wk being taken in the nets, which the banders at the time considered to be unacceptable. Our solution was to have banders patrol the nets between net runs to deter the predators. Discussions with other bird observatories led us to believe that increased activity at the mist nets could cause a change in capture rates, but we decided that the safety of the birds took precedence.

A few papers have measured the impact of human activity on bird behavior in a natural setting (van der Zande and Vos 1984; Gutzwiller et al. 1994; Miller et al. 1998; Gutzwiller and Anderson 1999). Since these studies focused on human disturbances, we compared them with our study investigating the effect of increasing visitation at a mist net from once every half hour to once every 10 – 15 min. Most of these studies reported that treatments with more disturbance influenced bird behavior, but although many species respond, disturbance response was species specific (van der Zande and Vos 1984; Miller et al. 1998; Gutzwiller and Anderson 1999). Even though researchers might assume that mist netting has little impact on birds due to the human presence, continuous human presence at a mist net would seem more likely to influence bird behavior. Our data allowed us to investigate the effect of increased net visitation from a 30- to a 10 to15-min interval, and to compare our results to the other human disturbance studies (van der Zande and Vos 1984; Miller et al. 1998; Gutzwiller and Anderson 1999).

To identify disturbance effects, we compared capture rates at the station before and after the initiation of predator patrol along mist net lanes. We compared four year-round resident species: Bushtit (*Psaltriparus minimus*), Chestnut-backed Chickadee (*Poecile rufescens*), Common Yellowthroat (*Geothlypis trichas*), and Song Sparrow (*Melospiza melodia*) because resident species should better demonstrate the year-round effects of disturbance from predator patrolling on capture rates. We also investigated correlations between our data and regional trends to make sure variation in regional trends was not masking our results.

METHODS

The Coyote Creek Field Station is located along Coyote Creek at the southern end of San Francisco Bay, California (37° 28' N, 122° 03' W). Riparian restoration was initiated at the site with the planting of woody vegetation in 1986. A portion of the banding area is in relic riparian forest along the creek. There is also a portion of the floodplain that was restored with woody vegetation. Between the two wooded areas is a flood channel where woody vegetation is cleared periodically to allow for the release of floodwaters when needed. A thorough description of the site is given in Sandercock and Jaramillo (2002).

Banding data collected between 2000 and 2001 before predator patrol and 2003 and 2004 during predator patrol were used in this analysis. Banding was conducted three days a week (Wednesday, Saturday, and Sunday), and different nets were opened each of the three days. On Wednesday 14.5 nets (the 0.5 is a half net) were open, on Saturday 14 nets, and on Sunday 19 nets. The nets were run for a 6-hr period starting approximately 30 min before sunrise. Nets were <500 m apart and covered an area of approximately 17 ha. Data were standardized as captures/100nh due to the differences in number of nets used each day.

Beginning in January 2002, at least one person was assigned to patrol the net lanes for predators, and any birds that were found in the nets during the patrol were collected immediately. If we spotted a grey fox, we chased it away. If we spotted a cat, we set traps after banding that day to try to capture it. Captured cats were taken to the Humane Society and all other animals were released from the trap on site. Grey foxes were not removed because they are native at the site. After initiation of predator patrol, there were no longer any bird predations in the nets. We did not measure human presence at the site prior to predator patrol, but we estimate human presence was at least doubled after the initiation of predator patrol.

To compare captures before and after the initiation of predator patrol we paired months before and after and ran a paired t-test on the two years pre- and post-patrol period. By using a paired month t-test, effects of season were alleviated since similar months were compared with each other. If a significant difference was found in the paired month t-test, a t-test would be used to investigate differences between years in order to try to classify the difference as yearly variation or differences due to the effects of predator patrol. In our study, this step was not necessary. Capture rates were log transformed prior to the t-test to meet assumptions of normality. We also inves-tigated trends in capture data at the site using data from the station and within the region using Breeding Bird Survey

(BBS) data for the 9-yr period prior to 2004. We used this comparison because effects from predator patrol could be masked by population changes occurring during the 4-yr analysis period.

RESULTS

There were 915 Bushtit captures before and 632 during predator patrol, 234 Chestnut-backed Chickadee captures before and 208 during predator patrol, 672 Common Yellowthroat captures before and 544 during predator patrol, and 1,287 Song Sparrow captures before and 1248 during predator patrol, with a total of 21,806 net-hours before and 21,242 net-hours during predator patrol.

The average number of captures/100nh for Bushtits prior to predator patrol was 4.16 ± 0.51 and after the initiation of predator patrol was 3.07 ± 0.28. There was no significant difference found between the pre- and post-treatment periods (t_{23} = 1.78, P = 0.088). The average number of captures/100nh for Chestnut-backed Chickadee prior to predator patrol was 1.04 ± 0.15 and after predator patrol was 0.99 ± 0.12. There was no significant difference found between the pre- and post-treatment periods (t_{23} = 0.13, P = 0.901). The average number of captures/100nh for Common Yellowthroat prior to predator patrol was 3.03 ± 0.48 and after predator patrol was 2.51 ± 0.35. There was no significant difference found between the pre- and post-treatment periods (t_{23} = 1.57, P = 0.130). The average number of captures/100nh for Song Sparrow prior to predator patrol was 5.70 ± 0.94 and after predator patrol was 5.46 ± 1.04. There was no significant difference found between the pre- and post-treatment periods (t_{23} = 0.64, P = 0.531) (Table 1).

We also graphed the trend in captures/100nh for each species from 1996 to 2004 (Fig. 1) to investigate changes in the trend after the initiation of predator patrol in 2002. Song Sparrow and Common Yellowthroat captures increased after the start of predator patrol. For the Bushtit and Chestnut-backed Chickadee there was a slight decline, but not below the average pre-predator patrol levels. Regional trends in the BBS data are steady for Bushtit, Chestnut-backed Chickadee, and Common Yellowthroat, and although there is more variation, the Song Sparrow trend also shows little change (Fig. 2; Sauer et al. 2005). Linear regression of our banding data with BBS data indicates that there is little correlation except in the case of the Bushtit: Bushtit ($F_{1,6}$ = 11.42, P = 0.015, r^2 = 0.66), Chestnut-backed Chickadee ($F_{1,6}$ = 1.73, P = 0.236, r^2 = 0.224), Common Yellowthroat ($F_{1,6}$ = 0.30, P = 0.869, r^2 = 0.01), and Song Sparrow ($F_{1,6}$ = 0.29, P = 0.609, r^2 = 0.05).

Table 1. Calculated values of the mean number of birds captured/100 net-hours for four species before and during predator patrol at the Coyte Creek Field Station, CA. Values resulting from paired t-tests of the log of the number of captures are also presented testing for statistical differences before and during predator patrol.

		Before Predator Patrol		Pedator Patrol			
Species	N	Mean	SE	Mean	SE	t-value[1]	p-value[1]
Bushtit	24	4.16	0.51	3.07	0.28	1.78	0.088
Chestnut-backed Chickadee	24	1.04	0.15	0.99	0.12	0.13	0.901
Common Yellowthroat	24	3.03	0.48	2.51	0.35	1.57	0.130
Song Sparrow	24	5.70	0.94	5.46	1.04	0.64	0.531

[1] Values were calculated after log transformation of means.

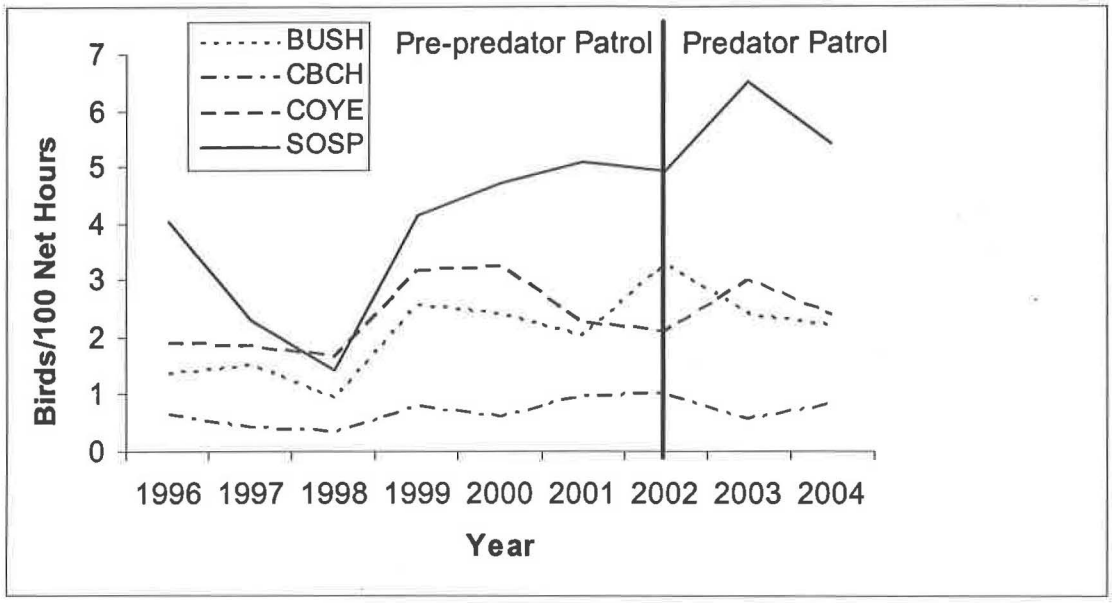

Fig. 1. Long-term trends in captures/ 100 net-hours for four resident species (BUSH = Bushtit, CBCH = Chestnut-backed Chickadee, COYE = Common Yellowthroat, SOSP = Song Sparrow) prior to and during predator patrol at the Coyote Creek Field Station, CA.

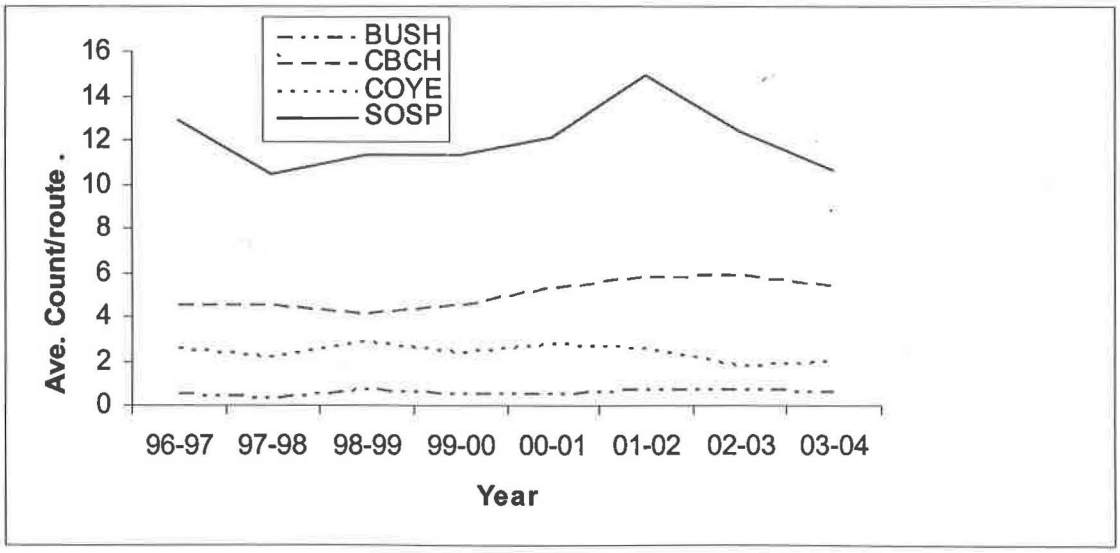

Fig. 2. Long-term trends in the average count/route for four resident species (BUSH = Bushtit, CBCH = Chestnut-backed Chickadee, COYE = Common Yellowthroat, SOSP = Song Sparrow) for Breeding Bird Survey Data in the Southern Pacific Rainforest physiographic area with data from 1996 through 2004 (Sauer et al. 2005).

DISCUSSION

The comparison between pre- and post-predator patrol indicates the increased human presence on the net lanes had no influence on the capture rates for the four species we tested. This was contrary to findings of several studies on impacts of human disturbance on birds (van der Zande and Vos 1984; Miller et al. 1998; Gutzwiller and Anderson 1999) that found an increase in recreational use had a negative effect on bird presence. A possible explanation for this difference is banders walking on the net trails are relatively quiet and they move slowly along the trail (except when deterring a fox from using the net lanes), thus having less of an impact than other types of walkers. Also, banding has occurred at this site since 1982, so effects of banding traffic is not new. Along this line of thinking: We used resident species in these analyses as an initial look into the influence of an increased human presence at the nets, but resident species may acclimate to a human presence and transient species may respond differently than residents. Thus, further research is needed to extend these ideas to transient species. The increased presence of predator patrollers may not be much of a stressor increase when compared to the initial presence of people on the net trails.

Local trends at the site for the species we studied were fairly consistent except for Song Sparrow, which increased for much of the 9-yr period. A negative effect on the local population caused by the initiation of predator patrol should appear as a decrease in the capture trend data. The Bushtit and Chestnut-backed Chickadee slightly decreased after the initiation of predator patrol, but we would argue this was likely a natural fluctuation as the numbers did not fall below the average capture rates of past years. As would be expected, local trends fluctuated more than regional trends. A comparison using linear regression revealed that regional trends are not correlated with local population trends for Black-capped Chickadees, Common Yellowthroats, and Song Sparrows. More importantly, there were no indications from the regional trend data that variations in regional trends were masking the results we found in the analysis of local data.

We found very little published information about predation in mist nets and what can be done to prevent it. What little information we did find pertained to unusual incidents with deer (Allen 1978), Roadrunners (Barclay 1977), and a raptor (Freer 1973) taking birds from the nets. Having worked at several banding stations, we know predation can be a widespread problem, although we have heard of only a couple of instances where it continued beyond an initial incident. We think long-term problems like those at the Coyote Creek Field Station are rare, but should be addressed. In this case the increased presence of banders on the net trails was enough to deter predators from taking birds from the nets.

The findings of this study indicate that a human presence can have less of an effect on the capture rates of birds than generally thought, at least for resident species. Also, the increased presence of humans can have the benefit of limiting the use of the area by predators, especially when there is a specific effort to deter those predators. We feel that predator patrol is an acceptable method to deter predators, but we would encourage others to test its effect after an initial-use period, as we have.

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