Title
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MANAGEMENT OF BIRDS ASSOCIATED WITH BUILDINGS AT THE UNIVERSITY OF CALIFORNIA, BERKELEY

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ABSTRACT: Information concerning fifteen species of birds associated with twenty-five buildings on the University of California at Berkeley has been collected for nineteen years. Fourteen species are included under three minor associations (temporary roosters, building invaders, and species that nest on, or in buildings in small numbers). Two species (cliff swallows, and feral pigeons) have caused major problems. Feral pigeons problems have been the most difficult and complex to resolve. Case histories are used to describe problems associated with these birds (ectoparasites, building defacement and messiness, slipping hazards and noise), and human contributions to the problems (feeding, trap vandalism, and legal and political constraints, and ecological and architectural design factors). Site specific solutions are emphasized, and future concerns and goals are discussed.

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INTRODUCTION

The values and popularity of birds are well known and accepted (Booth 1983). Less appreciated are the problems and costs to humans and their activities by birds associated with buildings. Costs to birds (disruption of migration and mortality from collisions with buildings) are important, but not significant on the Berkeley campus and are not discussed in this paper. Based on the amount of resources required to resolve problems (none, occasional capture, or single treatments every three to four years), fourteen species of birds are of minor importance. Four of these species roost on buildings, four are building invaders, nine nest on (or in) buildings in small numbers. Cliff swallows (also a minor problem on some buildings) and feral pigeons are sources of major problems.

Species of Minor Importance

Roost on buildings

1. Burrowing owl, *Athene cunicularia*
2. Brewer's blackbirds, *Euphagus cyanocephalus*
3. Peregrine falcon, *Falco peregrinus*
4. House sparrows, *Passer domesticus*

Building invaders

1. Brewer's blackbirds, *E. cyanocephalus*
2. Brown towhees, *Pipilo fuscus*
3. Hummingbirds, unknown species
4. Mourning doves, *Zenaida macroura*

Nest on (or in) buildings in small numbers, no complaints

1. Kestrels, *Falco sparverius*
2. Robins, *Turdus migratorius*
3. Starlings, *Sturnus vulgaris*
4. White-throated swifts, *Hirundapus caudacutus*

Minor complaints

1. Barn swallows, *Hirundo rustica*
2. Cliff swallows, *Hirundo pyrrhonota*
3. Mourning doves, *Z. macroura*

Complaints and nesting sites eliminated

1. House finches, *Carpodacus mexicanus*
2. House sparrows, *P. domesticus*

METHODS—MINOR PROBLEMS

The four species noted for roosting on buildings are included because of the considerable mess associated with their presence. Nothing was done about the burrowing owl and the peregrine falcon, because they are protected species and though extremely messy, especially the falcon, they were in inaccessible locations. The mess created by Brewer's blackbirds is widely dispersed and of noticeable, but minor importance. House sparrows nesting on decorative brick walls on Eshelman Hall create a mess, but less than that of the sticky repellent substances, and every couple of years the walls are power washed to remove the whitewash.

Building invaders can sometimes be removed by opening windows, darkening the room by turning off the lights, and flushed birds will fly out the open windows. Because blackbirds and doves fly to the upper parts of a room they are not easily flushed out windows. They can be flushed and caught with a long-handled net in dim light after dark and released out of doors. Blackbirds are no longer a problem because the Terrace Cafe where they roosted on a decorative wooden frame over the entrance and where they frequently entered through the open doors has been closed. Towhees are easily chased out doors, because they fly close to the ground. Hummingbirds are no longer a problem inside the Math Sciences Institute. During hot summer days the doors at the ends of the halls were left open to provide ventilation, and the birds were attracted to large, red fire alarm bells near the outside entrances. We checked with the campus fire marshal regarding code requirements for the color of fire alarms, there were none. The bells were painted white, and the hummingbirds no longer come inside.

We have received no complaints about four species that nest on (or in) buildings in small numbers and no controls are used. Kestrels nest in second story spaces between the ceiling and roof where ventilation screens have been removed. Robins nest on electric control boxes in out-of-the-way locations. Starlings nest in holes in walls, and white-throated swifts nest in cracks in Memorial Stadium.

Minor complaints have arisen from a few barn swallows nesting on porch lights, and a few cliff swallows nesting above entrances. Barn swallows are uncommon and we are trying to design a system to catch the mess. A shelf that can be easily cleaned at the end of the nesting season. Cliff swal-

lows nesting above sites where droppings will not catch on the side of the building below, or where the droppings collect on the ground are almost never complained about. A few nesting above a building entrance, or where an unsightly mess accumulates can usually be prevented from nesting by physical removal of the mud foundations by maintenance personnel. Mourning doves enter rooms through open windows. Usually the nest is removed and cleaned up after the young have fledged, and the window is closed. After the nest is abandoned chicken mites, *Dermanyssus gallinae*, may attack humans in the room. Chicken mites are easily killed with pyrethrin aerosols registered for space applications in offices.

House finches and house sparrows nesting on a ledge provided on the inside top of decorative columns created a racket that bothered residents of the building. During the winter, nesting materials were removed and the holes at the tops of the columns were sealed with patching concrete.

METHODS—MAJOR PROBLEMS

Cliff swallows and feral pigeons are sources of the most serious bird problems on buildings. Cliff swallows nesting on buildings adjoining swimming pools create a slippery mess and a potential source of pathogens (Weber 1979), and nesting near observatories can befoul telescope lenses with their droppings. In these locations the nests were removed and sticky repellents were applied. The sticky repellents are messy, but tolerable in these locations. On the west face of the Lawrence Hall of Science, a three storied man-made cliff, high on a hill above the Berkeley campus the visual impact of the sticky repellents is not tolerable and the newly started nests are removed by building maintenance personnel each season until the swallows give up, an expensive, but effective solution.

Pigeons are the major pest species. Problems associated with pigeons on buildings are from droppings, noise, ectoparasites and animal rights activists. Droppings create potential health hazards from the pathogens that they contain (Weber 1979). They are expensive to clean up, and accumulations of pigeon droppings are a major breeding source of little house flies, *Fannia canicularis*, in cities in the San Francisco Bay Area (Poorbaugh 1990). People slip and fall on slippery accumulations on porches, and the acidic droppings even erode stone window sills. Noise from nesting and court-ing birds is disruptive for nearby office workers, and ecto-parasites, chicken mites, often invade adjacent workplaces.

Controls used for pigeons on the UCB campus involve exclusion, baiting and trapping. Exclusion is used where possible, because it provides the most cost effective, long-term benefits. Exclusion measures we have used are netting and elimination of nesting and roosting ledges. Baiting with Avitrol is used on buildings where exclusion is not possible and to eliminate resident birds that "hang around" after exclusion has been completed. Trapping is used in one location where non-target racing pigeons would be affected by baiting.

Exclusion with netting has been used at two sites, Hearst Mining Building and the Banway Building. Hearst Mining, a four story building with decorative beams under an overhanging roof, is on the national historic building registry. Few sites have been better constructed for the shelter and propagation of feral pigeons. We trapped pigeons on the roof for several years after I started in 1973, but we had to give up because we could not prevent the traps from being vandalized. It then took over ten years of complaints about ectoparasites, people falling down the stairs, and several costly cleanings of the window sills before campus architects would relent to having the beams covered with black, nearly invisible plastic netting. The Banway Building is multi-storied and has an outer wall of decorative blocks. Each floor has a three foot wide porch between the decorative block wall and the outer wall of the offices. Pigeons were nesting and roosting on this porch. Office workers were complaining about the mess, noise (from squabs and adults), and ectoparasites that covered their walls and furniture and bit some of the employees. Wire mesh screen was installed on the inner face of the decorative blocks. However the problem persisted in one location. There was a hole in a corner of one of the porches that a pair of pigeons continued to nest in. Removing the young, treating the nesting cavity with a pyrethrin aerosol, sealing the entrance, and space treating the adjacent offices with a pyrethrin aerosol ended the complaints.

Exclusion by ledge elimination has been used at three sites.In two of these buildings, steeply sloped (Courtsal 1983), smooth patching concrete was used to cap protected flat ledges used for nesting and night time roosting. Flat-topped light fixtures hanging in a passageway at one of the sites were used for roosting. "Dunce cap" tops were added to these fixtures. In the third building, Sproul Hall, an exposed third story ledge over a feeding area was used for loafing. Sproul Hall is covered with glazed sandstone that resembles granite. To refinish and protect the decomposing glaze this building was sprayed with seven layers of acrylic and epoxy polymers (Hitchins America, Inc.) that provided a smooth, self-cleaning, slippery surface that the pigeons no longer landed on.

Baiting with Avitrol is used on four buildings (Memorial Stadium, Martin Luther King Student Union, Barker Hall, and Evans Hall). Whole corn is used for prebait and treated bait (Jackson 1991). All baiting is done on rooftops (three, five, six and twelve stories high). The size of the bait and locations tend to exclude non-target birds, and we have had no problems with non- target native species. Baiting is done as soon as the first pigeons are noticed (before they are numerous enough for people to notice and start feeding). Treated bait is placed on a Friday afternoon. Pigeons with food in their crops have a much more varied reaction time than unfed birds. Therefore, birds fed late in the day are more likely to scatter and not be noticed (especially the small numbers that we treat, usually two to six birds), and affected birds are less likely to be noticed on weekends.

Memorial Stadium has an internal maze of structural steel beams that cannot be practically modified to exclude pigeons. However,the stadium is not close to a source of immigrant birds and since the last baiting fours years ago, this structure has been free of pigeons.

Martin Luther King Student Union is between Upper and Lower Sproul Plazas. There is a large flock of pigeons that is fed three blocks away at People's Park, and several times a year (three to four) a small group of immigrants appears on the Student Union. If allowed to remain, they attract others, and people start to feed them. More are attracted, and they start to nest in the open-ended, fluorescent light fixtures at the northeast corner of Lower Sproul Plaza. Additional risks are posed by animal rights groups which often place

informational exhibits and tables on Upper Sproul Plaza, within view of the bait placement site. We are careful to treat immigrants soon after they appear.

Barker Hall roof has shelter, water, and grit sized aggregate. It is also the location of a high tech biohazard containment laboratory, and is close to sources of immigrant birds (downtown Berkeley, and Ohlone Park). The roof has an open center with shelves of parallel hung pipes, and ventilation fans and ducts placed under a ten foot wide overhang around the outer perimeter. Pigeons were also using a storeroom which had an open sliding door and no screen door. A screen door eliminated access to this room. However, the birds cannot be excluded from the rest of the roof area without interfering with access for stationary engineers and other maintenance workers. In this location baiting is required two to three times a year. Prebait and bait is placed out-of-the way on the top of a small, flat roofed structure on the roof.

Evans hall is a massive concrete-walled cliff rising from the campus. It was designed without flat window ledges, and I use it as an example of how window ledges should be constructed to prevent bird problems.However, the top floor has porches on the east and west sides that extend the length of the building. The porches are covered, but open on the sides and provide wonderful views. Little used picnic furniture and planter boxes were used by pigeons for nesting and the mathematicians and computer scientists who also occupied the top floor complained about the mess and the incessant cooing. The picnic furniture was removed, bird netting was placed over the planter boxes, and baiting was used to remove the site loyal birds (Jackson 1991). The site remains attractive, and baiting once, or twice a year is used to remove new immigrants. Overflow population from Evans Hall and the adjacent Hearst Mining Building was the source of pigeons that caused complaints from nearby structures. Now that the breeding populations are no longer present on Evans and Hearst, baiting on Evans (which is over twice as high as Hearst) provides effective control for the entire area.

The only location where trapping is still used is on the roof of the Marchant Building. This former manufacturing plant covers an entire city block, and after the university acquired Marchant the fourth floor was rented to a biotechnology company in a joint venture. A flock of several hundred birds used to live on the roof, roosting and nesting in an unused cooling tower, and feeding on broken pie crusts that were tossed on the sidewalk across the the street at the St. Francis Bakery. The conservator of the Campus Herbarium, also housed in the Marchant Building, requested that the bakery no longer put out the pie crusts, because the odors can attract herbarium (also called cigarette) beetles, *Lasioderma serricorne*, from several miles away. The bakery stopped putting out the broken pie crusts. The cooling tower was cleaned up and removed by a contractor and the remaining flock was baited. After several months a flock of thirty birds suddenly appeared after a baiting program at a horse race track several miles away. Staff members of the biotechnology program were concerned about pathogens vectored by pigeons and upset that the pigeons were roosting over the supply air intake and that droppings were collecting on the vents. We baited again, and caused some mortality in a newly started nearby racing pigeon flock. To prevent further problems we established a joint effort program. I supply the traps, bait and advice. Biotechnology staff members bait the traps whenever new pigeons appear on the roof. The staff members notify the pigeon racer whenever birds are trapped, and he picks up and removes them. Aggregate on this roof is mostly larger than 1/4 inch and is not suitable for grit.

DISCUSSION

Management of birds associated with buildings in the UCB program begins with an assessment of which control measures can be practically and legally applied. Redesigning the building to exclude birds by screening, eliminating roosts, or eliminating the attraction (painting red fire alarm bells white, eliminating an attractive food source (broken pie shells)) is preferred to shorter lived treatments. Sometimes sticky bird repellents are used where the messiness is not objectionable. Where it is objectionable, active nest removal by building maintenance workers has proven effective. Baiting is used to control feral pigeons where habitat modification is not practical, and baiting is an essential part of our program. Bait applications are designed to scatter small numbers of target birds. This differs from the approach that is recommended for controlling large flocks (feeding early in the morning and gathering affected birds). The length of effectiveness depends on immigration pressure and the attractiveness of the structure. Attractiveness of the structure seems to be associated with height, availability of ledges either near feeding sites for loafing, or protected sites for nesting and roosting at night (Murton and Thearle 1972). Availability of grit and water are factors in site attraction for pigeons. However, daytime use is minimal with our low populations and the importance of these factors is impossible to measure. UCB Pest Management provides short term services (evaluations and recommendations for redesign, application of repellents, and baiting). More labor intensive controls (active nest removal and trapping) are provided by maintenance and support staff members on site.

Early population control enables us to center our efforts on the most attractive sites for the major problem species, feral pigeons. There are a number of additional sites that would provide additional protected roosting and nesting sites if the population were higher, and birds were forced into less attractive, but perfectly suitable locations. If for some reason we were no longer able to remove immigrant birds by baiting the program would require much greater resources than are now required (1 to 2 hours per week).

We review blueprints for new buildings and have had some success with campus architects in developing criteria for preventing the use of pest inducing designs. However, the goals of people who use and maintain structures are usually in conflict with the short term benefits of selecting the lowest bidder and bringing a contract in on time and at least cost. This conflict is much broader than pest prevention and poses profound fundamental concerns in a future of declining opera-tional funding for the University.

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