Round and Around and Around She Goes: Flight-Conditioning in a Continuous Flyway

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Abstract—Construction of very large flight cages and creance flying are two traditional strategies for flight-conditioning larger raptors. This paper describes an innovative alternative: a continuous oval flyway surrounding a group of housing cages. Birds making multiple laps may fly 500 feet or more; however, the footprint of the structure is a relatively compact 64 x 52 feet.

INTRODUCTION

The challenges of pre-release flight conditioning for the larger raptors are well known to rehabilitators. For species such as bald and golden eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*), black and turkey vultures (*Coragyps atratus* and *Cathartes aura*), peregrine and gyrfalcons (*Falco peregrinus* and *Falco rusticolus*), a minimum of 100 feet of linear flight opportunity is recommended by NWRA and IWRC (Miller 2000). Engelmann (2002) encouraged raptor rehabilitators to build the largest affordable flight cage; similarly Wolff (2002) has commented, "It is not possible to build too large a flight cage for eagles" (p. 33). Even a very large rectangular cage offers little opportunity for banking and turning; however, one cage described by Wolff (2002) is L-shaped. As noted by Engelmann (2002), in addition to cost, cage size depends on factors such as available space, purpose, species, and number of birds to be housed; a mega-cage may be impractical for reasons other than funding. Creance flying has been advocated by some (e.g., Arent 2001) as an alternative to flight-conditioning within a cage. However, this technique requires extensive training and skill on the part of the human handler, and others (e.g., McKeever 1999) believe that creance flying is not appropriate for birds in rehabilitation. Further discussion of conditioning via cage versus creance may be found in Redig, Arent, Goggin, Guarnera, and Goosen (2000), and McKeever (2000).

The flight corridors linking McKeever's owl cages provided inspiration for middle ground between these two traditional approaches: a continuous oval flyway offering unlimited flight opportunity.

DESIGN AND CONSTRUCTION

All of the factors noted by Engelmann (2002) were taken into account in designing a compound comprising a central group of cages surrounded by a continuous flyway. Figure 1 shows a photograph of the compound, Figure 2 shows its basic floor plan and elevation profile. The compound is framed with environmentally-friendly pressure-treated lumber that uses recycled copper and contains no arsenic or chromium. The substrate is sand throughout. Two of the cages are approximately 14 x 20 feet (height/length); the third is 14 x 41 feet (height/length). Human access to the cages is through doorways off a service hall between the two smaller cages; the service hall is entered from the flyway. Netted sections of the doors allow observation into the cages. Because our compound was built on a site with a six degree slope, the height of the cages is not constant, but ranges from 13 to 16 feet. The flyway is 12 feet in width and its height varies from 10 to 16 feet. The circumference is about 200 feet at its outermost and about 160 feet at its midpoint. The roof of the compound is a combination of materi-

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als (sections of corrugated roofing alternating with sections of vinyl-coated wire and slats) that provide protection as well as sunlight and ventilation in each of the cages and in the flyway. The footprint of the entire structure is a compact 52 x 64 feet

The cage walls are all solid. Pairs of approximately 2 x 4 feet louvered doors located on all of the cage walls can be opened to allow access among the cages as well as between the cages and the flyway; when closed, these louvered doors provide a visual barrier, allowing different species to be housed in adjoining cages. The louvered doors are aligned with the wired sections of the compound roof to maximize light and ventilation within the cages.

Figure 1. Exterior photograph of compound.

The walls of the flyway contain sections that are solid, slatted, or wired (vinyl-coated). Entrance into the compound is through the flyway; an external vestibule prevents escapes when the door into the flyway is opened. The flyway is equipped with several perches; two span the entire width of the flyway. Others are shorter and removable; they can be mounted near an open set of louvered doors to encourage a bird in the flyway to re-enter a cage. Alternatively, the flyway, per se, can serve as a cage; once accustomed to the flyway, birds often prefer not to re-enter the cage area of the compound even when it is available to them. Birds housed in the flyway seemed to learn rather quickly that humans habitually entered the area only from one end; they therefore tended to perch at the opposite end (which, in our configuration, is also the preferred taller end). It was usually possible to enter the flyway and leave food at one of the feeding stations without coming into visual contact with birds in that space.

To facilitate capture of a bird in the flyway, two soft, tightly-woven netted drapes were installed across the flyway, about 45 feet apart. When not in use, they are pulled open and fastened to one of the flyway walls; they can be drawn and secured quite rapidly by one person. One drape is closed and the bird is maneuvered toward it; then the second drape is closed behind the bird, which can be netted easily within the space created by the drapes.

Performance and Evaluation

In its first year of use, this compound has proven to be an extremely adaptable and versatile space. The flyway performed as we had hoped; birds that emerged from an interior cage would first fly from perch to perch in the flyway, then fly one loop, and finally fly multiple laps (several hundred feet or more at a time). In addition to unlimited flight distance, the design of the flyway promotes banking through turns and the build-up of more speed than could be attained in a rectangular cage.

The 12 feet width of the flyway is approximately twice the wingspan of a bald eagle—sufficient, in our experience, to allow continuous flight in this species. Not surprisingly, however, multiple laps were more likely to be flown by other species such as American kestrel (*Falco sparverius*). We also conditioned several nonraptor species in the flyway, including, for example, American crow (*Corvus brachyrhynchos*). Occasionally, we used it to evaluate the flight ability of a smaller passerine recovering from a wing injury. The 1-inch spacing

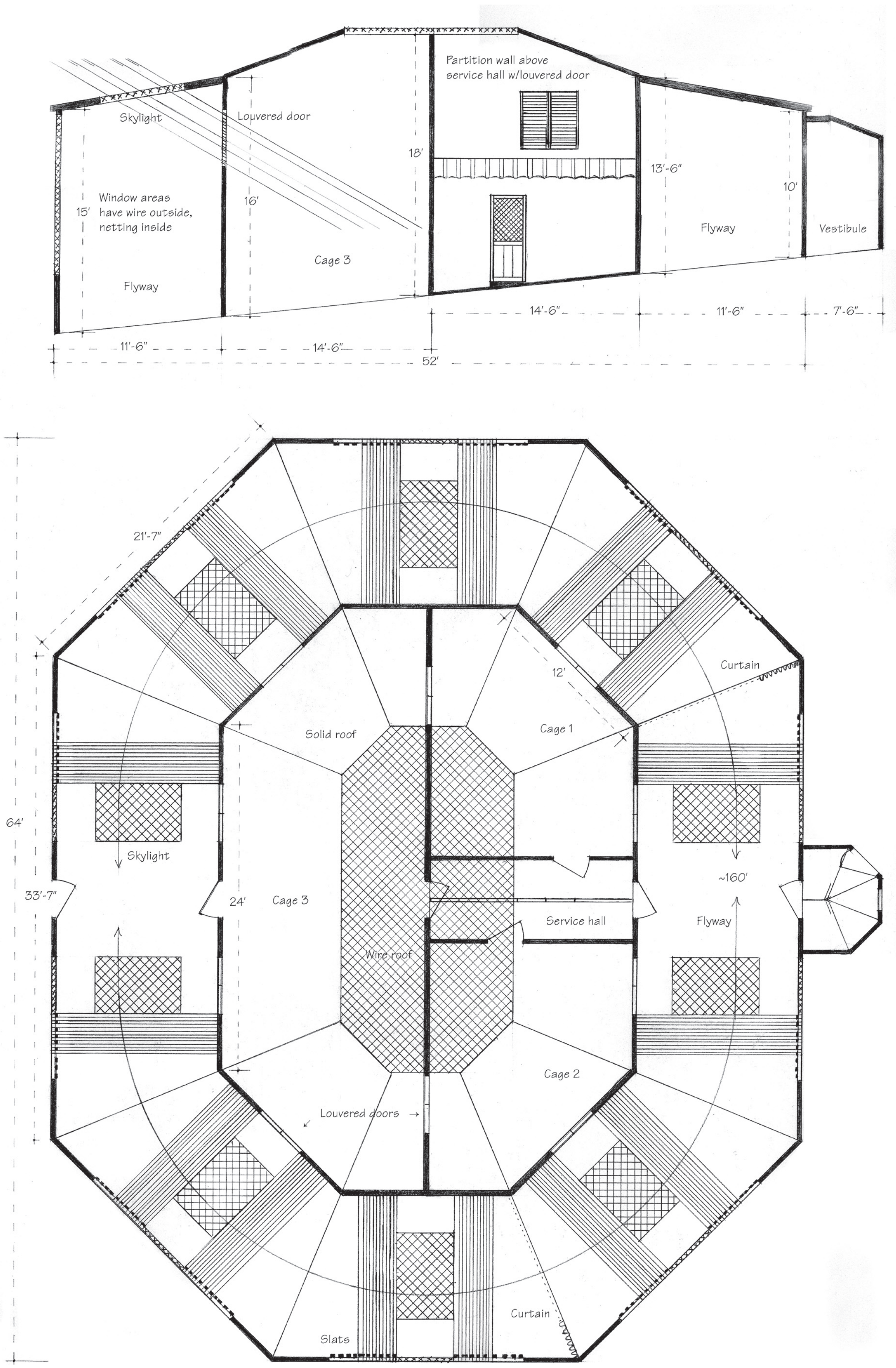

Figure 2. Floor plan and elevation profile. Floor plan shows interior cage layout plus door location, roof design, etc. Dark lines represent solid walls; light lines indicate roof sections. Elevation shows a cross-section of the compound. Note how angle of door louvers maximizes exposure to sunlight from wired section of flyway roof.

of the louvers limited the size of species that could be housed and exercised in the compound while other species were present.

In agreement with Engelmann (2002), solid cage walls were deemed necessary in order to allow housing of multiple species within the compound; the louvered sections facilitate light and air circulation. Solid walls are also advantageous for housing high-strung accipiter species. However, a possible disadvantage of this feature is that, except for the sky, there is no view of the outside from within the cages, although landscape murals painted on the interior walls reduce their monotony. Further and most importantly, however, the cages are not meant for long-term use, but only as a transition from limited-activity housing to the expanse (and outside views) afforded by the flyway.

The NWRA/IWRC minimum cage dimensions for "unlimited" activity of larger raptors are 100 x 20 x 16 feet (length/width/height) for a total of 32,000 cubic feet. These dimensions are based on an assumption of traditional rectangular design; in the present design, with the larger cage left open to the flyway, there is a total of approximately 33,300 cubic feet with opportunity for more truly unlimited activity within that area than there would be within a cage of traditional design.

The dimensions of the compound could obviously be modified according to budgetary, space, and other considerations. Although our compound was built on a slope, the design could also be changed to accommodate other types of sites. This article is intended primarily to convey an idea—an innovative way of providing exercise for larger birds—but our materials list and additional design and construction information are available upon request to any of the authors (avianhaven@northlandlink.com, 207-382-6761, or 418 N. Palermo Rd., Freedom, ME 04941).

Acknowledgements

A major source of funding for this compound was a grant from the Maine Outdoor Heritage Fund. We thank Kay McKeever, Mark Pokras, and Len Soucy for design consultations during the planning phase of the project. Author Terry Heitz masterminded the design and built the compound almost single-handedly (with assistance from his co-authors plus Marty Heitz, Rick Gray, Chris Collier, Dave Bailey, Sandy Imondi, and Kathy Kandziolka).

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