

TO FLY OR NOT TO FLY

Is that *really* the question?

Contributors

- Fred Beall, Zoo New England
- Sherry Branch, SeaWorld Orlando
- Chris Brown, Dallas Zoo
- Sara Hallager, Smithsonian's National Zoo
- Colleen Lynch, Lincoln Park Zoo
- Josef San Miquel, San Antonio Zoo
- Diane Olson, Moody Gardens
- Steve Sarro, Smithsonian's National Zoo
- Tom Schneider, Detroit Zoological Society
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To fly or not to fly: is that really the question? Flight restriction is a topic that bird curators and managers have been discussing for years. Certainly when I started in this profession 25 years ago, the topic was not new. In fact, as long as birds have been kept in captivity [thousands of years], the need to prevent them from departing their spaces has been something caretakers have been faced with. But what is flight restriction really? And what thought processes go into deciding what is the best method of flight restriction for your bird. The choices we make today for our birds can affect the rest of their lives and for something like a crane which can live for 40-50 years, our decisions will have lifelong implications. In this talk I will present the different methods of flight restriction, compare movement restriction with other taxa, provide some thinking points that should be considered when determining the best method of flight restriction and conclude with research questions that need to be answered about flight restriction. If you have never given flight restriction much thought, I hope this talk will encourage you to go back to your own zoo and discuss it with your bird staff.



What is flight restriction?

Flight restriction is a complex array of methods used by zoos and aquariums to allow the display of birds in spaces (including aviaries) while precluding the birds from using flight to depart these spaces. Flight restriction can be accomplished using a variety of methods and can be temporary or permanent.

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What are similar restrictions in other taxa?

Restriction of Movement via housing

- Hoofstock , pinnipeds, elephants, polar bears, and other large home-range animals
- Even rodents and reptiles have larger ranges in the wild than Zoo exhibits allow
- **Every Zoo animal somehow experiences restricted movement**



The practice of restricting birds departing their enclosure whether it be through housing or through physical means, is not limited to birds. Every zoo animal somehow experiences restricted movement. Whether it be animals such as elephants, polar bears, hoofstock, pinnipeds that have large home ranges in the wild, or animals such as reptiles and small rodents with small home ranges, EVERY animal in EVERY zoo has their movements restricted.



What are the methods of flight restriction?

- **Most common**
 - Covered outdoor & indoor aviaries
- **Common**
 - Feather clipping [reversible]
 - Pinioning [irreversible]
- **Less common**
 - Tendonectomy [irreversible]
 - Tenotomy [irreversible]
 - Brailing [reversible]
 - Vane trimming [reversible]
 - Tethering [reversible]



Preventing birds from leaving their enclosures is accomplished through a variety of means. For flighted birds, covered outdoor and indoor aviaries are one of the most common methods. These are very popular for a variety of reasons but as I will discuss in a few minutes, not always the most practical method. Sometimes, it is necessary to apply physical methods of flight restriction, the most common being feather clipping [a reversible means of preventing flight] or pinioning [a irreversible procedure which entails the surgical removal of the primary flight feathers]. Less common means of preventing flight include tendonectomy and tenotomy [both irreversible] and brailing, vane trimming and tethering [all reversible means of preventing flight]



Why aviaries don't always work

- **Cost**
 - Even extremely large aviaries still won't support natural flight behaviors (e.g. flamingos)
 - More cost efficient for many species vs. a few species
- **Complex management**
 - Individual species management may be necessary for proper husbandry and breeding success
- **Mixed species opportunities lost**
- **Snow load**
- **Size limitations**
 - Reduced social complexity
 - Reduced environmental complexity
- **Collisions**





Covered aviaries are very popular with guests for a variety of reasons. However, they are not always the most practical means of flight restraint for several reasons. First is cost. Even very large aviaries still can't support natural flight behaviors. For example, larger birds like flamingos and cranes need a certain amount of land for take off and once airborne, need a large space to achieve true flight. Covered aviaries sometimes won't work if institutions aren't willing to invest money into a covered aviary for a monogamous pair of large birds. This can very quickly affect sustainability of populations as I will discuss in a later slide. Covered aviaries don't always work when it comes to day to day management because they often prohibit or prevent the management of individual animals through an inability to handle, identify or observe species in free flighted areas. The danger of collapsed exhibits from snow loads is a very real danger for northern zoos and must be a consideration when determining whether to house birds in a covered aviary. Collisions with netting or supporting structures is a very real danger that should also be taken into consideration. Finally, the size limitations of covered aviaries can reduce the social and environmental complexity of the species housed preventing them from exhibiting behaviors which might be achieved were they not full winged.



What are irreversible/physical management actions in other taxa?

Procedures

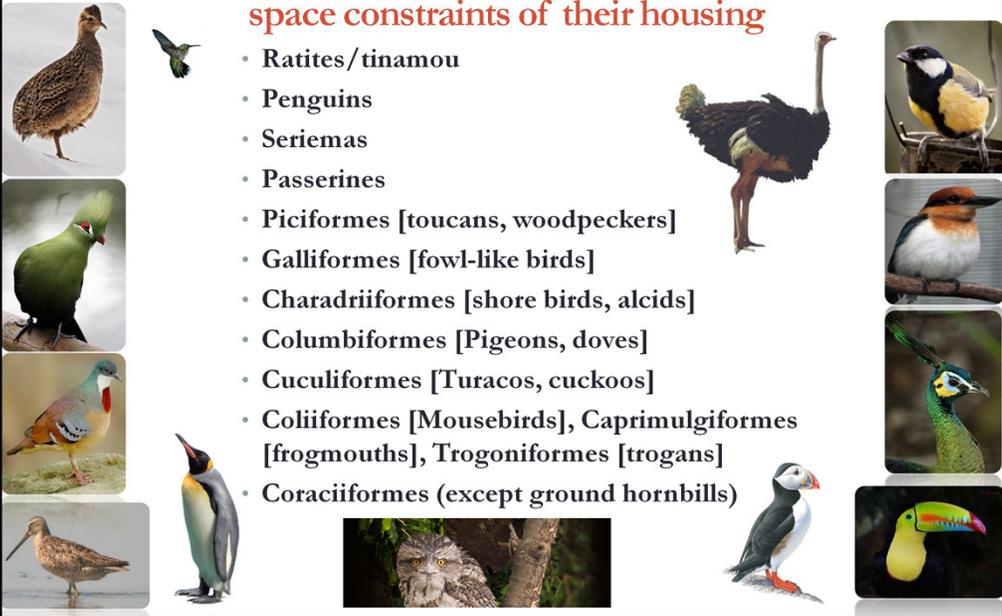
- De-horning goats for farmyard exhibits
- Neutering (castration or ovarian-hysterectomies) for the purposes of contraception and behavioral management (primates, carnivores, hoofstock, others)
- Population reduction (culling in hoofstock, reptiles)
- Toe-clipping reptiles and small mammals for identification
- Tattooing and other procedures that may require anesthesia (various taxa)

So if covered aviaries aren't always practical and applying reversible or irreversible means of preventing flight is necessary, are bird managers alone in the practice of applying physical means to achieve their goals? No. Many other taxa employ various means of physical manipulations in order to manage their animals. For example, goats are sometimes de-horned for petting zoos. Many mammals are surgically altered to prevent pregnancy and for behavioral management. Hoofstock are sometimes culled. Reptiles are often culled and toe clipped both for management reasons. Some animals are tattooed for identification means. The point is that many animals in zoos, not just birds, must be physically altered in order to successfully maintain them. For birds, this often means restricting flight.



Taxa typically not flight restricted except by the space constraints of their housing

- Ratites/tinamou
- Penguins
- Seriemas
- Passerines
- Piciformes [toucans, woodpeckers]
- Galliformes [fowl-like birds]
- Charadriiformes [shore birds, alcids]
- Columbiformes [Pigeons, doves]
- Cuculiformes [Turacos, cuckoos]
- Coliiformes [Mousebirds], Caprimulgiformes [frogmouths], Trogoniformes [trogans]
- Coraciiformes (except ground hornbills)



Many birds do not require any means of flight restriction. However, these birds are still flight restricted simply by the enclosures they are maintained in. Flightless birds aside [tinamous, ratites and penguins], many of orders of birds are flight restrained by means of covered aviaries alone. These often include toucans, woodpeckers, fowl like birds, shore birds and alcids, pigeons, doves, turacos, cuckoos, mousebirds, frogmouths, trogans, and most of the coraciformes except hornbills.



**Taxa managed by flight restriction
other than housing constraints**

- Waterfowl [pinioned]
- Flamingos [pinioned, clipped]
- Cranes [pinioned, clipped]
- Storks [pinioned, clipped]
- Bustards [clipped]
- Raptors [pinioned, clipped, jessed/tethered]
- Old World vultures [pinioned, clipped]
- Pelicans [pinioned, clipped]
- Parrots – [clipped]
- Others may be affected but are not common




Alternatively, many birds do require some form of flight restraint that does not include simply housing them in a covered enclosure. This most commonly includes waterfowl, flamingos, cranes, storks, ground hornbills, bustards, raptors, old world vultures, pelicans and parrots. These birds are all usually either pinioned or feather clipped. Some, like raptors, can be tethered or jessed.



Considerations for Flight Restriction

- What is the life style of the bird? Does it spend most of its time on the ground or in the air?
- What level of stress will be caused from implementing the flight restriction method itself, including any capture, handling and veterinary procedures?
- Future reproduction? Does copulation require wings for balance?
- How old is the bird? Neonates vs. adults will influence method
- What is your institution comfortable with? Permanent vs. non-permanent methods, surgical vs. non-surgical, one-time vs. maintenance-required?




Determining the best means of flight restriction for YOUR bird is a very important decision. Should I house the bird in a covered aviary remembering that covered aviaries come with their own set of problems? Should I flight restrict my bird and should I make this a permanent or a temporary restriction? Making these decisions should not be undertaken lightly.

You should consider the following

- 1] what is the life style of the bird? Does it spend most of its time on the ground or in the air?
- 2] what level of stress will be caused from implementing the flight restriction itself? Remember, this needs to include the actual capture of the bird and associated handling and veterinary procedures.
- 3] what about future reproduction? In many birds like flamingos, cranes and storks the male must jump onto the back of the standing female. If the male is unable to do this because he is flight restricted, fertilization may be compromised
- 4] how old is the bird? Pinioning in baby birds is a relatively quick procedure but is a complicated surgery in adult birds
- 5] finally, what is your institution comfortable with? Some zoos prohibit the practice of irreversible flight restriction all together.

These considerations and others must be carefully weighed and discussed with your staff and upper management in order to choose the method of flight restriction that is best for YOU.



Considerations for Flight Restriction

- Is staff capable of training/handling birds for clipping without causing injury? And are staffing levels sufficient to maintain non-permanent methods effectively?
- What do my facilities allow for?
- Vulnerability of birds to wild predators?
- SSP & TAG recommendations?
- What are the long or short term physical and psychological stress to the bird related to repeated handling to maintain a temporary flight restriction method?
- What method of flight restriction is most appropriate for a “flighty” species?



6] is your staff capable of training and handling birds for feather clipping without causing injury. Catching up a crane for feather trimming is much more dangerous [for both bird and keeper] than catching up a duck for the same procedure. Can your staff handle a large potentially dangerous bird one to two times a year?

7] Consider what kinds of facilities you have when making a choice in flight restricting your bird. For example, can you safely catch up a crane for twice annual feather clipping by walking it into a shed or will you have to chase the bird around the yard and corner it?

8] Vulnerability to wild predators should enter into discussion when determining the best means of flight restriction. While larger birds may be better able to fend off an attack, smaller birds like ducks cannot and may be better suited to a covered aviary.

9] what are the SSP and TAG recommendations? Many SSPs and TAGs have already carefully considered the pluses and minuses of flight restriction within their taxa so consultation with the appropriate TAG/SSP should be part of your thought process.

10] you should consider what the long and short term consequences are to your bird by repeated handling should you opt for a temporary flight restriction method. For example, a flighty species might be better suited for a permanent means of flight restriction.

These considerations and others must be carefully weighed and discussed with your staff and upper management in order to choose the method of flight restriction that is best for you, your staff, and most importantly, for the bird



Does flight restriction affect population sustainability?

- **Reduced fertility?**
 - Ability to successfully copulate compromised?
 - Ability to engage in courtship behavior compromised?
- **Increased/decreased trauma related to restriction or not restricting**
 - Handling injuries may be increased
 - Collision injuries may be decreased
- **Reduced space/population sizes if open air-exhibits are not utilized**
 - Reduction of courtship behaviors/social stimulus in reduced flock size?
 - Reduction of mate-choice in reduced flock size?
 - Reduction of population target size/gene diversity retention with increased inbreeding depression

IN DEPTH, RESEARCH STUDIES NEEDED!



As we near the end of the talk, I hope I have given you some things to think about when you are choosing the best method of flight restriction. Whether it is exhibiting the bird in a covered aviary, temporarily flight restricting the bird or permanently flight restricting the bird, the choice you make will affect the bird for the rest of its life. Flight restriction is complicated and there are many unknowns about flight restriction as it relates to the animal welfare of the bird and population sustainability of the species. For example, does flight restriction [of any kind] reduce fertility by compromising fertility? Are natural courtship behaviors compromised? Are these concerns offset by established AI techniques such as those commonly used in cranes? Does handling of birds for routine feather trimming lead to increased trauma? Or does permanently restricting flight cause less trauma either through less handling or reduced collisions with structures? Both reduced fertility and trauma are major contributing factors to any sustainable population. Perhaps something to consider would be a “what if” scenario. “What if”zoos decide that all bird exhibits must be covered and all birds must be left full winged. This will affect sustainability of populations because available space then becomes fewer and smaller and less birds can be exhibited. Fewer birds in a population means less sustainability, less genetic variation, less demographic stability and less social, behavioral, and environmental complexity which all contribute to breeding success. There are many unknowns about this complicated issue that will only be solved by in depth research.



Unknowns/Future Research

- What is the difference in behavior between a flight restricted and a full winged bird?
- Are there any health benefits/consequences to being non flighted vs flighted?
- In what taxa and how does flight restriction affect reproduction?
- How do we best manage pain during pinioning of neonates?
- Are there any neurophysiological consequences to flight restriction?
- What is the change in space availability for each taxa if space were reduced to currently available enclosed exhibits?
 - How would this reduction in spaces impact demographic sustainability of these populations?
 - How would this reduction in spaces impact retention of gene diversity and accumulation of inbreeding in these populations?
- How do visitors perceive covered enclosures vs. open exhibits?

IN DEPTH, MULTIPLE RESEARCH STUDIES NEEDED!



In addition to unknowns about population sustainability, there are many other unknowns related to flight restriction that will only be understood through in depth research studies. For example, what is difference in behavior between a flight restricted and a full winged bird? Are there any health benefits/consequences to being non flighted vs flighted? In what taxa and how does flight restriction affect reproduction? How do we best manage pain during pinioning of neonates? Are there any neurophysiological consequences to flight restriction? What is the change in space availability for each taxa if space were reduced to currently available enclosed exhibits? How would this reduction in spaces impact demographic sustainability of these populations? How would this reduction in spaces impact retention of gene diversity and accumulation of inbreeding in these populations? How do visitors perceive covered enclosures vs. open exhibits? These and many other questions need to be considered by keepers, managers, directors, veterinarians, and others in order to address the best practices related to maintaining birds in zoos.



TO FLY OR NOT TO FLY - Is that *really* the question?

- All animals in our collections have their movements restricted in some way
- Decisions regarding flight restriction procedures are complex
- Determine if flight restriction procedure is the best management tool for your situation
- Flight restriction procedures should not be undertaken lightly
 - Identify the reason for restricting flight
 - Identify the best method of restriction to achieve your goals
 - Identify the best method of restriction for your birds
 - Identify the best method of restriction for your staff
 - Create a flight restriction policy for your zoo that is transparent and consistent and educate your staff

In conclusion, I hope I have given you food for thought on a topic you may not have thought about much especially if you do not work with birds. However, the complex decisions related to flight restriction are decisions that bird managers wrestle with all the time. In fact, its been a topic of professional discussion with ASAG [Avian Scientific Advisory Group] and bird TAGs [Taxon Advisory Groups] and presented at ASAG workshops for the past 25 years. As good bird managers, making the decision to fly or not to fly depends on many criteria. What is best for the bird? What is best for the captive population? What is best for my staff and my zoo? How will the decision I make today affect this bird today and in the case of long lived birds, how will it affect the bird and the population 20, 30 or 40 years from now? We all want to do what is best for the animals we care for and provide them with the best possible welfare. To truly understand the implications of all kinds of flight restriction will require serious research studies and serious money. Only then, with knowledge from these scientific studies, can we truly make the best decision “to fly or not to fly”.