

## 5. The Role of Private Aviculture in the Conservation of Neotropical Psittacines

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*Abstract.*—The potentials of private aviculture to contribute to conservation are great but have been little realized. The principal avenues by which aviculture might aid conservation include supplying the pet trade with significant numbers of common species at competitive prices, developing avicultural techniques that can be used with endangered parrots, advancing the state of knowledge in avian medicine, maintaining viable captive gene pools of some species, and breeding birds for reintroduction programs. Unfortunately, mutual distrust and fear between conservationists and aviculturists, and among aviculturists have inhibited positive progress in achieving many of these goals. Organized species preservation plans demand a level of commitment and cooperation that many aviculturists have been reluctant to offer. Zoos have generally shown higher levels of inter-institutional cooperation, but have exhibited little overall interest in breeding psittacines. Perhaps the most significant future contributions of aviculture may lie with private foundations patterned on the model of the Peregrine Fund. Resolving conflicts over ownership and control of birds, overcoming traditional attitudes of independence and secrecy, and achieving good control over disease threats are among the most important challenges to be overcome in integrating private aviculture with conservation efforts.

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"Aviculture is conservation too." This slogan is often used by private aviculturists (Clinton-Eitnien 1989, Desborough 1989, Marshall 1989, Low 1989b), but is it accurate? Some observers are skeptical, but others feel that private aviculture could play a role in coordinated conservation efforts for Neotropical psittacines.

Ideally, the role of aviculturists in conservation could include: (1) supplying the pet trade with common species in high demand at a reasonable cost; (2) developing avicultural techniques with common species which could be applied to endangered species; (3) contributing to the body of knowledge in avian medicine; (4) striving for improved husbandry techniques that would make captive birds healthier and more productive; (5) cooperating in studbooks, registries, or species survival programs to maintain populations of known genetic diversity as safeguards against the decline or loss of species in the wild; and (6) breeding birds for present or future reintroduction projects.

Many aviculturists consider themselves conservationists and would like to participate in organized conservation efforts. However, opportunities to participate have not been readily available. Providing a means for aviculturists to become involved in conservation may be all that is necessary. But fear and independence may prevent many aviculturists from becoming involved in cooperative efforts. Perceptions of aviculturists as consumers rather than producers of avifauna, and a general distaste of conservationists for commercialism in aviculture stand between conservationists and aviculturists.

If conservation efforts are to utilize the tremendous potential of avicultural collections, prejudice and misconceptions on both sides must be put aside. Doors must be opened to establish a dialogue. These initial efforts, followed by education, encouragement to participate, and mutual respect, could lead to a beneficial alliance between conservation and aviculture (Toft 1990).

#### WHO ARE AVICULTURISTS?

By definition an aviculturist is one who cares for and raises birds in captivity. For practical purposes aviculturists may be divided into six categories: pet owners who happen to breed a few birds, serious hobbyists, exhibition breeders, commercial aviculturists, zoos, and non-profit foundations or conservation-



oriented aviculturists. While joined by a common fascination with birds, the roles that these groups could play in conservation efforts are quite different.

### **Pet Owners**

Pet owners are the ultimate consumer group for vast numbers of birds. Educated consumers could play a role in conservation, by preferentially buying captive-bred birds of species that can be maintained in captivity. Most pet owners are not inclined to purchase rare or expensive birds. But they are a prime market for inexpensive imported birds, especially common or readily available species. They also unintentionally buy smuggled birds.

Most aviculturists begin as pet owners and become so enamored of these pets that they continue to obtain additional individuals. This often leads to breeding on a small scale, typically utilizing common or semi-domesticated species such as cockatiels (*Nymphicus hollandicus*). Early success with these species encourages the acquisition of larger and more difficult avicultural subjects.

Today's pet owners will be the next generation of aviculturists, making education of this vast group of consumers of primary importance to conservation efforts.

### **Exhibition Breeders**

As with any hobby, many aviculturists breed primarily or exclusively for exhibition and competition, striving for the best type, color, mutation, song, or ability (e.g., racing pigeons). These aviculturists work primarily with highly domesticated species. While this type of aviculture does not directly benefit conservation, many birds which are unsuitable for exhibition are utilized as pets. Such birds may be promoted as making superior pets to birds of wild origin.

### **Hobbyists and Collectors**

Commercial aviculturists may have the greatest potential for supplying the pet trade but the role of hobbyists must not be discounted. The trend among serious hobbyists is to specialize and many restrict their efforts to a genus or group



of closely allied species (Desborough 1989). These breeders are more likely to maintain good pedigree information and to retain offspring for future breeding. Many hobbyists are concerned about conservation efforts involving their special interest groups. Given the proper direction, and a desire to work cooperatively, they could maintain genetically diverse, self-sustaining populations in case of future destruction of wild populations.

Unfortunately hobbyists and collectors have been implicated in the extinction or near extinction of rare species, such as Spix's Macaw (*Cyanopsitta spixii*), from the wild (Collar and Juniper 1991). In their desire to possess a representative pair of rare species, collectors have been willing to pay very high prices.

Conservation efforts involving hobbyists will require a great deal of cooperation and coordination. Removal of rare birds from the wild for collections cannot be considered conservation unless such efforts are part of officially sanctioned conservation programs. Some specialty groups of aviculturists have begun this task and are attempting to establish studbooks for some species or genera (e.g., *Pionus* and *Amazona*). Some aviculturists also participate in studbooks established by the American Association of Zoological Parks and Aquariums (AAZPA). For example, of 67 institutions participating in the Golden Conure (*Aratinga guarouba*) studbook, 11 are members of AAZPA and 41 are private breeders (Lieberman 1990). While hobbyists and collectors are primarily responsible for the demand for rare species, they also represent an untapped reserve for conservation efforts (Toft 1990).

### Commercial Aviculture

Commercial aviculture of domestic species for the pet trade is not a new phenomenon. Import records dating back to 1901 indicate a steady stream of avian imports. Between 1901 and 1942 an average of 350,000 birds were imported each year, of which 71% were canaries (Nilsson 1981). In the 1960s, Hartz Mountain Corporation created a massive cottage industry in the United States for private aviculturists producing Budgerigars (*Melopsittacus undulatus*). These common, highly domesticated species are still the mainstay of the avicultural industry (Meyers 1989).

With the widespread availability of large psittacine species in the pet trade during the last decade, many people became interested in commercial produc-



tion of macaws, amazons, or other psittacines. While some aviculturists have been successful, many have found the venture unprofitable, with expenses often outweighing sales. Due to the relative difficulty of breeding rare species, commercial aviculturists typically concentrate on common species which are adaptable, marketable, and profitable. Commercial aviculturists are most likely to provide birds in large numbers to meet the demands of the pet industry, but they are less likely to participate in coordinated captive breeding efforts and tend to resent any outside interference in their breeding programs.

### Zoos

Zoos have made tremendous strides with many species, primarily mammals, but psittacines are poorly represented in zoo exhibits and breeding programs. This may be due to their destructive nature, which makes them difficult to display attractively. For example, of all psittacine species reported to the International Species Inventory System (ISIS), Blue-and-Yellow Macaws (*Ara ararauna*) are the most numerous. Of 343 participating institutions, 116 hold 415 Blue-and-Yellow Macaws, an average of 3.5 individuals per institution. In 1989 these institutions reported only 43 chicks surviving past 30 days. Of 85 Neotropical psittacine species reported in ISIS, only 22 species are represented by 50 or more individual birds (ISIS 1989). If species survival were to depend on current zoological collections, only a handful of psittacine species would be present in viable numbers.

The zoological community, including the AAZPA, has discouraged private ownership of exotic animals. At the same time it is apparent that zoos have neither the space nor financial resources to sustain genetically viable captive populations of very many species. It is also evident that governmental support will only be available for a limited number of highly endangered species. If psittacine species can be adequately maintained by the private sector, perhaps zoos should encourage such an effort and use their resources to protect species which cannot be maintained privately. Such encouragement and cooperation between zoos and the private sector could result in valuable exchanges of information as well as breeding stock. But the question of who "owns" rare species, or controls their management must be resolved.



### Private or Public Foundations, Trusts, or Institutions

Private individuals with proper direction and an identifiable goal can make a significant contribution to conservation, as exemplified by the Peregrine Fund. The Peregrine Fund was started in 1970 by a group of dedicated falconers. They were alarmed by the extirpation of the Peregrine Falcon (*Falco peregrinus*) from the eastern United States, and the dramatic decline of the species on a global basis due to the effects of DDT and dieldrin. Despite tremendous legal and biological difficulties, this group has managed to breed in captivity and release over 3000 Peregrine Falcons. The reintroduction program has been successful and the species is now considered stable in the eastern United States (although reintroductions continue in the western United States). To achieve their successes, the Peregrine Fund pioneered many advances in captive breeding. While now a non-profit organization, the roots of the Peregrine Fund came from private aviculture of Falconiformes (Cade et al. 1988).

Private falconers have also responded to conservation goals. The U.S. Fish and Wildlife Service reports that of the 566 raptors bred in captivity by private breeders in the United States in 1988, 25% were used for conservation (reintroduction), 50% for falconry, and 25% for captive propagation (White 1989). Unfortunately such successes have not yet occurred in aviculture of psittacines.

### AVICULTURE MUST BE OPEN TO NEW ATTITUDES

The attitudes of many private aviculturists have been a point of great consternation in the conservation and zoological communities. The most harmful of these attitudes is fear which leads to paranoia and secrecy.

Aviculturists fear regulation on the national, state, or local level, which will limit their right to possess or sell their birds. Confusion about the application of federal law to captive wildlife, and an ever-changing barrage of state laws and local ordinances fuel this fear. For example, in Florida an aviculturist must register in order to sell or exhibit birds in the state. Under the Sunshine Law, a freedom-of-information-styled law, these records are accessible to the public. Aviculturists fear that this makes their birds vulnerable to theft. Certainly the fear of theft or confiscation is a driving force in the development of paranoia



among aviculturists, fed by the value of many species and the difficulty of tracing them once stolen.

Private aviculturists are also fiercely independent and resent being told what they can or cannot do with their birds. The prospect of being told where, or to whom, their birds will be transferred will limit the participation by private aviculturists in Species Survival Plans (SSPs) or other cooperative but relatively dictatorial programs. Most of the SSPs are under the direction of zoo personnel. Private aviculturists often feel zoos are unqualified to dictate policy concerning psittacines.

#### NEOTROPICAL PSITTACINES IN AVICULTURE

Bird sales in the U.S. in 1989 were estimated at approximately 3 to 4 million individuals (Meyers 1989). Approximately 500,000 were wild-caught, imported birds. Most birds sold are budgerigars, canaries, and cockatiels. Of 36,699 birds imported into Connecticut for resale in 1984, 85% were species bred primarily in captivity and 15% were species which were primarily wild-caught (Simon 1984). Captive-bred Neotropical psittacines (including macaws, amazons, pions, and conures) have been available in larger numbers in recent years and prices on the retail market have been dropping.

According to Low (1989a,b), 13 of the 26 genera of Neotropical psittacines are well represented in aviculture (Table 1). For example, the genus *Aratinga* is highly productive in captivity. Sun Conures (*Aratinga solstitialis*) and Jenday Conures (*A. jendaya*) were the "bread and butter" of many avicultural collections for years, as many aviculturists waited patiently for their macaws and amazons to become productive. Sun conures have been known to breed within a few months of importation. Some other *Aratingas*, such as Blue-crowned Conures (*A. acuticaudata*) have not been so prolific. *Pyrrhura* species have also adapted well to captivity, but these birds are not as popular as pets. In addition many species of *Pyrrhura* are either rare or unknown in aviculture as well as in the wild.

Macaws of the genus *Ara* are adaptable and hardy for the most part. Some pairs are very prolific and breed almost year-round. Their size and coloration has made macaws popular for exhibition in zoos. One privately owned zoo



Table 1. Status of the genera of Neotropical parrots in aviculture in the United States based on the personal experience of the author and Low (1989a).

| Genus                  | Relative numbers | Ease of breeding | Demand for pets | Pet quality |
|------------------------|------------------|------------------|-----------------|-------------|
| <i>Amazona</i>         | abundant         | difficult        | high            | good        |
| <i>Anodorhynchus</i>   | moderate         | difficult        | high            | good        |
| <i>Ara</i>             | abundant         | prolific         | high            | good        |
| <i>Aratinga</i>        | abundant         | prolific         | high            | good        |
| <i>Bolborhynchus</i>   | rare             | difficult        | low             | unknown     |
| <i>Brotogeris</i>      | common           | difficult        | fair            | good        |
| <i>Cyanoliseus</i>     | common           | moderate         | low             | good        |
| <i>Cyanopsitta</i>     | absent           |                  |                 |             |
| <i>Derophtus</i>       | rare             | difficult        | low             | poor        |
| <i>Enicognathus</i>    | uncommon         | moderate         | low             | good        |
| <i>Forpus</i>          | uncommon         | moderate         | low             | fair        |
| <i>Gradydidascalus</i> | absent           |                  |                 |             |
| <i>Gypopsitta</i>      | absent           |                  |                 |             |
| <i>Hapalopsittaca</i>  | absent           |                  |                 |             |
| <i>Leptosittaca</i>    | absent           |                  |                 |             |
| <i>Myiopsitta</i>      | abundant         | prolific         | fair            | fair        |
| <i>Nandayus</i>        | abundant         | prolific         | fair            | good        |
| <i>Nannopsittaca</i>   | absent           |                  |                 |             |
| <i>Ognorhynchus</i>    | absent           |                  |                 |             |
| <i>Pionites</i>        | uncommon         | difficult        | high            | good        |
| <i>Pionopsitta</i>     | rare             | difficult        | low             | poor        |
| <i>Pionus</i>          | common           | prolific         | high            | good        |
| <i>Pyrrhura</i>        | abundant         | moderate         | fair            | good        |
| <i>Rhynchopsitta</i>   | uncommon         | difficult        | low             | poor        |
| <i>Touit</i>           | absent           |                  |                 |             |
| <i>Triclaria</i>       | absent           |                  |                 |             |

in Miami, Florida, has been breeding Scarlet Macaws (*Ara macao*) since 1945 and has bred them to the fifth generation. Hyacinth Macaws (*Anodorhynchus hyacinthinus*) are highly prized by aviculturists, but unlike *Ara* spp. their reproductive rate in captivity has been low, as it is reported to be in the wild (Munn et al. 1989). High demand and low production keeps prices for a captive-bred juvenile of this species extremely high (\$7,000 to \$12,000). This creates



strong incentive for smuggling in spite of international protection efforts (Thomsen 1989).

Amazon parrots (*Amazona* sp.) are favorites of the pet bird industry and typify parrots to many people. Captive breeding of amazons is challenging and often unrewarding (Table 1). They have a short breeding season in captivity, often fail to recycle if eggs are removed or are infertile, and appear to take longer to adapt to captivity and become productive. Thus, it is doubtful that the tremendous demand for amazon parrots can be met by aviculture in the near future. Unfortunately smuggling of Mexican and Central American amazons is pervasive and may fill the void if legal imports are restricted (Clinton-Eitner 1989). Consumers are typically unaware of the protected status of species. Most aviculturists, on the other hand, will not knowingly buy smuggled birds.

In general, tropical lowland psittacine species (e.g., *Pionus* sp.) are well established in aviculture, whereas mountain species have been more difficult avicultural subjects. *Brotogeris*, *Pionites*, *Cyanoliseus*, and *Forpus* have been imported in large numbers but are not commonly bred. *Enicognathus* have been bred quite successfully despite being traded in relatively low numbers.

Approximately 11 genera of Neotropical psittacines are rare or not present in aviculture (Table 1). Some such as Hawk-headed Parrots (*Deroptyus accipitrinus*) have been imported in low numbers but are difficult to breed in captivity. The genus *Pionopsitta* has been regarded as too delicate by importers and has rarely been made available to aviculturists. Others such as *Ognorhynchus* or *Leptosittaca* are rare or poorly known in the wild and have not been imported (Low 1989a).

## ECONOMIC ASPECTS OF PRIVATE AVICULTURE

A subjective overview of the pet bird market in recent years indicates a dramatic change in supply and demand. Production has improved as birds are in captivity for longer periods of time. Years ago a captive-bred bird was a novelty commanding a high price. In an attempt to capitalize on this demand, many people began to breed parrots commercially. Many of these farms became productive, prices dropped, and the demand for some species has been exceeded by supply. Now captive-bred birds are common and consumers shop for price. Improved



incubation and handrearing techniques have allowed aviculturists to increase production and produce tame pet birds. Many aviculturists directly market their birds by advertising and selling them retail, rather than using pet shops or wholesale outlets for distribution which lowers the retail price.

Some common and popular psittacine species are being bred in large numbers. This produces a glut on the market and has resulted in price reductions. For example, in the early 1980s, juvenile imported Blue-and-Yellow Macaws were sold wholesale for approximately \$1,000 and captive-bred birds sold for approximately \$1,800. This species has adapted well to captivity and has proven to be quite prolific. Today captive-bred birds are being sold for as little as \$650 to \$900.

Wild-caught Blue-and-Yellow Macaws imported from Guyana are less expensive than captive-bred birds, selling for \$600 to \$700, and the majority are being sold to aviculturists (W. Lawson pers. comm.). More than 20,000 Blue-and-Yellow Macaws were imported from 1982 to 1988 (J. B. Thomsen pers. comm.). This species is very hardy and it is not unreasonable to estimate that half of these birds are still alive. If half of the surviving birds were set up for breeding, we would have approximately 2,500 pairs in the United States. If half of those pairs were productive and averaged 4 chicks per year, approximately 5,000 chicks could be produced annually. In this case we could theorize that importation of additional wild-caught birds is unnecessary to meet the demand for this species.

If captive-bred birds are to replace wild-caught birds for the pet trade, price is a vital factor. If import restrictions are legislated, prices for wild-caught birds may increase and discourage sale of those birds as pets. Aviculturists who want to obtain adult birds for breeding may be willing to pay a higher price for sexually mature birds rather than wait years for captive-bred birds to mature. For example, in 1989 the cost of maintaining Neotropical psittacines at two commercial breeding facilities averaged \$0.80 to \$1.50 per bird per day, including feed, labor, insurance, advertising, veterinary care, etc. (T. Ireland pers. comm.). If we conservatively estimate \$350 per year to keep a macaw in captivity, \$800 to buy a captive-bred Blue-and-Yellow Macaw cheaply, and four years until a successful reproduction, a sexually mature captive-bred individual would cost roughly \$2,200. For this reason, many aviculturists prefer to gamble with



imported, wild-caught adult birds even though they may take just as long to adapt to captivity and become productive.

If private aviculturists in the United States cannot meet the demand of the pet market, foreign aviculturists may. Breeding birds in third-world countries may be less expensive and more profitable than raising the same birds in the United States. Costs of shipping and quarantine may be offset by low labor and land costs. For example, prior to the embargo on trade with South Africa, thousands of captive-bred psittacines, primarily cockatiels, were imported into the United States each month. At that time a cockatiel could be purchased in South Africa for \$6, while an aviculturist in the United States would need to sell the same bird for approximately \$25 to \$30 to cover expenses and make some profit. (The cost of feeding a cockatiel for a year in the United States is roughly \$25.) It is also likely that other species could be raised in third-world countries, and imported into the United States at prices that are competitive with birds bred by aviculturists in the United States.

#### **DISEASE POSES PROBLEMS FOR PRIVATE AVICULTURE**

The growth of private aviculture has been paralleled by the growth of the Association of Avian Veterinarians, a group of veterinarians with a special interest in medicine of companion and aviary birds. A corresponding explosion in the knowledge and application of avian medicine, such as the widespread availability of rapid, accurate sex determination techniques, has made possible a great expansion of aviculture. This proliferation of information would not have been possible without pet owners and aviculturists providing economic support for veterinarians.

Infectious diseases have a profound effect on the aviculture of psittacines. Many diseases, especially viral diseases, can quickly turn successful aviculture into disaster. The incidence and severity of these diseases is compounded by the mixing of species from many regions in captivity, and the mobility of birds between collections. Private aviculturists are extremely concerned about the effects of disease on their collections, and actively seek solutions to disease problems. Some of these diseases, like Pacheco's parrot disease, can now be



controlled by vaccination. Other diseases, such as polyomavirus (papovavirus) infections, are a threat to neonatal psittacines, especially in a nursery environment.

Improved husbandry techniques and preventive medicine can minimize the effects of disease. However, the etiology of many recognized syndromes, such as proventricular dilatation syndrome, has not yet been established. The origin of these diseases certainly lies in wild Neotropical bird populations. Their effects on native wild bird populations if carried by escaped birds is unknown, but potentially serious.

#### A COALITION BETWEEN AVICULTURE AND CONSERVATION

The most important and most achievable conservation goal for private aviculture is to increase captive production of certain psittacine species to fill the demand for pets and take trade pressures off wild populations. However, while this may be an achievable goal for some species, for others it may not be.

The development of avicultural techniques, disease control mechanisms, and diets for common species can contribute to conservation efforts for rare species. To achieve this goal, aviculturists will have to share and disseminate information. Some aviculturists are very open and are willing to share their experiences for the benefit of others. But others closely guard information on numbers and species of birds held in captivity, and their breeding success. More open exchange of information is desperately needed.

Avicultural associations such as the American Federation of Aviculture (AFA), specialty groups, and local bird clubs abound in the United States. Avicultural magazines such as *American Cage Bird Magazine*, *Bird Talk Magazine*, the *AFA Watchbird*, and *Bird World* have a combined circulation of over 200,000 households. These associations and publications provide an excellent medium for the dissemination of information among aviculturists. If the leaders of private aviculture are convinced of the proper course of action, the means for dissemination of the message is in place.

Sharing of information by participation in studbooks or registries is also vitally needed. Although some studbooks have been established, rates of participation have been low, probably due to the fear of disclosure. Effective



population management will require coordinated efforts to manage a significant number of individual birds. For maximum participation, registries and studbooks should be managed by aviculturists for aviculture as well as for conservation. It is conceivable that smaller groups of private aviculturists could cooperatively strive for captive maintenance of selected psittacine species as a safeguard against future loss of wild populations.

Unfortunately, maintenance in captivity is the only hope for species that have been extirpated in the wild, such as Spix's Macaw. Maintaining and breeding declining species for present or future reintroduction programs is appealing to many aviculturists. But many obstacles will need to be overcome before private aviculturists can make a significant contribution to reintroduction projects. Fear of disclosing avicultural holdings and the unwillingness to relinquish possession of birds will have to be put aside for the common goal of conservation. For these species it is essential that aviculturists cooperate in studbooks, and be willing to trade or transfer birds in order to maximize genetic diversity and minimize artificial selection for adaptation to captivity.

The costs of participation in such projects by aviculturists will be high and the rewards may be limited. Aviculturists must be willing to give up their birds, usually without financial compensation, and risk the return of these birds to the wild. This may be the most difficult undertaking because aviculturists often consider the risks of mortality during reintroduction as unacceptable. Reintroduced birds are often viewed as being "sacrificed." Extreme caution will also be needed to minimize the introduction of disease into wild populations from avicultural collections.

Future advances in population management and better cooperation with conservation goals could make private aviculture a viable conservation tool. Time is of the essence. The first step can be as simple as breaking down communication barriers and should be followed by the establishment of practical, economically viable management programs. Mistrust must be replaced with mutual respect and a common purpose.

Aviculturists must be made aware of recent advances in population management, recovery plans, and species survival plans. If they wish to participate, they must re-examine entrenched attitudes of fear and independence which discourage participation. While many of the species that they possess are now common, the status of these species in the wild could change with alterations



of habitat. The time to develop genetically viable populations is now while most of the breeding stock is of wild origin. Finally, conservationists must also be willing to compromise and assist in the establishment of economically feasible management programs that can be managed by aviculturists to meet the needs of both aviculture and conservation.

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*Resumen.*—Los potenciales de la avicultura privada para contribuir a la conservación son muchos pero han sido poco utilizados. Las vías principales por la cual la avicultura puede ayudar con la conservación son: supliendo al comercio de aves mascotas con cantidades significativas de especies comunes a precios competitivos, desarrollando técnicas de avicultura que pueden ser usadas con loros en peligro de extinción, avanzando el estado de conocimiento sobre la medicina avícola, manteniendo reservas genéticas viables en cautiverio de algunas especies, y reproduciendo aves para programas de reintroducción. Desafortunadamente, la desconfianza mutua y temor entre los conservacionistas y avicultores, y entre los avicultores mismos, ha inhibido el progreso positivo para lograr muchas de estas metas. Planes de conservación de especies, organizadas, requieren un nivel de cumplimiento y cooperación que muchos avicultores han sido reacios de ofrecer. Los zoológicos generalmente han demostrado niveles más altos de cooperación interinstitucional pero en general han demostrado poco interés en reproducir psitácidos. Tal vez las contribuciones futuras más significativas de la avicultura pueden encontrarse en fundaciones privadas siguiendo el patrón del "Peregrine Fund." Resolviendo conflictos sobre la pertenencia y control de aves, superando actitudes tradicionales de independencia y sigilo, y logrando un buen control sobre la amenaza de enfermedades son entre los retos más importantes para ser superados al integrar la avicultura privada con los esfuerzos de la conservación.

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