SUMMARY OF SITE VISIT: WILDLIFE RESCUE (ZOO AVE)

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1 INTRODUCTION

Zoo Ave Wildlife Conservation Park is one of three wildlife projects owned and operated by the Nature Restoration Foundation (NRF). It is an officially recognized Costa Rican wildlife rescue center and premier zoological facility. The park hosts over 60,000 visitors every year, the vast majority of which (95%) are Costa Rican Nationals. Since 1990, Zoo Ave has worked to preserve native flora and fauna through wildlife rehabilitation, captive breeding, and release of native species and operation of the zoological garden. The Zoo itself is designed to enlighten and educate people about the importance of Costa Rican wildlife to the tropical ecosystems and their vital role in the global environment through interactive exhibits, wildlife rehabilitation and release of native fauna.

2 RESCUE AND REHABILITATION PROGRAM

Zoo Ave accepts orphaned, injured and former pet animals at the Center for Wildlife Rescue and Rehabilitation (CWRR) located on the Zoo grounds in La Garita de Alajuela. They have also received a number of confiscated animals at Playa San Josecito Center for Release in the Golfo Dulce region. In 1999 alone, they accepted almost 600 animals. The vast majority of these animals (77%) were birds, primarily psitticine species (parrots). The most common species donated include red-lored amazons (*Amazona autumnalis*), crimson-fronted conures (*Aratinga finschi*) and orange-chinned parakeets (*Brotogeris jugularis*). Other species of parrots are also donated including scarlet macaws (*Ara macao*) and a variety of other amazon and conure species. Other birds donated include a healthy number of owl species including tropical screech owls (*Otus choliba*) and ferruginous pygmy owls (*Glaucidium brasilianum*) and a variety of songbirds.

Almost 20% of donations to Zoo Ave's Clinic are reptiles, primarily green iguanas (*Iguana iguana*) and boa constrictors (*Boa constrictor*) and a variety of turtle species. A great majority of these animals are wild individuals that have arrived at someone's house or barn and been caught. In these cases, the animals are given an examination and released at appropriate nearby sites. Animals that cannot be released immediately for one reason or another (injury, for example) are placed in the rehabilitation or reproduction programs. In addition to public donations, Zoo Ave receives a number of animals through government confiscations. Each year, around Easter Week, the government does a massive nationwide roundup of illegally captured animals.

The remaining 4% of donations are mammals including monkeys, sloths and squirrels. Zoo Ave regularly cares for orphaned baby howler monkeys (*Alouatta palliata*) that are hand fed and cared for until they are old enough to be released. These animals require an enormous amount of care and attention in order to assure both good health and adequate socialization with others of their species. Zoo Ave is fortunate to currently have a group of babies who are being raised together. This should assure appropriate social bonding and a better chance at living a natural life in the wild. The dedication of the Zoo staff and consulting veterinarian

has produced strong, healthy monkeys from malnourished orphans.

3 CAPTIVE BREEDING

The NRF has successfully bred and/or released over 40 species of native Costa Rican birds, reptiles and mammals. Breeding efforts are focused on threatened, endangered or otherwise sensitive species such as the scarlet macaw (*Ara macao*), great green macaw (*Ara ambigua*), green iguana (*Iguana iguana*), and Central American squirrel monkey (*Saimiri oerstedii*). All of the animals housed at the Zoo are provided the room, appropriate nesting material and nutrition in order to successfully breed and rear young. The majority of these young are in turn released into appropriate habitats

4 DISCUSSION QUESTIONS AND ISSUES

- Zoo Ave is a private, independently financed effort. If not for the generosity of the founders, and the patronage of visitors, this type of effort would be unable to sustain itself financially. How viable a mechanism is this in other countries? What alternative mechanisms could be considered to finance and sustain this important activity?
- The focus of Zoo Ave is on so-called "charismatic megafauna" (i.e. big, exciting animals). What are the ethical or practical considerations in excluding other endangered species? What type of an approach should be taken for these other forms of endangered biodiversity?

5 ADDITIONAL INFORMATION

5.1 Captive Breeding and Release Programs

5.1.1 Captive Breeding of Birds

The scarlet macaw-breeding program is designed to provide birds with sufficient genetic variability to establish a reintroduced population at the Golfo Dulce Center for Release site. The NRF´s Scarlet Macaw Conservation Program is currently underway and 28 birds have thus far been released. A new breeding facility was constructed in July of 1998 and now houses the potential for 40 plus pairs of breeding psittacines. The first full year of activity in the new facility has shown 14 pairs make an attempt and 8 pairs which have succeeded in producing young including three active pairs of scarlet macaws and two active pairs of great green macaws. The success of the Breeding Area should only improve in the years to come. Captive breeding at Zoo Ave involves a combination of artificial incubation, hand feeding and parent reared chicks. In order to encourage multiple clutching (the laying of more than one set of eggs), the first eggs of the season are often pulled from the parents and chick are hand raised. Subsequent clutches may also be pulled due to problems or poor parenting abilities with some birds. However, efforts are made to leave at least one clutch per season to the parents. This encourages a more natural process (and ultimately produces bigger, stronger chicks)

Other psittacine species such as white-crowned parrots (*Pionus senilis*), yellow-naped amazons (*Amazona auropalliata*), and aztec conures (*Aratinga nana*) are also captive bred in this facility. Chicks are usually parent raised but may be pulled for various reasons (such as sickness or poor parenting) and hand raised. As with all of Zoo Ave's captive breeding efforts, these chicks are placed in appropriate specific groups and released into appropriate habitats.

5.1.2 Captive Breeding of Reptiles

Each year Zoo Ave progress towards better hatchling numbers and survival. Zoo Ave hopes to in the coming years to reproduce every native species in the

Zoo successfully. All offspring are immediately placed on a release course. In the case of most, this involves staying at the zoo for a few months to grow up a bit, to counteract the predation pressures hatchlings have in the wild.

The green iguana (*Iguana iguana*) breeding program has been very successful. The eggs were artificially incubated through a variety of methods in order to establish which is the most successful and practical. This process established future protocols that will maximize the iguana-hatching rate. They will eventually be released at the Bosque Escondido site, or on the Zoo grounds.

In addition to iguanas, the Zoo hatched 39 baby turtles of various species including mud turtles (*Kinosternon scorpioides*), Central American Wood Turtles (*Rhinoclemmyspulcherrima*), Costa Rican Sliders (*Trachemys ornata*), and our exotic African Spur-Thighed Tortoise (*Geochelone sulcata*). Zoo Ave also currently has multiple clutches have Snapping Turtle (*Chelydra serpentina*) and Black River Turtle (*Rhinoclemmys funerea*) eggs. Recently one of the Black River Turtles laid a whopping 12 eggs... a record number documented for this species. The new hatchlings of native species are currently being housed in the turtle kinder where they are provided shelter and food until large enough to be released.

5.1.3 Captive Breeding of Monkeys

All four species of native monkey at the Zoo have been actively breeding. Thus far both of the free-roaming female-mantled howler monkeys (*Alouatta palliata*) have given birth to healthy offspring. Periodically, males are kept in an open-air enclosure to which the females are freely able to visit. While the males are unable to leap out of the enclosure, the females seem to have no problem coming and going as they please.

5.1.4 Release and Reintroduction of Species

At Zoo Ave there are three probable destinations for donated animals: Release, Exhibition or Captive Breeding. Immediate release is realized for those animals, which come to the Wildlife Clinic without injury and free of behavioral abnormalities (i.e. are not former pets). Other animals require medical or other care prior to release. Once these animals are free of clinical problems, eating on their own and otherwise healthy, the decision is made as to their appropriate dispensation.

Some animals are quickly determined non-releasable because of injury or behavioral problems. Many of the breeding parrots are former pets that have not proven capable of behaving normally in a group or have plucked their feathers to the point where they are incapable of flight. Additionally, some of the raptorial birds on display here at the Zoo have fractured or amputated wings and therefore cannot function in the wild.

Other animals are retained at the Zoo until release is deemed appropriate and feasible. Most of the monkeys on display are former pets or orphaned animals. Because of the complex social needs and numerous logistical complications involved in primate releases, most of these animals must be housed for a period of time before being considered for release.

Ideally, all physically and behaviorally capable animals are considered as viable release candidates. Those, which can be released promptly after clinical or hand-rearing care is complete, are released at one of three Zoo Ave sites: Zoo Ave Wildlife Conservation Park, the Golfo Dulce Center for Release or Bosque Escondido Biological Reserve. Other release candidates are housed appropriately and care for until the appropriate facilities, social groups and permits have been established.

The Nature Restoration Foundation

(NRF) is the official home of the Scarlet Macaw Conservation Project that has the objective to establish a population of free-flying, reproducing macaws over the next ten years. The site is located adjacent to the recently established Piedras Blancas National Park, therefore providing access to appropriate habitat in an area where this species once thrived. Birds released are bred and raised at Zoo Ave and transferred to the site for prerelease screening and training.

The Center is also the site for various other release efforts including the liberation of various birds brought to the Center for Wildlife Rescue and Rehabilitation by private citizens and through government confiscations during Easter Week and throughout the year. Monitoring is taking place on a variety of levels from behavioral observations of pre-release and released macaws to point count surveys for all parrot species living in the valley.

Below is an interesting article on the release process of Endangered Species implemented by the Nature Restoration Foundation (NRF).

5.2 Technical Report on NRF Activities: Nature Restoration Foundation's Center for Release, Playa San Josecito, Costa Rica, Field Report 1998-2001, by: Jennifer Hilburn and Katie Higgins

Introduction: In 1998, the Nature Restoration Foundation (NRF) acquired property and began construction of cages and housing for the implementation of its Scarlet Macaw (*Ara macao*) Conservation Project. The Playa San Josecito Center for Release (Centro de Liberación) is one of three projects owned and operated by the NRF in Costa Rica. The other two are Zoo Ave Wildlife Conservation Park in la Garita de Alajuela located in the Central Valley and Bosque Escondido Biological Reserve in the Nicoya Peninsula.

The Center for Release is located in the Golfo Dulce area of southwestern Costa Rica (08º 39.73N, 083º 15.30W) within a 5-km2 valley bordering the 15,000-hectare Piedras Blancas National Park. The site is approximately 16 km north of the small town of Golfito and can only be reached via a 40-minute boat ride or 7 hour hike over rough terrain. Rainfall (as reported for Piedras Blancas National Park) is estimated at 5,500 mm to 6,000 mm with a peak rainfall in September of 900 mm. The park and surrounding areas are classified as wet tropical forest with evergreen vegetation. The climate, topography and vegetation closely resembles that of Corcovado National Park which is the home of the nearest extant Scarlet macaw population. Due to its isolated location, there are few surrounding human inhabitants, some of whom are employed by NRF to assist in construction and maintenance of the Center and field work including feeding station observations, fruit collecting, browsing and radio tracking.

The Center is in its third year of existence and in its second year with the Scarlet Macaw Conservation Project. This project's long-term objective is to reestablish a third population of scarlet macaws in Costa Rica. Releases of captive bred, confiscated, and donated birds will be performed over a ten-year period (1999-2009) with the goal of establishing a free flying, reproducing population of macaws. As an extension of Zoo Ave, the Center is also utilized as a Wildlife Rescue Center for the ACOSA branch of MINAE (*Ministerio del Ambiente y Energia*), which is the government agency in charge of enforcing Costa Rica's wildlife laws. Over the past three years, the Center has been accepting animals confiscated by MINAE. While animals are accepted throughout the year, the vast majority is confiscated during the Semana Santa (Easter week) holiday period. These

animals receive care, housing and preparation for release back into the wild. In addition to these functions, a variety of other conservation projects, studies and community activities are already underway, continuing the goals of the NRF to help protect and conserve native Costa Rican flora and fauna.

5.2.1 Scarlet Macaw Conservation Project

Goals: This project proposes to establish a third, self-sustaining population of Scarlet macaws within its historic range. Objectives include: a) the enhancement of the long-term survival of Scarlet macaw; b) the provision of long-term economic benefits to the local and national economy through eco-tourism; c) the promotion of conservation awareness; and d) the development of pre and post-release protocol for large psitticine birds.

5.2.2 Project Design and Implementation

Scarlet macaws are considered endangered throughout its range (CITES Appendix I). There are currently two recognized Scarlet macaw populations in Costa Rica, and a few small groups within scattered pockets of habitat (Janzen, 1983). The first of the two major populations is found in and around Carara Biological Reserve (CBR), in the Central Pacific region of the country. This population contains approximately 330 individuals (Nemeth pers. comm. 1999, Vaughn 1999). The second population occurs on the Osa Peninsula in and around Corcovado National Park (CNP). Scarce data is available on this population, although estimates are between 200-700 individuals (Vaughn 1999). Two of the primary threats to these populations are habitat destruction and poaching for the illegal pet trade, specifically within the country. Due to habitat destruction, 20% of the original Scarlet macaw habitat in Costa Rica remained in 1993, the remainder of which is currently protected (Marineros and Vaughan 1995).

The NRF and Zoo Ave's decision to begin the Scarlet Macaw Conservation Project was based on the endangered status of this species in Costa Rica, the continued existence of protected habitat within the macaw's native range in which the species has been extirpated and the presence of an existing captive population and source of new genetic material in the form of confiscated birds entrusted to Zoo Ave.

For the past ten years (1990-2000), Zoo Ave has been preparing birds for the Scarlet Macaw Conservation Project. Preparations have included a breeding program, extensive health screenings, genetic considerations and an appropriate location. By 1998, these preparations were in place. In November 1998, the first group of Scarlet macaws was transported to the Center. On arrival they were placed as a group in a large flight cage, where they began to develop flight and landing skills. Being placed in a large group initiated many different social behaviors and the development of complex relationships between the different members of the groups. Browsing of cages with many species of trees containing fruits, flowers and seeds which are known to be eaten by two different populations of Scarlet macaws from Costa Rica to Peru (Marineros and Vaughan 1995, Munn 1992) allowing the birds to develop the ability to recognize and utilize food found in nature. Once the birds met the pre-release criteria, they were released in five groups, occurring between May and December 2000. Currently there are 21 free-flying macaws around the Center. Current projects, studies and activities are underway to continue the development of the Scarlet Macaw Conservation Project.

5.2.3 Development of Pre-Release Protocol

Before reintroduction and release projects can occur, individual animals must be evaluated to determine their potential fitness for life outside of the captive environment. We are developing a pre-release protocol that uses descriptive and comparative behavior analysis to quantitatively determine whether a bird is a good release candidate. We are using a focal method of behavioral sampling using instantaneous recording during ten-minute periods in order to determine an activity budget of each release candidate. In addition, we are taking all frequency data on behaviors such as flight and copulation. Seven major behaviors are monitored within the cage, these are: feeding, socializing, moving, self-maintenance, breeding, no activity and any occurrence of non-natural behaviors such as talking or self-destructive feather plucking, etc.

These behavior patterns will be compared to patterns in our free-flying birds and with the same individual after it has been released. With this technique, we hope to track the progression of each release candidate and compare their success or failure outside of the cage with the behaviors recorded during captivity.

5.2.4 Establishment of Release Techniques

Something rarely considered is how to release a bird into its natural surrounding in the least stressful way. At this point we have released five groups of birds. The manner of release has varied from catching and placing the bird on the outside of the cage to luring and/or waiting for the bird to walk or fly out of a door located on the roof of the cage. The latter method has met with greater success as judged by the distance moved from the release cage within the first 48-72 hours. This period appears to be critical, as 5 out of the 6 birds, which have been “lost” during the project, have disappeared within the first three days.

During the first release, two birds were lured (using food) out of the cage. The birds stayed within 15 m of the cage for the first three days. One eventually flew away, and was later returned to the project with clipped wings, and was placed back in the cage for future release. The second release, in which we caught the birds and transferred them to the outside of the cage, 4 out of 5 birds immediately flew more than 50 m away. Two of these birds flew away, and were “lost.” For the third release, the birds were allowed to fly out of the cage. Unfortunately this occurred while workers where still climbing around on the top of the cage, and the birds left the cage in moments of stress. Of the three birds released, two immediately flew away and were “lost” and the third remained with the already released birds. In the fourth and fifth releases, we again allowed the birds to come out of the cage on their own, the majority of the birds sat on the cage for a short time (10-30 minutes) before flying to a nearby perch. The perceived stress level, judged by “panic” reactions from the birds such as immediate flight, appeared to be much lower with this more passive technique. As the initial flights and subsequent landings have been judged a critical learning phase for the birds in order for them to learn the boundaries of the station and their flying abilities, allowing the birds to take this step on their own time appears to be important to the survival of release candidates.

5.2.5 Development of Post-Release Protocol

Post-release monitoring involves a variety of methods including continued behavior sampling as described above in “Pre-Release Protocol.” Radio telemetry equipment is used to supplement this protocol as well as track any birds, which wan-

der from the site. The radio collars are expected to last for 18 months, giving ample time to observe the behavior of these birds (Holohill, 1999). In addition to these methods, routine head-counts are made at supplemental feeding platforms provided in and around the site. Individual birds are identified and accounted for at least twice each day

5.2.6 Nest Box Supplementation

Appropriate nesting cavities are a potential limiting factor for reproduction in macaw. populations. In studies conducted in Peru on three large macaw species (Scarlet macaws, Green-winged macaws (*Ara chloroptera*) and Blue and yellow macaws (*Ara ararauna*), a high degree of aggression was observed in and around nest sites during the breeding season indicating intense competition for low numbers of appropriate nesting cavities. Researchers provided artificial nest boxes to augment available nesting habitat. In each case, macaws attempted to nest in the artificial boxes. In one case, a pair of Blue and yellow macaws successfully fledged young (Munn, C.A. 1992). Artificial cavity studies have also been conducted on the CBR Scarlet macaw population. 12 out of 33 nest boxes placed between 1995-1999 were found with a total of 21 chicks (Vaughan et al. 1999). Nest boxes provided for the Scarlet Macaw Conservation Project have been similar in design to those used in and around CBR. Additional nest boxes have been designed and placed using information on nest boxes design from the Tambopata Nest Box Project in Peru (Brightsmith, 2000).

In October 1999, seven artificial nest boxes were built and placed around the release site. They were placed at various heights, positions and on a variety of tree species. Heights varied between 15 – 35 from the ground. Tree species used were cedro amargo (*Cedrela odorata*) – 1 box, gallinazo (*Schizolobium parahyba*) – 2 boxes, balsa (*Ochroma pyramidale*) – 3 boxes, and machete gauva (*Inga spectabilis*) – 1 box.

In January 2001, nine more artificial nest boxes of a slightly different design were built and placed around the release site, again at various heights, positions, and on a variety of tree species. All these boxes have been investigated within three to four days of placement. Thus far, nest box use has been restricted to exploration by several release birds. Although occasionally one pair of birds has been observed sleeping in the box located nearest to the site (in a large machete guava), no reproductive attempts have been made.

Monitoring of the nest boxes will continue throughout the project duration and will include both observations from the ground as well as periodic climbing checks. Data collected will include size and timing of clutch, hatch dates and subsequent growth of chicks. Each chick will be banded and periodically weighed and examined. Fledging time and survival will be closely followed. Data analysis will include preferences and success or failure in reference to box location and design. At least 30 more boxes will be built, placed and monitored during the first ten years of the project.

5.2.7 Community Activities and Involvement

As part of the pre-project preparations, in 1998 a Zoo Ave biologist met with the community to survey interest and reactions from local families. Without exception, the local people were encouraging and supportive (pers. comm. Torres, 99). Over the first three years, the community has proven to be of great importance in keeping us abreast of released macaw activity in the area. Within an approximate 100-km2 area, messages pass from person-to-person by word of mouth (a phenomenon locally known as the “jungle telephone”).

No matter the location, word of a macaw sighting usually reaches the Center within 2-3 days. This communication has assisted in the retrieval of three lost birds as well as valuable information on daily and incidental macaw movements.

The local school (consisting of 9 students ranging in age from 5-16 years) visited the Center in May 2000 for tours, games and information on the project. This "Day in Conservation" successfully interested the students and has resulted in requests from neighboring community schools to participate in similar field trips to learn more about the work occurring at the Center.

We have also recently begun work with a local group of students from the La Palma Association of Conservation of Scarlet Macaws. This group formed in 1998 independently from NRF's Scarlet Macaw Conservation Project and consists of students ranging in age from 15 to 20 who are working on local projects designed to promote awareness of endangered species in the area. Each year, this group hosts a festival that includes puppet shows, food, games and other activities centered on the plight of the Scarlet macaw. Staff from the Center participated in this event in 2000 and is currently collaborating further with the students on various projects. Such projects may include planting of known macaw food trees within and around Piedras Blancas National Park, and participation by La Palma volunteers in seasonal MINAE wildlife confiscations.

The Center is not open to the public; however there have been many visits from people living in the area. Although visitors are not taken to the release cages, they are able to enjoy seeing many released birds flying, eating and living a life outside the caged environment. Tee shirts and coloring books have been handed out to the community on a variety of occasions and will continue to be handed out to visiting schools.

5.2.8 Survey of Food Sources

Two known studies have produced lists describing natural food sources of the scarlet macaw. These studies were performed on the CBR population in Costa Rica and the Manu population in Peru respectively (Marineros and Vaughan 1995, Munn 1992). Comparisons of the tree species in and around the Center for Release with these studies have been made to determine availability of natural food resources. Many key species have been identified within and around the site. As birds are released, records are kept of identified tree species being used as food sources. Released birds have been observed eating all of the plant species in Table 1. Parts eaten include flowers (fl), fruit (fr), seeds (s), bark (b) and leaves (l).

5.2.9 Native Avifauna Release Projects

Although government confiscations happen throughout the year, MINAE officials, by far, confiscate the highest proportion of illegal wildlife, during the week before and two weeks following the Easter holiday. The week before Easter is officially considered the week of the saints or *Semana Santa*, therefore all government confiscations brought to the Center during this period are considered *Semana Santa* birds. Beginning during Semana Santa 1998, ACOSA asked the Center to rehabilitate and release birds that had been confiscated from the area. In the past three years, the Center has provided housing and training for these birds until release. To date, 285 birds have been released into the area (Table 2). The pre and post release methodologies used in these projects are similar to those of the Scarlet Macaw Conservation Project.

5.2.10 Release Techniques

Effectiveness of different release techniques is being evaluated. As Semana Santa coincides with the presence of neonates in the wild, the majority of the

birds arrive as either nestlings or fledglings and require extended care.This has created a unique opportunity to develop release techniques using very young birds.

These young birds are housed in boxes with open tops during the daylight hours as climate at the Center does not require artificial heat sources even for naked chicks. Once the young have reached fledgling age, they are transferred to nearby trees during daylight hours and returned to their boxes only for the night. This situation encourages young birds to take their first flights within hours or, at most, a few days after being placed outside of the "nest." In effect these birds are being released during their fledging period, an appropriate imitation of life in the wild. Fledglings continue to be fed until weaned and are provided cages in which to return to during the night until better able to fend for themselves. Six of seven red-lore amazons (*Amazona autumnalis*) released in June of 2000 using this method are observed daily foraging on their own within the site. These birds return nightly to roost in nearby trees.

5.2.11 Feasibility of Release Ex-pets

Many of the confiscated and donated birds accepted at the Center are former pets. This offers the opportunity to assess the feasibility of releasing such birds. These birds are often slower to fly, socialize and eat natural foods. Although they may take more time, thus far results show that many are able to re-adapt to a natural environment. In the last two red-lore amazon releases (June and July 2000), 35 birds were released, at least 30 of which were former pets. This number does not include the Semana Santa young or birds that were pulled from the project within the first 48-72 hours of release. These release birds consisted mainly of ex-pets.

5.2.12 Nest Box Designs and Preferences

Nest box augmentation will be provided throughout the site for a variety of psittacine species released. Dimensions for boxes will vary in order to provide adequate nesting options. To date, 8 nest boxes for *A. autumnalis* have been built of balsa wood from a fallen tree. These boxes vary in lengths and cavity size. As other trees fall, more nest boxes will be built and hung. Other nest box designs such as PVC tubing, hollowed palm trunks and plastic barrels will be used for comparative preference and success/failure studies.

5.2.13 Non-releasable Birds

Unfortunately, there will always be birds that are not releasable due to physical or behavioral reasons. A large "gymnasium" structure consisting of long, intertwined perches and trees is being built within a predator-proof enclosure to house these retirees. This will provide space for these birds to live out the remainder of their lives in an open, natural setting while also keeping them protected. Flight capable non-releasable birds will be housed in large, well-vegetated cages.

5.2.14 Native Fauna Conservation Projects

The NRF is also works on non-avian projects. To date, three other conservation projects have taken place in Playa San Josecito. These include a scorpion mud turtle (*Kinosternon scorpiodes*) release project, a spectacled caiman release (*Caiman crocodiles*), and conservation efforts with the Central American Squirrel monkey (*Saimiri oerstedi oerstedi*), a species listed as endangered (B1+2abcde, C2a (Primate Specialist Group)) on the IUCN Red List.

5.2.15 Turtles

There are three families of freshwater and terrestrial turtles found in Costa Rica. The semi aquatic mud turtles are found in the family Kinosternidae, and have three representatives in Costa Rica. All three are generally found in swamps, slow streams, and temporary ponds, and some individuals travel overland. These turtles are considered omnivorous, feeding on land as well as in water. They lay their eggs in small clutches throughout the year, and there is no special nest construction or site (Janzen, 1983). Due to the largely instinctive behavior of these animals, the pre-release protocol consists primarily of assessing physical condition rather than training them to find and manipulate foods, predator avoidance and other learned behaviors important to avian and mammalian species. On February 9th, 2000, thirty-one *K. scorpiodes* were released into the riverbed flowing through the San Josecito valley. A system of numbering the turtles with notches chipped out of the marginal scutes on the their carapace was used to identify individuals. As of September 1, 2000, NRF staff and locals have found six of the released turtles. Another 4 sightings have been reported to the Center, although without individual identification. These have been found throughout the valley, and all in good physical condition.

5.2.16 Caiman

The spectacled caiman (*Caiman crocodiles*) is a small species commonly found in lowland swamps and slow rivers throughout Costa Rica. Occasionally individuals are brought to the NRF's Center for Wildlife Rescue and Rehabilitation for care. One such animal arrived in April of 1999 with toxic levels of iron in its blood as a result of being housed in a metal tub. This animal remained at the clinic for several months for detoxification. In January of 2000, blood levels were found to be normal and it was taken to Playa San Josecito for release on February 10th, 2000. It was released in a lagoon located near the Center. Approximately 3-5 caiman seasonally occupy this lagoon. Their migratory nature is unknown at this time. On the night of July 15th a single caiman was seen hunting night by two biologists. As this was the only caiman seen, the probability is that it was our released animal. On November 2nd, 2000, another caiman was released into the lagoon.

5.2.17 Central American Squirrel Monkeys

From 1997-1999 another conservation group was located in the San Josecito valley. They were working with mammals. For a variety of reasons, they were unable to continue their work in the area, and left at the end of May 1999. When they left, they abandoned six recently escaped Central American Squirrel monkeys (*Saimiri oerstedi oerstedi*). These monkeys had been confiscated by MINAE and were all former pets, with 4 of 6 being very young, incapable of taking care of them, and bonded with people. The monkeys escaped on 22 May 1999. The two older females were quick to go exploring, leaving the four young males behind to fend for themselves. Within two days, the four monkeys found the Center. As they were accustomed to living with people, they immediately became intolerable pests to the biologists as well as to the caged and released birds. As there was no cage available to house them, the staff at the Center had to find another solution. We began a program of territorial exclusion. This consisted of feeding the monkeys outside the station, and acting like a tribe of aggressive primates when the squirrel monkeys came into the site. We literally jumped up and down in threat displays, making grunting and squealing noises, and shaking branch-

es. Within a month the two females and the four males had re-grouped. Unfortunately the youngest male monkey died in June of 1999. The additional feeding was terminated in July 1999. It was approximately one year of work before the monkeys became reluctant to enter the station. One of these five was (for unknown reasons) kicked out of and excluded from the group in September of 2000. This monkey retreated to the station, where it was captured and returned to Zoo Ave's captive breeding program. In December 2000, a male was brought to the group from Zoo Ave and introduced. This monkey became instantly attached to the group, and has been seen mating or attempting to mate with the two females. To date the remaining five monkeys (including the new addition) are seen almost daily around the site area. They are eating on their own, and have established a territory, including feeding areas and designated trees for sleeping. They seem to be reluctant to approach humans, although they still don't show actual fear of humans. If the area were more densely populated, this would pose a more serious problem, however currently this lack of fear poses little threat to the animals. Hopefully, with time, these monkeys will continue to become wilder. Although this project was more or less forced on NRF staff, the success of the released animals is encouraging. As this subspecies of *S. oerstedi* is endangered, as it is regularly accepted at the Center for Wildlife Rescue and Rehabilitation, and as appropriate habitat exists in the San Jocecito Valley, we are developing a project to release more individuals in order to augment this small released population.

5.2.18 References

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