

Final Report

El Oro Parakeet Project, Southwestern Ecuador 2002-2003

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We want to express our gratitude to the following organisations whose joint financial contributions made the project possible:



**LORO PARQUE
FUNDACIÓN**



Strunden Papageien
Stiftung

Nuttall's Club

Wharton's Club

Stihl Stiftung

Verein für Art- und
Habitatschutz

1. Executive Summary

180-200 El Oro Parakeets (*Pyrrhura orcesi*) were recorded in the Buenaventura valley and neighbouring remnant forest patches. 120 of these occur in the direct vicinity of the Buenaventura Reserve, while the remaining birds inhabit forest at 2-4 km distance. Flocks frequently transverse open terrain for > 500 m and the different flocks are most likely connected. We mapped the home ranges of flocks ranging in and adjacent to the reserve by radio-tracking and visual observations. Based on these data, we proposed priority areas for an enlargement to the Fundacion Jocotoco the owner of Buenaventura Reserve. In 2002 and 2003, two of these areas totalling 260 ha were purchased. This acquisition doubled the number of parakeets protected year-round by the reserve from 30 to 60, while approx. 120 birds are seasonally protected in the new reserve. Flocks ranged on an area of 1-3 km² and core areas changed seasonally according to the local fruit supply. Birds bred in December-February and ranged from November to June mainly above 850 m up to 1200 m, while from July-October they were found down to 550 m. During high but patchy food abundance, flocks united temporally, but always split up before roosting. Roost sites changed frequently and were located in cavities as well as on open branches. Birds maintained a highly constant flock size throughout the year. Breeding occurred in flocks from 3-9 individuals in natural cavities. In 3 out of 5 flocks, most or all flock members entered the cavity presumably to feed the young. Incubation was shared among at least 3 different birds. Birds preferentially ranged in relatively undisturbed forest, but tolerated disturbed habitat. They also often foraged on pastures with single trees and two of the nests were found directly on the edge of pastures. Birds fed mostly on figs and fruits of related trees. They were also observed to feed on flowers.

The reserve consists partly of abandoned pastures. Some of them are regenerating quickly, while succession on others is probably haltered by a persistent invasive grass species. A first reforestation plot established in 2002 showed low survival rates with two local palm species. Conversely, another reforestation planted in 2003 had high survival rates using three other tree species. Because species identity and former grass cover differed both, it is yet unclear which factor attributed to the difference in survival rates. The project also started an education initiative leading excursions with a total of 335 kids to Buenaventura Reserve and holding talks at local schools. A main obstacle to the conservation of this species is the ongoing deforestation of unprotected areas which our environmental awareness campaign was unable to prevent. It seems therefore important to expand environmental education activities in the near future. Such a campaign would also increase acceptance of the relatively young reserve in local communities.

2. Acknowledgements

We are very grateful to the various people who contributed vitally to the project. Foremost among these are Cesar Garzon, Mery Juina, and Michael Dietrich who were all invaluable and tireless workers in the field and in the analyses. They outwitted the many obstacles inherent to field work, escaped angry bulls by climbing trees and coped with camouflaged fer-de-lance, suspicious landowners, and cars turned upside-down. We very much enjoyed working and living with them. Our heartfelt thanks also go to Baldomiro Becerra and Darwin, the two guards of the reserve whose help in finding and maintaining trails on steep slopes, catching birds, and overcoming any obstacle was invaluable to the project. It was always a really great pleasure having the two around. We also thank Jo Heathcote, Tina Metzger, Andi Probst, Claudia Wickert, and Timo Zech for their great help in the fieldwork and the cheerful company. Our landlords Mirian Riofrio and Salvador Encalada made us feel at home from the very first day. We always remain thankful for their hospitality and the great pleasure to stay with them and their family. The project would not have been possible without the great collaboration of Fundación Jocotoco. Namely Francisco Sornoza, Robert Ridgely, and Nigel

Simpson were extremely helpful throughout the entire project, whether thousands of kilometres or just meters away. Iain Davidson and David Wege (both BirdLife) assisted with valuable advice in various stages of the project. Our thanks to all of them.

3. Introduction

The El Oro Parakeet (*Pyrrhura orcesi*) is one of the 62 globally threatened bird species in Ecuador. Described only in 1988, the parakeet is still poorly known. No study on the ecology and threats of the species has been carried out prior to this project. The species is classified as endangered (BirdLife 2000) with a rather rough population estimate of 2,000 to 10,000 individuals. A steady decline of the population seemed to have occurred over the past decade along with loss of the humid cloud forest in its range. The El Oro Parakeet is restricted to a narrow strip of approximately 100 km in length and 5-10 km in width of humid montane forest between 600 and 1300 m in the Azuay and El Oro Province (hence its name) of south-western Ecuador (Fig. 1, Ridgely and Robbins 1988). Here, forest tracts continuously shrink (Fig. 4) and become more fragmented due to logging and cattle ranching. In fact, after a deforestation rate of 57% per decade between 1950 and 1990, just 4% of the original forest cover remained in the early nineties (Dodson & Gentry 1991) and by now, forest is restricted to the most inaccessible slopes. Currently, there is only one protected site, where the El Oro Parakeet occurs, the Buenaventura Ecological Reserve owned by Fundación Jocotoco. Due to the paucity of information on the species ecology, it was previously unknown whether Buenaventura Reserve supports a viable population. The project was therefore initiated with the aim to i) determine the population size, habitat requirements, and threats at Buenaventura and ii) to identify priority areas for conserving the El Oro Parakeet by expanding the reserve.

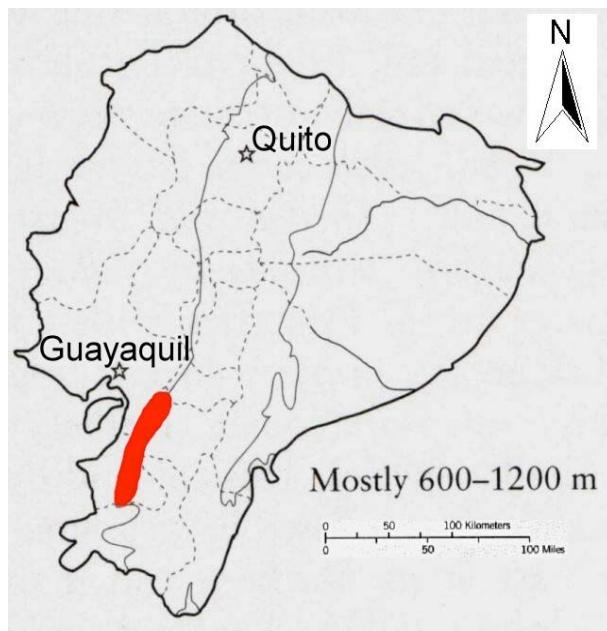


Fig. 1: Range of the El Oro Parakeet (after Ridgely & Greenfield 2001, modified by Dietrich 2003).

4. Objectives

1. Assess the population size of the El Oro Parakeet in the Buenaventura Reserve and in remaining suitable habitat in the vicinity of the reserve. Investigate the requirements for breeding and breeding success in different forest patches in and outside the reserve.
2. Study the daily and seasonal movements of this species. In order to assess whether the existing reserve protects this species sufficiently, it is essential to understand movements and home range use of birds during and outside the breeding season as well as dispersal patterns of juveniles from local populations.

3. Investigation of habitat preferences and spatio-temporal land use patterns. Identification of food plants of the El Oro Parakeet.
4. Improvement of habitat quality for this species on the old pastures within the reserve based on the results of (3). Planting food plants and monitoring of natural regeneration

of food and other plants, that have been identified as important requirements for nesting and habitat use of this species.

5. Identifying priority areas for an enlargement of the current reserve. Determine habitat in the surroundings of the reserve that either holds substantial parakeet populations or important feeding sites for parakeets living in the reserve.
6. Start an educational campaign on the importance of maintaining forests, promote local awareness and pride for the parakeet populations in the nearby villages and reduce the impact of potential direct and indirect persecution. Survey local markets to assess the extent of local pet trade.



Figure 2ab: A) The El Oro Parakeet in Buenaventura (taken by Dietrich). B) Two caught birds; The radio-collar is fitted around the neck of the bird on the right (taken by Schmidt).

5. Description of project sites

The Buenaventura Reserve is situated within a valley opening to the Pacific lowlands of western Ecuador. The slopes of the valley range from 400 –1200 m asl. With increasing altitude, humidity increases, the main precipitation consists of rain and fog (2000-3000 mm/a) due to the accumulation of clouds forming in the lowlands. Cloud cover is more pronounced on the upper slopes resulting in a gradient in humidity. The reserve comprised app. 1000 ha in March 2002. Forests in the valley and in the adjoining areas are all fragmented due to extensive pastures with all remaining fragments being invariably small (Fig. 3). Primary forest does apparently not exist anymore although a number of old trees is still present and a few small tracts seem to have been spared from logging. Most of the forest is secondary, with a broken canopy and dense understory. Canopy height is on average 20-25 m. The northern slope of the valley has been mapped by GPS to assess habitat availability (Fig. 5). The area surrounding the reserve is mostly used for extensive cattle ranching belonging to different properties.

6. Methodology

Population estimates Point counts from strategic viewpoints were simultaneously conducted by three to six different observers to assess parakeet numbers within an area. Besides yielding reliable and repeatable results, this method also served as a first indicator for the extent of parakeets' movements. Point counts are more reliable than transects. The latter method resulted in an over-estimated 1450 parakeets only two years earlier at Buenaventura.

To assess parakeet movements in detail, we employed radio-tracking. We used transmitters from AVM Instruments, Calif. fitted as a collar around the birds' neck (Fig. 2b).



Figure 4: Timber extraction adjacent to Buenaventura Reserve (Schaefer).

Figure 3: The forest belongs to the Southern part of Buenaventura Reserve, pastures to local landowners, These are used for cattle (Schaefer).

We used three element Yagi antenna for tracking birds. The signal was constant for over 2 km if not hidden by intermittent landscape features. Directionality was reliable, although strongly reduced in the steep and dense forest. Inclination often prohibited to track birds within sight distance and the use of radio-tracking provided the only unbiased estimate of the proportion of habitat types used by the species. Birds' locations were determined either by sight observation (after homing in on the birds) or by collecting two to four fixes from different angles. We tracked birds continuously every day during the first three weeks and every other day after that period. Since birds frequently fly for more than 400m, radio-tracking depicted home ranges more accurately than sight observations. Birds were caught either while flying close to the ground or in subcanopy nets. Transmitters were active for about five weeks before battery failure. We never managed to catch the same bird twice and thus cannot estimate how long transmitters stayed on the birds.

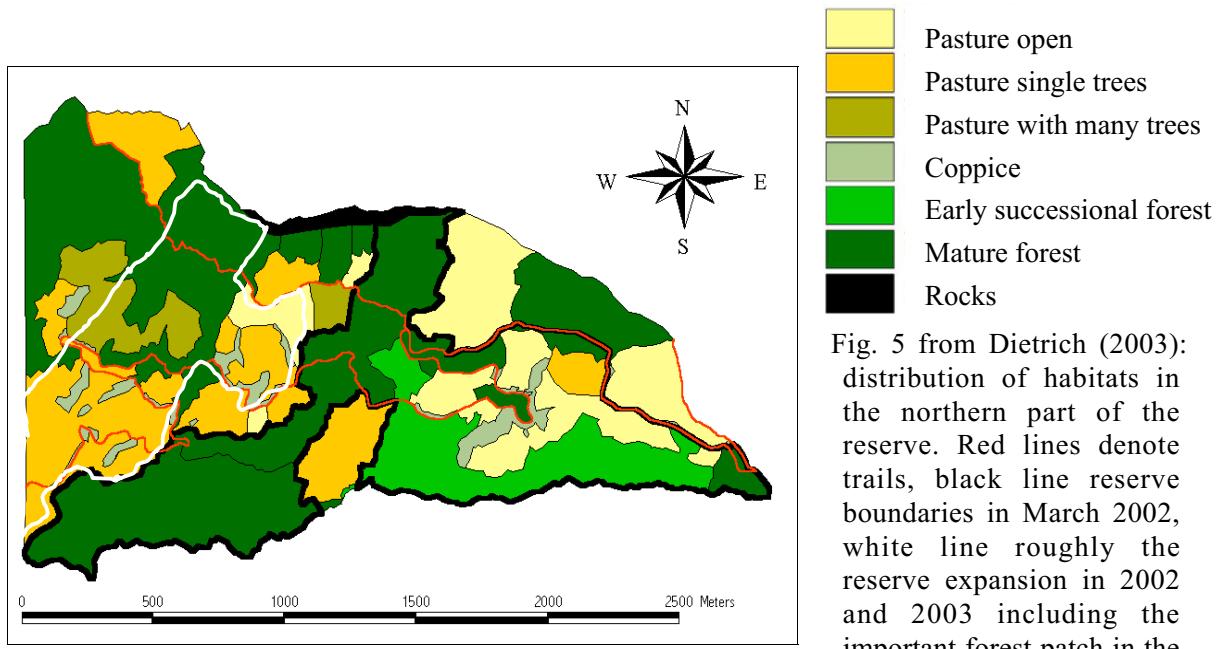


Fig. 5 from Dietrich (2003): distribution of habitats in the northern part of the reserve. Red lines denote trails, black line reserve boundaries in March 2002, white line roughly the reserve expansion in 2002 and 2003 including the important forest patch in the north.

Habitat use We determined habitat occupancy from flocks monitored by radio-tracking or from a few well known flocks that were observed intensively. At 517 locations, we investigated the habitat use of birds by noting habitat characteristics within 20 x 20m around the exact location of parakeets. The following habitat parameters were collected: exposition of slope, inclination, altitude, GPS coordinates, habitat type (pasture with few trees, pasture with substantial tree cover, early successional forest stage, open and mature secondary forest, gallery forest, forest edge), foliage cover in the canopy and at ground level, distance between trees, plant diversity index, tree form, height, BHD, crown diameter, crown foliage cover, epiphyte and moss abundance, and forest strata. We also collected data on habitat parameters at 210 randomly chosen locations to compare these data to parakeet locations for an assessment of habitat selection. In addition to the 210 data on forest structure, we collected data from 50 randomly chosen forest patches (10x 10m) to study differences in forest structure between high and low altitudinal forest to explain birds' seasonal avoidance of lower altitudes.

Fruit supply We established six forest transects in different areas in and outside of the reserve at different altitudes to assess the seasonality of the fruit supply and correlate birds' movements to changes in the fruit supply. The transects were visited once a months and all ripe and unripe fruits above 5m were counted within 10m to the left and right of the observer. We noted the size of fruits and categorised the fruit supply according to three forest strata. Height and crown diameter of fruiting trees were noted.

Reforestation We did not find trees native to the reserve in the local tree nurseries. Therefore, we collected seeds and fruits within the reserve and transferred them to a local nursery in Piñas for germination. Thereby, we obtained 80 seedlings of four species which were planted in October 2002 as a pilot project. We established another plantation in March 2003 on the land that was acquired in November 2002 by the Fundacion Jocotoco. Prior to planting, the grass was cut down to enhance seedlings' prospects. Depending on the nature of grass, the cutting was repeated every fortnight over the first two months.

Education initiative We organised excursions with local school classes to the reserve. Excursions lasted for four hours and consisted of a 3.5km walk where we explained the basics of the forest ecosystem and nature conservancy. After the walk, interactive games repeated the material learned earlier. Kids aged 8-14 were brought to the reserve. We also held talks in local schools to raise environmental awareness and promote the conservation of species and habitats. We prepared posters on the reserve for the local town hall in Piñas.

8. Project achievements and results

Objective 1: Population estimate

120 parakeets were found in and adjacent to the reserve. Average flock size was 7 ± 2 (mean \pm sd). At patchy but abundant food resources, flocks united to form a large flock of up to 60 individuals. 40-50 individuals were found in smaller forest fragments that were interconnected about 3 km north of the reserve. 20-30 birds ranged in another larger secondary forest southwest of the reserve. No other birds were found in the vicinity, but we might have missed birds as remote areas were not surveyed frequently. Previously, breeding was thought to take place in March-June. However, when we arrived in March 2002, birds had already fledged. In 2003, the breeding season started in December 2002 and birds fledged by mid- to late February. Due to seasonal shifts in rainfall (e.g. during El Niño), the breeding season probably shifts as well. We tried to assess juvenile numbers in 2002 by counting birds with juvenile characteristics (i.e. very limited amount of red on the forehead and a white not pink to red flesh around the eye) in the flocks. Thereby we estimated 1.37 juvenile per pair, but this figure likely overestimates reproductive output, since immature

birds present in the flocks also had characteristics of non-adults. A minimum estimate for 2002 counts 22 juvenile birds that were still begging for food at the start of the project. In 2003, however, only 10 juvenile birds were found out of 150 birds surveyed. Reasons for the difference in reproductive success remain yet unresolved. Three out of five nests surveyed in 2003 failed, one owing to nest predation by Crimson-rumped Toucanets (*Aulacorhynchus haematopygus*) and two for unknown reasons. Nest site selection was variable, two nests were found in the forest, two on the edge of pastures, and one in very small secondary forest surrounded by pastures. Nests were natural cavities 1.8-24 m above ground, each in a different tree species.

Objective 2: Daily and seasonal movements

The species is sedentary. Flocks occupy the same home range in the period November to June. Some flocks move to lower altitudes during July-October. This altitudinal shift is presumably a consequence of food shortage. We found very few fruits in the core areas of several flocks from August to early October. Home range sizes differed between flocks (Kruskal-Wallis test $p < 0.001$). The largest home range extended 3.5 km^2 while the smallest home ranges was about 1 km^2 . Several core areas existed within each home range. Roosting sites changed frequently and each roost was only used for a couple of nights. Birds started to move about 10 min after dawn and arrived at roost sites about 10-15 min before dusk. Birds moved on average $149 \pm 163 \text{ m}$ (mean \pm sd, range 5-1760 m) between two sites covering between 1.5-8.9 km/d. Birds stayed on average $42 \pm 40 \text{ min}$ (mean \pm sd) at a single site (range 0-283 min). Altitudinal movements were rare. Inside the forest, birds flew mainly in and directly above the canopy and sometimes in the subcanopy. In the open, birds flew considerably lower mostly 5-17 m high. Contact calls are frequent while in flight. Foraging and roosting birds are normally quiet and inconspicuous. After the breeding season, most of the flocks concentrated in just two areas, one of them now integrated in the expanded reserve. The overall fruit supply did not predict parakeet movements but birds may track Moraceae fruits.

Objective 3: Habitat use

The species prefers mature forest where it mainly forages in the subcanopy and canopy. It tolerates, however, disturbed forest, gallery forest, and even pastures with single trees. The species rarely uses early successional forest. When six flocks were investigated, they spent 67% (range 57 – 86%) of their time in the forest interior. We did not find activities restricted to certain habitat types and birds even nested on or at the edge of pastures. Birds also flew onto pasture to rest and returned into the forest for feeding. The species' microhabitat use was characterized by large and high trees in the forest. The microhabitat use was also characterized by the availability of fruits. We did not find interspecific competition between the El Oro Parakeet and any of the seven sympatric parakeet species. Birds readily transversed open areas and seem to tolerate fragmentation to a certain extent.

Objective 4 Reforestation

Reforestation was done to a smaller extent than planned. We did not find tree species native to the reserve in nurseries. Thus, we collected more than 1000 seeds in the vicinity of the reserve and brought them to a local nursery for germination. Species' germination rate was 7-25%. The first reforestation plot was established 3 months after germination. We planted 70 seedlings on an abandoned pasture. After nine months 30% of the seedlings had survived, the other ones mainly desiccated. A second plot was established in March 2003 containing 120 seedlings. Here, survival was relatively high with 85% after three months. We have collected samples of food trees of the parakeet, which are currently identified by an Ecuadorian botanist. The list will be used for future reforestation. We located one nursery having two

species that naturally occur in Buenaventura Reserve. Another reforestation is planned for the start of the rainy season in late December 2003 involving plants of these two species. The reforestation was done in cooperation with Robert Coronado from the US peace corps.

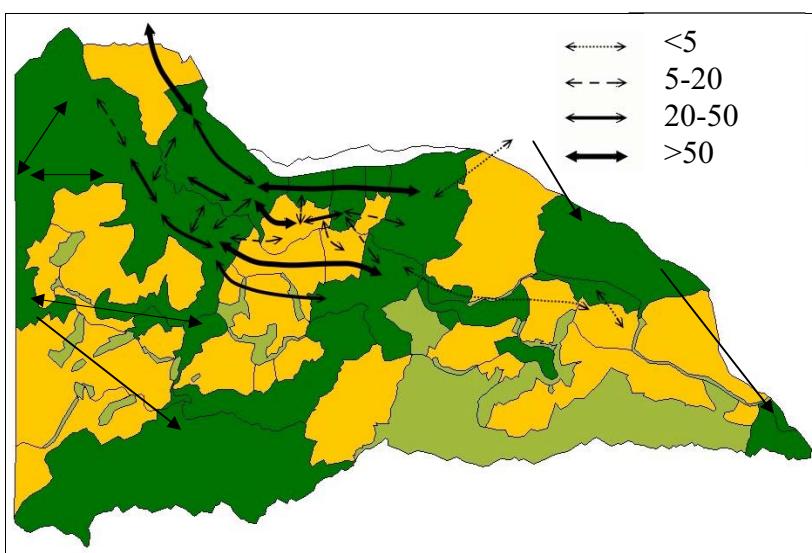
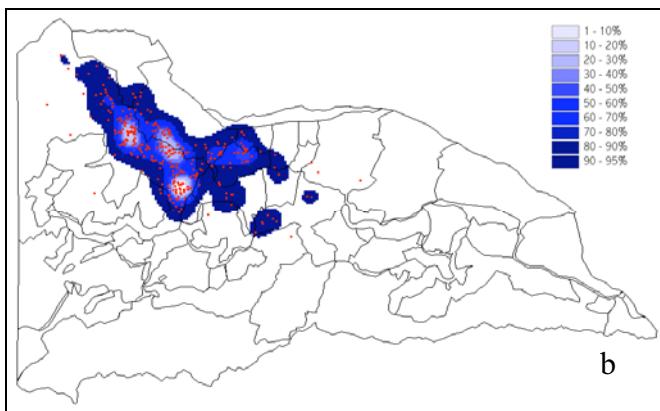
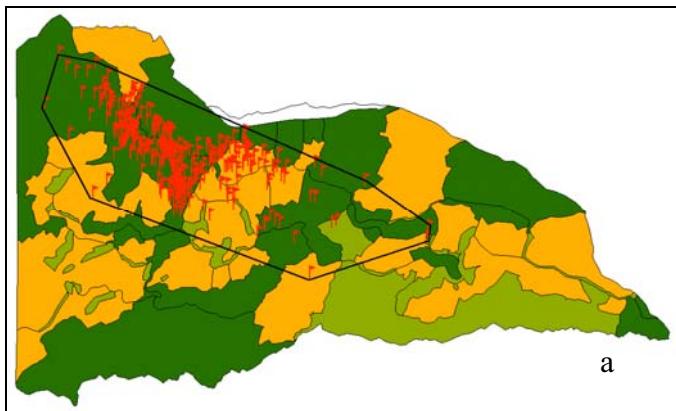


Figure 7 modified from Dietrich (2003): pictures main parakeet movements in the northern part of Buenaventura Reserve.

Figure 6 from Dietrich (2003): **A** The home range use of 1 radio-tracked flock during 375h. Locations are mainly in the newly (2003) bought area. Home range size was 29ha during 32d. Dark green denotes forest, brown pastures, and light green early successional forest. **B** denotes the probability to NOT locate the flock within a given area. Core areas are thus lightly shaded.

Objective 5: Priority areas

Based on the telemetry and sight observations, we identified two priority areas for an expansion. Foundation Jocotoco purchased already one of the areas in 2003. The second area encompasses 60ha at the southern boundary of the reserve

harbouring up to 50 parakeets seasonally. One of the nests in 2003 was located here. The area was threatened to be cut in 2002 but intact forest still covers large tracts also harbouring other globally threatened species.

Objective 6: Education Initiative
335 school kids from seven schools in Piñas and Zaruma, the main villages around Buenaventura were brought to the reserve (Fig. 12). We prepared a quiz repeating information given on the excursions to be done in the next lessons. We also visited schools and held talks on biodiversity in general and conservation in Ecuador.

We also prepared a poster that is now exhibited in the local town hall (Fig. 10). We found the species only twice in trade. One was a free-flying escaped individual in Piñas, the other instance were eight individuals traded in Loja. Nests on or at the edge of pastures are vulnerable to humans. The relative scarceness of the species in local trade likely reflects the difficulty to locate nests because birds only visit nests four-to five times a day, even while feeding juveniles. This is probably due to the fact that several individuals contribute to feeding, thus delivering more food at each of the rare visits. Nonetheless, local trade is a major threat to most parakeets in Southwestern Ecuador. In Piñas with its 9000 inhabitants, we discovered at least 100 captive parakeets belonging to eight different species. Birds are traded on the local market or by street sellers.

9. Evaluation

Radio-tracking worked well and the collars manufactured by AVM instruments can be recommended for other small parakeets. Birds having a collar were observed to preen longer than other birds, but we did not observe any other adverse effects. These birds also contributed to breeding. The methods employed to assess parakeet numbers and to identify yet unprotected priority areas seemed also appropriate. Activities for the reforestation, however, could be improved. The list of food trees currently identified by the botanist Pablo Lozano should be used to further search adequate tree species for the reserve in nurseries nationwide. Collecting seeds from the reserve for cultivation seems necessary besides buying commercially available plants in order to establish diverse plantations. It is not very time-consuming, since it can be done in addition to other activities in the reserve. Germination of these seeds was overall rather low which might be attributable to either climatic or soil difference between Piñas and the reserve. Establishing a small tree nursery in Buenaventura Reserve may considerably enhance survival rates. There are a few teachers both in Zaruma and Piñas who are willing to get involved in conservation activities. Involving these teachers and a few dedicated students in reforestation or other activities such as assessing parakeet numbers once a year would expand our narrowly focussed publicity work in a promising way.

10. Conclusions and recommendations

The El Oro Parakeet population in and around Buenaventura valley seems sizeable enough to support a viable population in the long-term. Because this site is the only protected place where the protection is enforced, it seems advisable to continue focussing future efforts at this site to enhance the current conservation status. The greatest threat in the area is logging of the remaining forest adjacent to the current reserve. Logging continued in 2002 and 2003, and the low reproductive success in 2003 combined with the fact that four out of the five nests discovered in 2003 were situated outside the reserve documents the species' continued vulnerability. Apart from expanding the protected area, a continued effort aimed to reduce pressure on the remaining forest is needed. Fundacion Jocotoco plans to enlarge Buenaventura Reserve to a target size of up to 5000ha. Working simultaneously to the expansion on environmental awareness will be essential for the species' conservation. A larger reserve will be more vulnerable to destructive human activities such as hunting, timber extraction, and waste dumping. Only an expanded future environmental campaign will gain the acceptance of the local population necessary for successful conservation in a populated areas. The El Oro Parakeet certainly has the potential to become a flagship species for the threatened humid forest in such a campaign. However, all parakeets are particularly vulnerable to humans owing to relentless trade. Future work therefore has to resolve how to promote the species' conservation without engraving the demand for it. The project's close collaboration with Fundacion Jocotoco has been extremely successful and resulted in the quick implementation of conservation measures. Continuing this collaboration will be essential for future conservation

work. The collaboration should also be extended to Ing. forestal Jeaneth Ramirez from Piñas Municipio who is growing native tree species.

11. Requests for assistance by Loro Parque Fundación

The conservation success at this site will ultimately depend on both the further protection of land as well as on improving the attitude of local people towards conservation. Fundación Jocotoco is an organisation without large overhead concentrating on the former, the establishment of a network of reserves in Ecuador. The foundation has, however, no staff to work on environmental awareness at Buenaventura. A continued funding for such activity has a high probability to turn into successful conservation due to the established links to Fundación Jocotoco.

12. Output of the project

- Dietrich, M. (2003): Habitatpräferenzen und Raumnutzungsmuster des Orcessittichs in SüdWest-Ecuador. Dipl. Thesis, University Oldenburg, Germany.
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- Schaefer, H. M. & V. Schmidt (2003): Conservación del Perico de El Oro (*Pyrrhura orcesi*). Birdlife Bull. Am. 6: 4.
- Schaefer, H. M. & V. Schmidt (2003): Ecology and conservation of the El Oro Parakeet (*Pyrrhura orcesi*). Cyanopsitta in press.
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- Schmidt, V. & H. M. Schaefer (2003): Erfolge im Schutz des Orces-Sittichs in Ecuador. Mittl. Zool. Ges. Art & Pop. Schutz 19: 24.



Fig. 8:Mery Juina and Cesar Garzon
radio-tracking parakeets (Schmidt)

13. Worksheet

The calculation of man days is rough because several activities, e.g. fruit counts and collection of seeds or the study of range and habitat use are normally done at the same time. Man days estimation represent therefore only rough estimates for these activities.

Population estimate

April, May, September 2002, March 2003, all personnel involved due to the need to count large areas simultaneously. 119 man days in 2002, 25 man days in 2003.

Range use and priority areas

Done throughout the entire period by most team personnel 210 man days in total.

Habitat use and Habitat mapping

April-August 2002. Done principally by Michael Dietrich, assisted by some team members. 126 man days.

Telemetry

May, September to November 2002, Januray-February 2003. Each flock was tracked by one principal observer which was either Martin Schaefer or Veronika Schmidt or trained the first five days by them (Michael Dietrich, Cesar Garzon, Mery Juina). The observers tracked the flock continuously and were accompanied by other team members (Mery Juina, Timo Zech) to assist the data collection of habitat use or to learn the methodology (Fig. 8). Tracking of each flock thus amounted to 40-55 man days, we used a total of 304 man days.



Fig. 9: Reforestatio by Baldomiro Becerra, Martin Schaefer and Darwin

Data entry and analysis

Throughout, by Michael Dietrich, Cesar Garzon, Mery Juina, Martin Schaefer, Veronika Schmidt approx 180 man days.

Education programme

Started in June 2002 to March 2003. Done principally by Mery Juina, Cesar Garzon, also by Martin Schaefer and Veronika Schmidt. A total of 84 man days spent in excursions, talks in the schools, and preparation of school material.

Reforestation

Started in October 2002 to April 2003. A total of 65 man days for seed collection, planting, and plant maintenance (Fig. 9).



Fig. 10: Poster explaining the value of Buenaventura Reserve now displayed in the local town hall.



Fig. 11: Northern slope of Buenaventura reserve and adjacent pastures.



Fig. 12: School excursion to Buenaventura reserve.