



ANDEAN FLAMINGO CONSERVATION: IMPORTANCE OF LOWLAND WETLANDS. ARGENTINA.

Final Report Presented by
Enrique J. Derlindati
Rufford Small Grants for Nature Conservation
January 2011



Andean flamingos (*Phoenicopterus andinus*) at flight. Photo: E. Derlindati 2010

Summary.

Andean flamingo (Phoenicoparrus andinus) is the rarest flamingo in the world with 34,000 individuals. It is restricted to the Andes wetlands during the breeding season and use lowland wetlands during the non-breeding season. There are many studies that estimated its populations and characterized the limnology of wetlands in the Andes. Nevertheless, there is no similar study from the lowland wetlands. Moreover, patterns of habitat use at local scale are poorly known, especially in their winter range. A key lowland wetland is Melincué, which in winter supports more than 15% of the total Andean flamingo population. It is located in the Pampas plains of Argentina. This wetland has been included as a Ramsar site and within the Network of priority sites for the Conservation of High Andes Flamingos. In our first RSG project, we recorded hundreds of individuals performing courtship displays at Melincué. It is likely that this behavior conditions the reproductive success of this species at the Andes. In order to understand the role of the lowland wetlands in the annual cycle of the Andean flamingos, we surveyed their abundance and recorded habitat use and activity patterns at this key site during the whole non-breeding period during a year through 2009 to 2010.

Both RSGs allowed us, to collect key information that highlighted the importance of Laguna Melincué and other lowland sites in the conservation of Andean flamingos. The grants also allowed us to have background information that enabled us to begin developing new lines of research aimed at developing and implementing management plans and use applied to the conservation of these wetlands and their species.

Second RSG allowed us to develop two undergraduate thesis: (1) The first one includes the continuation of the studies on activity patterns at high Andes of the two Andean species, and (2) the second, still in development, including the study of these species at lowland sites.

CONTENTS

Team
Project objectives
Activities developed
Research activities
Teaching and development experience
Formation of human resources
Difficulties
Main products
Bibliography

ACKNOWLEDGEMENTS

I wish to extend my heartfelt thanks to the Rufford Small Grant for Nature Conservation, for the financial support which made possible that this project achieved its fruitful results. Without its support this conservation work would not have been possible to develop. Also I wish to thank my project team: Vet. Marcelo C. Romano, Dr. Ignacio Barberis, and Lic. Daniela E. Vázquez for their technical support towards the successful implementation of this project. I also must thank to following undergraduate biology students ; Mr. Rodrigo Guanuco, Ms. Nancy Cruz and Ms. Carolina Trigo, who gave us an invaluable help during fieldwork and decided to work on wetlands and flamingos conservation for their thesis.

TEAM

Participants	Project Involvement	institution
Biol. Enrique J. Derlindati	Leader	Doctoral student UNT. Auxiliary Professor Vertebrates and Biological Diversity IV, UNSa. Researcher at IBIGEO, UNSa.
M. Vet. Marcelo C. Romano	Team member	Centro de Investigaciones en Biodiversidad y Ambiente (ECOSUR - non-governmental organisation)
Nancy N. Cruz	Team member	Undergraduate student, UNSa.
Rodrigo S. Guanuco	Team member	Undergraduate student, UNSa.

OBJECTIVE

We plan to conduct inventories and ecological studies directed to identifying and analysing microhabitat characteristics associated with the behaviour and distribution of this species, in order to produce a science-based, long-term and effective conservation strategy for sites used by Andean Flamingos during the non-breeding season. Also we plan to develop a conservation strategy for the Andean Flamingo taking into account the ecological processes at local and regional scales and their interactions with human activities. In this way, we need to assess habitat use and activity patterns of Andean Flamingos in a poorly known area of its range (lowlands) and poorly known time during its annual cycle (winter). It is necessary to promote the creation, design and management of protected areas in lowland wetlands in cooperation with local people, NGOs, State Governments and international initiatives (e.g. Ramsar Convention, IBAs, and CMS). This will allow the creation of management and conservation plans of the Melincué wetland, based on the abundance and habitat use of flamingos, as well as on the different types and intensities of human use.

ACTIVITIES DEVELOPED

Publications related to the research project.

- Marconi, P., Sureda, A.L., Arengo, F., Aguilar, M.S., Amado, N., Alza, L., Rocha, O., Torres, R., Moschione, F., **Romano, M.**, Sosa, H. & **E. Derlindati**. 2010. 4TH Simultaneous Flamingo Census in South America: Preliminary Results. *Flamingo* 18, in press.
- Derlindati, E. J., Maschione, F. & **N. N. Cruz**. 2010. Nuevas colonias de nidificación de la Parina chica (*Phoenicoparrus jamesi*) en el noroeste de la Argentina. *Nótulas faunísticas - Segunda Serie*, 56: 1-5.
- **Romano, M.**, Barberis, I.M., **Derlindati, E.J.**, Pagano, F., Marconi, P. & F. Arengo. 2009. Variation in abundance of Andean and Chilean Flamingos wintering in lowland wetlands of central Argentina in two contrasting years. *Flamingo* 17:11-16.
- F. Arengo, Bucher, E., Clark, R., **Derlindati, E.**, Harris, G., Marconi, P., Michelutti, P., Moschione, **F.**, **Romano, M.**, Sosa, H., Sureda, A., and R. Torres. 2009. In situ breeding summary. *Flamingo* 17:6-7.

Research activities related to the research project.

- Researcher at annual surveys of highandean flamingos, summer and winter of 2008, 2009 and 2010.
- Participation at two workshops of HighAndes Flamingos conservation Group. November 2009 and May 2010.
- Results presentation at “Avances en la implementación de la red de humedales de importancia para la conservación de flamencos altoandinos - Argentina, Bolivia, Chile y Perú” Simposium, at I Congreso Latinoamericano y IV Argentino de conservación de la Biodiversidad. November 2010.

Teaching experience and formation of human resources.

- Project results are included in study cases in undergraduate programmes of biology career at 2009 and 2010 courses, of Salta National University.
- Two students are developing their undergraduate thesis projects in Wetlands and flamingos, one is at final evaluation stage.
- Two undergraduate students and two government technician receive informal and formal education during different field trips, through their participation in flamingo surveys.

DIFFICULTIES

Main difficulties were related to climate issues aside, with very low temperatures (down to -14 °), high winds and snow (very rare in these latitudes), which extended the fieldwork. On the other hand, the economic crisis which the country is now, made to increase the costs from the beginning to the end of the project. This is especially true at the logistics related to transportation. Campaigns costs increasing 100%, this demonstrates the need to support themselves, especially in off-road vehicles.

MAIN PRODUCTS

Study site

Study area comprises a wetland sited in winter range of Andean flamingos at central Argentina (S33°25', O61°28'; 84 m.a.s.l., Fig. 1). Laguna Melincué is considered a key site for Andean Flamingos conservation (Rose and Scott 1994, Wege and Long 1995, Caziani et al. 2007, Derlindati 2008, Derlindati et al. 2007, Marconi y Sureda 2008, Romano et al. 2008). This site is an endorreic basin, hyper salty Lake. Climate is temperate and wet (Pasotti et al. 1984), annual average temperature is 16°C, and annual precipitation is 917 mm, concentrated in austral summer-autumn (Biasatti et al. 1999). The site is in the principal agricultural zone of the country, native vegetation is grassland, dominated by *Distichlis spicata* and *Paspalum vaginatum* (Romano et al. 2005).

This wetland support a great water bird diversity, with a highly proportion of Neartics and Neotropical migrants (Derlindati 1998, Caziani and Derlindati 2000, Romano et al. 2002, Romano et al. 2005). Laguna Melincué is used by Andean flamingos mainly during non-breeding season (June – September) (Caziani et al. 2007, Romano et al. 2008).

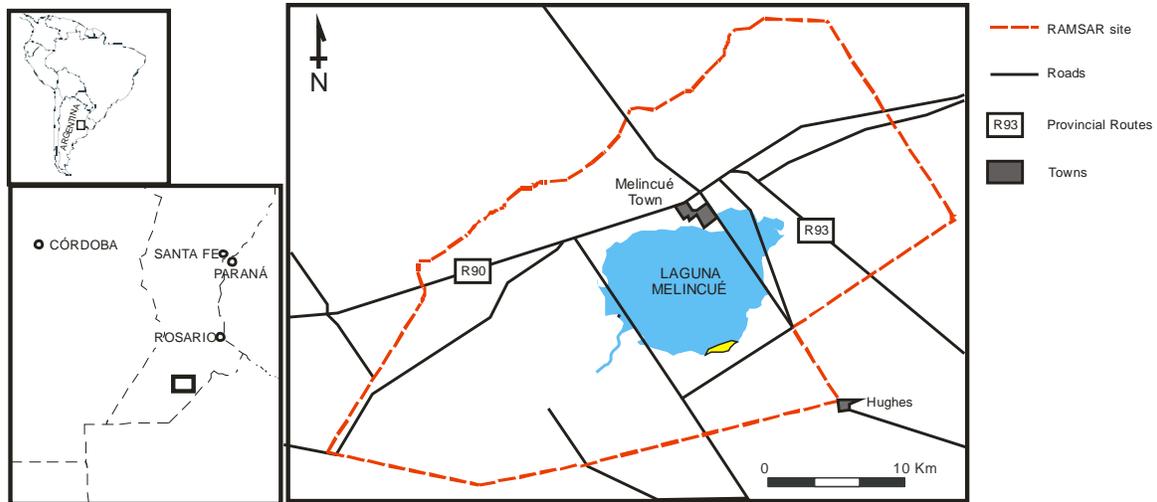


Figure 1. Ubication of study site, central Argentina. In yellow area used by Andean flamingos.

Research and surveys

We conducted five campaigns during the non-breeding period in July and August 2009 and June, July and August 2010. In this period, we worked at the field for 600 accumulated hours. Under the same line of investigation, and as part of an undergraduate biology thesis (work currently under review and approval), it could add three more surveys at the Andean range of this species, accumulating over 612 hours of fieldwork. In addition, we began a new thesis project in the same way, on reproductive aspects of this species.

We are going to carry out a survey by recording flamingo abundances and activity patterns in the different microhabitats used by Andean flamingos at Melincué.

We will stand at one or more survey points on the shore and use spotting scopes to count individuals and record the microhabitats used. In each microhabitat, we will take samples to measure several variables: O₂ (mg/l), conductivity (mS), and pH. We will record the behavior of Andean Flamingos by choosing an individual within a flock and recording the activities doing through 3 minutes. This process will be repeated with at least 100 random individuals in three time periods: early morning, noon and dusk. At the same time of recording individual behavior. This will allow us to construct activities frequencies for flamingos in different habitats.

We will analyze graphically if there are differences among microhabitats and if there are differences in flamingo activities.

Main results

The main finding of these surveys was that the non-reproductive season of this species is more restricted than it specialists thought it was. Andean flamingos arrived to lowland wetlands in early June, using them until late August. In addition, this species showed a strong fluctuation between years, abundance year highs reaching 6,630 individuals during the winter of 2009, and only 2,587 in the same period in 2010.

Activity patterns and habitat use remained dominated by activity at resting, followed by feeding activities (Fig. 2).

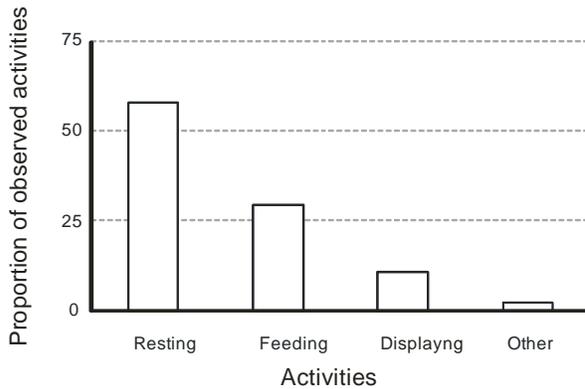


Figure 2. Proportion of activities observed on Andean Flamingos during all non-breeding season at Laguna Melingué, Central Argentina.

We observed continuous courtship displays (marching) of flamingos during non breeding seasons, with a flock size from 50 to 106 individuals, displaying during 1 to 4 minutes each march. We observed that Andean flamingos only use the southwest portion of the lake systematically for all activities, with little or no movement to other areas of the lake (Fig. 1). If this movement exist, flamingos are moving to other wetlands near Laguna Melincué.

We recorded that physicochemical parameters at this wetland are high homogenous among the samples, with average values of 7.78 ± 1.67 mg / l for O₂, a conductivity of 7.10 ± 1.8 mS, and a pH of $9,95 \pm 0.19$ (Fig. 3).

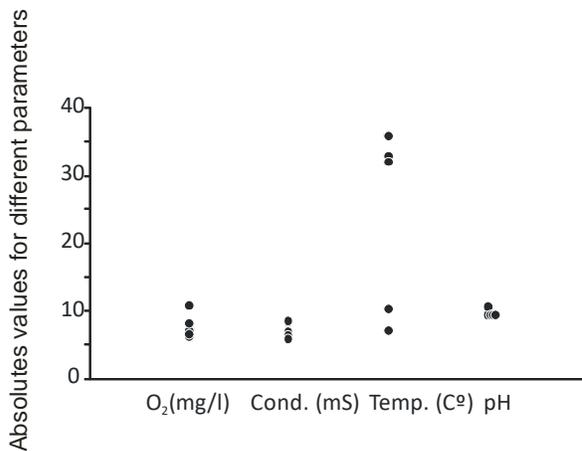


Figure 3. Absolute values of differents parameter at Laguna Melincué surveys. Average and Standar desviation at text above.

DISCUSSION

Andean flamingos showed the same seasonal patterns in abundances like observed on RSG1 and other previous surveys at this site (Caziani and Derlindati 2000, Romano et al. 2005, Caziani et al. 2007, Derlindati 2008), with highest total abundances in August, although this pattern is highly variable between years. For example in 2009 we observed over twice the abundances than in 2010. Resting and displaying activities were the dominant activities. Courtship displays were frequent too, but flock size differed from previous studies (Derlindati 2008, Derlindati et al. 2007). This is probably related to the total numbers of flamingos at the site, considering that higher numbers were recorded in 2007 and 2008 (Derlindati 2008).

An important nocturnal activity was recorded at our surveys. Apparently Andean (and sympatric Chilean) flamingos use most of night time for feeding activities. Our new projects will focus in analyzing this time period.

Despite the abundance of flamingos and weather conditions were very different between surveys, chemical and physical conditions of the lake were homogeneous, even over the summer (Romano, unpublished data).

Variation in abundance and presence of the Andean flamingo at Laguna Melincué, could respond to availability of habitats in other parts of its distribution, such as benign conditions in the high Andes wetlands (Pozuelos at 3,600 m, support 15,700 Andean flamingos in August 2010, Rodriguez com. pers.).

At this lowland wetland, energy is available to be used in pre-nuptial and other social behaviours, these patterns were reinforced with our last surveys. These results are critical for the reproductive success of these species at the breeding colonies in the high plateau of central Andes. We need to study, how non-breeding range conditioned breeding successes at The Andes. Conservation, management and use plans for Laguna Melincué and other lowlands sites are key for Andean Flamingos long term conservation strategies. In this way, a project supported by governmental agencies will start next year, which their major goals are (1) to develop a conservation and management plan for ten wetlands, including Laguna Melincué, and (2) to implement Laguna Melincué Ramsar site.

CONSERVATION RECOMMENDATIONS

The activity pool of data from Laguna Melincué provided detailed description of activity patterns of high Andes flamingos during the whole non-breeding season. Effects of human activities are little known, and their effects on flamingos could be extreme, especially at lowland sites where differences in biological conditions could be high between years, and constant water pumping for agriculture reduces the lake size and water levels (Romano et al. 2005, Derlindati et al. 2007, Romano com. pers.). These human activities appear to decrease non-breeding habitats, which is important because breeding success depends on it. Certainly a major management objective should be to implement management and use plans, focused on maintaining habitats used by Andean flamingos in Laguna Melincué, where human pressure is more pronounced. There is a need for research on feeding ecology, food production, reproductive physiology of breeding birds, and a detailed description of the hydrology of wetlands used by Andean flamingos. We have started a project in this direction, and included nine new wetlands at Pampas lowlands in Central Argentina and three wetlands systems at high Andes, in order to understand the role of these wetlands in the annual cycle of the Andean flamingo.

RECOMMENDATIONS

- i. For the successful long term management and conservation of the high Andean flamingo wetland, there is a great need to develop monitoring programmes. These monitoring programmes are highly needed at lowland sites, not only in Melincué, also including other key sites like Southern Santa Fe, Mar Chiquita and Ambargasta/Salinas Grandes. We have started to work in these lines at two sites.
- ii. There is a great need to implement the Andean and lowland sites Network of protected areas.
- iii. There is a great need to continue the development of educational programmes to increase valuation of wetlands at different community levels (i.e. school, authorities, etc.).
- iv. It is necessary to increase investigations that determine the real relevance of lowland sites on the breeding season and the entire life cycle of flamingos, and to analyse the effect the use of wetland resources and management interventions have on the wetland site, especially those associated to productive activities like wetland drying for agricultural/urbanization.
- v. There is a great need to continue including local people and governmental authorities in management plans of these basins. These authorities should be responsible for monitoring changes in ecological character of these wetlands.
- vi. There is a great need to continue the exploration and identification of alternative economical activities for farmers and local people, with lower impact on wetlands.
- vii. There is a great need to introduce bird watching tours to the wetlands in order to generate more money for the management and conservation of the wetland ecosystem.

BIBLIOGRAPHY

BIASATTI, N., DELANNOY, L., PERALTA, E., PIRE, E., ROMANO, M. and TORRES, G. 1999. Cuenca Hidrográfica del Humedal de la Laguna Melincué, Provincia de Santa Fe. ProDIA, SRNyDS, Buenos Aires.

CAZIANI, S. M. and E. J. DERLINDATI. 2000. Abundance and habitat of High Andean flamingos in Northwestern Argentina. *Waterbirds* 23 (Special Publication 1): 121-133.

CAZIANI, S.M., O. ROCHA, E. RODRÍGUEZ, M. ROMANO, E.J. DERLINDATI, A. TÁLAMO, D. RICALDE, C. QUIROGA, J.P. CONTRERAS, M. VALQUI and H. SOSA. 2007. Seasonal Distribution, Abundance, and Nesting of Puna, Andean, and Chilean Flamingos. *The Condor* 109: 276-287.

DERLINDATI, E. J. 1998. Los flamencos de James, andino y austral (*Phoenicoparrus jamesi*, *P. andinus* y *Phoenicopterus chilensis*): Abundancia y características de sus hábitat en los lagos altoandinos de Jujuy, Argentina. Tesis de grado, Universidad nacional de Salta, Argentina.

DERLINDATI, E. 2008. Conservation of High Andes Flamingo Species (*Phoenicoparrus Andinus* and *P. Jamesi*): Habitat Use and Activity Patterns in Two Contrasting Wetland Systems of Argentina. Final Report. Rufford Small Grants for Nature Conservation, UK.

DERLINDATI, E., M. ROMANO and F. MOHR. 2007. Preliminary results on behavior and abundance of High Andes flamingo in two wetlands of Argentina. Pp. 26-27. In Childress, B., Arengo, F., Bechet, A. & Jarrett, N. (eds.). Flamingo, Bulletin of the IUCN-SSC/Wetlands International Flamingo Specialist Group, No. 15. Wildfowl & Wetlands Trust, Slimbridge, UK.

MARCONI, P. M. and A. L. SUREDA. 2008. High Andean Flamingo Wetland Network: Evaluation of degree of implementation of priority sites-preliminary results. *Flamingo, Bulletin of the IUCN-SSC/Wetland International Flamingo Specialist group* 16:36-40.

ROMANO, M. C., BARBERIS, I. M., PAGANO, F. and J. I. MAIDAGAN. 2005. Seasonal and interannual variation in waterbird abundance and species composition in the Melincué saline lake, Argentina. *European Journal of Wildlife Research* 51:1-13.

ROMANO, M. C., BARBERIS, I. M., PAGANO, F., MARCONI, P M. and F. ARENGO. 2008. Winter monitoring of Andean and Chilean Flamingos in lowland wetlands of central Argentina. Pp: 45-47. In: Childress, B., Arengo, F. and Béchét, A. (eds.) 2008. *Flamingo, Bulletin of the IUCN-SSC/Wetlands International Flamingo Specialist Group*, No. 16.

PASOTTI, P., ALBERT, O. and C. CANOBA. 1984. Contribución al conocimiento de la laguna Melincué. Instituto de Fisiografía y Geología “Dr. Alfredo Castellanos”. Publ 66. UNR Editora, Rosario.

ROSE, P. M. and D. A. SCOTT. 1994. Waterfowl population estimates. 2nd ed. *Wetlands International Publication 44*, Wageningen, The Netherlands.

WEGE, D. C. and A. J. LONG. 1995. Key areas for threatened birds in the Neotropics. *BirdLife International, BirdLife Conservation Serie Nro. 5*.