

Sterna Project

Final report

**Isla Verde: the only nesting site of Royal Tern and
Cayenne Tern in Uruguay**

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**BREEDING BIOLOGY OF ROYAL TERN (*Thalasseus maximus*) AND
CAYENNE TERN (*T. sandvicensis eurygnatha*) ON ISLA VERDE ISLAND,
ROCHA - URUGUAY**

INTRODUCTION

Royal Tern (*Thalasseus maximus*) is widely distributed throughout the American continent, from United States to southern Argentina along the Atlantic coast, and to Peru along the Pacific Ocean (Figure 1) (Harrison 1983). Cayenne Tern (*T. sandvicensis eurygnatha*) is distributed throughout South America, along the Atlantic coast, from the Antilles to southern Argentina (Harrison 1983). These species can change the breeding site from year to year and they could abandon it if high predation rates or perturbation occur (Quintana & Yorio 1997). Generally this species lays one egg which incubates approximately 30 days (Buckley & Buckley 1972, Quintana & Yorio 1997). Some days after they hatch, chicks join in a crèche and parents have a prolonged parental care during several months (Ashmole & Tovar 1968, Buckley & Buckley 1972, Quintana & Yorio 1997). In the breeding period, eggs and chicks can be under predation pressure, mainly by Gulls (*Larus* spp) and many species of Falconiformes (Buckley & Buckley 1972, Langham & Hulsman 1986, Quintana & Yorio 1997, Yorio & Quintana 1997, Branco 2003a, 2003b). During several decades ornithologists thought that these species bred in Uruguay or in the region (Escalante 1968, 1970a, 1970b, 1985, 1991). A mixed colony of Royal and Cayenne Terns and two nests of South American Tern (*Sterna hirundinacea*) were reported on Isla Verde Island (Rocha, Uruguay) in 1998 breeding season, representing the only one colony of these species in more than 2000 Km of Atlantic coast (Cravino *et al* 1999). However, only recently, the first study along the complete reproductive cycle was carried out by the Sterna - Project.

In this study, we made a description of the breeding biology of the Royal Tern and Cayenne Tern of the Isla Verde Island. The spatio-temporal dynamics, breeding success, and interactions with breeding sympatric Kelp Gulls (*Larus dominicanus*) during the August-November 2005 breeding season, were assessed.

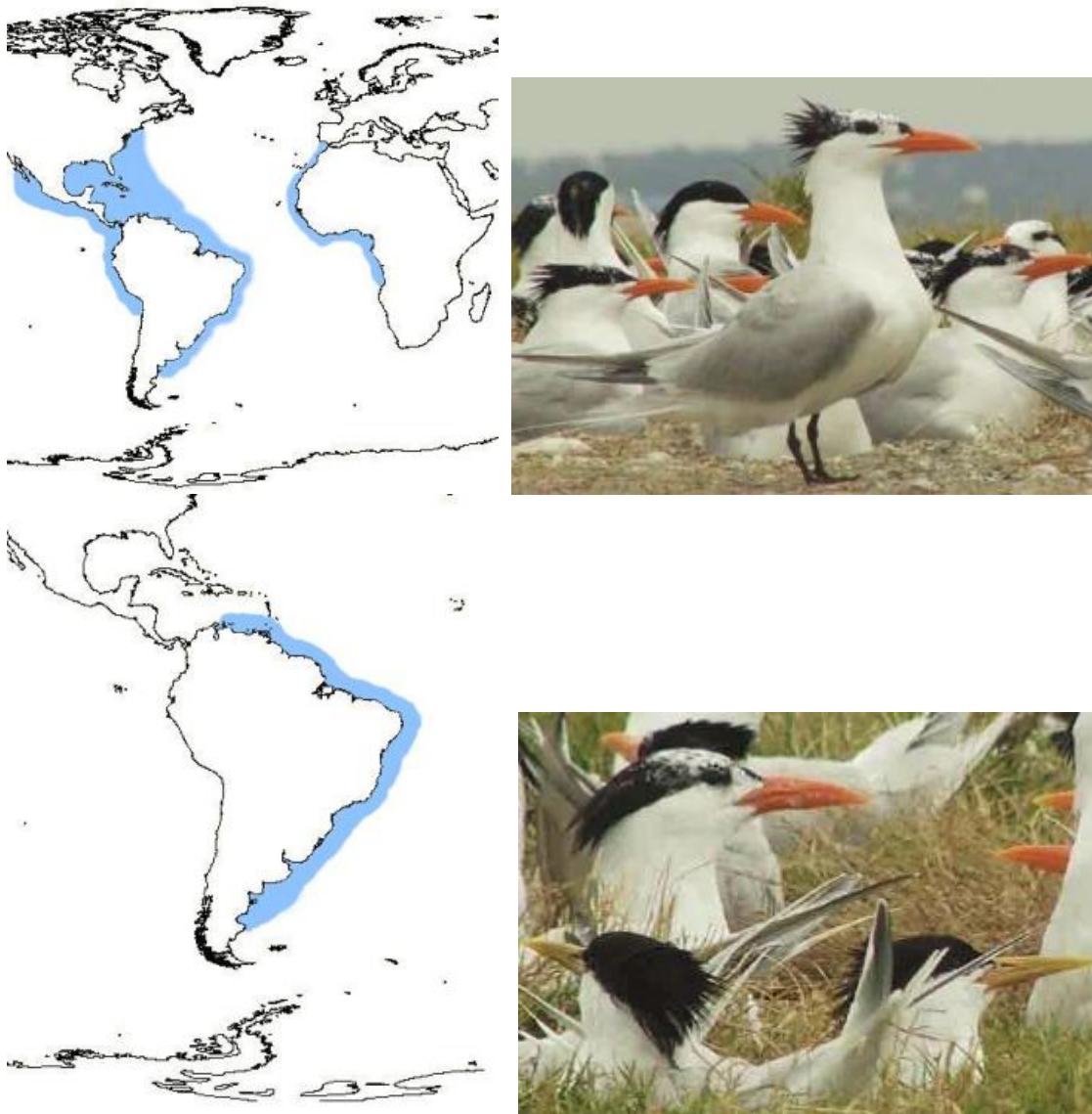


Figure 1. Distribution maps (Harrison 1983), and pictures of Royal Tern (a) and Cayenne Tern (b) on Isla Verde, Uruguay.

STUDY AREA

La Coronilla Islands Group (53°29'W, 33°56'S) is part of the Coastal Island National Park (Decree 447/996) and the access for the general public is restricted but not regulated. This group of islands is composed by Isla Verde and Islote Coronilla islands, and a rocky shoal from the continental coast (Cerro Verde beach) to Isla Verde. This island is situated 1450 m off the coast, its maximum length and width are 696 m. x 180 m respectively and the main substrates are sand and rocks (Figure 2a and 2b). The dominant vegetation is Bermuda grass (*Cynodon dactylon* L.) and a reedbed of (*Arundo donax*) with a diameter of 35 m. (Vaz-

Ferreira 1956). This island is used as a breeding site by many bird species like Kelp Gull (*Larus dominicanus*), Royal Tern, Cayenne Tern, Black-crowned Night Heron (*Nycticorax nycticorax*), Snowy Egret (*Egretta thula*) and Cattle Egret (*Bubulcus ibis*) and American Oystercatcher (*Haematopus palliatus*). Isla Verde is also a resting and/or feeding site for many others, like South American Tern, Common Tern (*Sterna hirundo*), Olivaceous Cormorant (*Phalacrocorax olivaceus*), Ruddy Turnstone (*Arenaria interpres*), Yellowlegs (*Tringa melanoleuca*, *T. flavipes*, *T. solitaria*) and Red Knot (*Calidris canutus*).



Figure2a. Isla Verde Island (front) and Islote Coronilla island (behind).

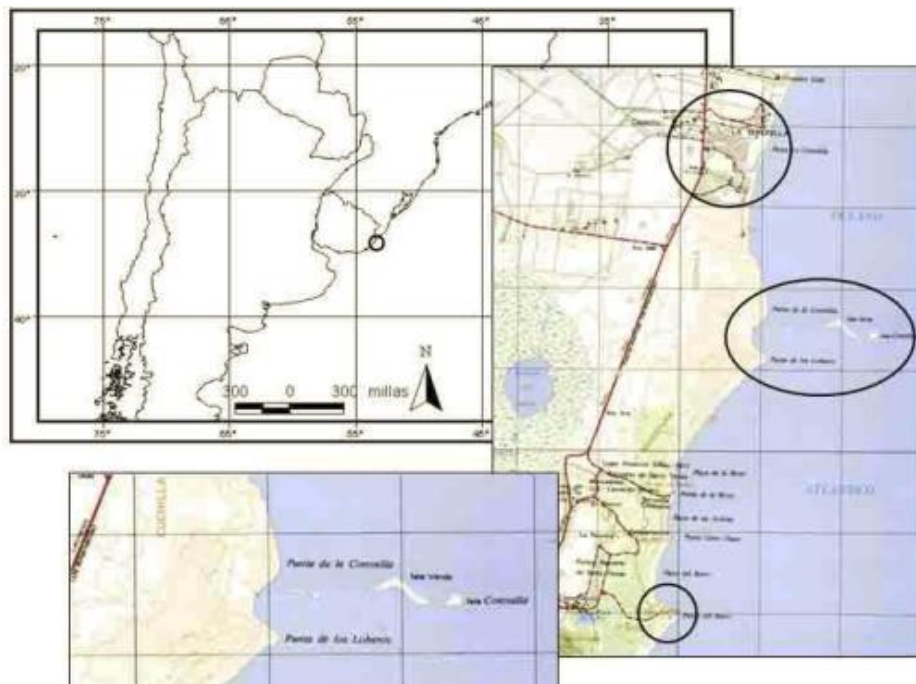


Figure2b. Location of the study area. The bigger circle on the chart shows La Coronilla Town and the small one shows Punta del Diablo Town. The ellipse marks the Isla Verde area that is shown in the chart below

METHODS

The study on Isla Verde Island comprised the period between August to November 2005. Eleven surveys were made, each one every 7-10 days, except in September when the frequency was every 15 days, because of the weather conditions that restrict the access to the island (see Table 1). For went to the island we used the Karumbé boat, sailing by Carlos Romero, or the National Army zodiac (Figure 3).

Table1. Schedule of all the activities.

Date	Activities	Data
12 / 08	Survey to Isla Verde; work within the colony	Number of breeding pairs and nests, photos
20 / 08	Survey to Isla Verde; work within the colony	Number of breeding pairs and nests, photos
28 / 08	Survey to Isla Verde	Number of breeding pairs, photos
06 / 09	Survey to Isla Verde; work within the colony	Number of breeding pairs, photos, egg size, density (nest / m ²), distance between nests, n° eggs/nest, predation observations
07/09	Flight	Aerial photographs
22/09	Flight	Aerial photographs
26 / 09	Survey to Isla Verde; work within the colony	Number of breeding pairs, photos, egg size, density (nest / m ²), distance between nests, n° eggs/nest, predation observations
02 / 10	Survey to Isla Verde; work within the colony	Number of breeding pairs, photos, egg size, density (nest / m ²), distance between nests, n° eggs/nest, predation observations
11/10	Flight	Aerial photographs
12/10	Survey to Isla Verde	Number of breeding pairs, photos, predation. observations
22/10	Survey to Isla Verde	Number of breeding pairs
02/11	Survey to Isla Verde	Number of breeding pairs
10/11	Survey to Isla Verde	Number of breeding pairs
19/11	Survey to Isla Verde	Number of breeding pairs



Figure 3. Karumbe boat (up) and National Army zodiac (down) used to go to the island.

Spatio-temporal dynamics and breeding success

In every campaign the number of tern breeding pairs was estimated by direct count. Work within the colony was carried out in three times (Sep. 6th, Sep. 26th and Oct. 2nd), with the purpose of taking egg measurements (with 0.01mm calliper), number of nests, nests density (with random quadrants 1m^2), nests distances to nearest neighbour and clutch sizes (Figure 4). In three times (September 7 and 22, and October 11) aerial pictures were taken to analyze the spatial distribution of the colony. In all campaigns the number of breeding pairs was estimated by direct count with binoculars and telescope, from a distance of 40 m to the colony. An analysis of variance (ANOVA) was used to identify variations in the breeding parameters during the breeding period.



Figure4. Some methods used within the colony: egg size (up-left), density (up-right) and nearest neighbour distance (down).

Interactions with Kelp Gull

The predation study starts after the settlement of the Gull's colony. Observations were made with binoculars and telescope at a distance of 40 m. and from a mobile blind, at a distance between 10 to 5 m to the colony (Figure 5). The interactions with Kelp Gulls were quantified, considering as an "attack" each of the aggression behaviour from Gulls to Terns. Each one was classified as successful (predation), unsuccessful or inconclusive. Also, the identity of the attacked species, location within the colony (centre or periphery), sort (aerial, terrestrial) and objective (egg, chick or kleptoparasitism) of the attacks were registered. "Absolute predation rate" was defined as the number of successful attacks per observation hour. Also the "predation rate" was defined as in Yorio & Quintana (1997), like the number of predation events per hour of observation, relative to the number of potential prey (peripheral nests). In every campaign, the peripheral nests were counted by means of pictures taken from the ground.



Figure5. Colony observed from the mobile blind above, and from a distance of 40m below.

RESULTS

Spatio-temporal dynamics

With regard to the colony dynamics and spatial distribution, three main stages were registered.

The first stage began on August 12th with four Royal Tern nests on the Bermuda grass. Two weeks later, this species reached its highest peak of abundance with 350 pairs, and we registered the first pairs of Cayenne Tern. Since that a decrease of abundance of Royal Tern was observed (Figure 6). By the middle of September terns abandoned this site and the stage finished.

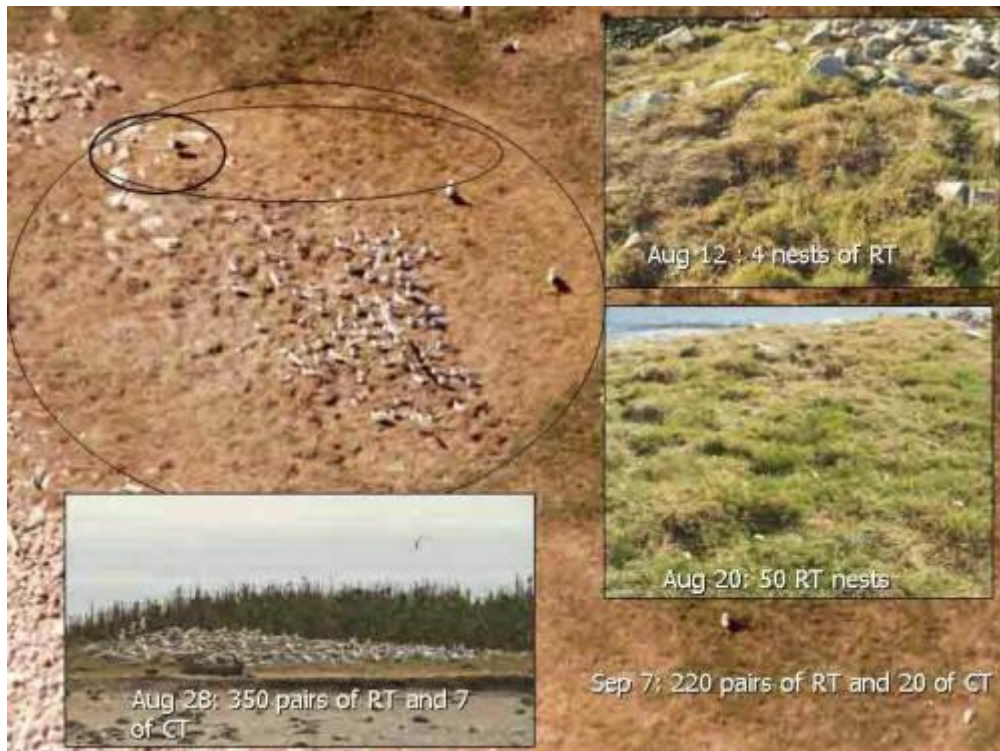


Figure 6. This is a photographic composition of the first stage in the colony. Background picture was taken on September 7. The ellipses represent the growth of the colony

By September 22nd the colony had shifted to a nearby site on the same substrate, here we defined the second stage. The aerial photographs show 100 individuals of *Thalasseus* spp at this date. Four days after, we counted 222 pairs of Royal Tern and the maximum number of Cayenne Tern breeding pairs with 27 couples. On October 2nd, 278 and 25 couples of Royal and Cayenne Tern were registered. In this last one, some terns have settled on a sand matrix, adjacent to the Bermuda grass. This comprised the second stage of the colony and the beginning of the third stage (Figure 7).



Figure 7. Photographic composition of the second stage. Background picture was taken on September 22. The ellipse represents the place of the first setage of the colony and the polygons represent the growth of the second stage.

The third stage occurred from October to the middle of November (Figure 8). On October 12th, 200 pairs of Royal Tern and 15 of Cayenne Tern were registered. The colony continued growing with several adjacent re-settlements up to 300 pairs of Royal Tern and 11 of Cayenne Tern on October 22. In this survey 13 Royal Tern's pairs and 1 of Cayenne Tern were registered on Isote Coronilla Island, on a vegetable matrix. This observation constitutes the first record of Royal and Cayenne Tern nesting on this island (Figure 9). On November 2nd this new colony had been disappeared and Isla Verde colony decreased in numbers to 130 pairs of Royal Tern and 10 of Cayenne Tern in two patches. Four chicks were registered in this survey and one of them was preyed by Gulls (see notes). The lasts terns were observed on November 10th and by the end of November no one tern was on the island. Figure 10 shows the variability in abundance of both species of terns during the whole period.

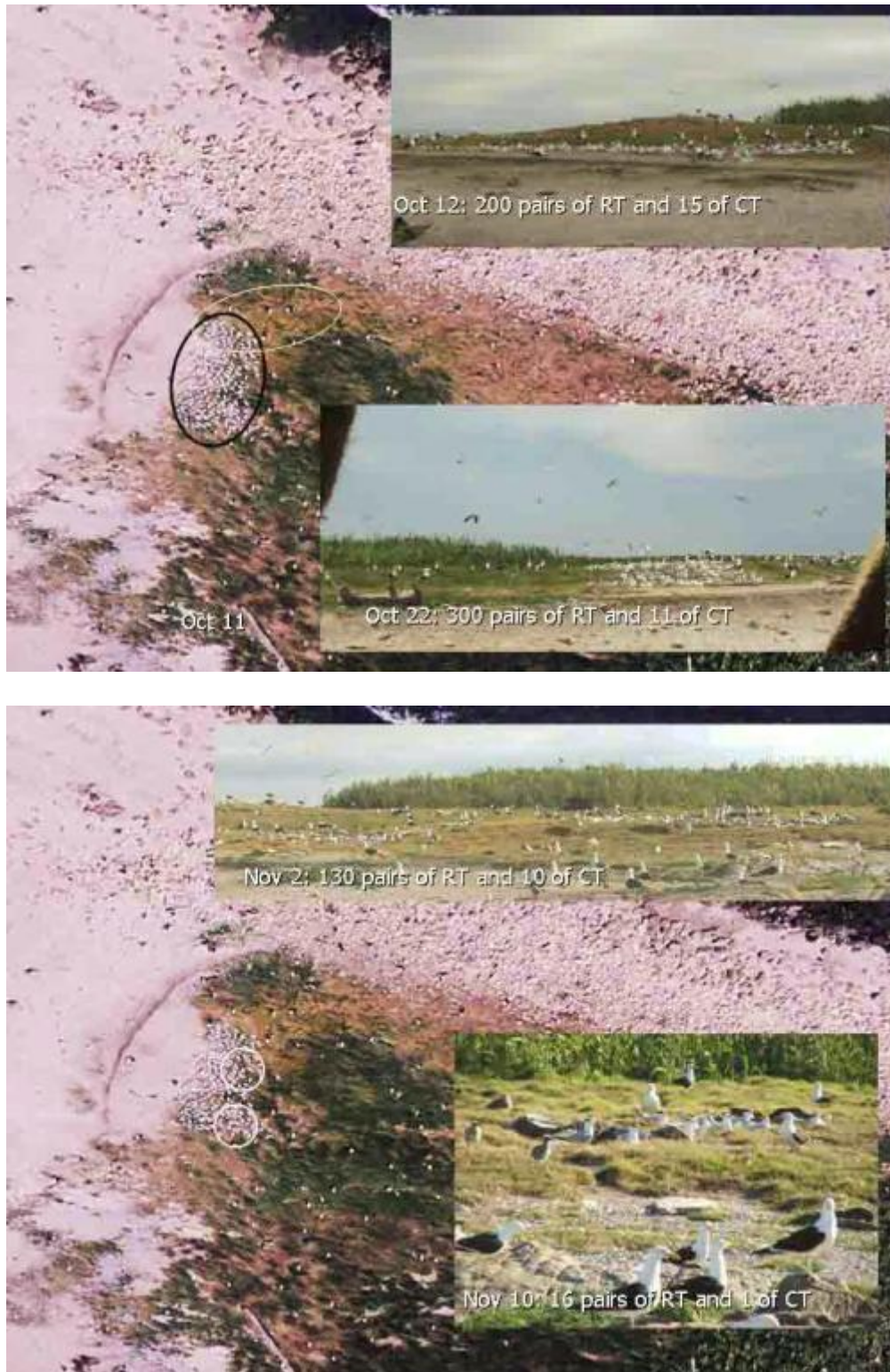


Figure 8. Photographic compositions of the third stage. Up: background photo was taken on October 11. The white ellipse represents the second settlement of the colony and the black one represents the growth of this stage. Down: shows the decrease in numbers of this final period. The white circles in the background picture, represents the spatial distribution on November 2.



Figure 9. This is a photographic composition of the first report of Royal Tern and Cayenne Tern on Islote Coronilla Island. The green ellipse represents the place where this patch was on October 22.

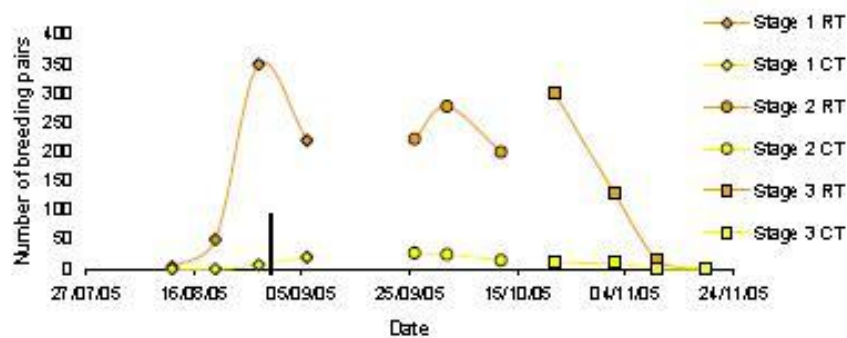


Figure 10. This figure shows the variability in abundance of Royal Tern (RT) and Cayenne Tern (CT) during the breeding season: from stage 1 to stage 3. The black line shows the date of great increase in the Kelp Gull settlement.

Characteristics of the colony

Royal Tern egg size was $64.67 (\pm 1.55) \times 44.37 \text{ mm} (\pm 0.82)$ and for Cayenne Tern was $52.54 (\pm 1.66) \times 37.49 \text{ mm.} (\pm 1.77)$. These measurements did not vary statistically during the breeding season (Royal Tern: ANOVA $p > 0.93$ long, ANOVA $p = \text{n.s.}$ wide; Cayenne Tern: ANOVA $p > 0.28$ long, ANOVA $p > 0.76$ wide) (Table 2). These average measurements were similar to those registered by Cravino *et al.* (1999) of $66.7 \times 43.9 \text{ mm.}$ for Royal Tern and $52.7 \times 36.9 \text{ mm.}$ for Cayenne Tern.

Also, no significant differences were found for density values (nests/m²) along the breeding season (ANOVA $p > 0.41$) (Figure 11). However, density values grew slightly as the season progressed (Sep 6: 8.2 nests/m² ± 1.9 ; Sep 26: 8.7 nests/m² ± 1.1 ; Oct 2: 8.9 nests/m² ± 1.2).

Table2. ANOVA test results for egg sizes among the three settlements.

Royal Terns	H	p-value	n
Length	0.07	0.97	43
Wide	0.64	0.73	43
Cayenne Terns			
Length	2.60	0.11	24
Wide	2.23	0.14	24

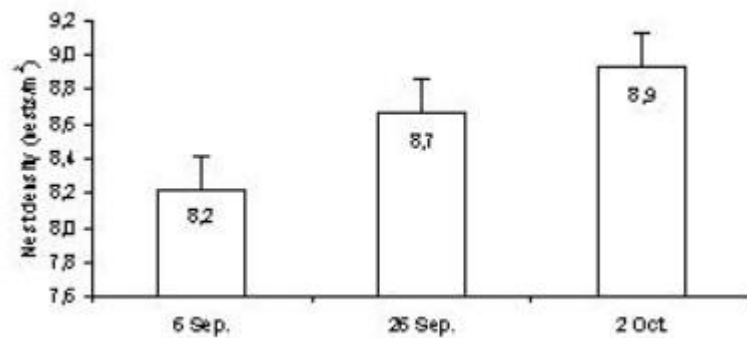


Figure11. Graph showing density (nests/m²) values in each sample, (Sep. 6 and 26, and Oct. 2) within the colony.

Average distances to nearest neighbour were higher among Royal Terns, intermediate for Royal and Cayenne Tern nests and fewer among Cayenne Tern's (Figure 12).

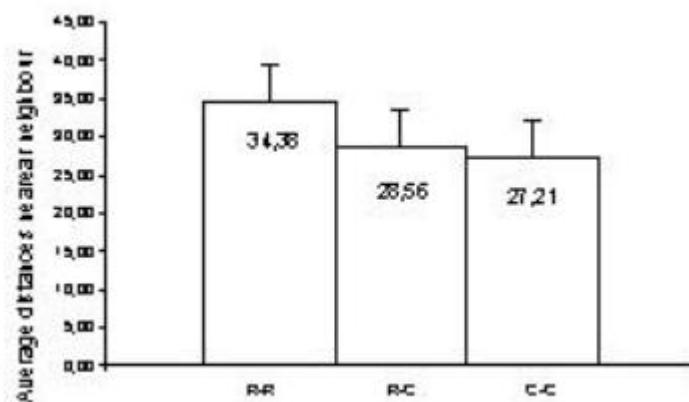


Figure12. Graph showing the average distances to nearest neighbour for Royal-Royal, Royal-Cayenne and Cayenne-Cayenne Tern nests.

Due to the few Cayenne Tern nests, only distances among Royal Tern nests were statistically analyzed. Distances among Royal Tern nests had reduced towards Sep 26th and Oct 2nd (ANOVA $p < 0.01$; T-test: Sep 6-26 $p < 0.003$, Sep 6-Oct 2 $p < 0.002$, Sep 26-Oct 2 $p > 0.5$) (Figure 13). Distances between Royal Tern and Cayenne Tern also showed a decrease as the season progressed (Sep 6: 33.4 ± 4.2 cm; Sep 26: 29.4 ± 4.4 , cm; Oct 2: 23.5 ± 7.4) and distances among Cayenne Tern nests showed an increase (Sep 6: 24.8 ± 7.5 cm; Sep 26: 27.0 ± 2.4 cm; Oct 2: 29.4 ± 2.7 cm) (Table 3 and Table 4).

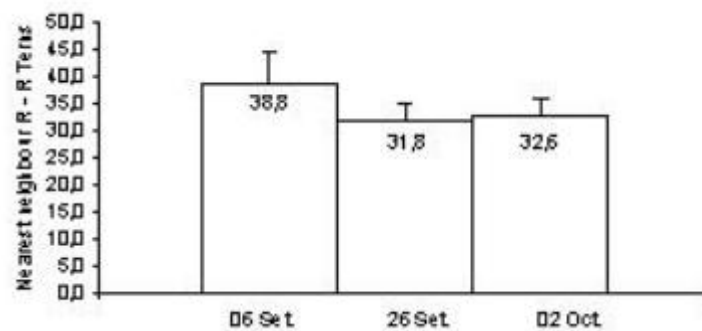


Figure 13. Nearest neighbour distances among Royal-Royal Terns over the breeding season.

Table 3. ANOVA test values for distances between nests of the three species over the breeding season.

	H	p-value	n
Royal – Royal	11.24	0.04	37
Royal – Cayenne	5.17	0.08	18
Cayenne - Cayenne	1.80	0.40	14

Table 4. Comparisons of paired distances among Royal-Royal Tern nests by means of Mann Whitney U test.

Sampling pairs	H	p-value	n
6 Sep-26 Sep	17.000	< .005	22
6 Sep-2 Oct	31.500	< .005	27
26 Sep-2 Oct	62.500	>.400	25

Clutch sizes were 1-3 eggs/nest for Royal Tern and only 1 egg/nest for Cayenne Tern.

At the beginning of the season, the clutches of Royal Tern were bigger than by the end of it, with several nests with 2 or 3 eggs. At the end of the season the nests mostly had 1 egg.

Interactions with Kelp Gull

During 19:13 hours of observation, 52 attacks by Kelp Gull were recorded (2.7 attacks/hour) from which 11 (21%) resulted in predation events (Table 5). A predation rate of 0.03 and an absolute predation rate of 0.58 were recorded.

Table5. This table shows the absolute predation rate (predations/hour) and predation rate (predations/hour/nest) by Kelp Gull, during 19:13 hours of observation.

Royal Tern	Absolute predation rate	Predation rate
Average	0,58	0,03
Standard deviation	0,67	0,06

All the attacks occurred from the ground to peripheral nests except in the last survey, when three aerial attacks in central nests were observed, and also the highest predation rates (0.17 predations/hour/nest) (Figure 14). A single non successful attack was registered to a Cayenne Tern on the periphery of the colony. However, on November 2 egg shells of Cayenne Tern were observed in the periphery of the colony, where Kelp Gull attacks were registered.



Figure14. Attack from a Kelp Gull to an adult of Royal Tern is shown.

DISCUSSION

Isla Verde Island maintains the only one mixed colony of Royal and Cayenne terns in a wide area between the colonies in Brazil and Argentina. This colony is principally composed by Royal Tern with numbers that are considered very important in the area and in this site. At the beginning of the project, in winter 2005, we registered big numbers of South American Tern resting in the island, but no one sign of reproductive activity, and all of them disappeared by the end of august 2005. We suppose that the two pairs of this species registered by Cravino *et al.* (1999) was occasional, because of the known distribution of this species, but a long term (years) study is necessary to confirm this.

The breeding season of Royal Tern on Isla Verde Island, occurred from August 12th to November 10th, while Cayenne Terns' began around August 20-28th and finished by November 10th. Maximum breeding population sizes of Royal Tern and Cayenne Tern on Isla Verde Island was 350 and 27 respectively, and both settled on a Bermuda grass (*Cynodon dactylon*) substrate. The breeding season of Isla Verde colony exceeded 10 weeks in incubation period. Generally, the whole breeding period of this species does not rise 12 weeks (egg laying and incubation: 33 days, hatching and crèche formation: 20 days, crèche: more than 30 days) (see Buckley & Buckley 1972, Quintana & Yorio 1997). Therefore, if the season has normally occurred, crèche period should have ended between the end of October and the beginning of November (see Cravino *et al.* 1999). On the other hand, on a preliminary survey made in November 30th 2003 a small crèche and several fledge flying in the area were registered. The period of the breeding season in Isla Verde colony exhibits a latitudinal gradient in connection with the rest of this kind of colonies in the region (Cravino *et al.* 1999). The northern colonies have the beginning of their breeding seasons earlier than southern ones, which begin at the end of the winter, or at the end of the spring in the southernmost.

With regard to the spatial and temporal dynamics, several studies around the world showed that many species of *Larus* frequently displace sympatric breeding birds (e.g. Terns, Gulls) from their nesting space (e.g. Nisbet 1973, Burger 1979, Quintana & Yorio 1998). The causes of those displacements are given mainly by inter-specific competition for nest sites and predation of eggs and chicks (see Burger 1979, Quintana & Yorio 1998, Yorio & Quintana 1997). The analysis of aerial pictures and the increase in nest number, recorded in the field, showed that a great number of gulls settled by the end of the first stage of the Tern's breeding period, when the number of tern breeding pairs began to decrease (Figure 15). Because of this, we can suggest that Kelp Gulls could have affected the spatial and temporal dynamics of

this tern colony, taking into account that the interactions between this species could be the main factor influencing this dynamics.

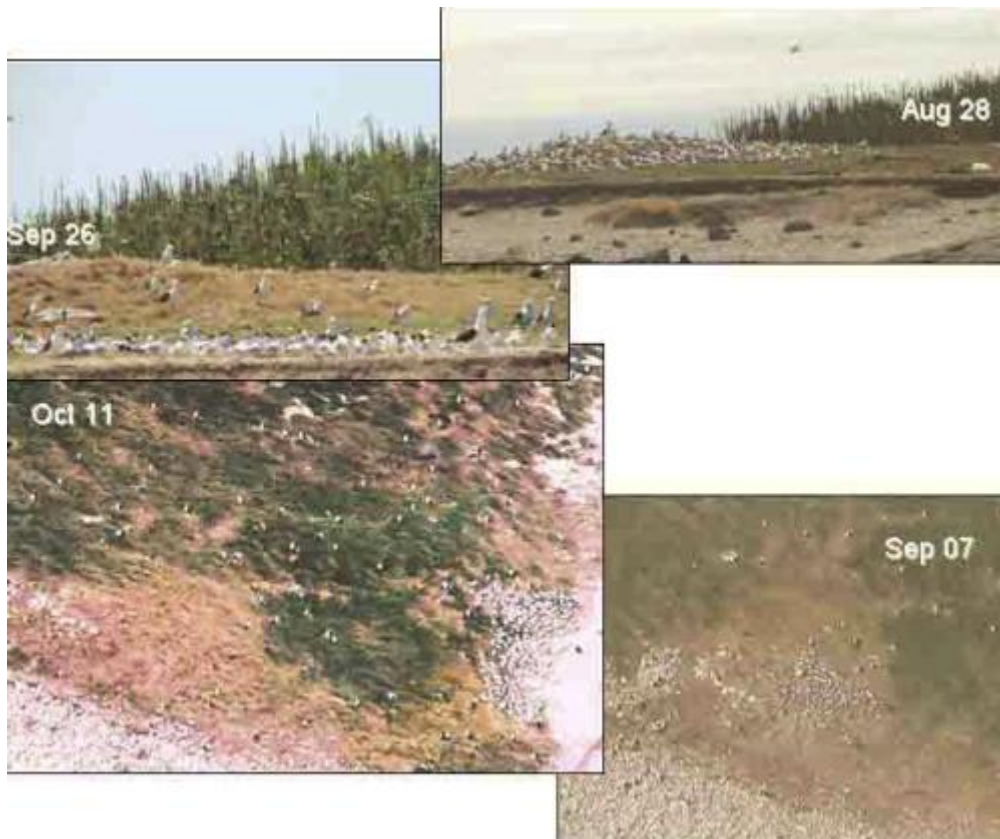


Figure15. Pictures showing increase of Gull's abundance, from August 28 to October 11.

Other factors might have influenced the spatial dynamics observed, like flooding, strong winds or the collection of eggs, but no evidence of all these factors were recorded during the period of study.

Species that breed in colonies pay fitness costs, that are balanced by the benefits obtained. One of the many hypotheses that have been proposed to explain how colonial breeding could benefit them is the reduction of predation (Danchin & Wagner 1997). The increase of the density values, the decrease in the nearest neighbour distance of Royal Terns, and also in the clutch sizes may be mechanisms in response to predation and competition by Kelp Gulls. The amount of predation observation hours were not enough to detect potential intense predation events alternating in time. Anyway, colony's settling with re-laying events and its null breeding success showed that terns were greatly affected because of the interactions with Kelp Gulls. In Patagonia, predation by Kelp Gulls causes important losses of eggs having a great impact on the breeding success of this tern species (Yorio & Quintana 1997). In recent years,

Pablo Yorio (pers. comm.) could establish that almost whole tern cohorts had disappeared by Kelp Gulls. Colony size is a main factor regarding the predation impact, because when colonies are bigger the proportion of vulnerable nests is fewer (Yorio & Quintana 1997). The colony on Isla Verde is smaller than Patagonian ones and exhibits similar predation rates, which becomes more sensible to predation impacts.

Increases in population sizes of Gulls (*Larus* spp.) negatively affect the breeding of tern colonies, causing the desertion of the nesting sites (Burger 1979, Quintana & Yorio 1998). Several studies in Patagonia showed that Kelp Gull takes advantage of artificial food sources resulting from human activities (Giaccardi et al. 1997, Bertelotti & Yorio 1999, Yorio et al. 1999, Yorio & Bertelotti 2002), which was probably the reason for the population expansion of this species in Argentina (Yorio *et al.* 1998). Because no studies of Kelp Gull population sizes exist in Uruguay, population trends of this species is unknown at a national and regional level. However, anecdotic information suggests that Kelp Gull numbers had increased in the last decades. Therefore, the developments of long term studies about population dynamics of Kelp Gulls are required. Moreover, if take into account that Isla Verde Island is part of the Coastal Islands National Park, and also presents a great diversity of mammals, turtles and birds.

Some recommendations to manage the Terns breeding stocks on Isla Verde Island

These species have high inversion, prolonged parental care and predation and competition pressure by Kelp Gulls. Also, Isla Verde Island possess the only colony in more than 2000 Km. of Atlantic coast in South America, so in necessary to achieve a management plan for these species in Uruguay.

- Although, people access to the island is regulated by law (decree 447/996), is very important to increase the control, essentially during the breeding season (July-December).
- The opening at sea of the Andreoni channel and La Coronilla beach, in front of Isla Verde Island, are very important courtship and copulation sites for Royal and Cayenne Terns. Permanent presence of vehicles on the beach is a constant threat for the breeding of these species and the permits and control of these activities have to be more intense.
- During this study, qualitative data showed that is necessary to establish an exclusion area for boats and air transport to the island. This allows that the human disturbance

over the colony will be reduced. We observed that the minimum distances required are 200m and 800m. for boats and aircrafts respectively.

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ACTIVITIES OF THE STERNA PROJECT IN PUNTA DEL DIABLO AND LA CORONILLA TOWNS

INTRODUCTION

Nowadays, La Coronilla town is of about 1200 inhabitants. During many years it was a very important beach resort in the Uruguayan coast. There was an artisan fishermen community of about 20 families, close to there. At the border of the town there is a canal which used to discharge fresh water to the Atlantic Ocean, The Andreoni Channel. During 70's this canal was connected with rural establishments for draining fresh water to cattle, and also for refreshing the rice mills of an extensive area. This fact produced the contamination of the canal and, as a consequence, an important decree in tourism. On the other hand, the fishermen community had been disappearing little by little, and nowadays only two fishermen are still in the area, Carlos Romero and Toto. He collaborates actively with us and with other groups of young researchers, like Karumbé (marine turtle's research group) and Cetáceos Uruguay (cetacean's research group).

Punta del Diablo town had been an artisan fishermen community, for several decades, and in summer, one of their main economic activities is the tourism. In this sense, the number of buildings for vacations had increased so much in the last years.

Both towns had always been bonded to Isla Verde, from fishing or local tourist activities. Nowadays, this island is part of the Coastal Islands National Park (Decree 447/996) (Figure 16) and the access for the general public is restricted. Isla Verde island is a breeding site for many bird species (e.g. Gulls, Terns, Herons and Oystercatchers) and Southern Sea Lions, and is also extensively used as feeding and/or resting by a great diversity of marine fauna (Common Tern, South American Tern, Petrels, Sandpipers, Plovers, Bottlenose Dolphin, Southern Elephant Seal, South American Fur Seal and Green Turtles). The island and the coastal areas between La Coronilla and Punta del Diablo towns constitute a natural reserve with a great diversity of flora and fauna so now it is considered to be included as a protected area by the government. Because of this, is necessary to continue with research and educational work in this area to conserve and protect the wildlife in the area and to contribute to the conservation management.

In this chapter we present educational activities carried out. The objective was to transmit concepts of biology and ecology, principally of birds, through games, observation and research.

One of the main activities was to collecting popular stories about Isla Verde Island, with the objective to know the historical use the island was received and the importance for the local community. Stories were collected by children, taking interview to his parents, family and neighbourhoods, and also by us taking interviews to local people and fisherman.



Figure16. This picture shows Isla Verde Island (in front) and Cerro Verde (Green Hill, behind).

ACTIVITIES AT THE SCHOOLS

We worked with children between three and eleven years old at the schools in Punta del Diablo and in La Coronilla towns.

From August to December four visits were made. In the first one, several activities were carried out with the objective of recognize different parts of birds which are used for the identification of the species. For this activity, we used a big Kelp Gull model (Figure 17), with exchangeable parts of diagnostic characteristics, such as crest, bill, collar, wings, headband, etc.

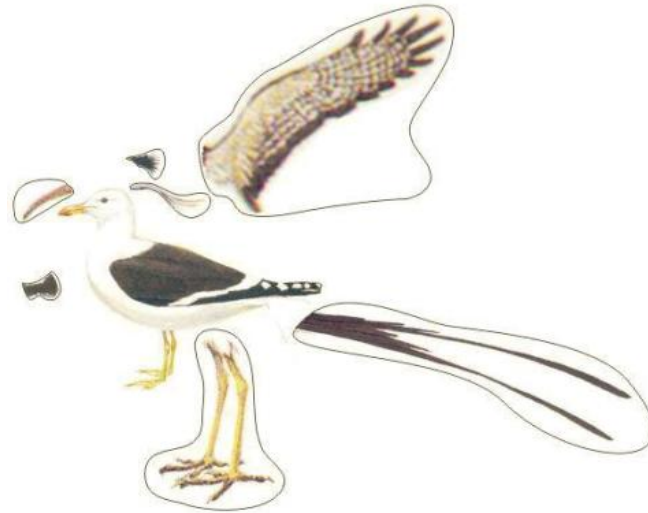


Figure 17. Kelp Gull model, with characteristics of other birds around them.

Then the main tern species of Isla Verde (Royal Tern, Cayenne Tern and South American Tern) were shown. We use plates of the three species with references of their main characteristics and those which differentiate them (Figure 18).



Figure 18. Plates of terns used to show the differences between the species.

We also played a game, which we modified from an existing one (“Cara a cara” or face-to-face) to meet our objective, that we called “Pico a pico” (Bill-to-bill). It consists of two boards with the same set of flappable bird figures, each one for each team (each board remains hidden from the other). Each team has to choose one bird, and the other team, through asking about morphological and ecological characteristics of the bird, has to guess which bird had the other team chosen.

For younger children (3 to 7 years old), we prepared a sheet with an image of Isla Verde Island and the wildlife that exists on it (Figure 19) for them to colour it.

The aims of the second visit were to recognize Isla Verde Island and its fauna and flora. We ordered from a young illustrator a drawing of Isla Verde and the species that can be found there, to plot a poster of 120 x 70 cm. (Figure 20). The purpose was to give an idea of the whole environment. Moreover, given the fact that there are many research groups in the area, and therefore is very important to show the great diversity of Isla Verde and the surroundings (whales, dolphins, turtles, flora and birds) in an integrated way. This activity worked as a trigger for to the children to start writing and collecting stories about Isla Verde Island.

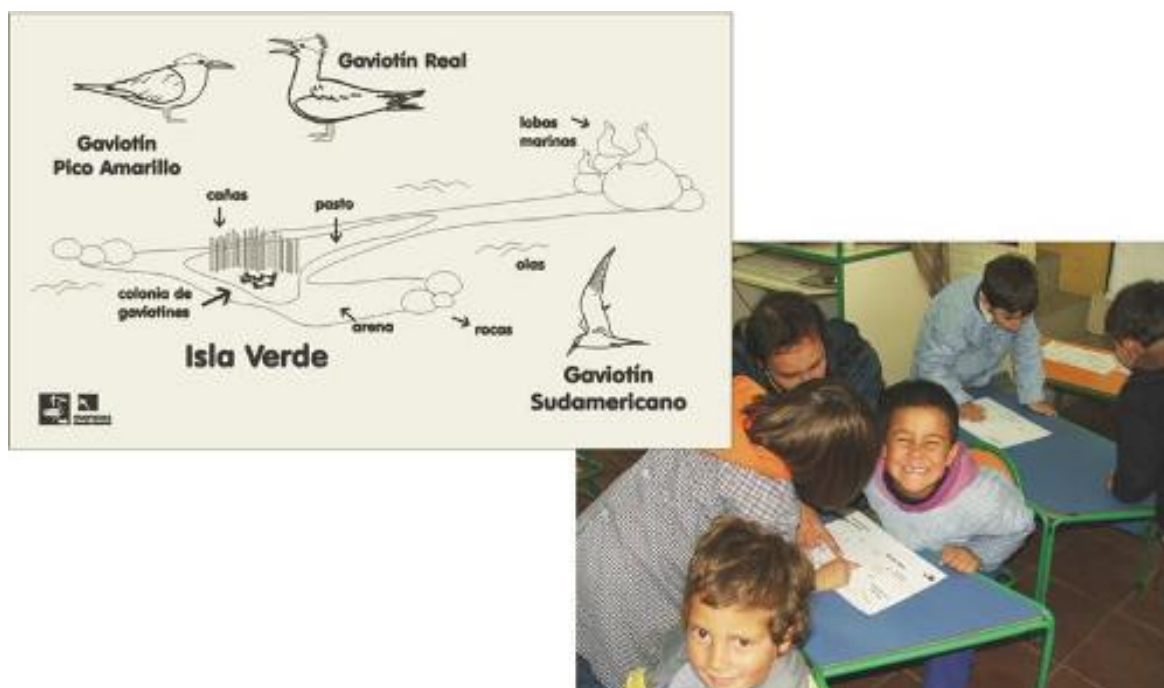


Figure19. Figure given to young children to colour.



Figure20. The picture shows the beginning of the activities of the second visit and the figure below shows the poster with a draw of Isla Verde and the species where cab be found there.

During the third visit we played a memory game which consists in a cardboard with several cards, each one with a figure of a diagnostic part of a bird (leg, bill, wing, etc.) or a group of birds. On the back appeared the name of this part. Groups up to 5 children were formed. The game consists in identify each part, associate it to a bird or a group of birds and its function (e.g. swimming legs, seabirds wing, bill to tear, etc.). If the group did it correctly, one point was given to it; the group with more points was the winner. Through this game the children learned different diagnostic parts of the birds and their main taxonomic groups. Another game was carried out in the playground, to learn and practice the use of binoculars. We put figures of different bird species at several distances and the children had to regulate correctly the focus of the binocular (Figure 21), and also identify the bird species in the figure (Figure 22). In this visit the essays (stories and draws about Isla Verde) were collected, and advances of our research project and their stories were exchanged (Figure 23). We talked about the breeding biology of the tern species (mainly about courtship and reproduction in the mouth of the Andreoni Canal and the near beaches) and the history, importance and conservation of Isla Verde.



Figure 21. Some figures of birds used to learn and practice the use of the binoculars.



Figure 22. Some pictures of the children playing the game to know how to use the binoculars.

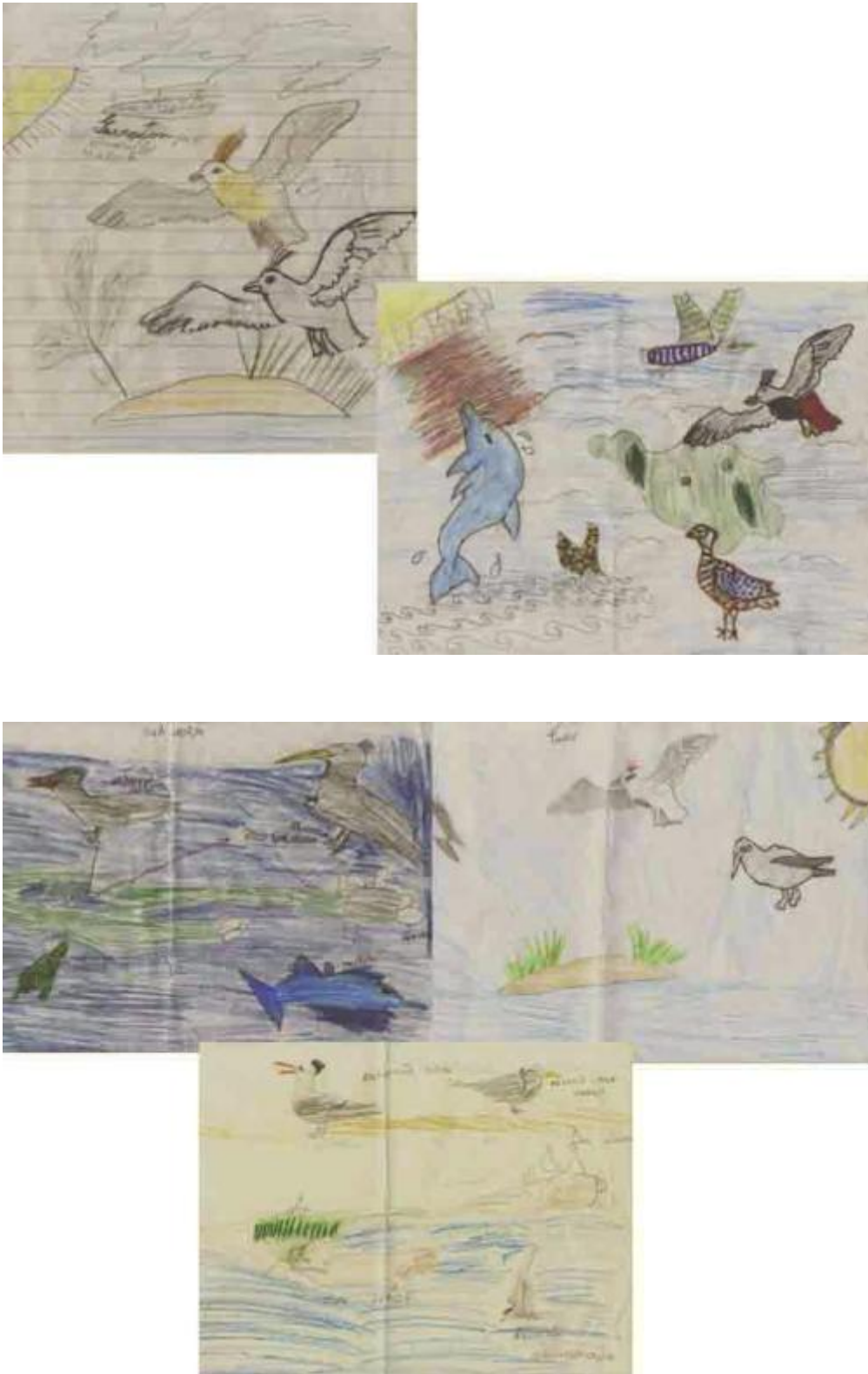


Figure 23. Some images of the children's drawings of La Coronilla School.

Finally, in the fourth visit, we did two field works on the beach. These activities were carried out with the aim of recognizing which bird species use the coasts of each town. Field guides and binoculars were given to the children, and by means of these, abundance and number of bird species that use the beach were recorded.

CONCLUSIONS

In spite of the fact that each group was visited with low frequency (due that we worked with all the classes of both schools) we consider that it had been a very good approach to all the children of both communities. They were very enthusiastic with the presence of the biologists group and had demonstrated that they learned the concepts given in class and in the field work activities. By means of the games the children were involved in the project. These kinds of activities help in deepen their sense of belonging to this place. We believe that a great step was taken therefore this kind of activities have to be continued.

WORKSHOPS IN THE COMMUNITIES

We organized two workshops in La Coronilla and Punta del Diablo to inform about our project. A final workshop was held in La Coronilla to present the results of the *Sterna* Project (Figure 24). During these workshops many stories and anecdotes about the island were exchanged. Fishermen of both towns, who know the island since many years ago, contributed with stories about how they utilized the island, which used to visit it and which fauna were found in those days. Isla Verde Island used to be visited by inhabitants of La Coronilla and Punta del Diablo, mainly by artisan fishermen who took eggs from tern's and gull's colonies for their own consumption. It was also used as a place for collecting mussels (*Mytilus* sp.) which were transacted in the towns and the surroundings. There was a fisherman called "Gallego" Figueiras who inhabited the island during three months and used to live from mussels and fish. While digging the ground, he found fresh water near the reed of Arundo Grass (*Arundo donax*). The island was used once for the reproduction of rabbits and for harvesting vegetables. Also, the island was a target of the army's operations. In another period, during the weekends the island was used as a place for rest and relaxes by local people.

These stories show that it was an island with a very important use by humans, but since 1996 people is banned from the island because it was declared as a part of the Coastal Islands National Park.



Figure 24. Final workshop held in La Coronilla.

GENERAL PERSPECTIVES

- Continue monitoring the tern colony with regard to its spatio-temporal dynamics, breeding success and movements.
- Deepen the studies about the interactions among gulls and terns.
- Start to quantify the Kelp Gull breeding population on Isla Verde to achieve information, at a long term, about its population trends.
- Identify and assess the amount of artificial food that gulls might consume (gathering information from onboard fishing boats and sources of urban dumps)
- Continue with our educational activities in the local communities.

ACKNOWLEDGEMENTS

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We thank other members of Averaves: Rosina Seguí, Andrea Lanfranconi and Lucía Ziegler for their great collaboration at the beginning of the work, Martin Abreu, Luciano Liguori and Natalia Zaldúa for their collaboration in the fieldwork, to Felipe García and Inti Carro for his help in the educational activities, and Carolina Abud, Mercedes Gutierrez, Pablo Rocca, Fernando Pons, Macarena Sarroca and Natalia Arbulo for logistic support. To Alejandro Fallabrino (Karumbé project) for the constant support and willing during the project. To Adrián Azpiroz and Cetaceos Uruguay for sharing field transport to the site. We thank Romero’s family for their permanent collaboration with the project. Thanks to Cesar Fagúndez for providing us the digital chart of the area and Lucía Franco for the graphic design and illustration of the poster of Isla Verde. We thank Leandro Bugoni, Hamilton Cohelo and Washington for giving us a course on bird banding and mist net catch technique. We also thank Birder’s Exchange and Optics for the Tropics for the field equipment donated. Finally, we thank the **Rufford Small Grant for Nature Conservation** for the financial support received for this project.

NOTES

- Part of this report has been published in the *VIII Jornadas de Zoología del Uruguay* (The VIII Congress of the Zoological Society of Uruguay in 2005):
Lenzi J., Jiménez S., Alfaro M., Caballero-Sadi D., Lanfranconi A., Laporta P., Seguí R., Ziegler L. & Zaldúa N. Algunos aspectos de la biología reproductiva de *Thalasseus maximus* y *T. s. eurygnatha* (AVES: LARIDAE) en Isla Verde Rocha-Uruguay. *VIII Jornadas de Zoología del Uruguay*. October 2005. Montevideo, Uruguay.
- Sterna-Averaves Project was invited to be a partner of the International Program for Ringing and Conservation of Terns, coordinated by Márcio Efe (Brasil), Proyecto: Andorinhas do mar. PARTNERS:: IBAMA, CEMAVE, AVIDEPA (Brasil), CENPAT-CONICET (Argentina) and AVERAVES (Uruguay). We were planning a ringing campaign of chicks by the end of the breeding season that could not be achieved because of any one chick had survive.
- In December 2004 two of our partners were invited by Dr. Pablo Yorio to make an internship in CENPAT, Puerto Madryn (Patagonia, Argentina) with the aim of participate in the Project: Ecology and Conservation of Seabirds in North Patagonia. There, they could gain experience in the fieldwork with seabirds and ringing, taking part in ringing campaigns in Puerto Madryn. Costs of travel tickets and hostelling were included in the budget. (Figure 25).
- A communication in the XIII Brazilian Ornithological Congress 2005 resulted for the internship in Patagonia with Marcio Efe, Pablo Yorio and compeers.
Efe M. A., Yorio P., Gatto A., Jiménez S. & Lenzi J. Programa internacional de anilhamento e conservação de Trinta-Réis no cone-sul. *XIII Congresso Brasileiro de Ornitología*. Oct – Nov 2005.



Figure 25. Up: A picture of the breeding assemblage of Royal Tern, Cayenne Tern, Kelp Gull, Olivaceous Cormorant and King Cormorant (*Phalacrocorax albiventer*) in Punta León, Chubut-Argentina. Down left: A picture of the researchers who were working in CENPAT-CONICET with Dr. Pablo Yorio. From left-right: Kees Hulsman (Australia); Javier Lenzi, Sebastián Jiménez (Uruguay-*Sterna* Project) (up); Alejandro Gatto, Pablo Yorio (Argentina); Márcio Efe (Brazil) (down). Down right: a ringing campaign in Punta León.

BUDGET BALANCE

Heading description	Global	Total (£)
Transport	Travel tickets	427,4
	Gas Oil (3 surveys x £22,4 each)	67,1
	Tolls (3 surveys x £3,6 each)	10,6
	Boat's fuel and oil (11 surveys x £10)	110,0
Field expenses	Food for 3 researchers 45 days x £3,23 each	436,8
Fix-wood hide and blind-hide	Materials and carpenter's stipend	118,2
Workshops	Printing of information leaflets and posters, coffee break for three workshops	176,5
Aerial survey	Flight	160,6
	Photographer's stipends	25,0
Dissection and ringing equipment	Scalpels (x2), alcohol 95° (x2), bottles (x50), pliers (x2), scissors (x1), box, Darvic	67,6
Photographic equipment (Stolen)	Digital Camera Fuji Finepix 5100	200,0
	Memory stick 256 Mb	42,4
	Charger and battery	27,6
	Bag	19,4
Fees	Stipend for boat driver (20 x £3.5 surveys each)	70,5
Travel to Patagonia	Travel tickets and hostelling	188,2
Miscellaneous	Debts, cards, t-shirts, stickers, local bus tickets	294,4
Total		2442,3