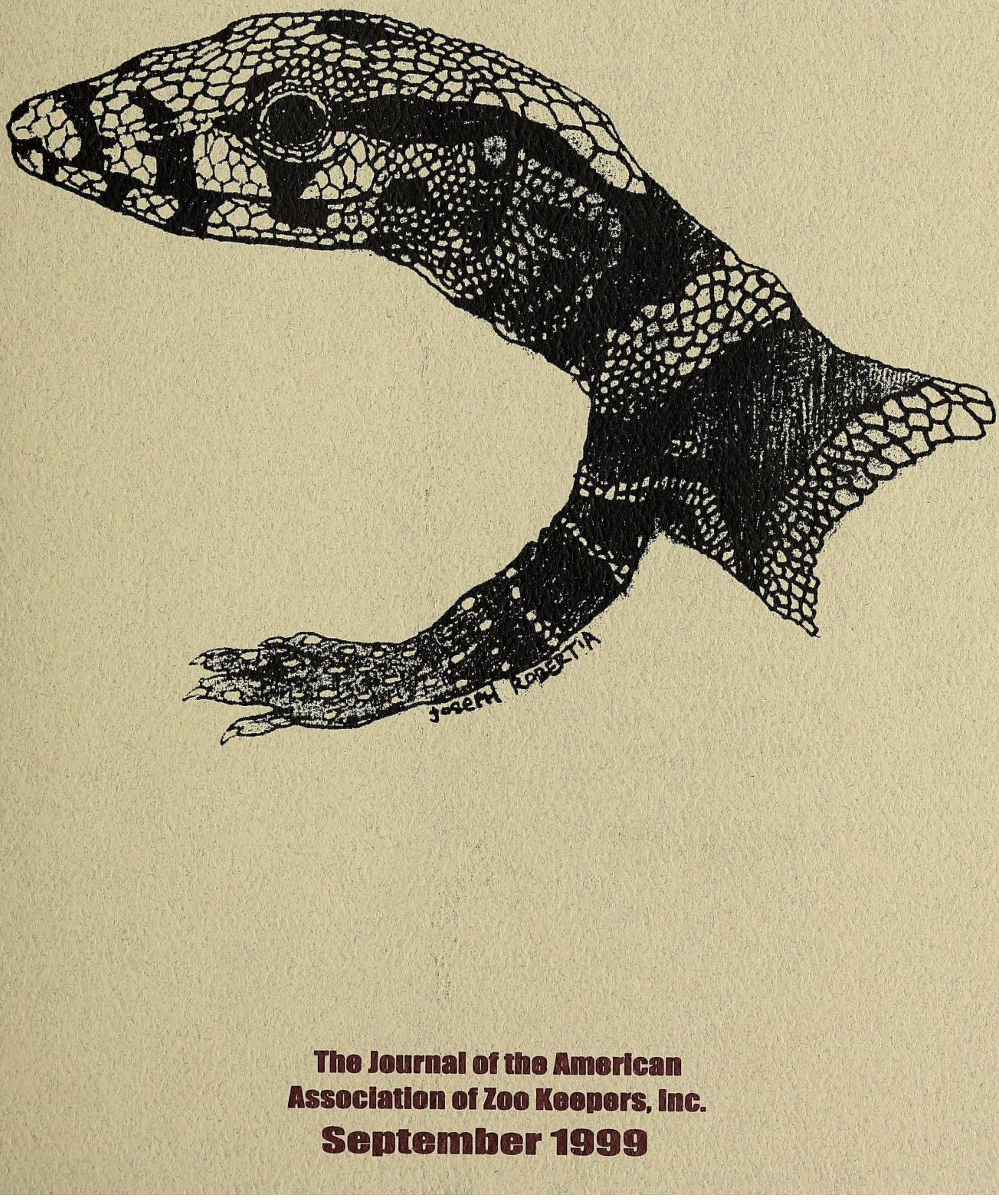
ANIMAL KEEPERS' FORUM



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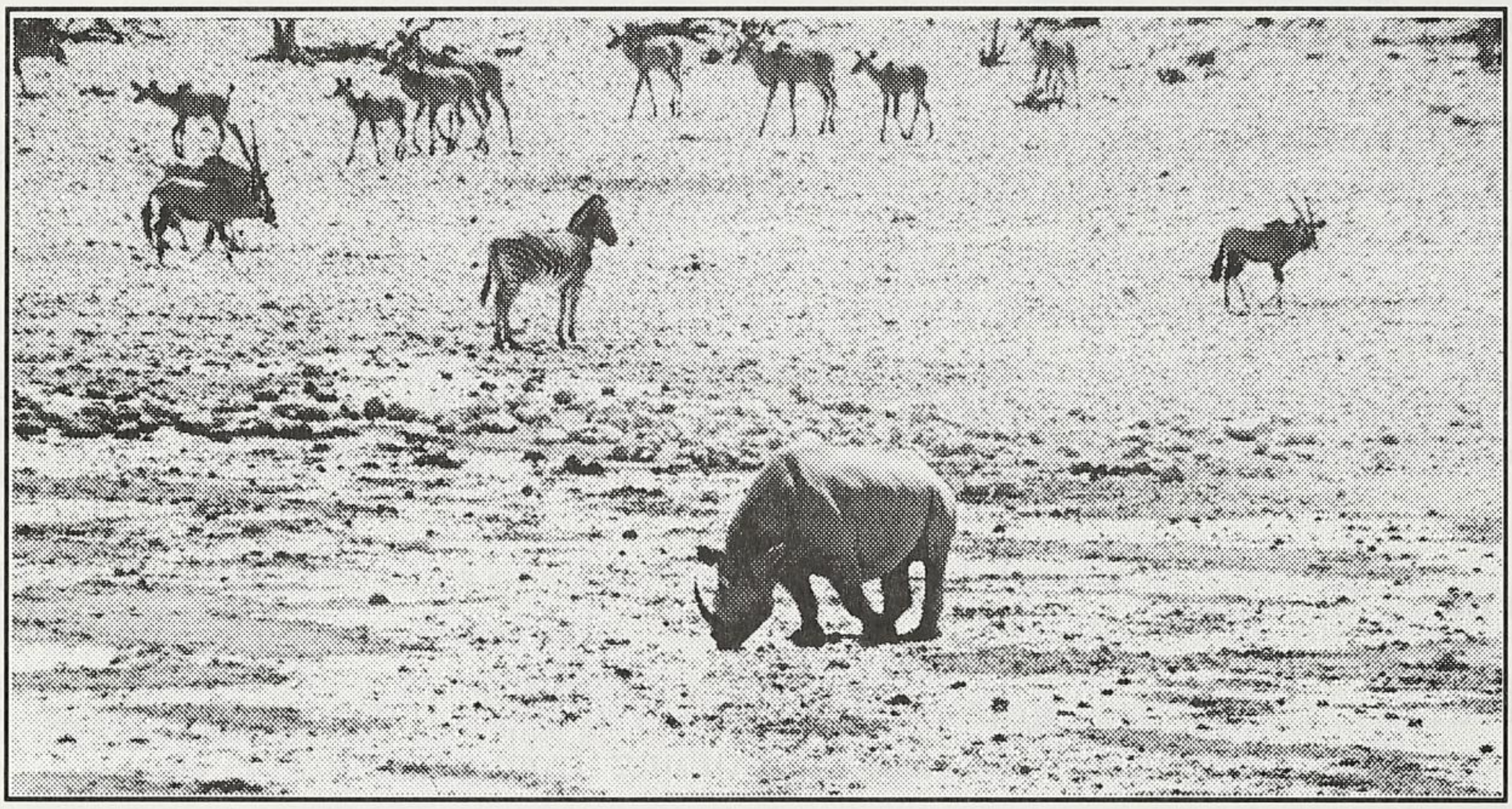
Behavioral Activity Budget of Black Rhino (Diceros bicornis bicornis) at a Watering Place

Field Notes

A Collaborative Observation: Etosha Ecological Institute/Disney's Animal Kingdom

By
Farshid Mehrdadfar, Zoological Manager
Disney's Animal Kingdom, Lake Buena Vista, FL



The following is a summary of field notes made during October/November 1998 by the author while on an internship at Etosha National Park (Republic of Namibia). These recordings are submitted in this journal as baseline/reconnaissance observations. Although numerous studies have been conducted on behavior of black rhinos, the following observations were made to explore possible behavioral similarities between animals managed in captivity and those in the field. In writing this article it was my intention not to presume any correlation between the behaviors exhibited by animals in captivity and the animals in the wild, but rather, provide a snapshot picture of animal's activity at a watering hole. This recording of the behaviors exhibited by black rhinos *(Diceros bicornis bicornis)* at a watering hole is submitted as a baseline/preliminary observation in the hopes of strengthening a possible future case study.

Introduction

Activity budgets are connected with drives or needs and the stimulating situations which together govern behavior. A stereotyped program therefore presupposes the

regular arousal and quiescence of drives in correlation with an external situation which, by necessity, has to be a stable system in its stimulus value. Obviously all kinds of adaptive reactions to changes in the environmental situation disturb regular and stereotyped program patterns.

Black rhinos eat woody plants, therefore their habitat must supply sufficient food in the form of young trees and shrubs. Black rhinos are dependent on water and they normally drink daily or on alternate days during the dry summer months. Black rhinos will frequently wander great distances from water and their range includes the drier areas of Southern Africa. This phenomenon can probably be explained by their dietary preference and social behavior.

"In the semi-arid and arid regions of the subcontinent most grasses are ephemeral, being annuals with a short lifespan. After rain showers they germinate quickly, grow, produce seeds, and have disappeared before the end of the dry season. In these areas, therefore, there would not be enough fodder for bulk grazers such as white rhino. Furthermore, in contrast to white rhino who live in family groups, black rhino are solitary, and a lower density of food would meet their requirements. In general, woody plants are more resistant to drought than grass. In the arid areas the woody vegetation is restricted to washes. These dry washes frequently provide enough food to sustain a single rhino. Black rhinos also show an affinity for broken, mountainous terrain. Bearing all this in mind it is not strange to find that black rhinos have a wider geographical distribution than white rhinos, not only in southern Africa but also the rest of the continent (E. Joubert, 1996)".

In Namibia black rhinos possibly occurred all the way from the Orange River in the south to the Kunene River in the north. However, their distribution was mostly limited to the broken mountainous region between the Namib Desert and the sandy plateau of the interior. In the pro-Namib they moved deep into the Namib Desert along the seasonally flowing rivers. Their distribution eastward on the plateau was probably limited by the shortage of surface water and preferred food plants. The latter, especially the *Acacia* species, are restricted to clay and calcrete soils. It is doubtful whether black rhino ever lived in the sandveld regions of northeastern Namibia. In the east they probably did live in the Omarambas that drain into Botswana. The highest density of black rhinos in Namibia was in the mixed acacia vegetation zones of northwestern Namibia, (Figure 1).

Observation Area

Etosha National Park: Covering 22,270 square kilometers (8,600 square miles), Etosha National Park ranges from dense bush to large open plains where herds of animals roam as free as they did in the days when the world was new (Figure 2). Conservationists regard it as one of the greatest and most important game parks in the world. Broadly speaking, the vegetation of the park is predominately of two subtypes, tree Savannah in the east and shrub and thorn-tree Savannah in the west. Etosha's animals are typical of those found in the southern Savannah plains of Africa. Five rare or endangered species, the black rhinoceros, black faced impala (*Aepyceros melampus petersi*), Hartmann's mountain zebra (*Equus zebra hartmani*), Roan antelope (*Hippotragus equinus*) and the Damara dik-dik (*Madoqua kirki*) live in this habitat. Today the park, although little more than a quarter of its original size, remains one of the world's most impressive game sanctuaries.

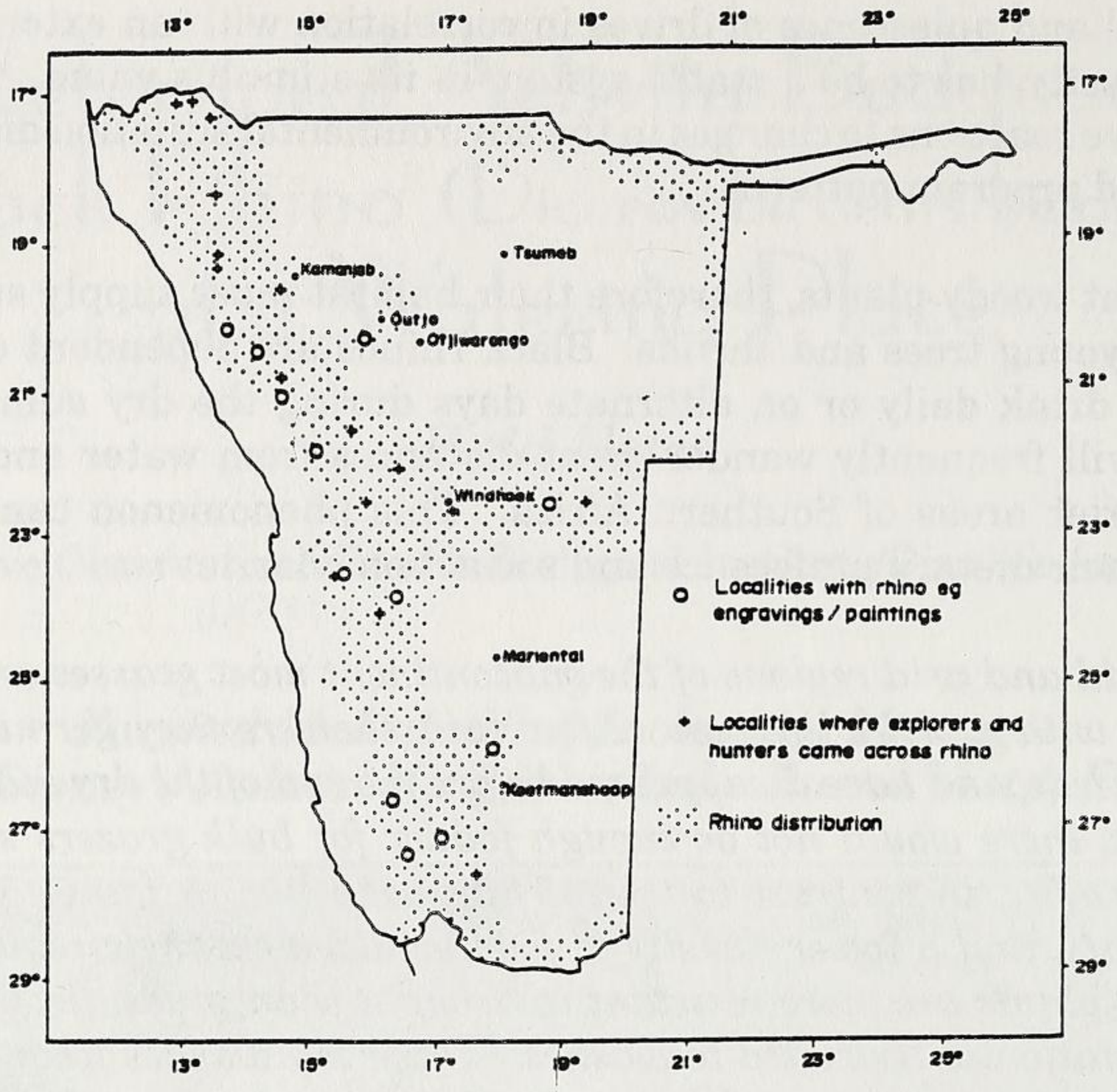


Figure 1
Historical Distrbution of Black Rhino in Namibia

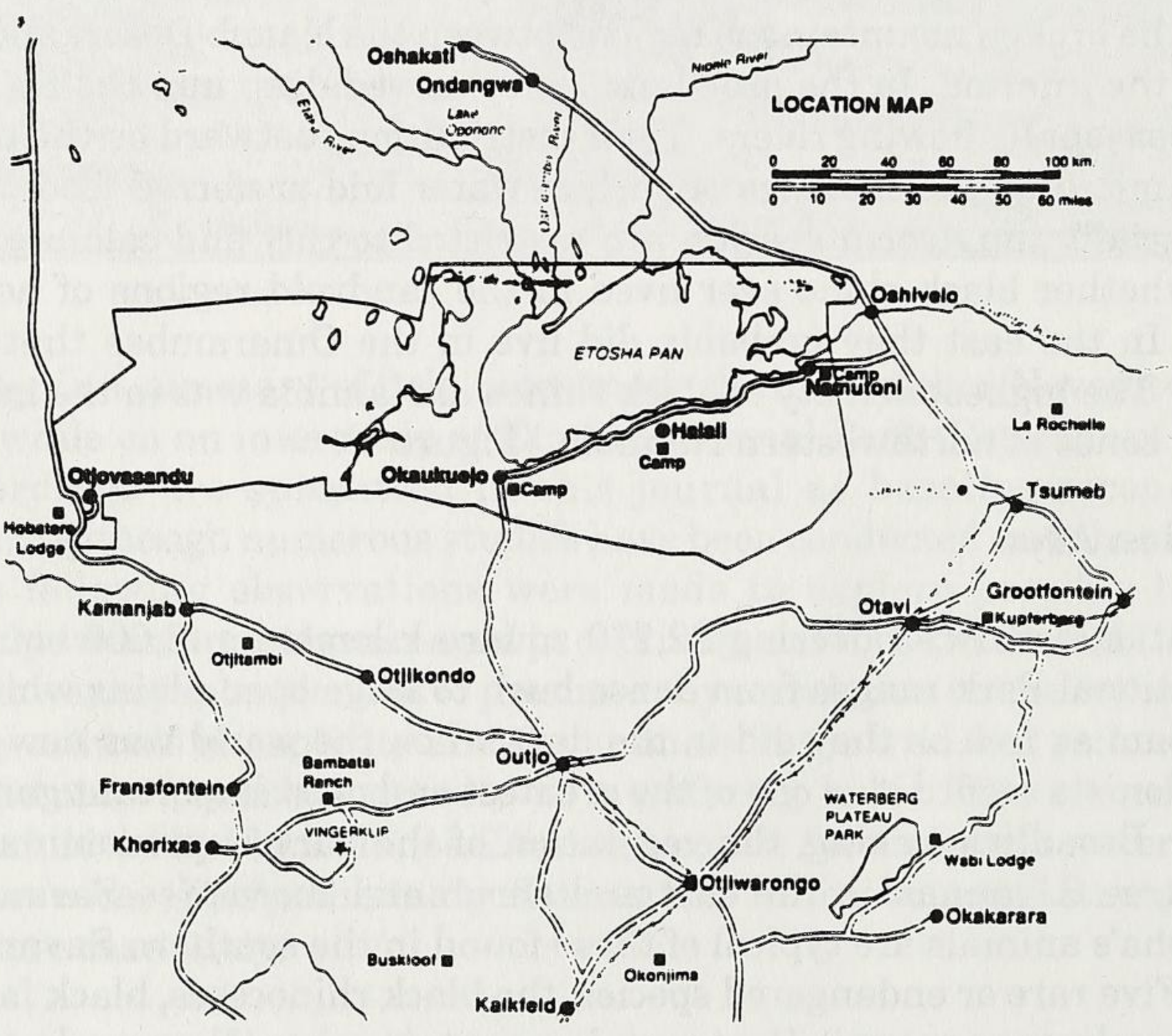


Figure 2
Etosha National Park

During the boundary changes a control post was established at *Okaukuejo* - one of four designed to combat the spread of foot-and-mouth disease and contain illegal hunting and gun-running on the north. Although *Okaukuejo* Fort, built in 1901, has long since disappeared, the post still serves as the main administrative camp in the park and also houses the Ecological Institute from where the research and management of nature conservation are directed. In 1953 B J G de la Bat, the first game ranger to be stationed at Etosha, arrived. The only inhabitants at that time were Haikom Bushmen.

* It must be noted that my internship/volunteer work at Etosha National Park was granted after receiving the temporary work permit from the Ministry of Home Affairs, Republic of Namibia and was supervised by Dr. Conrad Brain, senior veterinarian at Etosha Ecological Institute. Data collected and presented in this journal represent a collaborative effort with Etosha Ecological Institute science/conservation staff.

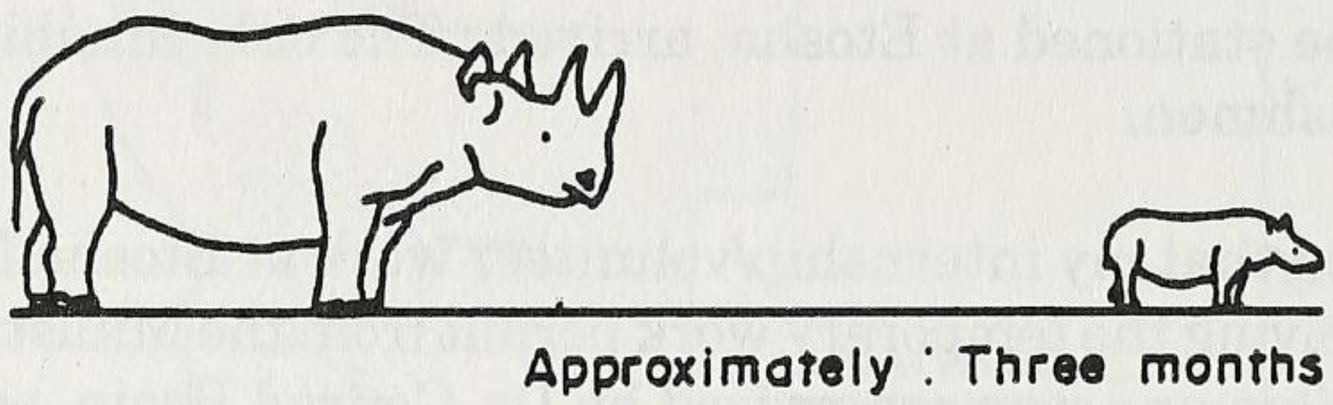
Methodology

During my internship at Etosha National Park, all of my observations as it relates to this summary/field notes were conducted at *Okaukuejo* watering hole. Two hundred hours of data were collected at this location, of which 110 hours were scored as the direct observation of black rhino activity/interaction at this site. All observations were made between 1900 hrs. and 0600hrs. Primary observations at this location were centered around identifying the individual black rhinos that were present at this site for purposes of cross-reference to the identification data bank at the Etosha Ecological Institute (EEI). Sixteen individual rhinos were identified at this location, "The aging of an immature black rhinoceros using ratio of body size between the calf and the cow (After Peter Hitchins)" diagram (Figure 3) and the "Rhino Identikit" diagram, by Dr. Eugene Joubert, (Figure 4) were utilized for identification. In order to better understand and record the behaviors exhibited at this site, a basic ethogram and data sheet were produced. Thus by applying One-zero sampling method with intervals of 15 seconds, (i.e. total number of intervals, from the time a black rhino was present at the watering hole, divided by number of intervals each animal exhibited any of the behaviors described on ethogram was scored as one).

From the studies conducted by Dr. Eugene Joubert on activity cycles of black rhinos (On the Clover Trail by Dr. Eugene Joubert, 1996), it was determined the hours of observations set aside for these field notes were 1900 hrs to 0600 hrs.

Results and Discussions

To better understand the activity budget of the black rhino at the watering hole, one must examine the activity cycle of the animal and all the elements that could influence this cycle. Complex elements of nature constitute the climate of a given area. These elements are interrelated and their influences on biota are exerted in various ways. Although the influence of microclimate is infinitely more important to plants and smaller creatures, one cannot underestimate its importance as regards black rhino behavior.



The ageing of an immature black rhinoceros using ratio of body size between the calf and cow (After Peter Hitchins)

Figure 3

Date..... Time..... Weather.....
Home range (Area).....
Individual (ID No)..... Sex.....
Age class..... Activity.....
Info on other rhino/s (if present).....
.....
Other remarks.....
.....
.....
ID Notes
Left ear:.....
Right ear:.....
Front horn:.....
Rear horn:.....
Tail:.....
Other:.....

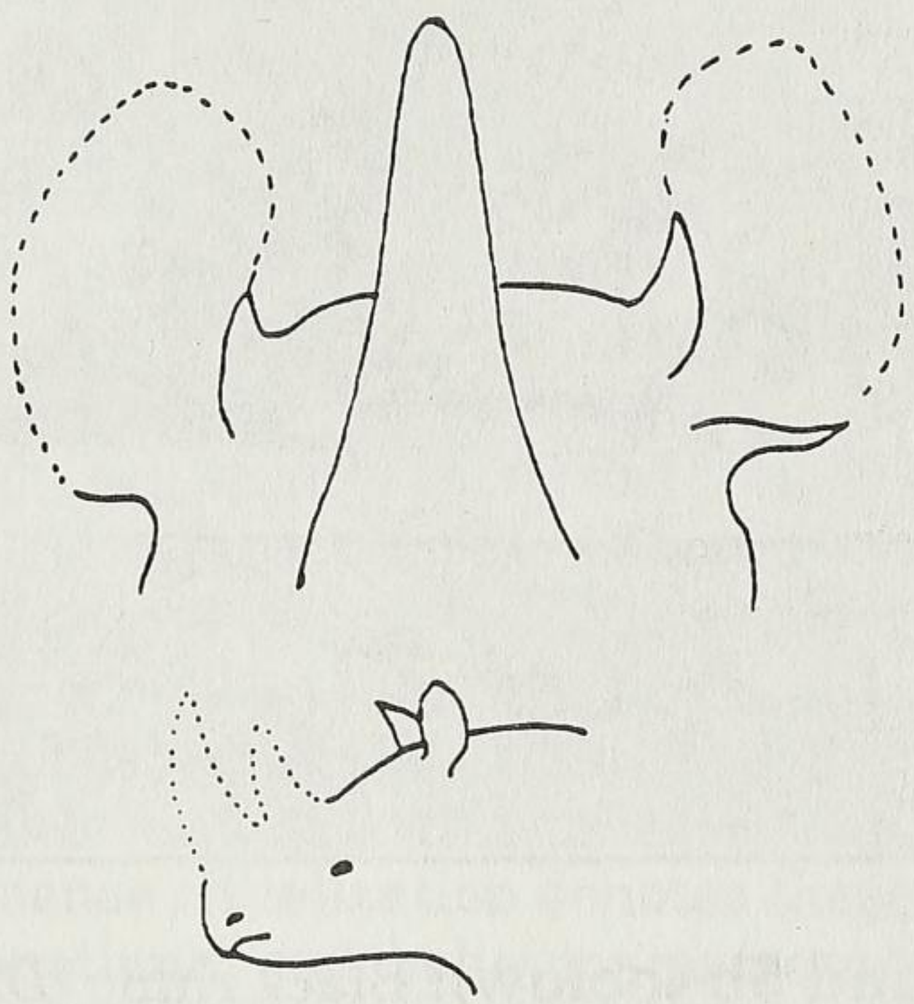
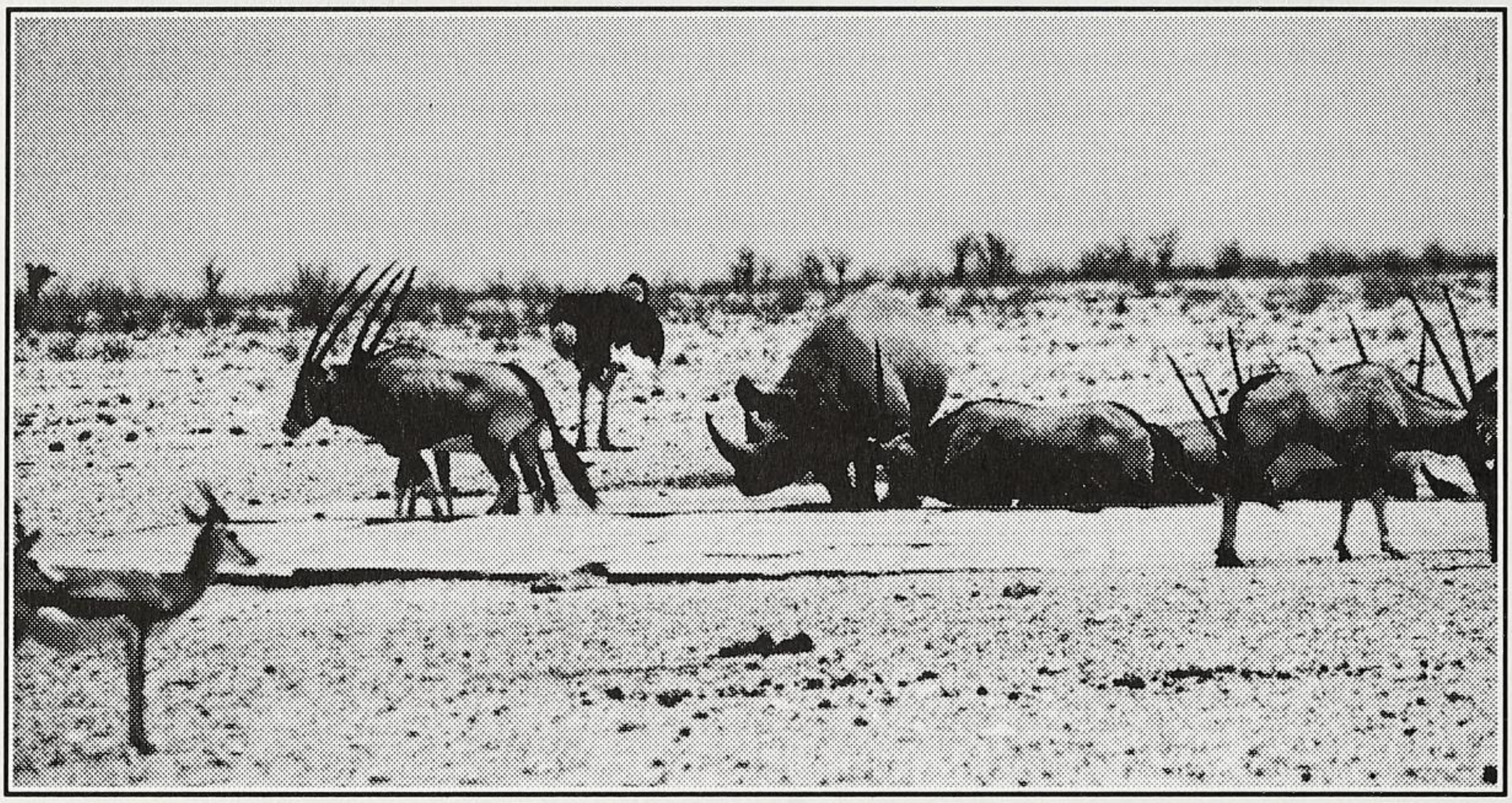


Figure 4
"Rhino Identikit" diagram by Dr. Eugene Joubert

"Clearly the rhinos had two active and two inactive periods per day. The active periods, with expected individual variations, lasted approximately five hours each. This means that out of every twenty-four hours rhinos were active for ten to eleven hours. On summer mornings they started browsing earlier than in the winter but stopped their activities earlier in the morning. Similarly, in summer they started browsing later in the afternoon. This meant that during summer they were active for longer periods at night than during the day. In winter the opposite was true. They would spend more daylight hours being active than they would night time hours. In winter they would browse longer during the morning and start earlier in the afternoon. showing that they were less active during cold winter nights" (E. Joubert 1996).

The drinking patterns of rhinos are rather predictable. In the study area they normally went to drink between sunset (~1900 hrs) and approximately 2300hrs. For many decades game in Namibia had to share the watering places with humans and their animals. The activity of people and their livestock at the waterholes during the daytime may have forced rhinos and other game to visit the waterholes at night. *"This drinking pattern is still followed by rhinos in the game reserves to which they have been translocated" (E. Joubert, 1996).* Another reason for the nocturnal drinking habits of rhinos in the semi-arid regions of Namibia is that these animals may have large home ranges. *"Home range size varies greatly, depending on the habitat and to some extent on sex and age. Subadult males wander most widely (R. D. Estes, 1992)".* They travel during the late afternoon and early evening, perhaps, in order to avoid the heat. This may have invariably caused them to reach the waterhole after sunset.



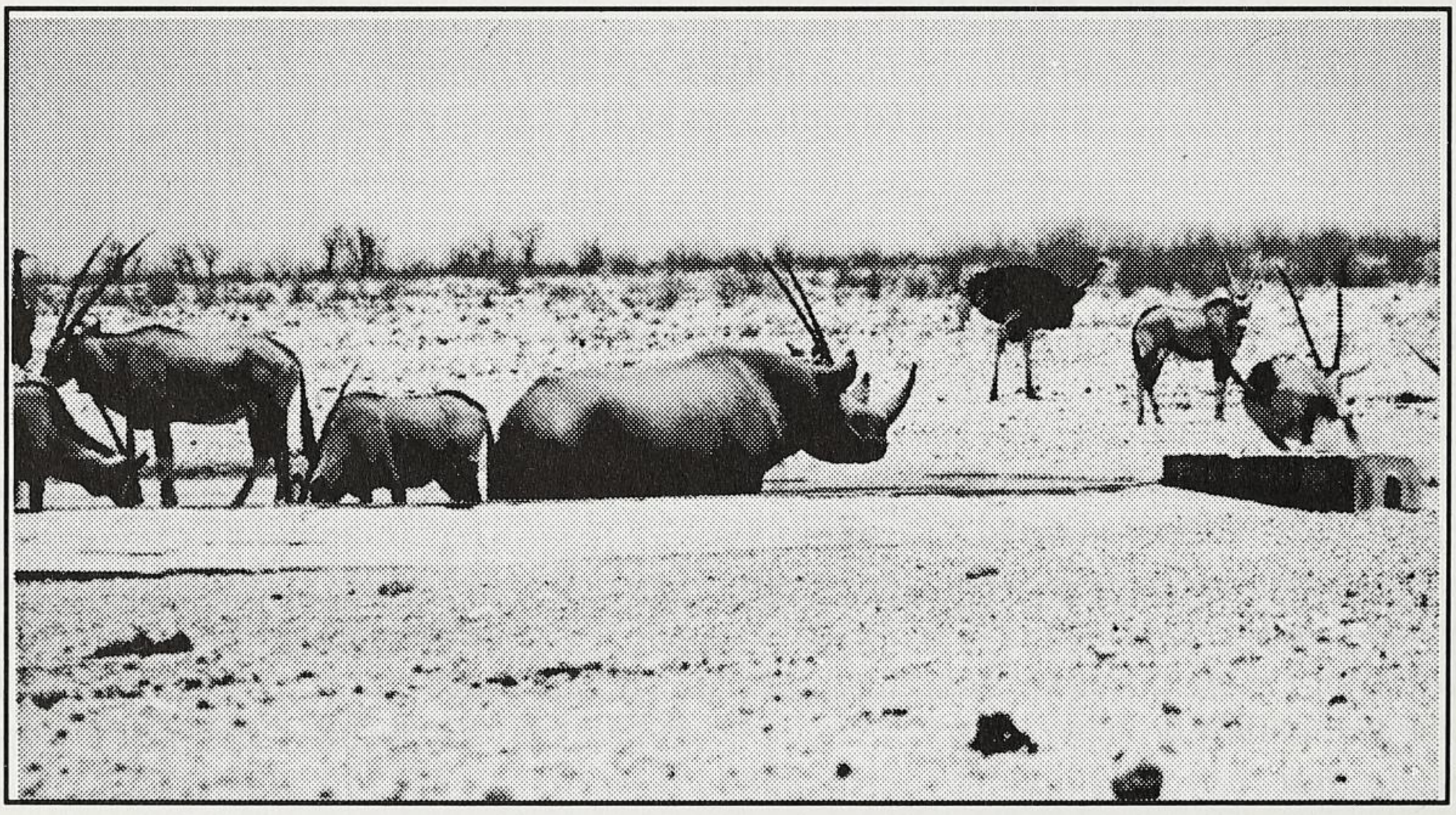


Figure 5a (above) and 5b (below): Black rhino (*Diceros bicornis bicornis)* interaction with other animals in an artificial watering hole in Etosha National Park *(photos provided by the author)*

The time spent at the water by the various rhinos differs, some of the factors influencing the time spent could be contributed to present and subsequent interaction of the rhinos with other animals present at the watering hole (Table 1) (Figures 5a & 5b). *"It seems that there is another reason for the congregation of rhinos from a large area to one watering place: rhinos have a tendency to meet there" (R. Schenkel, L. Schenkel-Hulliger, 1969).* On average the rhinos surveyed during this observations spent about 20 to 120 minutes at the site. The actual drinking time could not be calculated due to insufficient night vision equipment.

The time spent at the watering hole and the behaviors exhibited by each animal seems to have no correlation on the actual drinking time but rather the watering hole seems to present a gathering site for rhinos to socialize (Table 2). During these observations, there were bouts of what appeared to be play interaction between the calves traveled to the site and general inspection of different individuals by means of exhibiting olfactory behaviors toward urine and feces. *"This animal is not as solitary and antisocial as commonly portrayed, but instead rather similar to the white rhino (R. D. Estes, 1992)".*

"In higher vertebrates with their complex way of life, the need for social signals and, generally, for means of communication is obviously very high. Particularly in animals living in organized groups, social integration is maintained by the permanent tuning-in of all members. This permanent process has to achieve a working social unit by coordinating differentiated individuals, "personalities". Social integration therefore requires a highly differentiated system of communication. Obviously many activity patterns have adopted secondary social functions through modifications in shape, which serve these functions: they have developed a more pronounced signal quality, partly by changes in their dynamic aspect, partly by conspicuous body structures. In many cases the original function has been dropped for the benefit of the communicative function (R. Schenkel & L. Schenkel-Hulliger, 1969)".

In its most comprehensive sense ritualization denotes these modifications in shape serving communicative functions; and behavior patterns which have lost their original function in favor of communication are called symbolized or symbolic. One might be inclined to assume that most solitary animals such as rhinos have not much need for communicative behavior. Yet, it is the solitary way of life for which communication within the population must be an issue of major importance. In the rhino, it seems that neither their optical nor their acoustical manifestations of presence comply with the need for communication within the population; it seems that, this function is accomplished by the medium of scent. In the rhino a number of behavior patterns which imply the production of scent traces, mainly defecation and urination, appear to be ritualized. The assumption seems justified that ritualization in this context also functions in increasing the efficiency for communication. A watering place seems to be the ideal location for rhino to communicate both social and individualistic messages. The importance of behavioral observations at the watering place was the main drive for this student to conduct and record the activity cycle of this animal.

As a student of rhinoceros behavior, I am constantly in search of furthering my understanding of this magnificent animal. The observations compiled during my internship in Namibia has only provided a snapshot into the natural behavior of this animal and how these behaviors could shed a light on possible ways of improving this species husbandry management in captivity.

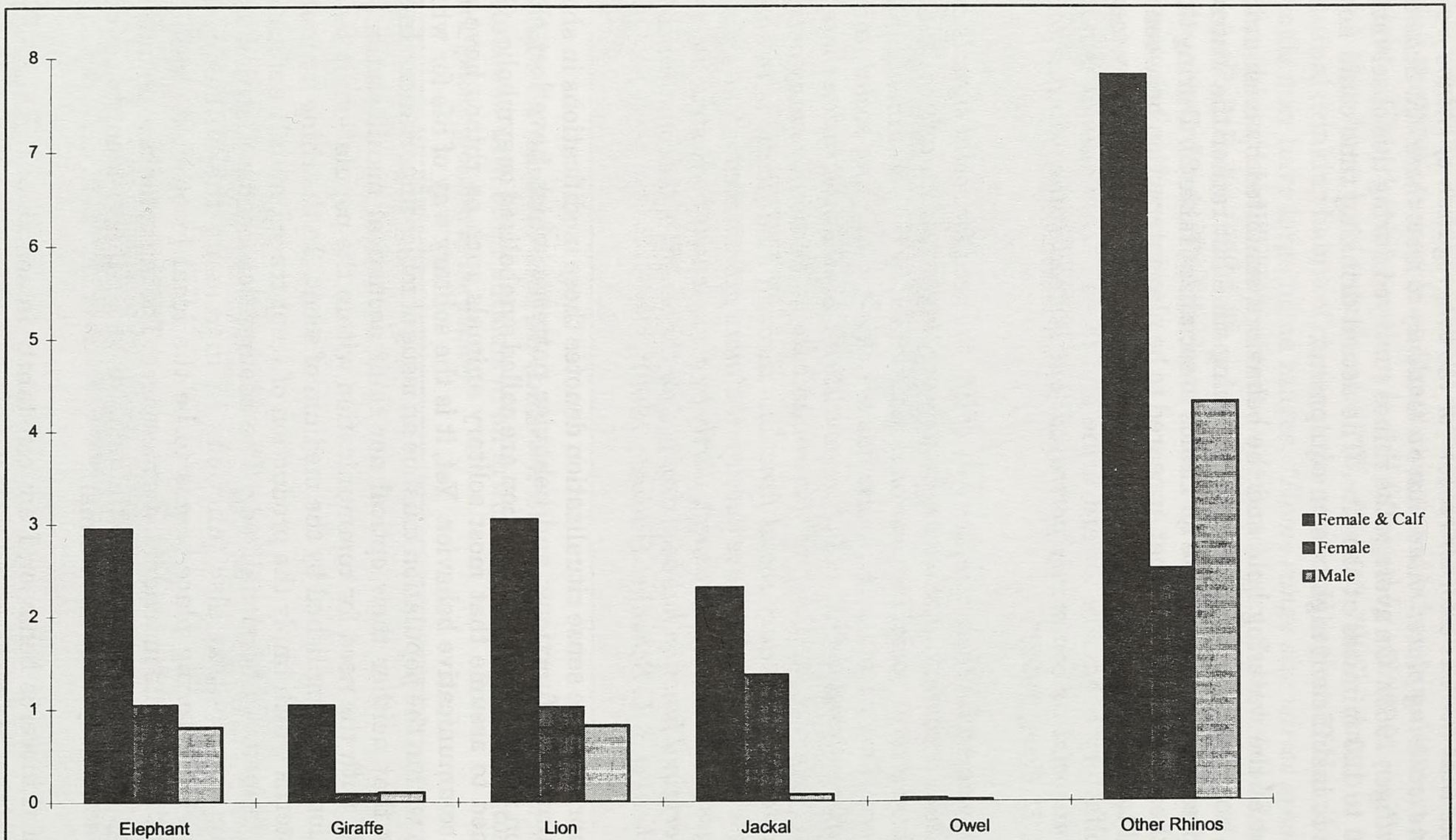


Table 1
Interaction of Black Rhinos (*Diceros bicornis bicornis*) With Other Animals Present During Observations
Okaukuejo Watering Hole, Etosha National Park

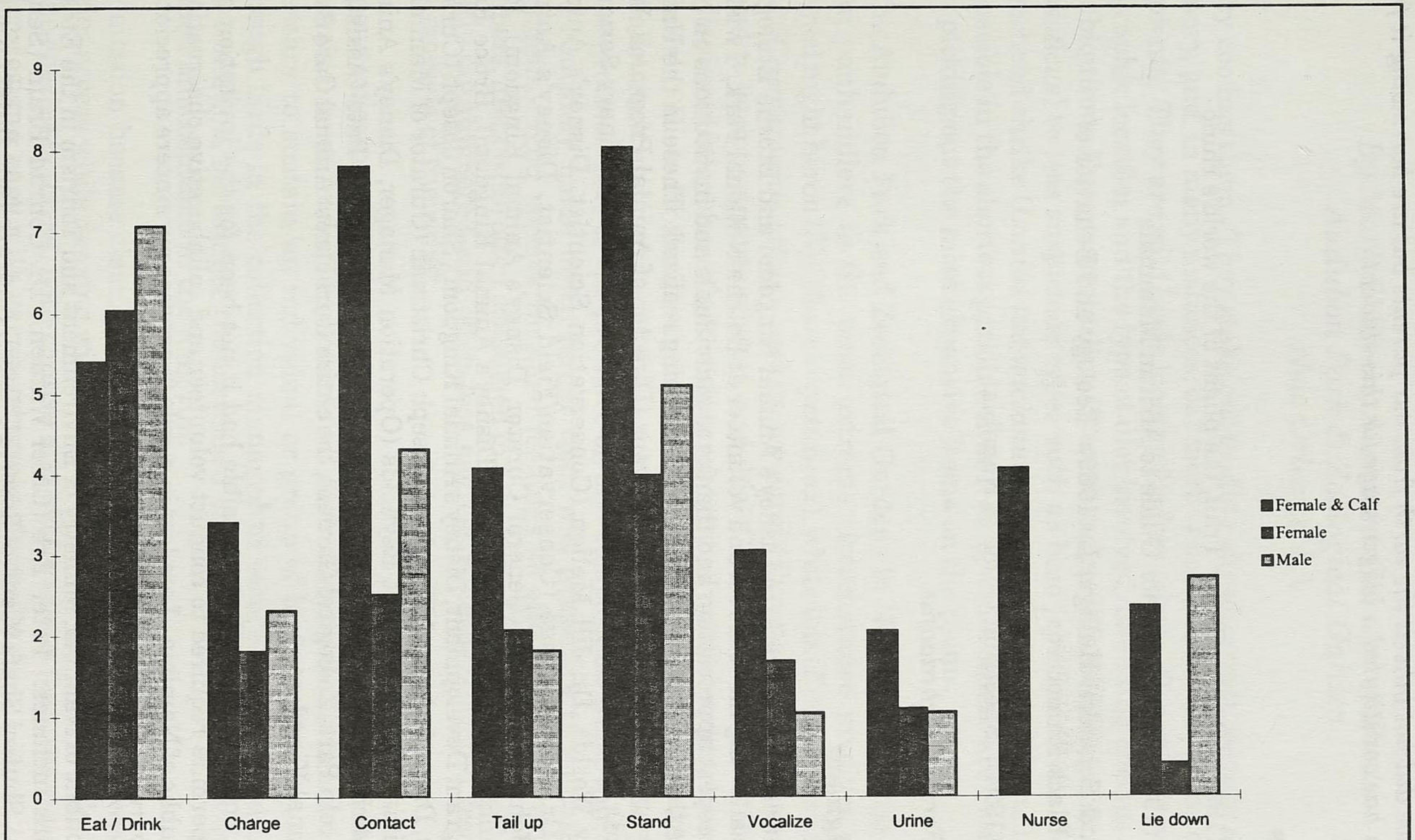


Table 2
Activity Budget of Black Rhino (Diceros bicornis bicornis) at a Watering Hole
Okaukuejo, Etosha National Park

In the national and international arenas of politics and economics, environmental issues, including nature conservation, seem to be put on the back burner. The old adage that we did not inherit the earth from our parents but are borrowing it from our children has constituted a bigger stage for this student.

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Photos by: Farshid Mehrdadfar

Acknowledgment

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This dream would not have been possible had it not been for the invitation and subsequent permits required to conduct volunteer and collaborative observations/ work at Rupublic of Namibia. I am lost in words to express my sincere appreciation for all who were involved in this process.

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