MEMO TO: John Guarnaccia and Victor Gonzalez

MEMO FROM: Paul Kerlinger, Curry & Kerlinger, LLC

SUBJECT: 2004 Territorial Boundaries of Puerto Rican Nightjars at the WindMar Project Site in Guayanilla, Puerto Rico

DATE: July 6, 2004

This memo is in response to your request that I analyze data on the 2004 distribution of the Puerto Rican Nightjar at the WindMar project site in Guayanilla, Puerto Rico. It also supplements my report of August 30, 2003, in which I analyzed nightjar distribution during the 2003 breeding season.

Attached are maps showing the locations of 2004 nightjar territorial boundaries. These locations are approximate. The discussion below provides some explanation as to the number of territories.

The analyses were first conducted by constructing a rough map based on the locations of simultaneously calling birds – birds heard from the same listening station on the same night at the same time or within several seconds. When two or three birds on at least one occasion were calling from the same listening point on the same night *before* tape playback, they were marked on a blank map to establish that there were at least two or three territories from which birds were advertising prior to their reacting to the tape. This also established the rough location of territorial boundaries. This construction revealed the probable number territories. The next step was to examine the locations of birds calling before and after the playback tape was played.

Punta Verraco – A conservative total of 23 territories were identified during the analysis of nightjar vocalizations. Although this represents three more than were found during the surveys of 2003, and a 15% increase in numbers of territories, there is reason to believe the 2004 estimate may be low. Confusion over some boundaries was resolved by assuming that the closeness of some vocalizations represented only one bird. There could have been two more territories within Punta Verraco. Territories were, essentially, found throughout the peninsula. Although there seems to be some open space in the middle of Punta Verraco (see question mark), it is likely that the territories adjacent actually extend farther into the area that does not seem to be occupied.

Cerro Toro – There are at least six territories within this area as shown by the attached map. It is possible that there was a seventh territory present, but the boundaries were confusing and the parsimonious solution was to conclude that there were only six territories. This amounts to one more territory than in 2003, or a 20% increase in numbers of territories. The boundaries of the territories changed slightly from 2003, including various shifts. Birds were heard farther to the east (Territory 6 on the attached map) and to the southeast (Territory 3). In addition, Territory 4 extended the area of

nightjar territories to the northwest. It is unlikely that the increase in territories between 2003 and 2004 may be explained by better access in 2004, because the survey route was the same, abutted the Territory 4 area, and included more listening stations in 2003 (see discussion below). That there are more territories is supported by the presence of a possible seventh territory on Cerro Toro. There were fairly large areas on Cerro Toro in which no vocalizing nightjars were heard. For example, to the north listening point #4407, north of #4402, and west of #4405 there were reasonably large areas that seemingly do not have territories, despite habitat that is not materially different from that in which territories were found.

Punta Ventana – A total of 17 territories were determined to be present within the Punta Ventana area. Portions of several of these (N=9) extend into the Guanica State Forest. Of these, three are predominantly within the State Forest and the others are either one-half or less than one-half outside of the State Forest. Seventeen territories represent an increase of 78% increase in numbers of territories during 2004 as opposed to 2003 when only 9 territories were found. There were three relatively large areas on Punta Ventana that did not seem to have territories, or, at least, have calling birds. These are areas fairly well removed from the trails that were established, which may explain the relative scarcity of territories found in those areas. The fact that several territories were mostly within the Guanica State Forest may also explain the increase in numbers of territories. It is likely that the closeness of new trails to the State Forest permitted hearing more birds than in 2003.

Summary and Conclusion

Overall, there were a total of 46 nightjar territories found on all three portions of the WindMar project site. This represents 12 more territories than were found in 2003 or a 35.3% increase overall.

There are three potential explanations for the greater numbers of territories encountered during 2003. First, the observers may have become more adept at finding the birds. This does not seem to be a reasonable explanation because it is easy to hear nightjars and observers really did not need training to do the work in 2003.

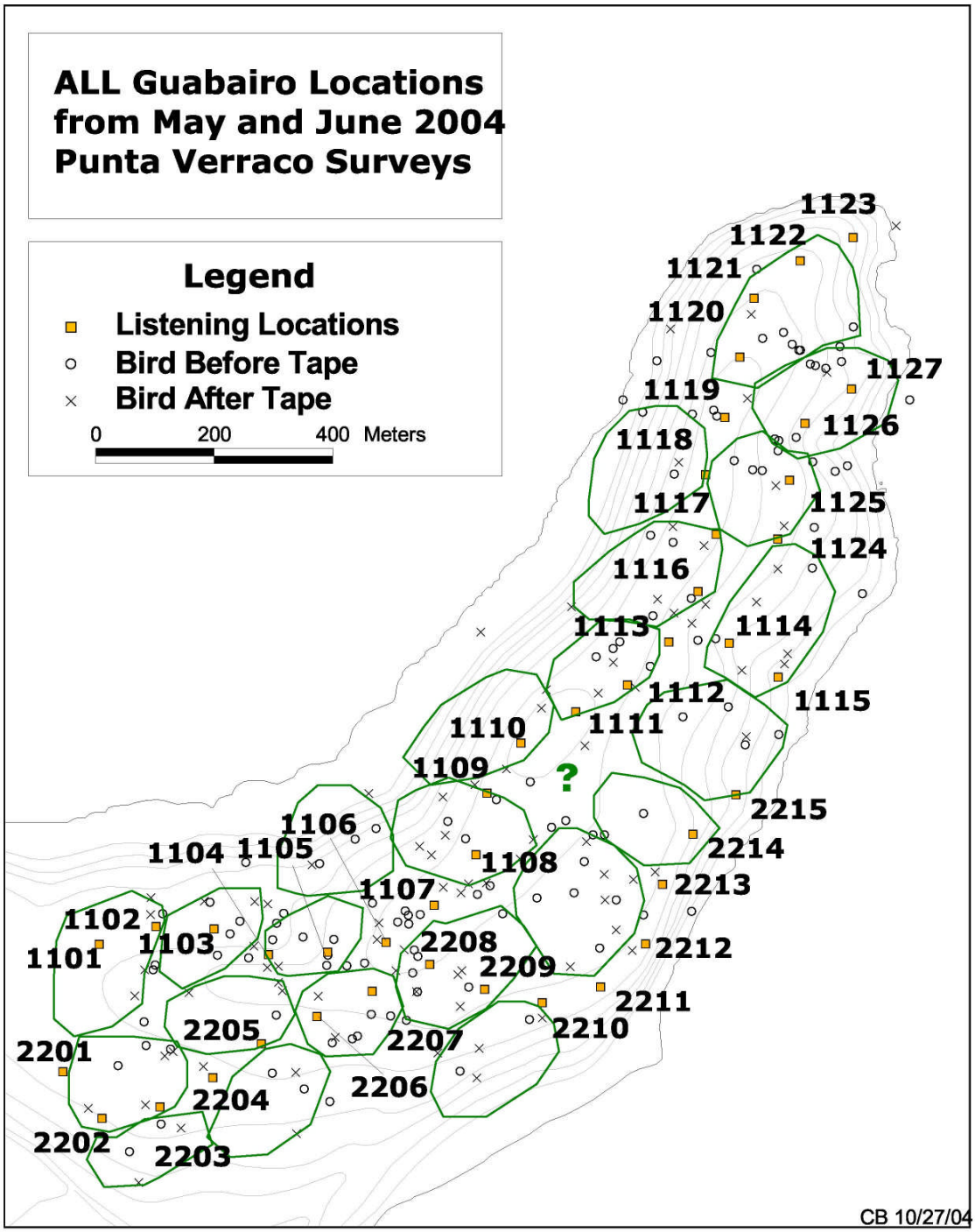
Second, there may have been an overall increase in the nightjar population. This increase may have resulted from better reproductive success (more food, fewer predators, fewer storms, etc.) or recovery from previously depressed population levels. It is important to note that the density of nightjars on a per hectare basis was higher on the Wind Mar project site than has been reported in most parts of Puerto Rico. Given the high density, one would expect birds to disperse to other locations rather than become even denser at the Wind Mar site.

The third explanation, and the one I favor, is that the access roads that have been cut through the forest at the WindMar site provided better foraging habitat such that more territories could occupy the site. It is possible that openings in the forest make foraging easier and that such clearings are a limiting factor. Just as some North American birds

are adapted to forest edges and clearings (Golden-winged Warbler and Mourning Warbler), the trails at the WindMar site may now provide better foraging habitat that actually attracts nightjars from other areas or permits them to live on smaller territories by making foraging better. On Punta Verraco, the close packing of territories at the base of the peninsula may correlate with the establishment of a new access road. On Cerro Toro, the new nightjar territory (# 4) happens to coincide with a 750 m^2 clearing made to conduct a geotechnical study of the bedrock. On one night at the Punta Ventana property, where more access roads were established, the data collection team reported an adult with two recent fledgling nightjars foraging along one of the access roads, and another older fledgling foraging along another.

It is also possible that a combination of the above factors could have contributed to the increase in numbers of territories in 2004 as opposed to 2003.

These new data shed light on how nightjars might react to the development of a wind energy project on the WindMar site. The Puerto Rican Nightjar could conceivably respond positively to the WindMar project even without mitigation activities. Nevertheless, it is still difficult to predict how nightjars will respond to the actual construction of a wind farm, including turbine base excavation, crane operation, traffic of heavy vehicles, and significant human presence. These activities are more intensive than the bulldozer work that preceded or just overlapped the 2004 nightjar breeding season, but it is significant that this bulldozer work showed no evidence of displacing nightjars.


ALL Guabairo Locations
from May and June 2004
Punta Verraco Surveys
Legend
Listening Locations
Bird Before Tape
Bird After Tape
0
200
400 Meters
1123
1122
1121
1120
1127
1119
1126
1118
1117
1125
1124
1116
1113
1114
1112
1115
1111
1110
1109
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2215
1106
2214
1104
1105
1108
2213
1107
1102
1103
2208
2212
1101
2209
2211
2205
2210
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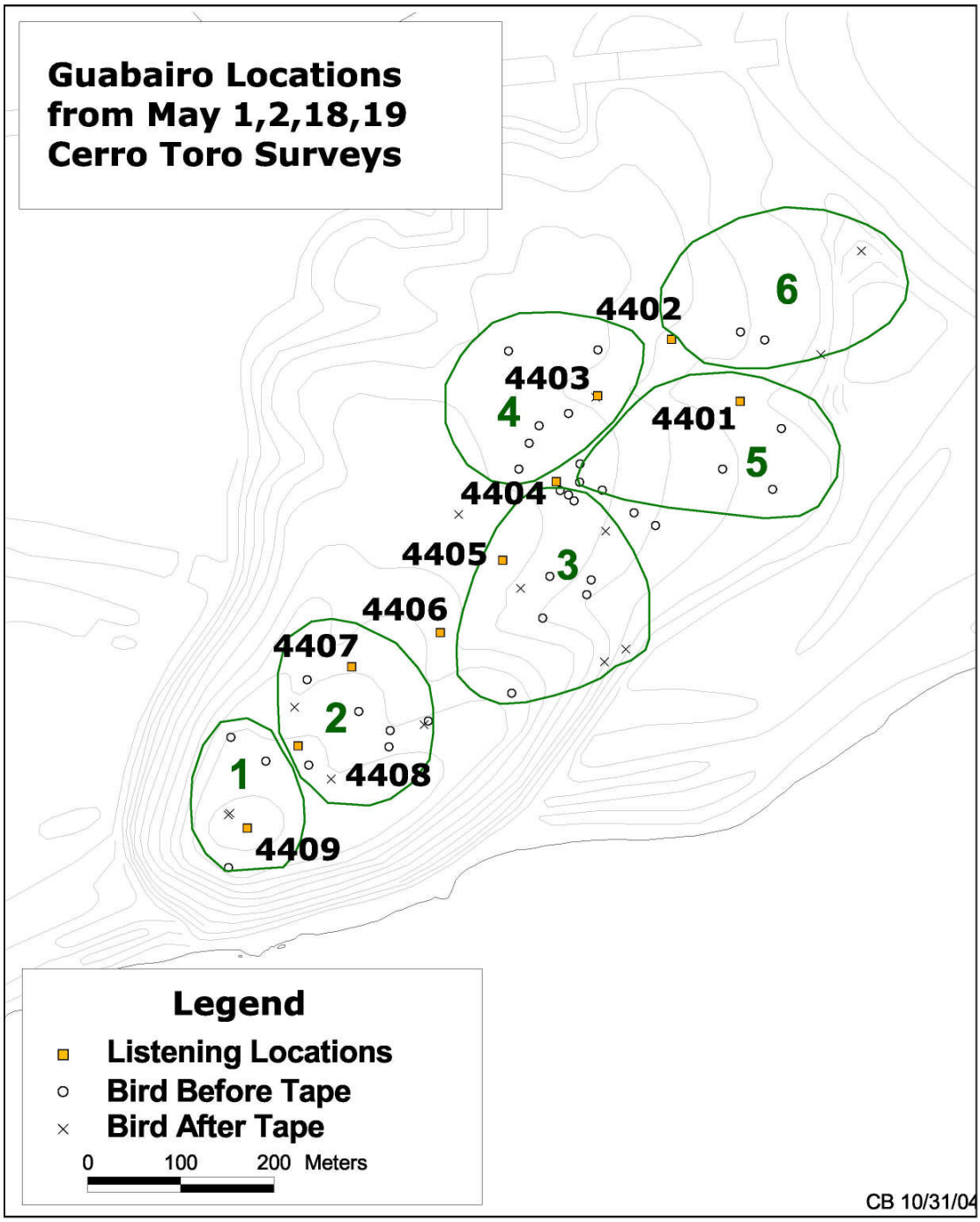
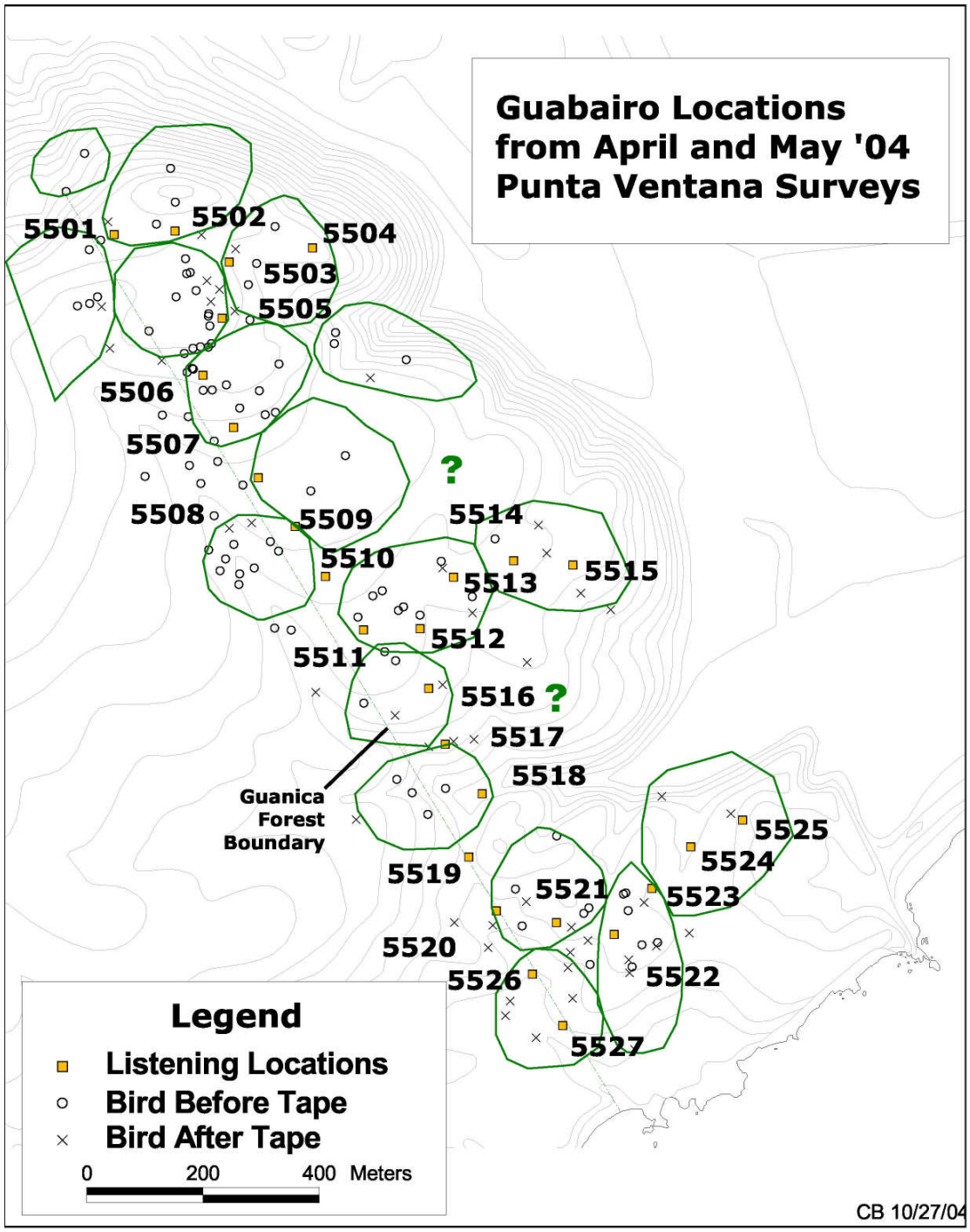
2204
2202
2203
CB 10/27/04


Guabairo Locations
from May 1,2,18,19
Cerro Toro Surveys
4402
6
4403
4
4401
5
4404
4405
3
4406
4407
2
1
4408
4409
Legend
Listening Locations
Bird Before Tape
Bird After Tape
0
100
200 Meters
CB 10/31/04


Guabairo Locations from April and May '04 Punta Ventana Surveys
5501
5502
5504
5503
5505
5506
5507
5508
5509
5510
5511
5512
5513
5514
5515
5516
5517
5518
5519
5520
5521
5522
5523
5524
5525
5526
5527
?
?
Guanica Forest Boundary
Legend
Listening Locations
Bird Before Tape
Bird After Tape
0
200
400 Meters
CB 10/27/04