

Supplementary material for

Monitoring of small rock pools reveals differential effects of chronic anthropogenic disturbance on birds and mammals in the Calakmul region, southern Mexico

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Selection and monitoring of sartenejas

The Calakmul archaeological site (18.1056°N, 89.8093°W) and the checkpoint at the entrance of the Calakmul Biosphere Reserve (18.3648°N, 89.8925°W) have buildings associated to them and are permanently guarded, therefore, we defined them as sites with permanent human presence within the reserve. The *Nuevo Conhuas* village (18.5389°N, 89.9189°W) was defined as a site with permanent human presence outside the reserve. To test for differences between the features associated to the *sartenejas* within and outside the reserve, we measured canopy cover around each *sarteneja* using a GRS densitometer™ every two months; moreover, we measured rainfall and temperature during the entire study period using four Onset® Data Logging Rain Gauges (two within and two outside the reserve).

Table S1. Species recorded visiting and using the *sartenejas* within and outside the Calakmul Biosphere Reserve in Campeche, southern Mexico.

Species	Site ^a		Level of threat ^b
	Within the reserve	Outside the reserve	
AVES			
<i>Accipiter bicolor</i>	—	B	LC (A)
<i>Aramides albiventris</i>	—	D	LC
<i>Buteo plagiatus</i>	—	D/B	LC
<i>Buteogallus urubitinga</i>	D/B	D/B	LC (Pr)
<i>Cathartes aura</i>	—	D	LC
<i>Chondrohierax uncinatus</i>	B	—	LC (Pr)
<i>Ciccaba virgata</i>	D/B	D/B	LC
<i>Crax rubra</i>	D	D	VU (A)
<i>Crypturellus cinnamomeus</i>	D	D/B	LC (Pr)
<i>Falco columbarius</i>	B	—	LC
<i>Herpetotheres cachinnans</i>	—	B	LC
<i>Leptodon cayanensis</i>	B	B	LC (Pr)
<i>Meleagris ocellata</i>	D	D	NT (A)
<i>Micrastur ruficollis</i>	D/B	D/B	LC (Pr)
<i>Micrastur semitorquatus</i>	D/B	D/B	LC (Pr)
<i>Ortalis vetula</i>	D	D	LC
<i>Penelope purpurascens</i>	D	—	LC (A)
<i>Psilorhinus morio</i>	D/B	D/B	LC
<i>Ramphastos sulfuratus</i>	D	None	LC (A)

Table S1. Continued.

Species	Site ^a		Level of threat ^b
	Within the reserve	Outside the reserve	
<i>Rupornis magnirostris</i>	D/B	D/B	LC
<i>Spizaetus ornatus</i>	D/B	—	NT (P)
MAMMALIA			
<i>Canis latrans</i>	—	D	LC
<i>Canis lupus familiaris</i>	—	D	—
<i>Conepatus semistriatus</i>	D	D	LC
<i>Cuniculus paca</i>	D	D	LC
<i>Dasyprocta punctata</i>	D/B	D/B	LC
<i>Dasypus novemcinctus</i>	D/B	D/B	LC
<i>Didelphis marsupialis</i>	D	D	LC
<i>Didelphis virginiana</i>	D	D	LC
<i>Eira barbara</i>	D/B	D/B	LC (P)
<i>Galictis vittata</i>	D	—	LC (A)
<i>Herpailurus yagouaroundi</i>	—	D	LC (A)
<i>Leopardus pardalis</i>	D	D	LC (P)
<i>Mazama pandora</i>	D	D	VU
<i>Mazama temama</i>	D	—	DD
<i>Nasua narica</i>	D/B	D/B	LC
<i>Odocoileus virginianus</i>	D	D	LC
<i>Panthera onca</i>	D	D	NT (P)
<i>Pecari tajacu</i>	D/B	D/B	LC
<i>Philander opossum</i>	—	D	LC

Table S1. Continued.

Species	Site ^a		Level of threat ^b
	Within the reserve	Outside the reserve	
<i>Procyon lotor</i>	—	D/B	LC
<i>Puma concolor</i>	D	D	LC
<i>Spilogale angustifrons</i>	D	D	LC
<i>Tapirus bairdii</i>	D	D	EN (P)
<i>Tayassu pecari</i>	D	—	VU (P)
<i>Urocyon cinereoargenteus</i>	D	D	LC

^a “B”: bathing inside the *sartenejas*, “D”: drinking water from the *sartenejas*, “None”: visiting the *sartenejas* but not using them, “—”: not recorded visiting the *sartenejas*.

^b IUCN red list category, “DD”: data deficient, “LC”: least concern, “NT”: near threatened, “VU”: vulnerable, “EN”: endangered. The level of threat at the national level is shown within parenthesis, “A”: threatened, “P”: endangered, “Pr”: under special protection, no parenthesis: not evaluated in Mexico.

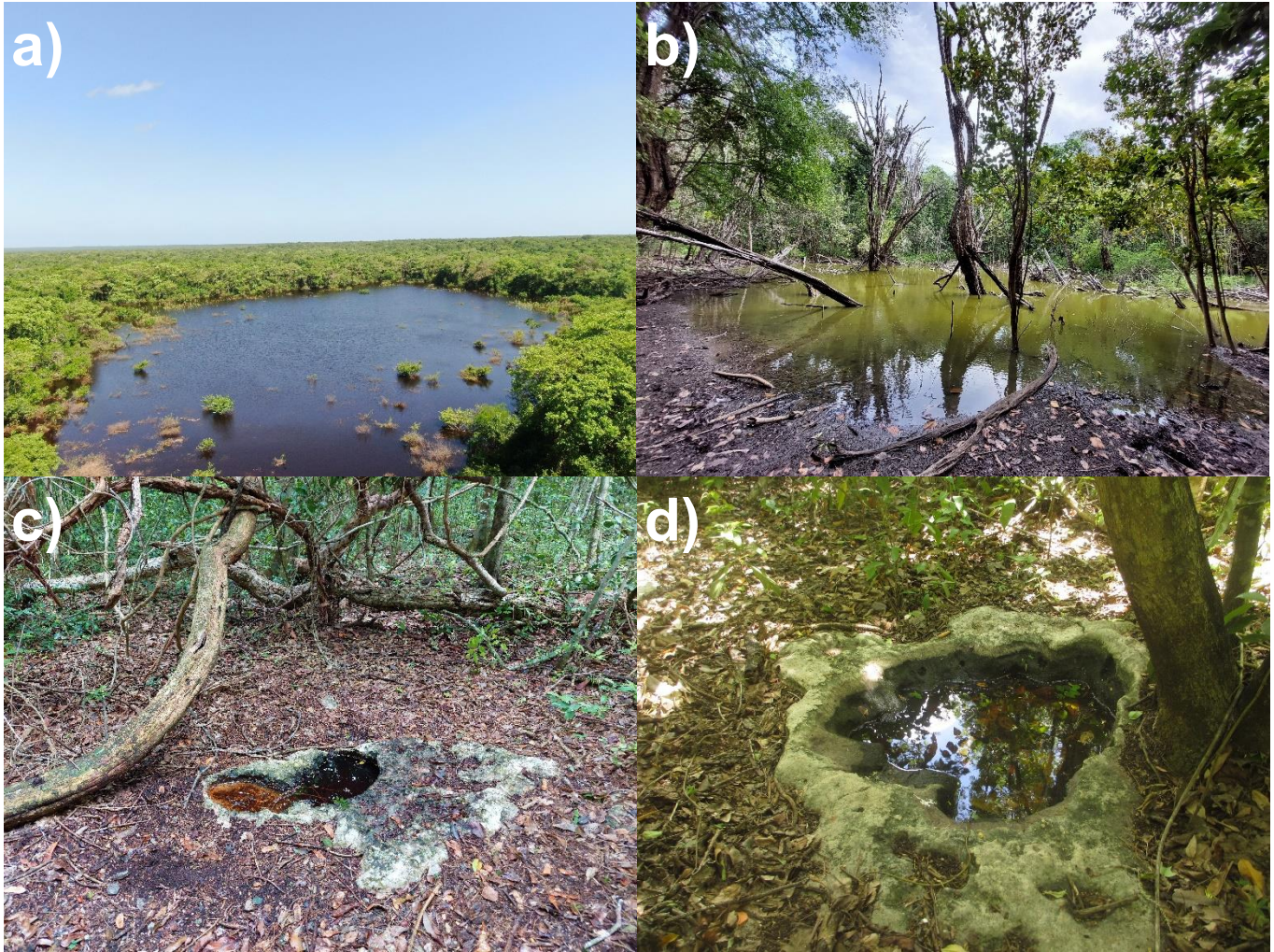


Fig. S1. *Aguadas* are natural depressions on limestone soils that collect rainfall: a) aerial and b) ground photograph of *aguadas*. *Sartenejas* are small crevices formed on exposed bedrock which temporarily fill with rainfall (c, d). Credits: (a) David Simá Pantí - Reserva de la Biosfera Calakmul-CONANP, (b-d) Carlos M. Delgado-Martínez.

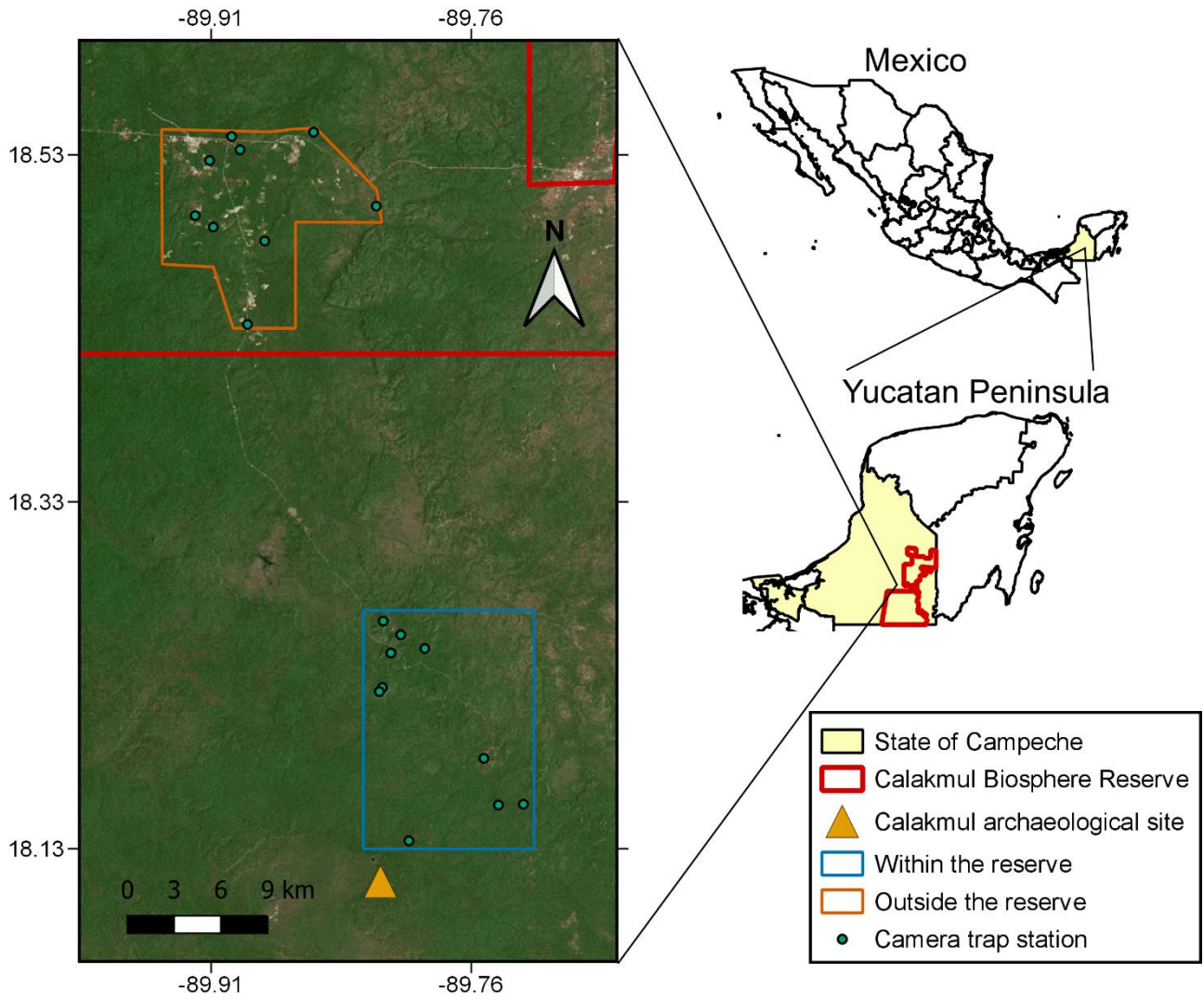


Fig. S2. Location of the study area. Camera trap station points represent the location of *sartenejas* monitored during this study.

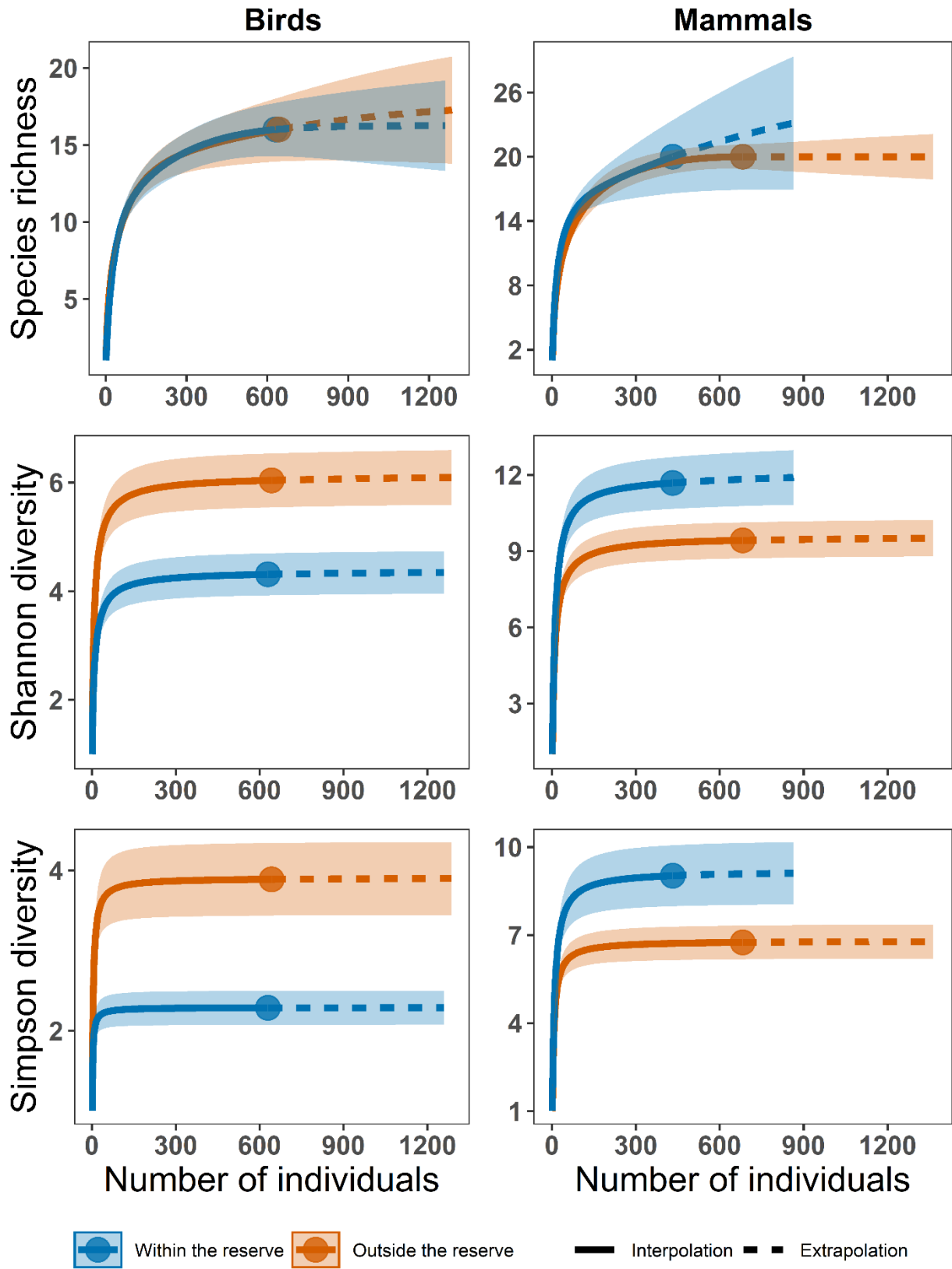


Fig. S3. Species richness, Shannon diversity and Simpson diversity of bird and mammal species using the *sartenejas* within and outside the Calakmul Biosphere Reserve.

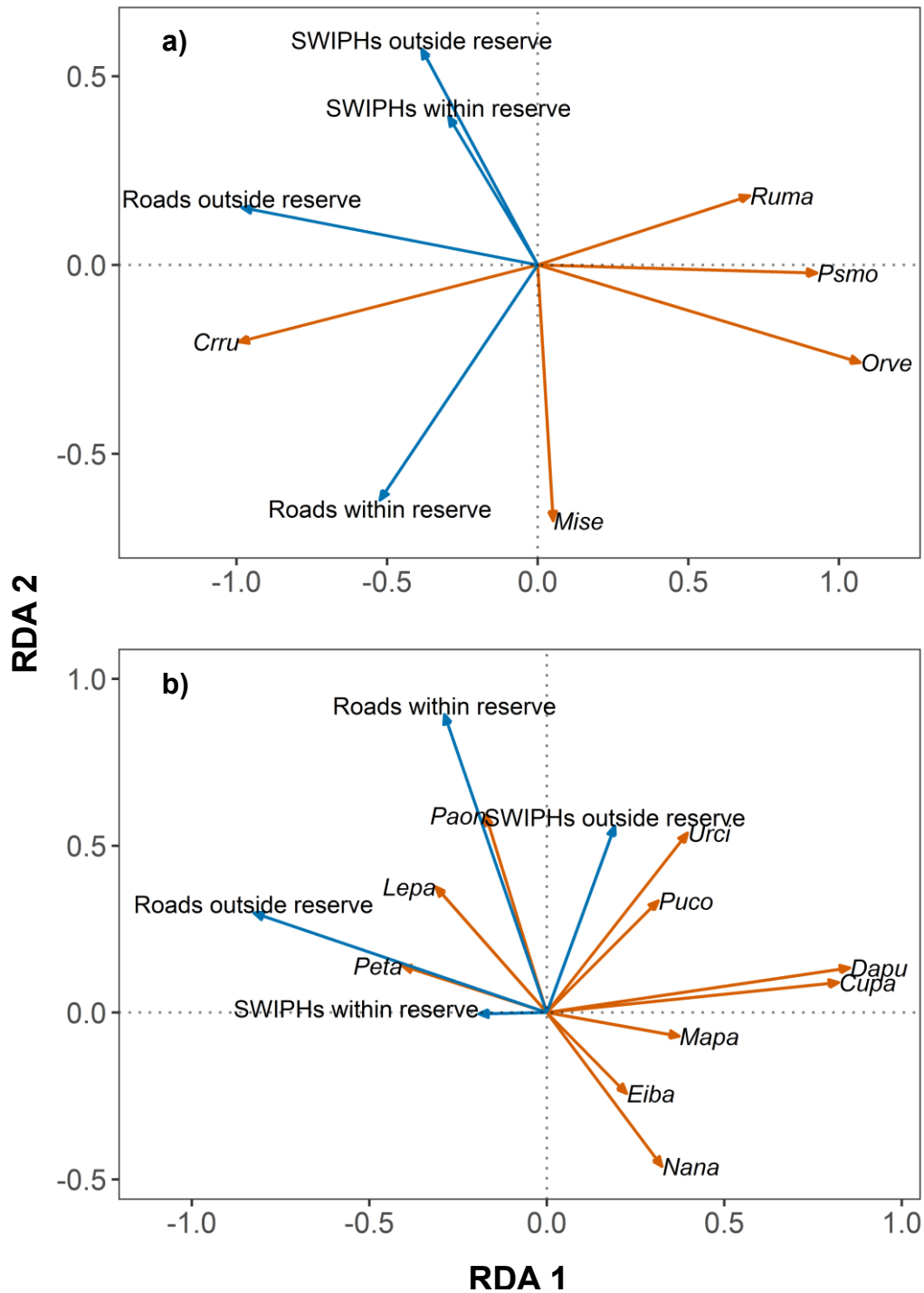


Fig. S4. Distance-based redundancy analysis triplot showing the relationship between distance to roads and SWIPHs and the frequency of use of *sartenejas* by a) birds and b) mammals within and outside the Calakmul Biosphere Reserve. Bird species codes: *Crru* = *C. rubra*, *Mise* = *M. semitorquatus*, *Orve* = *O. vetula*, *Psmo* = *P. morio*, *Ruma* = *R. magnirostris*. Mammal species codes: *Cupa* = *C. paca*, *Dapu* = *D. punctata*, *Eiba* = *E. barbara*, *Lepa* = *L. pardalis*, *Mapa* = *M. pandora*, *Nana* = *N. narica*, *Paon* = *P. onca*, *Peta* = *P. tajacu*, *Puco* = *P. concolor*, *Urci* = *U. cinereoargenteus*.

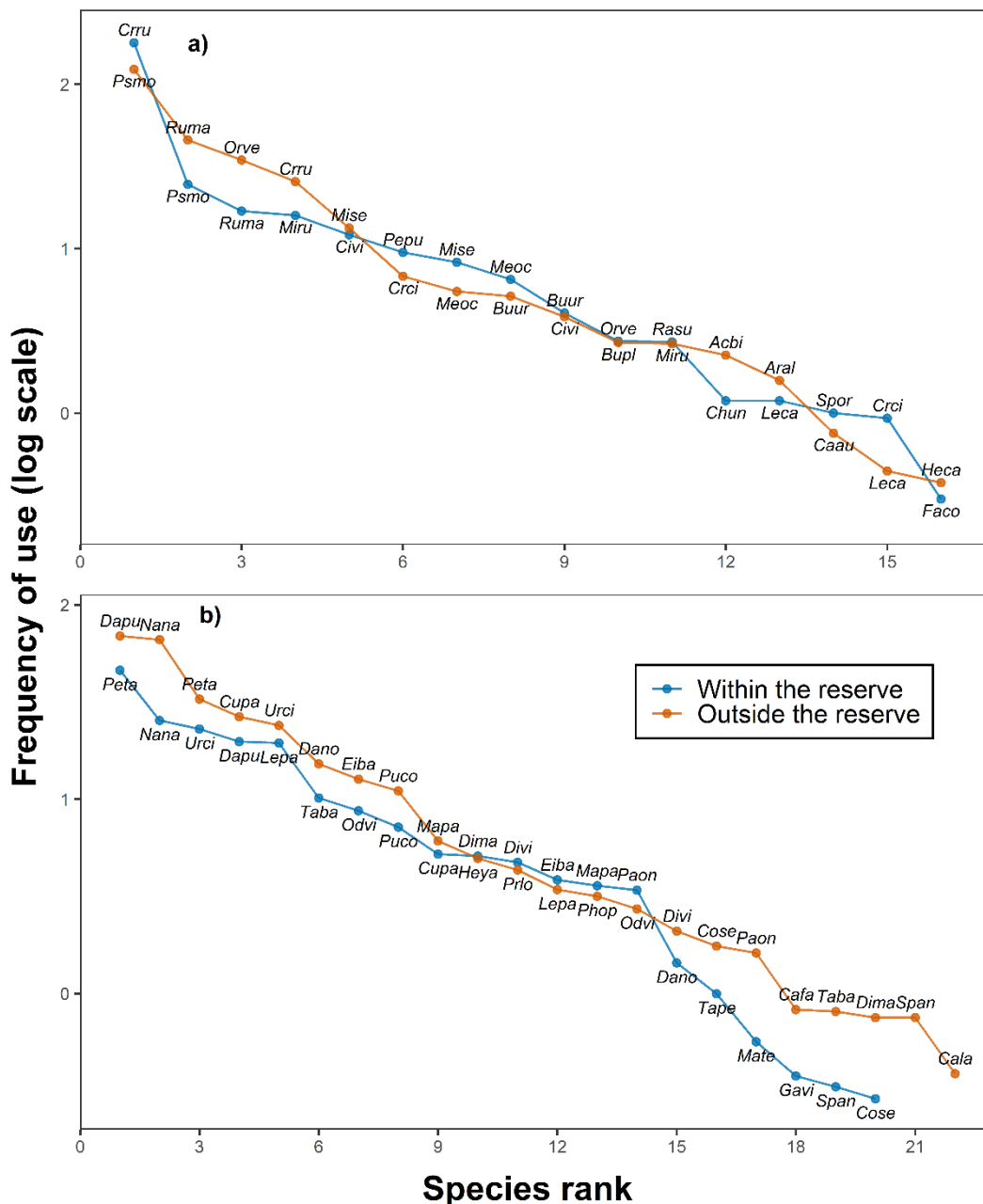


Fig. S5. Rank-frequency curves of use of *sartenejas* by a) bird and b) mammal species within and outside the Calakmul Biosphere Reserve. Bird species codes: *Acbi* = *A. bicolor*, *Aral* = *A. albiventris*, *Bupl* = *B. plagiatus*, *Buur* = *B. urubitinga*, *Caau* = *C. aura*, *Chun* = *C. uncinatus*, *Civi* = *C. virgata*, *Crru* = *C. rubra*, *Crci* = *C. cinnamomeus*, *Faco* = *F. columbarius*, *Heca* = *H. cachinnans*, *Leca* = *L. cayanensis*, *Meoc* = *M. ocellata*, *Miru* = *M. ruficollis*, *Mise* = *M. semitorquatus*, *Orve* = *O. vetula*, *Pepu* = *P. purpurascens*, *Psmo* = *P. morio*, *Rasu* = *R. sulfuratus*, *Ruma* = *R. magnirostris*, *Spor* = *S. ornatus*. Mammal species codes: *Cafa* = *C. lupus familiaris*, *Cala* = *C. latrans*, *Cose* = *C. semistriatus*, *Cupa* = *C. paca*, *Dapu* = *D. punctata*, *Dano* = *D. novemcinctus*, *Dima* = *D. marsupialis*, *Divi* = *D. virginiana*, *Eiba* = *E. barbara*, *Gavi* = *G. vittata*, *Heya* = *H. yagouaroundi*, *Lepa* = *L. pardalis*, *Mapa* = *M. pandora*, *Mate* = *M. temama*, *Nana* = *N. narica*, *Odvi* = *O. virginianus*, *Paon* = *P. onca*, *Peta* = *P. tajacu*, *Phop* = *P. opossum*, *Prlo* = *P. lotor*, *Puco* = *P. concolor*, *Span* = *S. angustifrons*, *Taba* = *T. bairdii*, *Tape* = *T. pecari*, *Urci* = *U. cinereoargenteus*.

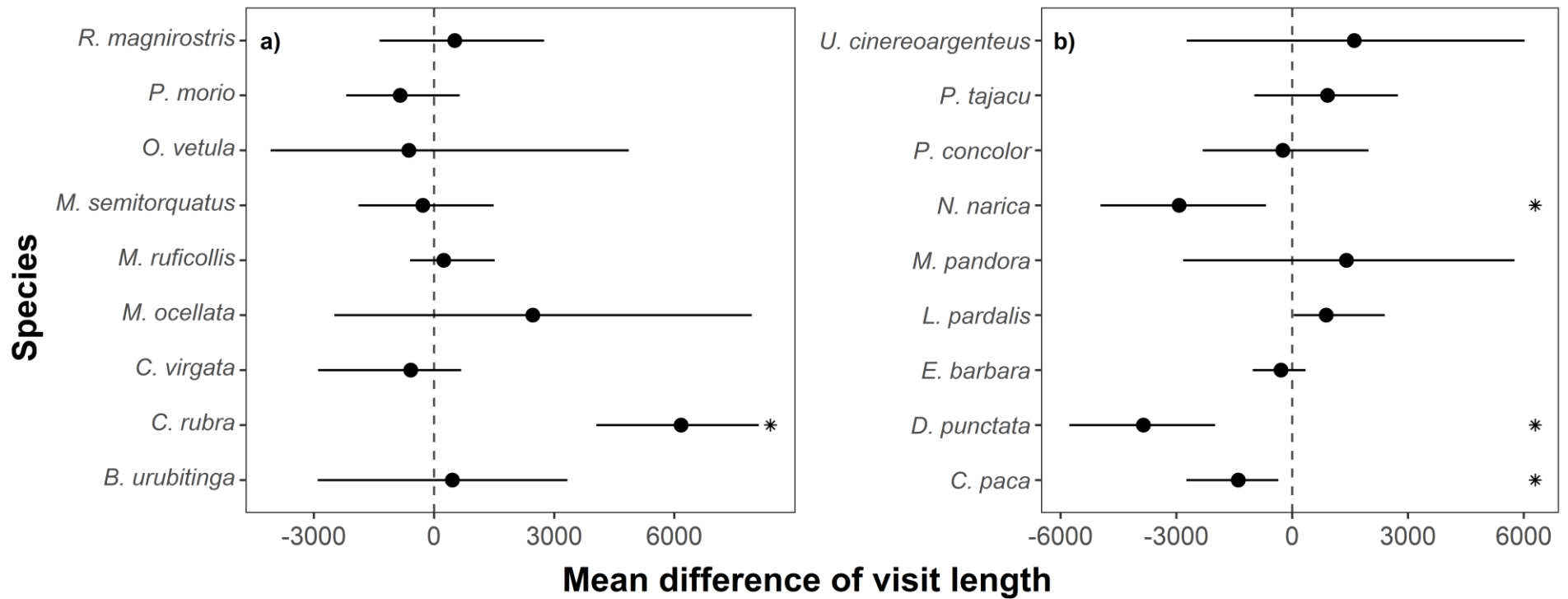


Fig. S6. Differences in means of duration of use of *sartenejas* by a) birds and b) mammals within and outside the Calakmul Biosphere Reserve. Dots and lines represent the observed mean difference and 95% bootstrap confidence intervals, respectively. Values located to the left of the dotted line represent longer visits outside the reserve and those located to the right represent longer visits within the reserve. Statistical differences (p -value < 0.05) are indicated with an asterisk.

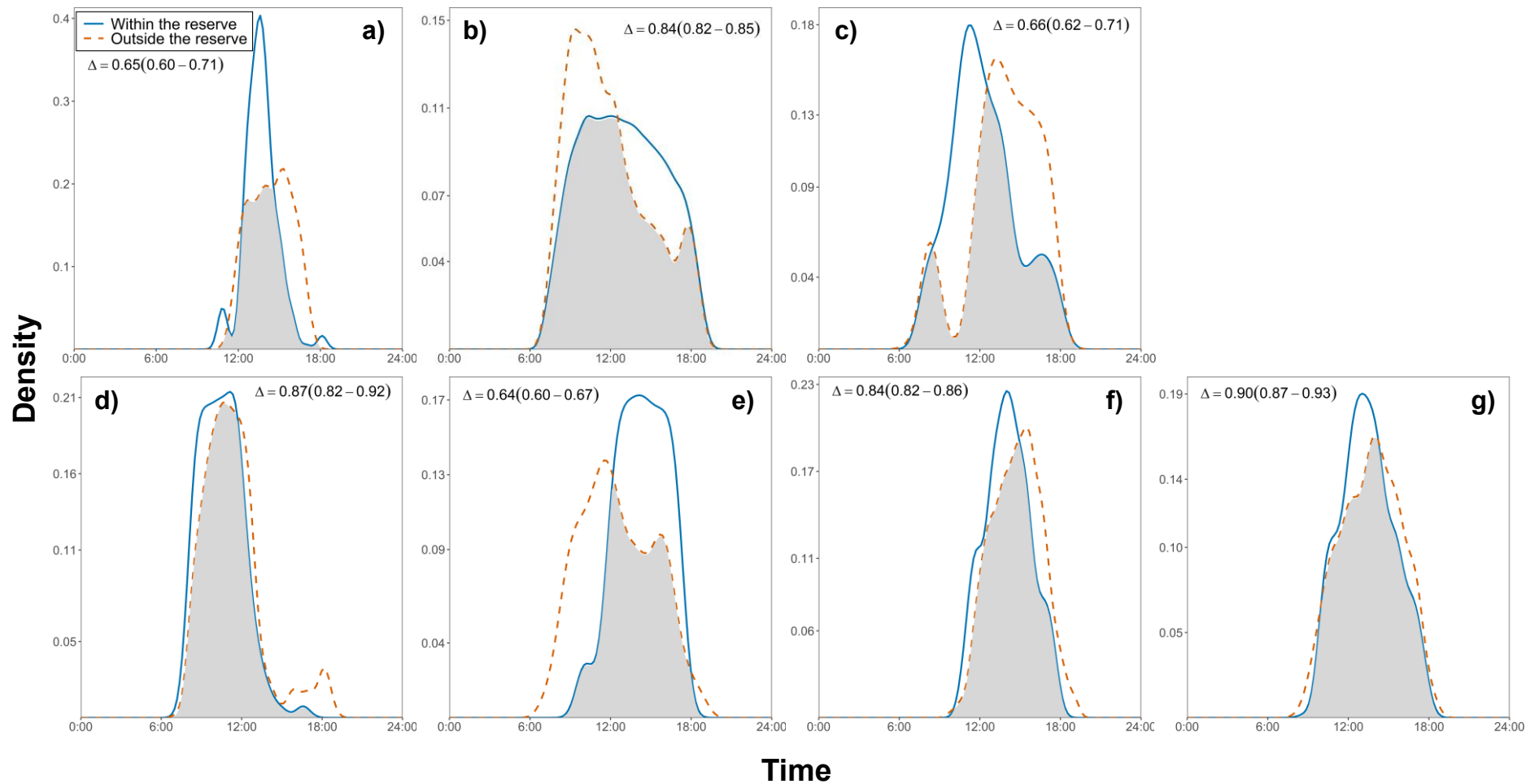


Fig. S7. Comparison of daily activity patterns of use of *sartenejas* within and outside the Calakmul Biosphere Reserve by a) *B. urubitinga*, b) *C. rubra*, c) *M. ocellata*, d) *M. semitorquatus*, e) *O. vetula*, f) *P. morio* and g) *R. magnirostris*. Overlap coefficients with their 95% confidence intervals are shown in each case. Gray-shaded areas indicate overlap in activity.

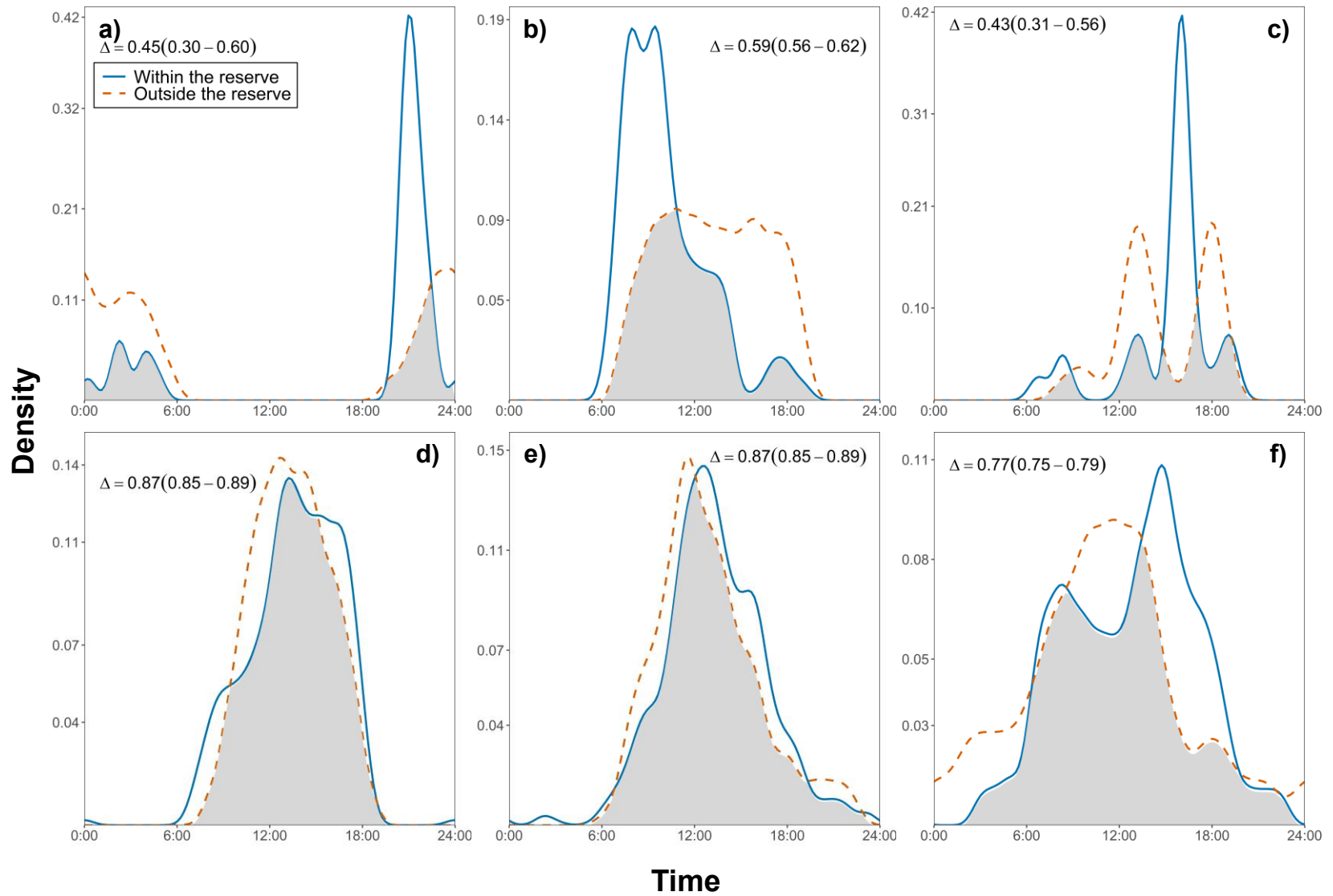


Fig. S8. Comparison of daily activity patterns of use of *sartenejas* within and outside the Calakmul Biosphere Reserve by a) *C. paca*, b) *D. punctata*, c) *E. barbara*, d) *N. narica*, e) *P. tajacu* and f) *U. cinereoargenteus*. Overlap coefficients with their 95% confidence intervals are shown in each case. Gray-shaded areas indicate overlap in activity.