

Yaqu Pacha Grant: Second Report

Ph.D. Project: **Passive acoustic monitoring to analyze variation in dolphins' habitat use**

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Project summary

A small and resident population of bottlenose dolphins, *Tursiops truncatus gephyreus*, inhabits a lagoon system in Laguna, southern Brazil. Some individuals of this population interact with artisanal fishermen in a unique foraging tactic, the so-called cooperative fishing (Simões-Lopes et al., 1998). Their habitat use is linked with this foraging tactic. Dolphins that interact with fishermen have their diurnal home ranges concentrated around sites where cooperative fishing occurs (Cantor et al., 2018). We propose passive acoustic monitoring to investigate if and how individuals change their home ranges at night, when fishermen are absent and when there is a risk of bycatch in gillnet fishery. Gillnets are used at night to fish catfish (see Peterson et al., 2008), resulting in bycatch, the main cause of non-natural mortality in this dolphin population. In this way, we will build 10 Solo audio recorders (cf. Whytock and Christie, 2017), a low-cost autonomous recorder used in the terrestrial environment and for the first time adapted to cetacean research. We will use the recorders to identify areas where dolphins and gillnet fishery overlap, which will help decision-makers to adjust management plans to avoid bycatch.

Progress

After testing the waterproof housing that we were developing, we decided to improve the project. Then, we built a more practical and reproducible version. This 3D printed version can be easily replicated by other researchers, just by sharing a digital file. Then, we built a prototype in a 3D printer (Fig. 1). Our new waterproof housing had some improvement, like a proper fit for the Solo recorder components (Fig. 2 and 3) and a screw cap to easily open and close the housing. Besides the improvement of the waterproof housing, we decided to change the anchorage system to prevent the equipment from being dragged by the current (Fig. 4). We tested this new anchorage system and it worked very well in our study area (Fig. 5).

At this moment, we are finishing the production of 10 Solo recorders (cf. Whytock and Christie, 2017). We had a delay in receiving the equipment imported from the United States due to Brazilian bureaucracy (a tax reduced form). Then, while we wait for all the components to arrive to build the recorders, we used two previously built Solo recorders to collect pilot data in an important site for dolphins in our study area (Fig. 6 to 9). Also, we are collecting data in other points of our study area by boat (Fig. 10 and 11). These data will be used in our analysis of whistles. Until now, we have a catalog with 140 distinct whistles. Two of these whistles could be recognized as signature whistles (cf. Janik et al., 2013; Fig. 12 and 13) and will be used in the acoustic monitoring data analysis to identify the dolphins present in each monitored site.

2019 Project timeline

Activity	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Waterproof housing design	X						
Build Solo recorders	X						
Passive acoustic monitoring (PAM) operation		X		X		X	
Signature whistles analysis	X	X	X	X	X	X	X
PAM data analysis			X	X	X	X	X

References

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- Peterson, D., Hanazaki, N., & Simoeslopes, P. (2008). Natural resource appropriation in cooperative artisanal fishing between fishermen and dolphins (*Tursiops truncatus*) in Laguna, Brazil. *Ocean & Coastal Management*, *51*(6), 469–475. <https://doi.org/10.1016/j.ocecoaman.2008.04.003>
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- Whytock, R. C., & Christie, J. (2017). Solo: an open source, customizable and inexpensive audio recorder for bioacoustic research. *Methods in Ecology and Evolution*, *8*(3), 308–312. <https://doi.org/10.1111/2041-210X.12678>

Photos



Fig. 1 – Waterproof housing (prototype 2)



Fig. 2 – Waterproof housing (inside)



Fig. 3 – Waterproof housing (fitting for the recorder components)



Fig. 4 – Anchorage system



Fig. 5 – Deploying the new anchorage system to test



Fig. 6 – Solo recorder operating.



Fig. 7 – Solo recorder prepared to do recordings in Tesoura beach



Fig. 8 – Solo recorder operating in Tesoura beach



Fig. 9 – Solo recorder operating in Tesoura beach (fisherman waiting for dolphins)



Fig. 10 – Dolphins recordings made in lagoon by boat.



Fig. 11 – Dolphins recordings and photo-id made in lagoon by boat.

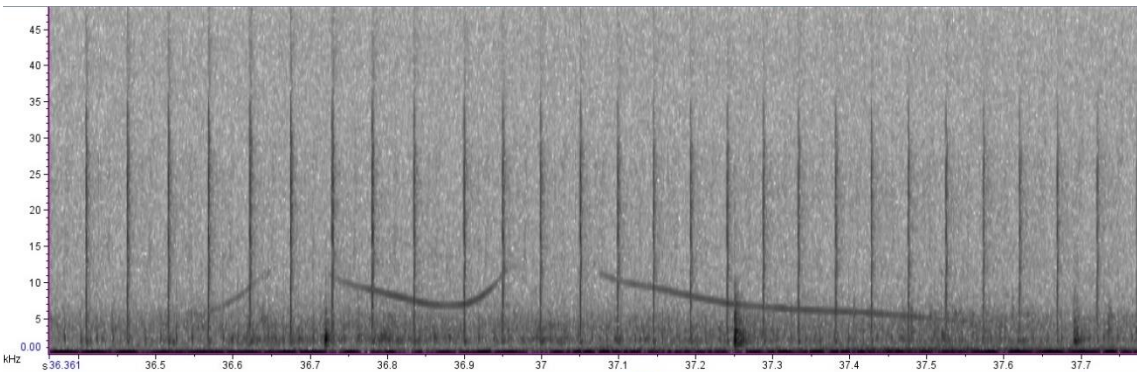


Fig. 12 – Signature whistle 1

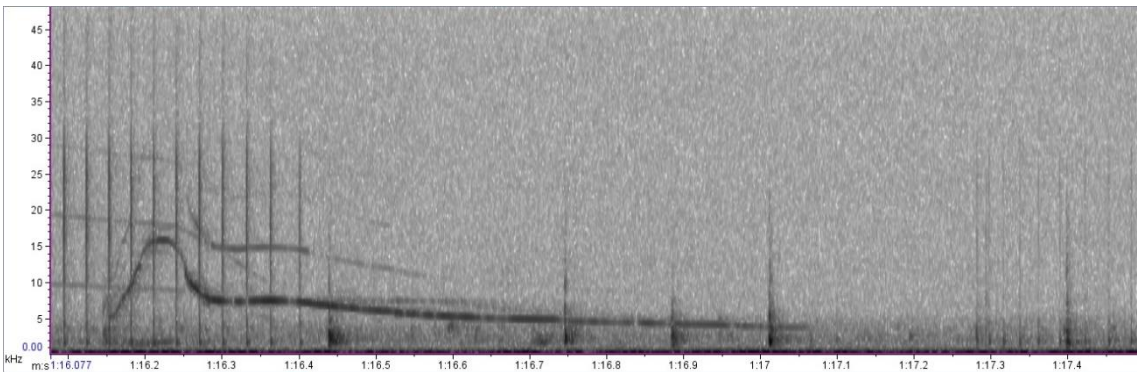


Fig. 13 – Signature whistle 2