

Project Update: April 2019

Our IP camera system was updated for easier transportation and installation on the top of Tijeras Island (Fig.1). The changes made of two smaller panels and a reduction in the size of the metal safety box made it much easier to install. Added to this, the use of a specific box for the batteries and the charge controller, as well as the security boxes for the IP camera and the antenna, considerably expedited the assemblage of the system and was even more secure against possible theft.



Figure 1. The improved IP camera system, installed at Tijeras island.

Infrastructure improvement, which included a more precise directional adjustment and configuration, generated a more optimal connectivity. Together with the new monitor, which is more compatible with the resolution of the IP camera (Fig. 2), the fluidity and sharpness of the video image in real time was greatly improved, even with low light at sunrise (see video: <https://youtu.be/ltZGywHvjHY>). All this contributed to the successful monitoring of whales and interactions with whale watching (WW) boats. The energy produced by the solar panels is sufficient for recording during the whole day during both full sun and cloudy days. The network video recorder (NVR) was large enough to archive all footage from the 2-month season.

The IP camera was installed from January 15th until March 27th 2019 and linked to the system at the API BCS (Administración Portuaria Integral de Baja California Sur) installation (Fig.2) where one person was monitoring continuously each day during daytime. During that period, we monitored 252 hours that correspond to 114 hours of blue whale behaviour including 86 hours of interaction with whale watching boats, 12 hours of interaction with CICIMAR investigation boat and 16 hours with only whales.



Fig.2. Monitoring system installed at the API

An example of the data monitored is shown in this video (<https://youtu.be/NEdDzl39D5E>) a blue whale first surfaced at 0:22 min, took 10 breaths while moving in straight line and started a dive at 2:17 min. So it could be seen to spend 1:55 min at surface. In this other video (<https://youtu.be/AyfkdRC-0cl>), the dark dot at the horizon is a WW boat, waiting for a blue whale to come to surface. In time (0:16 min video time) the whale surfaced and, as it moved in direction of the WW boat, took eight breaths and stayed at surface for 1:57 min (starting the dive at 2:13 min). These are two examples of one sequence of diving behaviour parameters (surface/number of blows and with the next surfacing sequence, the dive time can be calculate) that will be used to evaluate variances between natural behaviour and during interaction with WW boats. The compiled results

of several hours of recording the same whales will be compared with our 2019 focal individual follows at sea to validate this independent method (the IP camera system) for long-term monitoring of the passive WW method. During the coming months these data sets will also be analysed and compared to further validate the new independent IP camera method.

The success of this project has exceeded our expectations and demonstrates clear evidence of the multiple benefits to all involved, the whale watching service providers and users, the authorities in charge of the protection of the Loreto Bay National Park, the researchers who study the behavior and monitor the of health of blue whale and, ultimately, the whales themselves.

Links videos

<https://youtu.be/ltZGywHvjHY> Catching a sunrise

<https://youtu.be/NEdDzI39D5E> Whale surface sequence

<https://youtu.be/AyfkdRC-0cl> catching whales blow at sunrise