DOLPHINS IN FACILITIES ARE INSTRUMENTAL IN DEVELOPING FIELD TECHNIQUES

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Dolphin Research Center (DRC) conducts a field study of wild dolphins (NMFS LOC# 22587), dating back to 2013, to determine the distribution, residency, and movement patterns for bottlenose dolphins (*Tursiops truncatus*) in the middle Florida Keys. Partnering with the Marine Order for Research and Action through Environmental Stewardship (MORAES), our additional goals are to use a drone to collect morphometric data of wild dolphins to determine body condition, and to collect blow samples using the drone to analyze genetic parameters of bottlenose dolphins in our study area. Of course, when you add new methods of data collection, there will be new techniques that need to be developed. By definition, we are already “harassing” wild dolphins under conditions of the permit by approaching them at less than 50 yards. If we developed and refined our new techniques with them, we’d be adding additional stress for animals already dealing with the pressures of living in the wild. However, dolphins at DRC are trained with positive reinforcement techniques, so we could do this work with them - and that’s exactly what we did.

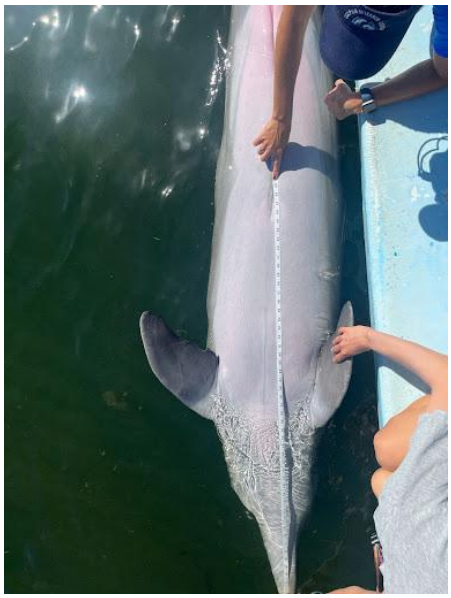
The dolphins at DRC helped test possible field methodologies in three main areas: calibrating morphometric software for aerial images of dolphins, developing techniques for blow sample collection and processing, and refining the logistics of pairing drone photos with photo-ID before going in the field.

To develop the tools and techniques needed to achieve these goals, we first had to desensitize the DRC dolphins to the drone. To start, we created a dummy drone paired with a speaker that played audio of drone propeller noise. With successive approximations, we were able to “fly” the dummy drone suspended from a 3-meter pole all around the dolphins while reinforcing them for calm behavior. In the next step of this succession, a trusted trainer held the real drone on the dock to assess comfort levels, and once the dolphins were comfortable, we could launch and fly the drone over the lagoons.

Successive approximations with the dummy drone and speaker

Real drone held by a familiar trainer

Once the dolphins were desensitized to the drone, it was time to start developing our data collection strategies, starting with calibrating the morphometric software in the camera mounted to the drone. We did this by asking the dolphins to remain still in layout positions at the dock, and flying the drone over them, taking many photographs from various altitudes. Due to regular medical screenings, we already had known dimensions of the animals that live at DRC, so we were able to use that data to calibrate the software. By the time we got to taking photos out in the field, all of the software had been tested and proved reliable.



Known measurements of the DRC dolphins allow for calibrating the software using the drone photos, and establishing body condition scores utilizing known healthy individuals

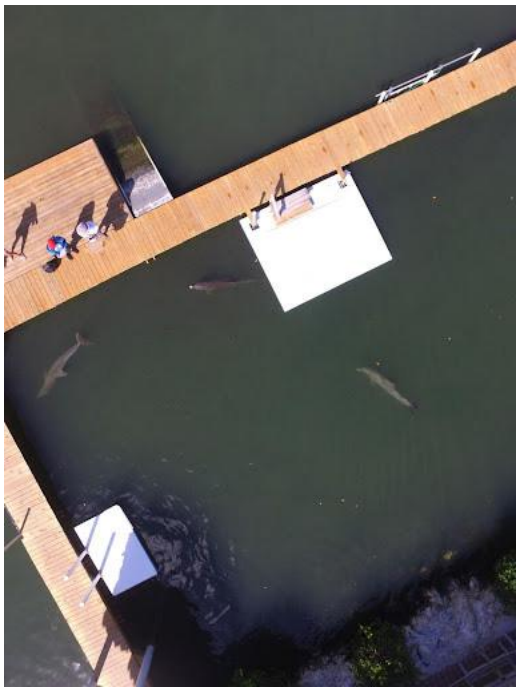
Next, we turned to blow sampling and processing techniques. Dolphins at DRC routinely chuff into petri dishes as part of their clinical care. We were able to provide a lot of samples for the epigeneticist that we're collaborating with so that she could develop the processing techniques in the lab without needing a single sample from a wild dolphin. We were also able to design and refine the array of petri dishes on the collection plate by practicing with the DRC dolphins. We flew the drone over those dolphins that were most comfortable

with it and asked them to chuff, which helped refine the petri dish array and determine both the optimal height of the drone and the most appropriate length to suspend the collection device from underneath the drone.

The tray is set up with an array of petri dishes ranging from 35mm to 90m

Utilization of the drone and the petri dishes with a DRC dolphin.

Finally, we needed to develop a method to match up the photos taken from the drone to those taken with the boat-based photo-ID camera. The photo-ID camera is critical, as it identifies the individual, which the overhead drone photos cannot do with most dolphins. To work out this system, we spent an afternoon flying the drone over a DRC lagoon with dolphins that were comfortable with it, while simultaneously taking photos with the photo ID camera. Through trial and error, we ended up with a system whereby one person acts as the director for the sighting, simultaneously directing the drone pilot and the photo ID researcher which animal to focus on. This breaks up the sighting into focal subsets, and the director writes down which photos (e.g. 1-15 on the drone camera, and 1-23 on the photo ID camera) go with which subset. We were able to practice this system multiple times, so that by the time we employed it in the field, we were well rehearsed.



Flying the drone over DRC dolphins comfortable with it, while simultaneously taking photo-ID, allowed us to develop and practice a logistical system to match photos taken by both the drone and the cameras

Research with animals requires forethought and mindfulness to develop strong scientific studies and protect the well-being of the animals being studied. In marine mammal facilities, dolphins can be willing partners through positive reinforcement training, so we can ask for their participation in refining research techniques. The same isn't true for wild dolphins, where the repeated trial and error as researchers work out the kinks of data collection could be extremely stressful. The opportunity to conduct such important preliminary tasks with trained animals leads to stronger data from the field, with no stress on the cooperating resident dolphins and less stress on the wild dolphins.