A TREASURE ON THE BEACH

Two pop-up satellite tags attached to bigeye tuna in New Caledonia have been recovered on the Australian east coast two year after deployment.

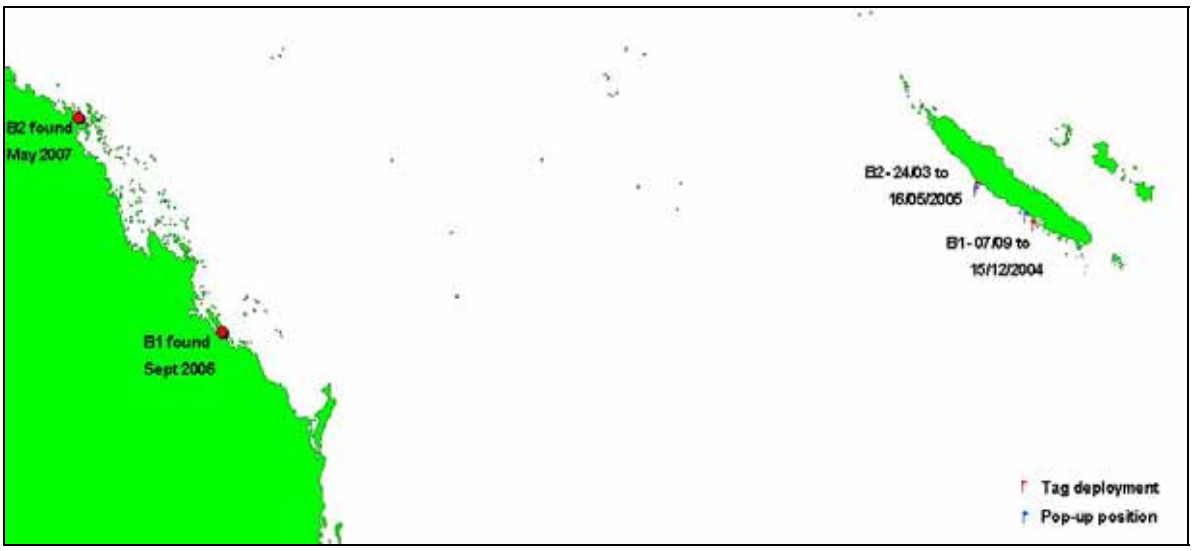
Picture 1: a pop-up satellite tag

Pop-up satellite tags are a very sophisticated electronic piece of equipment used by scientists to learn more about large pelagic marine animal behaviour and movements. They can be attached to sea mammals, turtles, sharks, marlins or large tunas. They contain sensors (pressure, temperature and light), a memory, a precise clock, a battery and a radio transmitter. When attached to, for example, a tuna, it records the depth, the sea temperature and the light intensity (every 30 second in our example, but can vary depending upon scientific data requirements) and stores this data in the memory. After a preset time (3 months in our example) it releases from the fish, floats to the surface and transmits the data to a satellite (Argos system). The data are then forwarded to the scientist computer by e-mail.

The amount of information collected by 3 sensors recording data two times per minute is considerable after a few weeks. To keep the tag size small so that it does not unduly impact behaviour, battery size is small which limits its operational life span. The uploading of data from the tag to the satellite once the tag has released from the fish and floated to the surface requires considerable battery power. Consequently, sending all the collected data to the satellite is not possible as the battery will expire before all data is uploaded. This problem is overcome by sending aggregated data (for example mean depth and temperature spent inside 4 hour periods) which substantially reduces the volume of data required for transmission. Importantly, all the original data is stored in the memory of the tag, so if the tag is found it can be downloaded in the laboratory.
The first satellite tag -B1- was deployed on a 55 kg bigeye tuna caught on a longliner along the west coast of New Caledonia on the 07 September 2004 .

Picture 2 : a bigeye tuna ready to be tagged (B1)

The tag stayed on the fish for 100 days before popping up only 17 miles from the release position and successfully transmitting all its data to the satellite over the next 10 days. Then, with its battery exhausted, the tag drifted to finally end up almost 2 year later on a beach near Gladstone in Australia, about 1000 nautical miles away

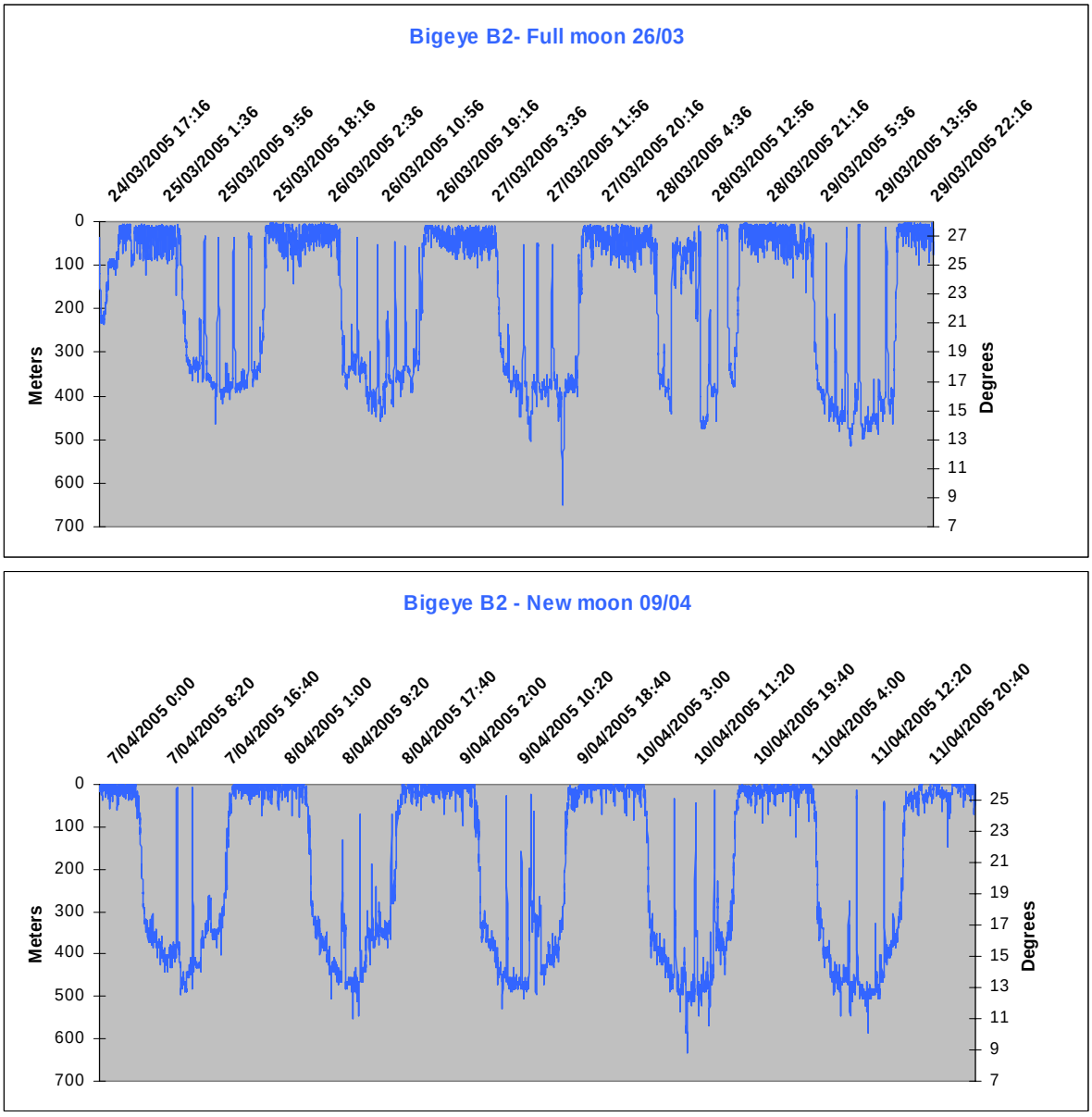


Map 1: Tagging, pop-up and found positions for the 2 satellite tags B1 and B2

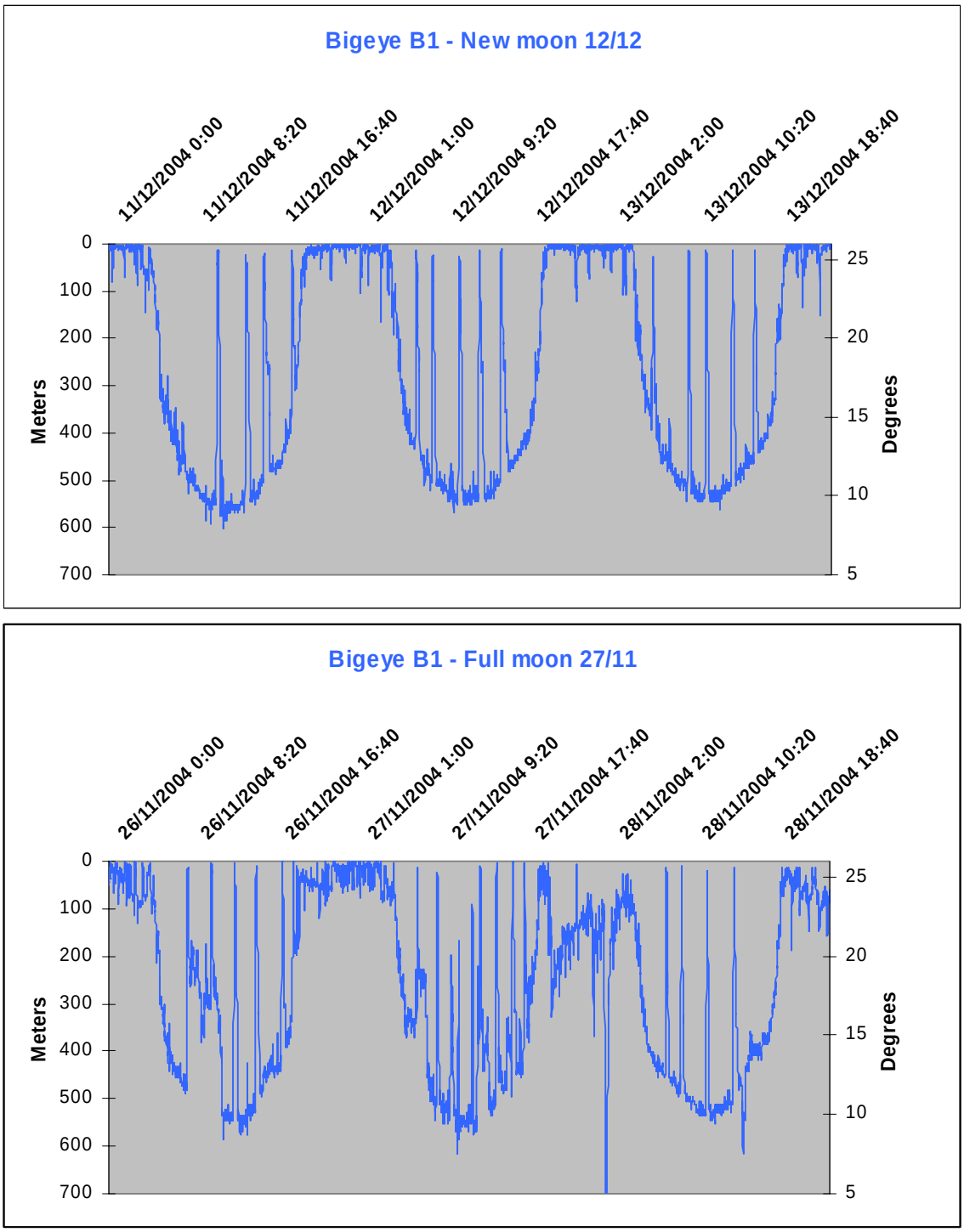
The second tag -B2- was attached to a bigeye tuna of about 45 kg, also along the west coast of New Caledonia on the 24 March 2005. In this case, the tag stayed on the fish for only 53 days (it shed from the fish for unknown reasons), and popped-up to the surface on the 16 May 2005, about 4 nautical miles from the release position. The tag then started to drift and transmitted its data until the 22 May, stopping when its battery was exhausted. It also drifted to Australia, and was found on Airlie Beach exactly 2 years later.

In both cases, the person who found the washed up tag managed to contact us, thanks to our address labelled on the tag body. Each finder got a $250 reward but the real treasure about finding a pop-up satellite tag is that you could get the very detailed data archived in the tag memory: the 100 days of attachment on the fish, resulted in 288 000 records of depth, sea temperature and ambient light.

Examining the depths records showed a distinct variation in the water depths used between day and night hours. Both fish generally stayed between the surface and 100 meters depth during the night and between 300 and 500 meters during the day with some dives recorded up to 1000 meters in 5 degrees Celsius water. The data also clearly demonstrated the influence of moon phase on behaviour at night, during the new moon each fish occupied water depth generally within 25 meters of the surface, however around full moon they no longer used the top 10 meters of water, occupying water in the 10 to 100 meter range (see Graph 1 & 2). This information provides important insights into the foraging behaviour and ecology of tuna's that will assist with managing this important fish species.



Graph 1 : Showing influence of moon phase on B2 night swimming depth



Graph 2 : Showing influence of moon phase on B1 night swimming depth