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OBSERVATIONS AND RADIO TAGGING OF BALAENOPTERA EDENI NEAR PUERTO LA CRUZ, VENEZUELA

by

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TECHNICAL REPORT

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The 23 October to 13 November 1979 Venezuelan radio tagging and tracking experiments on whales (*Balaenoptera edeni*, Fig. 1) provided essential field tests of the new modifications to the WHOI radio whale tag (see list of tag reports), and the chance to try it on a new species. We found that we could approach and tag these whales from a slow (4 to 6 kt) vessel. Good radio tracking with automatic direction finding equipment was possible within 12 to 20 km, with longer ranges probable. In addition, the radio tags provided new information about the behavior of these whales.

Over the three-week experiment, we found 32 whales (up to seven per day) in the operating area, 20 to 50 km N.E. of Puerto La Cruz, Venezuela. A local survey of the cetacean population throughout this area had been carried out during the previous two years by Hubbs-Sea World Research Institute (San Diego, California). Contrary to our expectations, all the whales that we could recognize were seen for only one day and did not appear to be locally resident. Even the tagged whales left the area. A final airplane search, including both radio and visual reconnaissance, failed to locate any whales within 100 km, including the whales that were tagged with highly visible colored streamers and radio transmitters. We concluded that the whales were only visitors to the local area, attracted perhaps by the concentration of fish activity in

the area. Curiously, the high concentration of fish, porpoise, and whale activity coincided with a portion of the usual traffic lane for the many ferries from Puerto La Cruz to Isla Margarita. These observations raise many new questions about the distribution of that B. edeni population.

Because of the thin blubber layer on B. edeni we did not tag any of the small (less than 11-m) whales that we approached. We also did not tag whales in obvious cow-calf pairs. Two whales were tagged (Fig. 2). The first, on 27 October, was an 11-m whale, tagged 1.5 m behind the blowhole and approximately 75 cm to the left of the mid-line (tag #027 at 30.030 MHz, with a highly visible yellow and pink streamer). This location was not exposed above water regularly, so that the radio signals were received well only during high rolls (Fig. 3). In another attempted tagging on 29 October, the propulsion cartridge was apparently defective, so that the tag struck the water 2 to 3 m from the whale. The second whale was tagged on 1 November, and was a 13-m whale. First, the tag missed and hit the water 1 m from the whale (Fig. 4), then 25 minutes later this same whale was successfully tagged 60 to 70 cm forward of the fin and perhaps 10 cm to the left of the mid-line (tag #035 at 30.150 MHz, with an orange streamer). This location provided excellent radio signals during most surfacings since these whales habitually exposed their fin above water. A tag system that utilized a second 30-m line attached to surface floats also was successfully tested but not fastened to a whale.

Immediate reactions by the whales to the tagging and to the missed shots included rapid acceleration to get away, followed by two breaches (the first tag), sudden rapid swimming by the whale and its companion

without ever being seen again (the first miss), strong fluke motions with rapid swimming (the second miss), and quick acceleration for a short (150 m) distance (the second tag). The tagged whales both returned to apparently normal behavior, the first within 2.5 hours and the second within 2 to 5 minutes. Both appeared to be feeding after tagging, and both passed near the boat after tagging.

The whales were difficult to find, they often blew underwater, their behavior at the surface was variable, with erratic swimming direction, and each whale remained in the area only during one day. Based on close observation (and photography) of fin shape, relative size, and natural marks, we noted that each day's whales were new to the area. The whales of the previous day (including the tagged whales) disappeared overnight. At dusk, we found a radical change in behavior, indicated by changes in the radio signals. There was a shift in the whales' submergence times, from 6 to 8 minute duration followed by 4 to 7 blows, to much shorter submergence times of 0.5 to 2 minutes with only one or two blows. These short submergences matched observed surfacing rates of other B. edeni that were seen travelling through the area shortly before sunset.

The new modifications to our radio whale tag system all appeared to perform well (Fig. 5). The new pushrod-to-tag attachment allowed setting the tag just below the surface of the blubber and eliminated flanges from the tag to reduce drag through the water. The increased holding system ("hula skirts") created no problems during implantation, but the tags were not observed for long enough to assess any effect on retention duration. The beat frequency oscillators which had been added to the

receivers improved recognition of the signal through background noise and made tracking much less arduous.

We had good help from the Venezuelan authorities, particularly the Ministry of Natural Resources and the Environment (Ministerio del Ambiente y los Recursos Naturales Renovables de Venezuela), and we appreciated the support of Dr. Edgardo Mondolfi, Mr. Edmundo Miralles, and the participation in the field work by Mr. Carlos Gremone. We operated under the auspices of Hubbs-Sea World Research Institute with a crew of four (Giuseppe N. di Sciara, Hubbs-Sea World Research Institute, San Diego; Romaine Maiefski, San Diego tag consultant; Karen E. Moore and William A. Watkins, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts). We used a 12-meter sailboat (Morgan) for tagging, tracking, and observing the whales (Fig. 6). A pair of Adcock antennas for radio direction finding were mounted on the masthead, approximately 18 m above the water, and Ocean Applied Research (San Diego) automatic direction finding receivers were used for tracking. A platform-pulpit was constructed on the bow for ease and safety during the tagging operation. The boat was adequate for the conditions of weather and whale activity that we encountered, although mobility was severely limited, often at very crucial times, by wind variability and failures in the engine gear box.

Support for the experiments came from Boeing Marine Systems, Seattle (tagging supplies and equipment transportaion), Ocean Industries Program of the Woods Hole Oceanographic Institution, and the Oceanic Biology Program of the Office of Naval Research (Contract N00014-79-C-0071 NR083-004).

Radio Tag Reports

1. Watkins, William A., James H. Johnson, and Douglas Wartzok. 1978. Radio tagging report of finback and humpback whales. WHOI Reference No. 78-51, 13 pp., Woods Hole Oceanographic Institution, Woods Hole, Massachusetts.

2. Watkins, William A. and William E. Schevill. 1977. The development and testing of a radio whale tag. WHOI Reference No. 77-58, 38 pp., Woods Hole Oceanographic Institution, Woods Hole, Massachusetts.

3. Watkins, William A., Douglas Wartzok, Hugh B. Martin, III, and Romaine R. Maiefski. In Press. A radio whale tag. In, F. P. Diemer, F. J. Vernberg, and D. Z. Mirkes (eds.), Advanced Concepts of Ocean Measurements for Marine Biology, Belle W. Baruch Library in Marine Science, No. 10, University of South Carolina Press, Columbia, S.C.

Figure 1. Balaenoptera edeni turning sharply at the surface. Its left side is down. The dorsal ridges on the rostrum are distinctive to this species. (Photo by Watkins)

Figure 2. Whale with a radio tag implanted. Only the colored streamer (60 x 5 cm) and the antenna for the tag (barely visible slanted to the right) remain outside of the whale. The tag was implanted approximately 1.5 m behind the blowhole and 75 cm to the left. (Photo by Watkins)

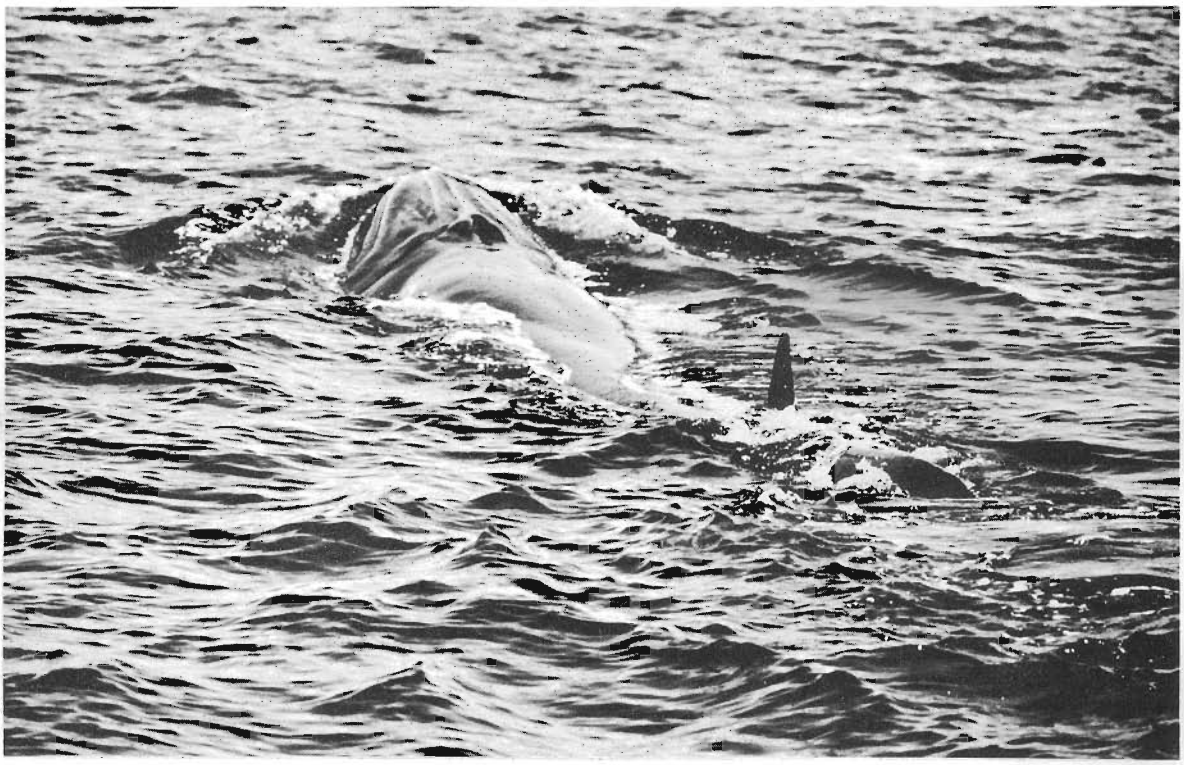

Figure 3. The ridges on the head and rostrum of B. edeni. This is the tagged whale of Fig. 2 -- the tag is just underwater on the left. The location of this tag allowed radio signals only when the whale's back was raised well out of water. (Photo by Moore)

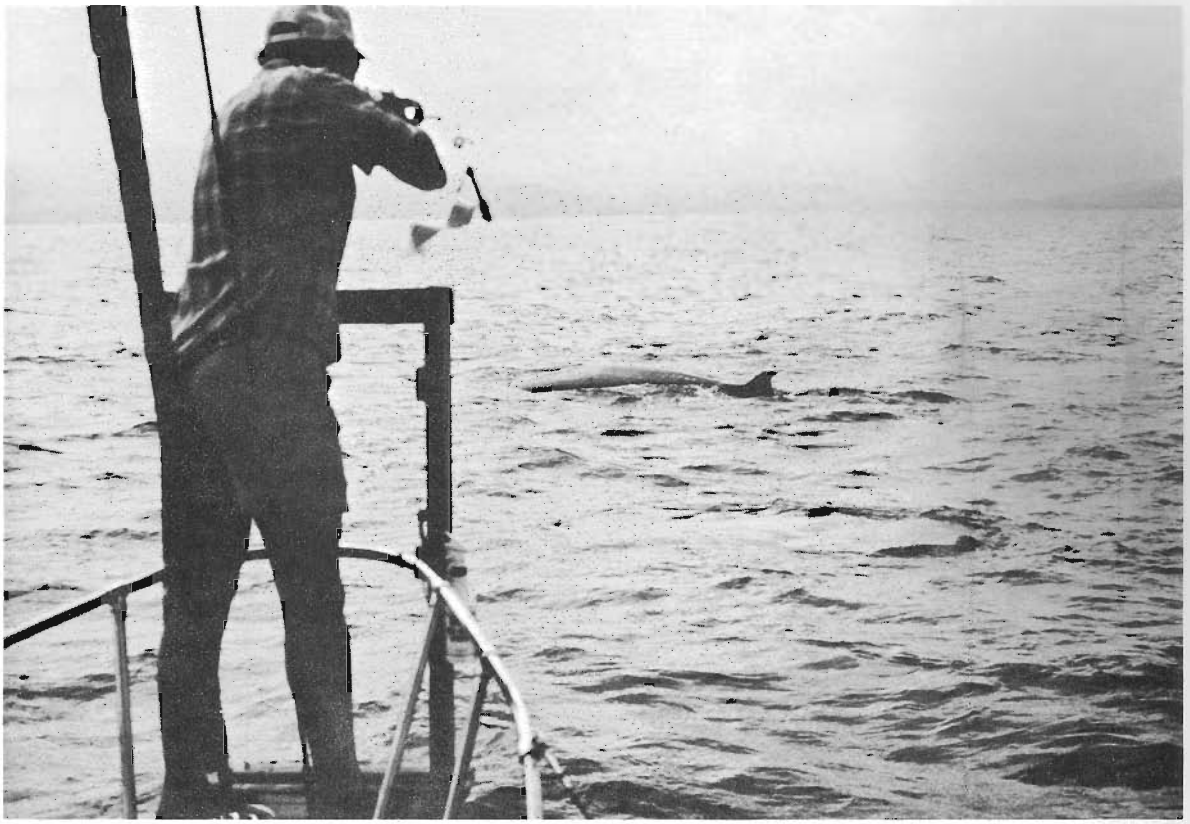

Figure 4. Radio tag in flight, with colored streamer unfurling, This tag struck the water approximately 1 m from the whale (B. edeni). (Photo by Moore)

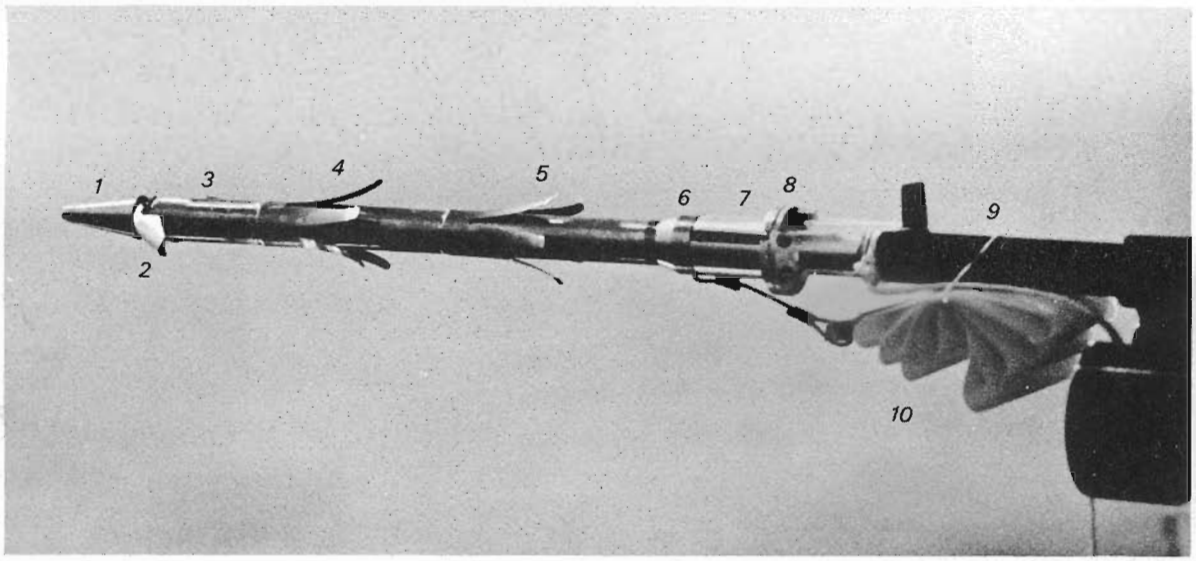

Figure 5. Radio whale tag used on B. edeni, off Venezuela, October and November 1979. The tag is made of stainless steel. Components of the tag, starting from the left: (1) point, (2) folding toggles, (3) pressure case with two sets of "hula skirt" (4 and 5) projections, (6) antenna flange, (7) release couplings, (8) pushrod flange, (9) barrel of shoulder-gun, and (10) folded plastic streamer. The new modifications for these experiments were the hula skirt projections (4 and 5) for increased holding area in the blubber, and flange and release couplings (6 and 7) which reduces external drag and sets the tag antenna base below the skin. (Photo by Watkins)

Figure 6. Tagging and tracking arrangements on a Morgan 41 sloop. A platform was constructed on the bow ahead of the mast stay for unobstructed tagging, and the Adcock ADF antennas were mounted at the top of the mast. (Photo by Moore)