METHODS FOR TAGGING SMALL CETACEANS

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ABSTRACT

Four types of tags have been used on four species of delphinids. These include a circular plastic button tag that is attached to the dorsal fin by a nylon bolt, a highly visible dart-type spaghetti tag that is placed near the base of the dorsal fin, a radio transmitter tag, and a freeze brand.

Use of button tags has been discontinued due to high shedding rate. The dart-type spaghetti tag has proved best for tagging large numbers of animals without capturing them. The radio tag provides very detailed information on behavior and movements, while freeze branding provides a permanent mark, though both require capturing the animal.

The importance of marking commercially valuable species of whales (primarily the larger baleen whales and the sperm whale) has long been recognized. Since their development in the mid-1920's, "Discovery-type" tags have been used to mark large numbers of these animals (Rayner, 1940; Brown, 1962; Clark 1962). Returns from these tags have provided valuable information on the species' distribution, migration, and abundance and on such basic aspects of their biology as relative growth rates and the timing of the events in their lives (Mackintosh, 1965).

The relationship of several small delphinid species to commercial fish populations and the potential of these cetaceans as a major economic resource has renewed interest in their stocks during the last decade (Perrin, 1970). Early attempts to study these populations in the wild have been hampered by the difficulty of positively identifying an animal or a population from one encounter to the next. Therefore, development of a reasonable method for marking these animals for identification would facilitate studies of their life histories.

Although several investigators have tried tagging small cetaceans, only three have had even moderate success. In a program conducted by the Oceanic Institute, Oahu, Hawaii, plastic cattle eartags were placed on two *Steno bredanensis* and one *Stenella attenuata* (Evans, 1967). This program was continued by Norris and Pryor (1970), and at least one of the tags was still on a *Stenella attenuata* when it was resighted after 3½ years.

Sergeant and Brodie (1969) tagged 812 belugas, *Delphinapterus leucas*, in Hudson Bay, Canada, over a 2-year period. Six hundred and ninety-four of these animals were tagged with a spaghetti tag originally designed by Mather (1963) for use in tagging pelagic fishes and manufactured by Floy Tag Company,[4] Seattle, Wash. The remaining 118 belugas were tagged with Petersen disc tags, similar to the button tags we used. Of the 812 animals tagged, 2 with spaghetti tags were recovered by the beluga fishery. A third spaghetti tag was observed in a live animal temporarily stranded by the ebbing tide 1 year after the original tagging.

Perrin and Orange (1971) tagged 218 *Stenella* spp. in 1969 and approximately 1,000 in 1970 in the eastern tropical Pacific with spaghetti-type dart tags. Five tags have been recovered; maximum time at liberty was 138 days (916 km net movement).

Since 1968, personnel of the Naval Undersea Research and Development Center's Marine Bioscience Division at San Diego, Calif., have been

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investigating the distribution and biology of several odontocete cetaceans off the southern California coast. In order to delineate migration routes and to keep track of local herds of the common dolphin, *Delphinus delphis* auctt., a tagging program was initiated. During the same period, a tagging program was also initiated for *Tursiops truncatus* on the west coast of Florida. The special problems associated with tagging odontocete cetaceans required the modification of old and the development of new tagging techniques.

This paper discusses the relative merits of the four marking methods used by our laboratory. In addition, it presents some preliminary results of the program in order to substantiate the utility of the various methods.

METHODS AND RESULTS

We have used modified dart-type vinyl spaghetti tags (Floy Manufacturing Company) on four species of Eastern Pacific delphinids in an area from Point Conception, Calif., to Cabo San Lucas, Baja California, Mexico, and throughout the Gulf of California. Our original spaghetti tags were 5 mm in diameter by 17 cm long. In order to increase visibility and flow characteristics of the tag, we increased the length to 30 cm (Figure 1). Using the modified tag, we have marked 240 *D. delphis*, 10 *Lagenorhynchus obliquidens*, 8 *Tursiops gilli* auctt., and 13 *Stenella graffmani* to date (July 1971). The animals were all tagged at the anterior insertion of the dorsal fin while they were surfing on the bow pressure wave. Several dolphins were observed to continue riding the bow pressure wave after being tagged, so the tagging process apparently did not affect their normal behavior.

A *T. gilli* auctt., tagged on 27 October 1970, off Magdalena Bay, Baja California, was recovered by an American tuna boat off Manzainillo, Mexico, on 22 January 1971. The animal had covered at least 816 km between the time of tagging and the time of capture, a period of just less than 3 months.

Three *D. delphis* bearing spaghetti tags have been observed swimming in the vicinity of the Coronado Islands near San Diego, Calif., and at least one spaghetti-tagged *D. delphis* has been sighted off Magdalena Bay, Baja California. Each of these animals was known to have been carrying the tag for from 2 weeks to several months.

Circular plastic "button" tags (10 cm diam) (Figure 2) were through-bolted to the dorsal fins of 46 *D. delphis* and 6 *L. obliquidens* between 1967 and 1970. These tags are similar to those employed by Norris and Pryor (1970) in Hawaii, but are larger to make them more easily spotted. Button tags were attached to animals captured off the southern California coast, or near Cedros

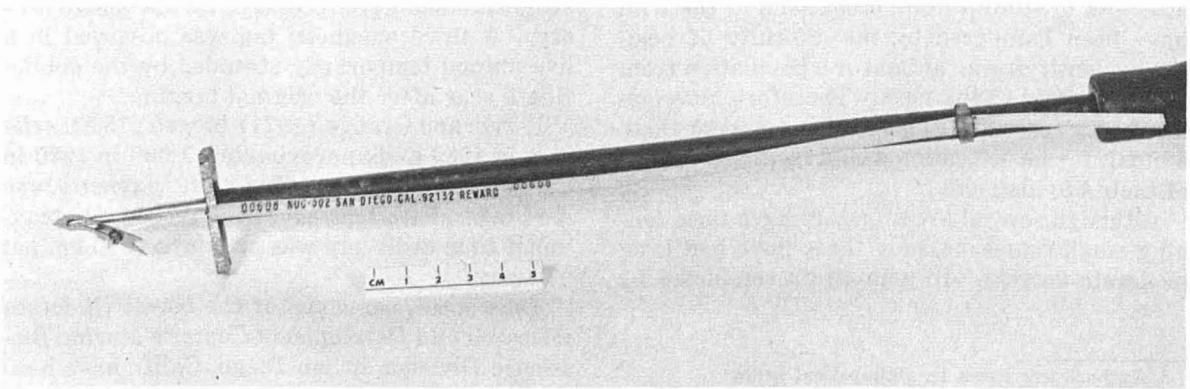

FIGURE 1.—The dart-type spaghetti tag in place on the tagging apparatus.

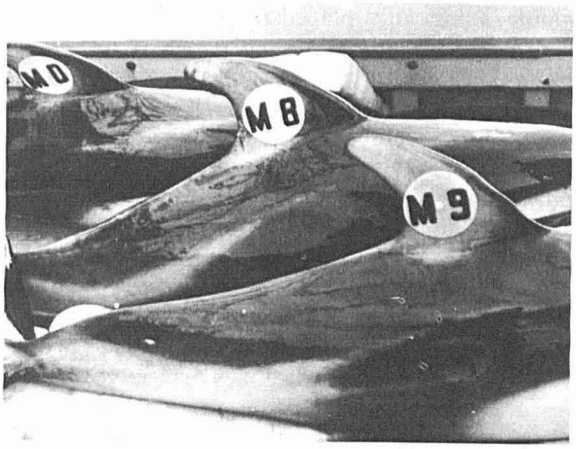

FIGURE 2.—Three *Lagenorhynchus obliquidens* with the plastic button tag, just prior to release.

Island, Baja California. Two of the *L. obliquidens* tagged in 1969 were resighted almost 1 year later, and a *D. delphis* tagged in 1968 was resighted 21 months later.

Twenty-four *T. truncatus* were tagged with the button tags near Sarasota, Fla., from August 1970 through September 1971. Animals bearing tags have been resighted several times.

The third and most successful short-term tag is the radio transmitter tag with which at least four species of small cetaceans have been successfully marked to date (Evans, in press, Martin, Evans, and Bowers, 1971). The original package used in these studies was a 27 mHz (11 m) transmitter and antenna housed in a waterproof envelope which is attached to the dorsal fin of a dolphin or a small whale by means of a spring-loaded corrosible link. The link dissolves and releases in 30 days, allowing the package to slip off the animal.

These early radio beacons, designed for short-term transmission (30-60 days), weighed up to 900 g, and though they proved especially useful in studying the detailed movements of *D. delphis* in the waters off San Diego, Calif., their size, cost, and relatively short transmission time made them unacceptable for long-term monitoring of herd movements.

To meet this need, a new lightweight radio tag (170 g) with a 9-12 month transmitter life was developed. This tag combines the advantages of a radio beacon and a button tag in that it continues to serve as a color coded marked even after it no longer transmits (Figure 3). Furthermore, the new radio tag is available commercially at less than 10% of the cost of the 900/gm transmitters.

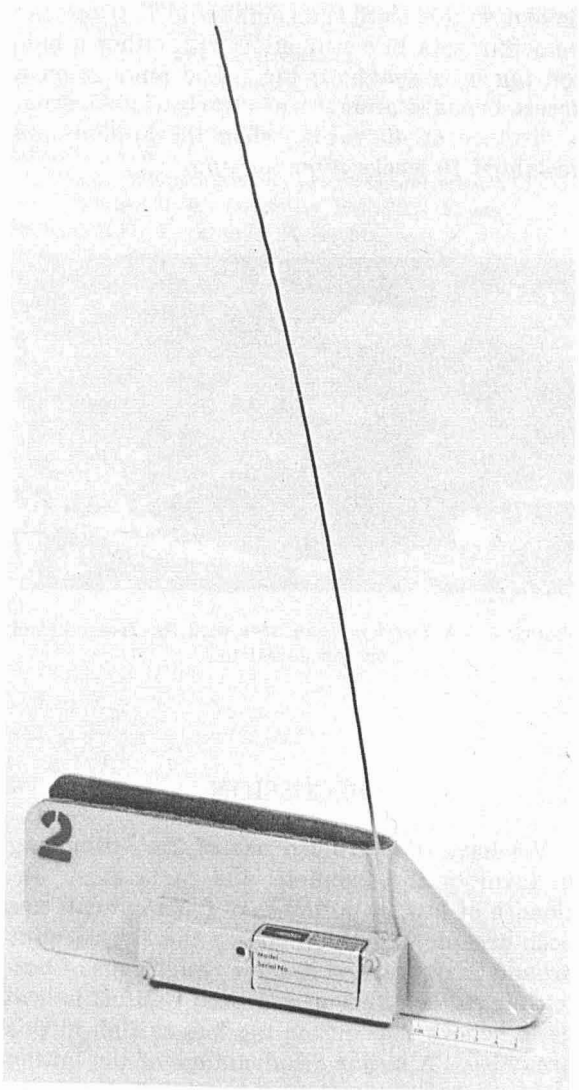

FIGURE 3.—The lightweight (170 g) radio tag.

The fourth method, freeze branding, consists of applying a supercooled branding iron, usually copper, to the epidermal surface of the dolphin for 5-30 sec. Evidence from freeze branding cattle indicates that the branding process is painless to the animal and has no lasting effect other than leaving a permanent mark (Farrell, Laisner, and Russell, 1969). Though evidence of the branding usually becomes indistinct shortly after application, after about 2 months the animal will display a highly legible brand (Figure 4). We have used this method on eight wild *T. truncatus* near Sarasota in conjunction with either a button tag or a spaghetti tag. The number on a freeze branded animal was clearly visible, from a distance of 40 yards, when the animal was resighted 10 weeks after tagging.

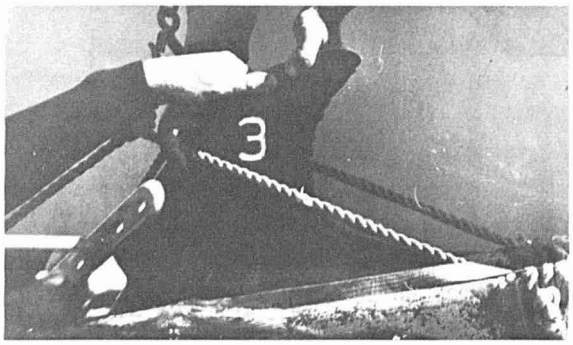

FIGURE 4.—A *Tursiops truncatus* with the freeze brand on the dorsal fin.

DISCUSSION

We have discontinued use of the button tag in favor of the spaghetti and radio tags. Incidence of loss of button tags from animals has been exceptionally high among the *T. truncatus* around Sarasota, and the few resightings of button-tagged dolphins off southern California lead us to believe that button tag loss is high in this area also. A major disadvantage of the button tag is that the animal must be captured in order to be tagged. The spaghetti tag, on the other hand, is normally placed in the animal while it is free swimming and thus does not require capture. Using this method we have placed over 50 spaghetti tags in one herd of *D. delphis* in less than 2 hr. When spaghetti tags are placed in the fibrous tissue at the insertion of the dorsal fin, incidence of tag loss appears to be lower for spaghetti tags than for the button tags (Nishiwaki, Nakajima, and Tobayama, 1966). In either case, the numbered information on the tag is so small that it cannot be read on a moving animal at sea. Unless the spaghetti tags are color-coded, resighting at sea can give no information on the original tagging location. Spaghetti tags may also be placed in an animal that has been captured.

The radio tags can be placed only on captured animals but provide very detailed information concerning exact movement and diving patterns of the animal.

While freeze branding involves capture of the animal, it appears to provide permanent and highly legible identification of cetaceans. Tomilin (1962) reported taking a Black Sea *D. delphis* in 1953 which bore a brand posterior to the eye. The brand was quite legible and contained numbered information. The source and nature of the brand were not known. In the future, we plan to freeze brand all the dolphins we capture for radio tagging and to continue to use the spaghetti tags for free-swimming delphinids.

An advertisement was placed in the July issue of *National Fisherman* requesting that any information on sightings of tagged delphinids in the Eastern Pacific be forwarded to the Marine Bioscience Division of the Naval Undersea R & D Center, San Diego, Calif. (Evans, Leatherwood, and Hall, 1971). Copies of this advertisement have been placed at sportfish landings and commercial docks from Santa Barbara to San Diego, Calif.

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