



# Marine mammal marking techniques: a critical review of the effects

Kristen A. Walker

University of British Columbia, Animal Welfare Program

## Introduction

Marine mammal research often requires marking animals to collect important long-term ecological data. A variety of methods have been used including ear and flipper tags, external satellite transmitters, hot and cold branding, and subcutaneous radio implants [1]. Studies on marker effects in non-marine mammal species have shown that markings can affect growth rates, cause pain and distress, reduce survival, influence the animal's thermoregulatory abilities, cause drag, and even influence mate choice. Marine mammals are subjected to marking procedures during field research, which are likely to interfere with the animal's natural behaviors or cause pain; however, there are few data available which evaluate such marking effects.

*The aim of this review is to identify the short and long term effects of marine mammal marking techniques and identify the major gaps in the literature.*



## Findings

- Research has primarily focused on behavior (Fig. 1)

## Methods

This review covers all articles published in peer reviewed journals that addressed the direct effects of placing a marking device on an animal ( $n = 17$ ) (e.g. physiological assessment of hot-iron branding); [2-18]. These studies included 13 species (Order: Pinniped – 7, Cetacean – 6).

Classification of marking effects:

- Survival**
- Behavior** – e.g. changes in swimming behaviors, haul out behavior, group structure, migration, trip length
- Physiology** – e.g. changes in heart rate, blood counts and chemistry, histology, cortisol levels, heat flux
- Disease**
- Reproduction and Growth**
- Injury** – e.g. wound healing and tissue damage

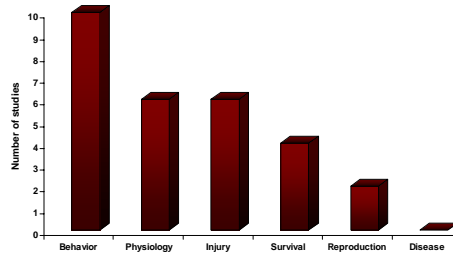
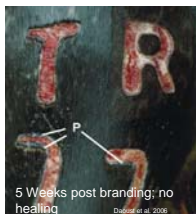


Figure 1. Effects of marking as measured in the 17 studies. 50% report multiple effects.

- All physiology and injury effects were reported as significant ( $n = 12$ ); however, no significant survival effect was detected ( $n = 4$ ; Fig. 2)

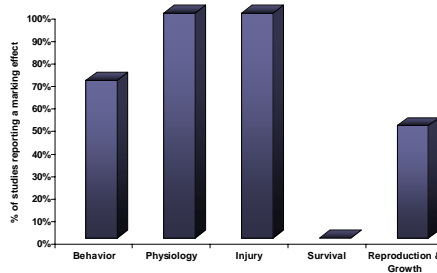


Figure 2. The percentage of studies detecting a significant effect of marking.

- Research on devices, such as radio transmitters and time-depth recorders, have focused on behavioral effects [2,5-11,16]
- Research on tags, such as flipper and dorsal fin tags, have focused on injury [2,3]
- Branding studies have focused on physiology and survival effects [12,13,15,16]
- Species differ in their responses to marking, even when using the same marker

## Conclusions

- To date, research on marker effects has primarily focused on behavioral responses to marking including swimming and migration
- No studies have addressed the effects of markers on disease
- No studies have addressed pain and distress
- No study to date has shown reduced survival due to marking, but many of the studies lack appropriate controls

**Future research on marine mammals under controlled conditions is required to document any acute effects of marking, including pain and distress, and to better understand longer-term effects on health, reproduction, and survival.**

