

BRIEF COMMUNICATIONS

Acoustic enrichment for dolphins in pool environment

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*Abstract: Dolphins have an advanced biosonar. In dolphin exhibits around the world an artificial setting (i.e. pool environment) is the most common mode of display. The bare and static environment in a pool does not provide many acoustic challenges for these animals. The acoustic aspect of a pool holding twelve bottlenose dolphins (*Tursiops truncatus*) was improved by introducing enrichment devices. The dolphins responded positively to tested acoustic enrichment additions, indicating that this kind of enrichment should be further exploited. The dolphin's biosonar should be considered when designing facilities and enrichment devices.*

Introduction

The acoustic conditions in a pool environment are important when working with sonar dependent odontocetes. In the year of 1999 the Cetacean Facilities Database listed 166 research and display institutions housing dolphins and whales in 42 countries (Couquiaud-Douaze 1999) and an artificial setting (i.e. pool environment) is the most common mode of display.

The bottlenose dolphin has excellent vision and a highly developed sonar system. This is a broadband system based on trains of very short click sounds, in which the intensity, power spectrum and click repetition rate can be considerably varied (Au 1993). This allows them to navigate in dark and turbid waters. Sonar in the wild is to a large extent used when foraging, hunting and navigating. When travelling long distances dolphins use keystructures (e.g. reefs and underwater ridges) as orientation references (landmarks).

A pool environment often has sufficient lighting, clear water and limited amount of obstacles which means that the dolphins can rely on their vision to navigate. For health and safety reasons the dolphins are handfed dead fish and are therefore not encouraged to hunt. The often acoustically barren and static environment in a pool does not provide many acoustic challenges and in the design of enrichment objects for dolphins acoustically transparent material such as rubber, plastic and textile is often used.

In this study environmental enrichment techniques were developed to improve the acoustic aspect of a pool environment.

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Enrichment objects were introduced in a pool holding twelve bottlenose dolphins (*Tursiops truncatus*) in intent to encourage natural behavior activities associated with sonar use. The study was conducted at the Kolmården dolphinarium, Sweden.

Four digital Porpoise Detectors (PODs) recording sonar clicks, were deployed at different locations in the pool complex to monitor the sonar activity. The acoustical target strength in an artificial kelp algae-imitation was improved with air-filled net floats and a hose set in motion by high pressure running water in response to sonar sound was introduced in the pool. Dolphin-device-interactions and behavioural displays were documented over time.

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The sonar activity appeared to be relatively low and almost none during night hours. PODs in open surroundings received more clicks. In the study of the kelp a higher frequency of sonar use was recorded in the interactions with a device with improved acoustic target strength. The moving hose appeared to trigger the use of long intensive sonar click trains, locked on target, and specific group formations (e.g. one or more dolphins place themselves in a diagonal line behind the first individual).

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Devices with a good acoustic reflection in an otherwise acoustic bare surrounding received more sonar clicks indicating that the dolphins used these objects as “land marks”. The long intensive sonar click trains, locked on target, and group formation patterns appeared to be hunting correlated behavioural displays similar to observations made by Bel’kovich (1991) in wild dolphin schools.

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The dolphins responded positively to tested acoustic enrichment additions indicating that this kind of enrichment should be further exploited to improve the acoustic aspect of a pool environment. Dolphins sonar use should be considered when designing pool facilities and enrichment for these animals. Enrichment devices used in this study could beneficially be developed and implemented in dolphin facilities around the world.

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