



## Demonstration of an acoustic warning system to alert manatees of approaching DOD vessels

Project  
#05-232

### Background:

The West Indian manatee (*Trichechus manatus*) is an endangered marine mammal which inhabits the waterways of DOD installations in S.E. Georgia and peninsular Florida. Manatees are vulnerable to collisions with watercraft. In an effort to protect manatees slow speed zones have been proposed by wildlife regulatory agencies which could impact DOD support vessel traffic and base operations. The DOD Legacy Management Resource Program supported behavioral hearing and acoustic propagation studies that revealed manatees can not adequately detect and locate the dominant lower frequency sounds of approaching vessels, and slower speeds can increase the risks of collisions. These discoveries lead to the recommendation for an acoustic warning device to provide manatees with the sensory awareness to avoid collisions.



### Objective:

This study will test the efficacy of two acoustic prototype devices designed to alert manatees of approaching vessels.

### Summary of Approach:

Manatee behavior in response to approaching vessels will be systematically recorded and archived. Continuous behavioral observations will be recorded from the air using a tethered aerostat video system in concert with a network of underwater acoustic sensors to synchronously record behavior and the localized acoustic levels throughout the demonstration area. The two experimental conditions: 1) vessel approaches without the alarm and 2) the same vessel approaches with the alarm will be analyzed to determine the frequency, strength and timing of manatee avoidance responses to the two conditions.

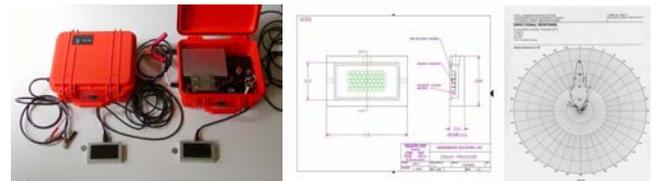
### Benefit:

The device will be an effective and inexpensive method to protect manatee from injury with vessels at DOD installations without effecting the speed or operation of DOD and support vessels. The device will allow these vessels to operate

unimpeded in manatee inhabited areas at optimum speeds at all times. Aside from the direct military benefit, the device could provide wide spread benefits in the civilian sector and used to protect manatees throughout their range. The previous manatee hearing research that led to this applied project received wide spread positive media attention. A popular article in American Scientist prominently acknowledging Legacy funding has received significant attention in both the general public and academic arenas <http://www.americanscientist.org/template/IssueTOC/issue/346>. The final application and demonstration of this conservation technology should receive further positive media attention. This positive high profile project will further the awareness of the DOD Legacy Resource Management Program and the Navy's commitment to protecting this endangered marine mammal.

### Accomplishments:

Two parametric transducers have been developed to project a stable narrow beam of sound just under the surface of the water for distances of up to 100 m. Since the device has been designed to exploit the manatees best hearing abilities very little power is required. The parametric transducer design has been successfully tested at the Kings Bay Submarine Base and in other manatee habitats.



Essential Fish and Wildlife permits have been granted to test the efficacy of the devices in open water with wild manatees. Synchronized aerial video and underwater acoustic monitoring systems have been developed and tested to provide time-coded records of manatee behavior and acoustic conditions during these tests.

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