



Potential Effects to Marine Life from Sonar

SOUND SOURCES MODELED

- Surface ship sonars
- Sonobuoys
- Torpedoes

MODELING PROCESS

Using five general steps, the Navy was able to calculate the number of potential marine animal exposures to sound

Identify sonar parameters

Determine sound propagation loss

Calculate the zone of influence

Determine marine species densities

Calculate potential exposures

The method for determining potential sound exposures to a marine animal was jointly developed by the Navy and the National Marine Fisheries Service.

Potential exposures to marine mammals from sound in the water from active sonar do not take into account the implementation of the Navy's protective measures.

FINDINGS

The Navy evaluated potential effects of sonar on the following resources:

- Marine mammals
 - Whales, porpoises and dolphins (cetaceans)
 - Seals and sea lions (pinnipeds)
- Sea turtles
- Fish
- Seabirds
- Marine invertebrates

MARINE MAMMALS

- Short term behavioral response or TTS
- Except for one exposure to harbor seal, no potential for PTS
- No significant impacts and no significant harm



SEA TURTLES

- Cannot hear mid- and high-frequency active sonar
- No effects anticipated

FISH

- Most cannot hear mid-frequency active sonar
- Minimal effects anticipated

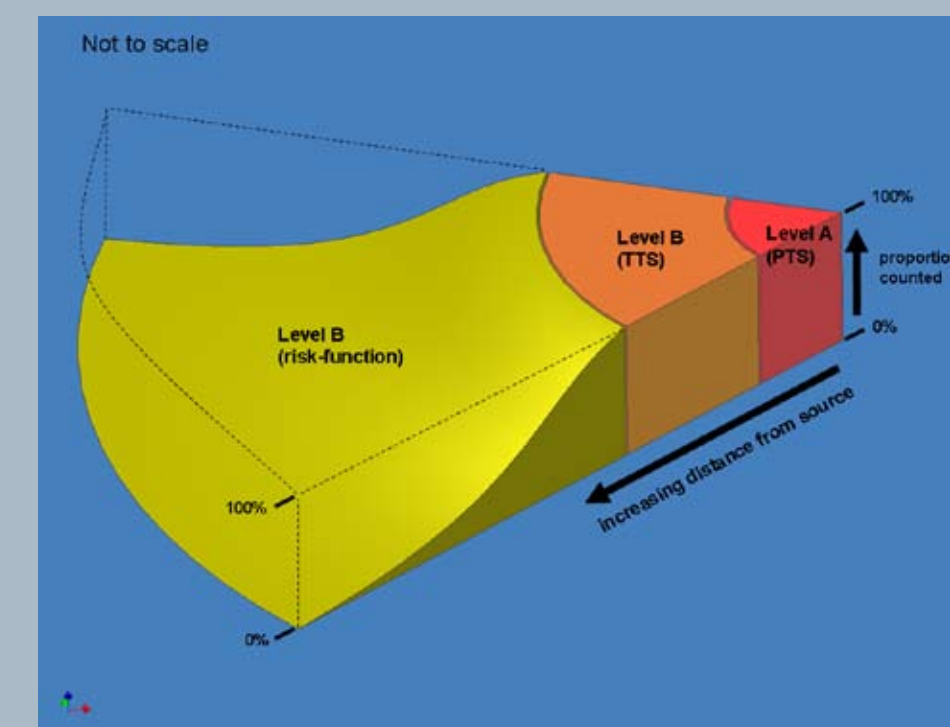
SEABIRDS AND MARINE INVERTEBRATES

- No effects anticipated



REGULATORY CRITERIA

- The National Marine Fisheries Service is a Cooperating Agency
- Currently in consultation with regards to the Marine Mammal Protection Act and the Endangered Species Act
- Thresholds for potential effects are based on best-available science
 - Permanent threshold shift (PTS) = Level A Exposure
 - Temporary threshold shift (TTS) = Level B Exposure
- Potential exposures represent the total number of exposures and not the number of individuals exposed – an individual may be exposed multiple times
- "Risk Function" used to calculate probability of an individual reacting to sound, constituting short-term Level B Behavioral response
- Behavioral effects are likely to occur before permanent or temporary effects on hearing



Exposure zones extending from a sound source

