

## Minutes seminar 'Underwater noise, sources and technological developments' held on 20 January 2011, Delft.

Date: 25 January 2011

Thursday morning, the 20th of January, a seminar took place about underwater noise caused by international shipping. Four presentations were given dealing with sources of underwater noise (*Christ de Jong, TNO*), developments in legislation (*René Dekeling, Min. of Infrastructure and Environment*), effects on the marine environment (*Monique van de Water, North Sea Foundation*) and a possible technological solution in the form of a cavitation free screw (*Sjoukje Sipkema, Van Voorden Gieterij*). Participants were representatives from the industry, knowledge institutes, NGO's and the Dutch government.

### National and International legislation

For the Dutch government underwater noise is of concern for several reasons; the importance of underwater noise for marine life is recognized, social concern about the subject and the observed increase in ambient noise levels. On the national / EU level underwater noise has been implemented in the Marine Strategy Framework Directive and a working group has been installed to address issues such as standardized measurement of low frequency underwater noise and setting up a set of targets and indicators to determine the 'Good Environmental Status' considering underwater noise. Most work on this will be done in 2011. In the international arena the International Maritime Organisation (IMO) and OSPAR have recognised underwater noise as a subject of concern as well, with shipping being a priority issue. To solve fundamental data gaps an international research strategy studying the effects of underwater noise has been set up by the European Science Foundation (ESF). Up to now no concrete standards and measures have been put in place, however these can be expected to be set in the future.

### Effects

The dominant sense utilized by marine animals is not eye sight but sound which is used for location of food, navigation, communication, marking of territory, finding suitable mates and raising the offspring. Marine mammals, fish, dolphins, anemones, shrimp etc. produce and use all sound in one way or another. As a result marine organisms use a broad spectrum of sound, however the impact of shipping is expected to be in the low frequent domain. Effects of underwater noise on marine organisms include avoidance of certain areas, (temporal) damage of hearing and mask of communication sounds. Although species can adapt to a certain extent; by avoiding certain areas, altering the frequency they use or by increasing the intensity, this will cost them energy and has thereby a negative impact on survival rates. Although very difficult to assess, more research is required to determine what safe ambient noise levels are to successfully protect marine life.

### Sources and technical options to reduce noise

The noise level produced by ships differs considerably between ships and is depending on ship speed, the machinery and settings, load, maintenance and whether the ship is steaming or manoeuvring. The main source of underwater sound is cavitation at the ship's screw. Other reduction options include isolation of the engine, reduction of vibrations and reduction of the noise originated from water currents along the ship's hull. From research vessels and marine vessels, where already significant effort was put in reducing noise emissions, it is known that a significant reduction in underwater noise emissions is technically feasible. Although basic knowledge about noise levels produced by conventional ships is present, less is known about 'special' ships such as light weighted fast moving vessels with new hull shapes (catamaran) and propulsion concepts (thrusters, pods etc).

### The way forward

Currently no (workable) uniform procedure exists to measure the emitted sound by vessels. Development of an universal methodology is required to measure sound making it possible to compare these with environmental standards (to be set in the future). For setting a standard protecting marine life more research is required about the effects of underwater noise. Although no standard exists yet it is believed that the current increase in ambient sound levels has to be stopped. With increasing ship activity reduction measures are required. From the discussion it became clear that both ship owners and builders are willing to put effort in reducing noise emissions. Before considering a certain reduction measure however, it is welcomed to know to what extent the sound levels need to be reduced. In this way invested money can be translated directly to reduced dB.

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