Reducing Noise from Commercial Ships: Current Efforts and Ways Forward

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Need for broad-scale quieting

- Effect of present-day ambient noise (largely from commercial shipping noise at longer distances) **greater than** that of local shipping
- Need for broad-scale solutions as well as local management

Chart: Hatch et al. 2012, as adapted by L. Hatch
Need for broad-scale quieting

Ship-quieting technology
Advancing ship-quieting technology

Technical standards
Incentive systems
Regulations

International bodies

Governments

Ship classification societies

Port authorities

Green cert societies

Shipping lines/ ship owners
Advancing ship-quieting technology

International bodies

ISO
IMO

Technical standards
Incentive systems
Regulations

Governments

Ship classification societies

ABS
DNV
Lloyd's Register

Green cert societies

Port authorities

MAERSK
CO2CO

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Standards

International Organization for Standardization
- Non-government organization composed of national standards bodies
- 165 nations represented
- U.S. member: ANSI

International Maritime Organization
- Intergovernmental body organized under the United Nations
- 170 member states
- Head of U.S. delegation: USCG
Standards

[Draft] International Standard 16554
Measurement and reporting of underwater sound radiated from merchant ships

- Based on U.S. standard: ANSI/ASA S12.64
- Provides standard for measuring vessel noise output in deep water

- Target date for publication: April 2015
Standards

Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life

- U.S.-led effort, tabled by U.S. in 2008, completed in April 2014
- Provides general guidance for reducing cavitation and machinery noise, and for vessel-quieting operations and maintenance
- Does not set noise output standards or prescribe methods of noise reduction
Standards

Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life

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IMO/ ISO standards are products of American leadership: now must implement!
Reducing impacts: quieting ships

**Needed:** Noise output standard for individual commercial ships

**Lime Kiln:** Development of standards based on noise output measurements from 1800 ship transits, taken off Lime Kiln Park (WA)

Source: Beam Reach/ NRDC
Reducing impacts: quieting ships

**Needed:** Noise output standard for individual commercial ships

**Lime Kiln:** Development of standards based on noise output measurements from 1800 ship transits, taken off Lime Kiln Park (WA)

**SILENV:** EU Commission-funded project

Source: Beam Reach/ NRDC; SILENV 2012
Incentive systems

**Ship classification societies**

**RINA**: first society notation for measurement/output of underwater noise: now in draft

*Notations for individual ships*

**Green certification societies**

**Green Marine**: voluntary U.S./Canadian society developing underwater noise certification for ports

*Certifications for ship owners, ports, other maritime authorities*

**Ports**

**Tax code**
Incentive systems

Mewis duct system
-5% increase in fuel efficiency on VLCC (Renilson 2009)
-Cavitation reduced

Kappel propeller
-4% increase in hydro. efficiency (Renilson 2009)
-Should reduce cavitation

PBCF hub modification
-7% increase in efficiency
-Hub vortex/ cavitation canceled; noise reduction verified in tunnel test

Cost incentives: many (though not all) noise reduction methods also increase efficiency and reduce prop. erosion
Regional ambient noise targets


Requires member states to set and meet targets for “good environmental status” by 2020

100 dB: annual average noise target originally proposed by Euro. Commission

120 dB: annual average noise modeled for Greater Puget Sound (Bassett et al. 2012), exceeding both proposed EU and existing U.S. (MMPA) standards
(2) **Government/flag ship prescriptions**

States may prescribe standards for government vessels, flag ships, and foreign ships entering their ports, internal waters, and territorial seas.

(3) **IMO code**

IMO may adopt code, which can become binding by reference in convention.

[Draft] Polar Code

Noise Levels Aboard Ships
Ways Forward

Recommendations to Congress

• **Provide tax credit** for vessels bearing the underwater noise notation of an IACS-member ship classification society

• **Establish a fund to facilitate port development** of noise incentive/management/monitoring programs

• **Provide funds for collaborative research** with industry to evaluate noise benefits, financial costs, and efficiency outcomes of quieting methods

• **Commend USCG/NOAA** for leadership on IMO guidelines and urge further work on underwater shipping noise at IMO

• **Require that all new builds/reconstructions** of non-military U.S. flag vessels obtain the underwater noise notation of an IACS-member ship classification society
Questions?

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Leila Hatch (NOAA)
Scott and Val Viers (Beam Reach)
EXTRA SLIDES
Need for broad solutions

Yearly averages, Atlantic

Source: NOAA Sound Map
Reducing impacts: quieting ships

**Focal areas for ship quieting (IMO)**

- **Propulsion**
  - Propeller design/modification to reduce cavitation
- **Hull Design**
  - Flow noise reduction
  - Hull/propeller optimization to reduce wake field
- **On-Board Machinery**
  - Damping, mounts, and equipment isolation
- **Operational Modifications**
  - Speed and load variations
  - Maintenance
Reducing impacts: quieting ships

**Needed**: Underwater noise emission standard for individual commercial ships

Source: Beam Reach/ NRDC