Reducing Noise from Commercial Ships: Current Efforts and Ways Forward

Michael Jasny, NRDC September 26, 2014



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 Lloyd's legister societies ORT METRO Port ABS authorities DINV MARINE PORT Green cert societies COSCO MAERSK

Shipping lines/ ship owners

Advancing ship-quieting technology



International bodies

Technical standards **Incentive systems** Regulations







societies





Shipping lines/ ship owners





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



[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

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Doc.: ISO/DIS 16554.2

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

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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

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

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 Commissionfunded project

Incentive systems

Ship classification societies

Ports



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

Tax code



Incentive systems



Mewis duct system

-5% increase in fuelefficiency 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

Regulations

(1) Regional ambient noise targets



Marine Strategy Framework Directive (EU)

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



Regulations



(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 IACSmember 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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Thanks to: Leila Hatch (NOAA) Scott and Val Viers (Beam Reach)



EXTRA SLIDES

Need for broad solutions



Marine Geospatial Ecology Lab, Duke University (2012)

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