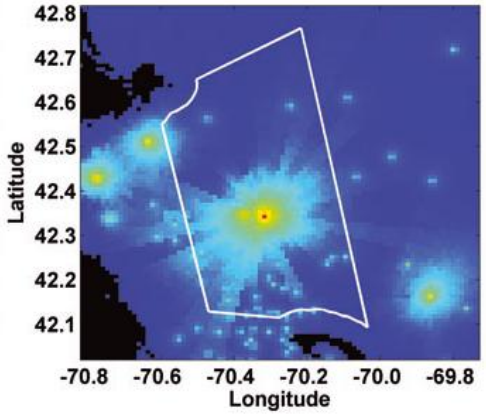
Reducing Noise from Commercial Ships: Current Efforts and Ways Forward

Michael Jasny, NRDC
September 26, 2014

NRDC
THE EARTH'S BEST DEFENSE

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

Loss of right whale communication space, Stellwagen Bank, Apr. 2008

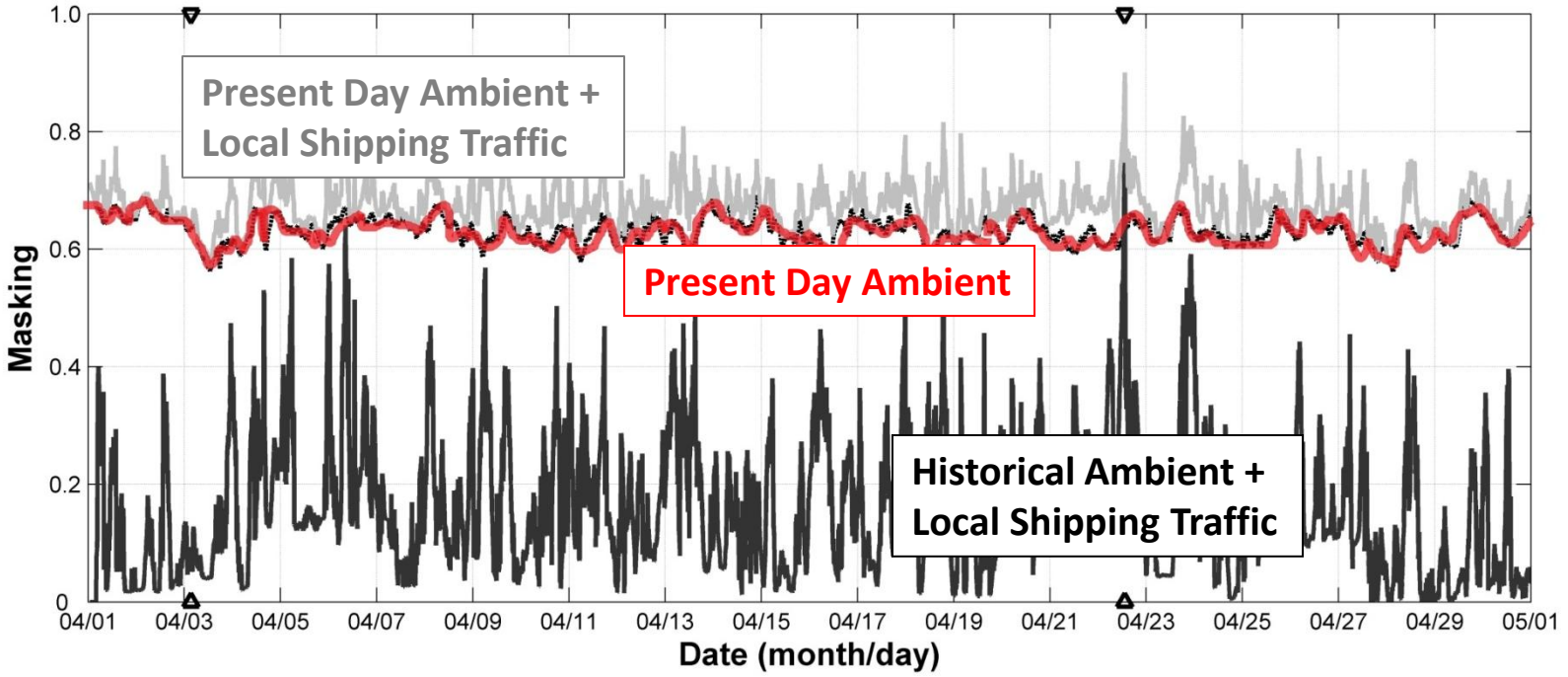


Chart: Hatch et al. 2012, as adapted by L. Hatch

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

Technical standards

Incentive systems

Regulations

International bodies

Governments

Ship classification societies

Green cert societies

Port authorities

Shipping lines/ ship owners

Advancing ship-quieting technology

Technical standards

Incentive systems

Regulations

International bodies

Governments

Ship classification societies

Green cert societies

Port authorities

Shipping lines/ ship owners

Advancing ship-quieting technology

Technical standards
Incentive systems
Regulations

International bodies

Governments

Ship classification societies

Port authorities

Green cert societies

Shipping lines/ ship owners

Standards

International Organization for Standardization

- **Non-government organization composed of national standards bodies**
- **165 nations represented**
- **U.S. member: ANSI**

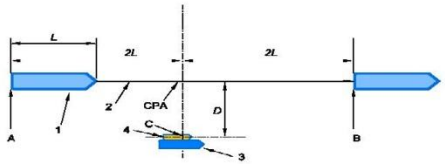
International Maritime Organization

- **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

DRAFT INTERNATIONAL STANDARD ISO/DIS 16554.2

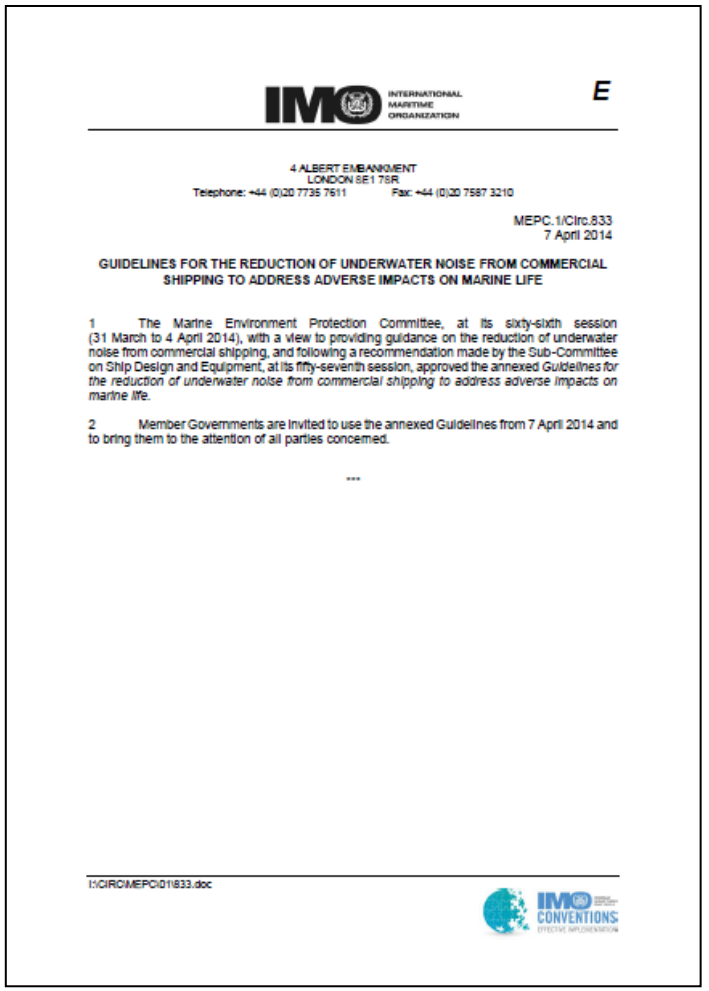
Ships and marine technology — Marine environment protection — Measurement and reporting of underwater sound radiated from merchant ships

Doc.: ISO/DIS 16554.2

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



IMO INTERNATIONAL MARITIME ORGANIZATION

E

4 ALBERT EMBANKMENT
LONDON SE1 7SR
Telephone: +44 (0)20 7735 7611 Fax: +44 (0)20 7587 3210

MEPC.1/Circ.833
7 April 2014

GUIDELINES FOR THE REDUCTION OF UNDERWATER NOISE FROM COMMERCIAL SHIPPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE

1 The Marine Environment Protection Committee, at its sixty-sixth session (31 March to 4 April 2014), with a view to providing guidance on the reduction of underwater noise from commercial shipping, and following a recommendation made by the Sub-Committee on Ship Design and Equipment, at its fifty-seventh session, approved the annexed *Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life*.

2 Member Governments are invited to use the annexed Guidelines from 7 April 2014 and to bring them to the attention of all parties concerned.

...

I:\CIRC\MEPC\01\833.doc

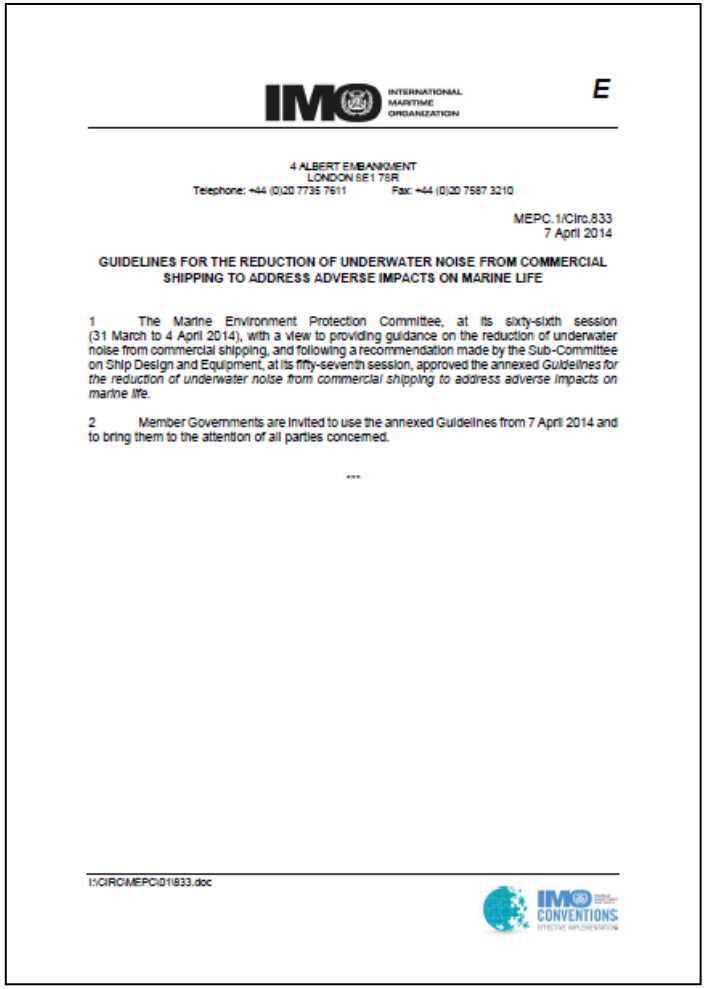
IMO CONVENTIONS

Doc.: IMO/ MEPC.1/Circ.833

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



IMO INTERNATIONAL MARITIME ORGANIZATION

E

4 ALBERT EMBANKMENT
LONDON SE1 7SR
Telephone: +44 (0)20 7735 7611 Fax: +44 (0)20 7587 3210

MEPC.1/Circ.833
7 April 2014

GUIDELINES FOR THE REDUCTION OF UNDERWATER NOISE FROM COMMERCIAL SHIPPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE

1 The Marine Environment Protection Committee, at its sixty-sixth session (31 March to 4 April 2014), with a view to providing guidance on the reduction of underwater noise from commercial shipping, and following a recommendation made by the Sub-Committee on Ship Design and Equipment, at its fifty-seventh session, approved the annexed *Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life*.

2 Member Governments are invited to use the annexed Guidelines from 7 April 2014 and to bring them to the attention of all parties concerned.

...

I:\CIRC\MEPC\01\833.doc

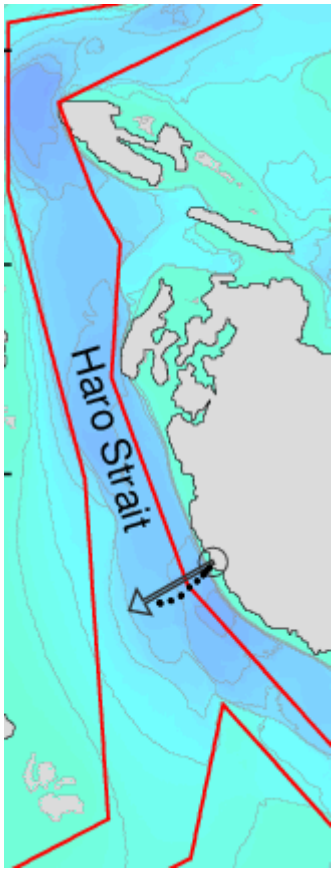
IMO CONVENTIONS

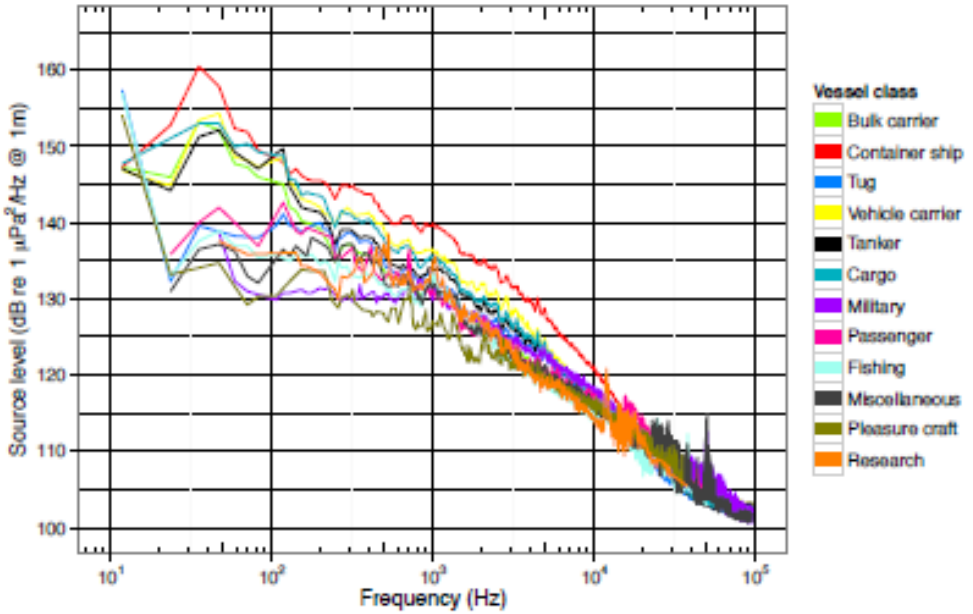
IMO/ ISO standards are products of American leadership: now must implement!

Doc.: IMO/ MEPC.1/Circ.833

Reducing impacts: quieting ships

Needed: Noise output standard for individual commercial ships



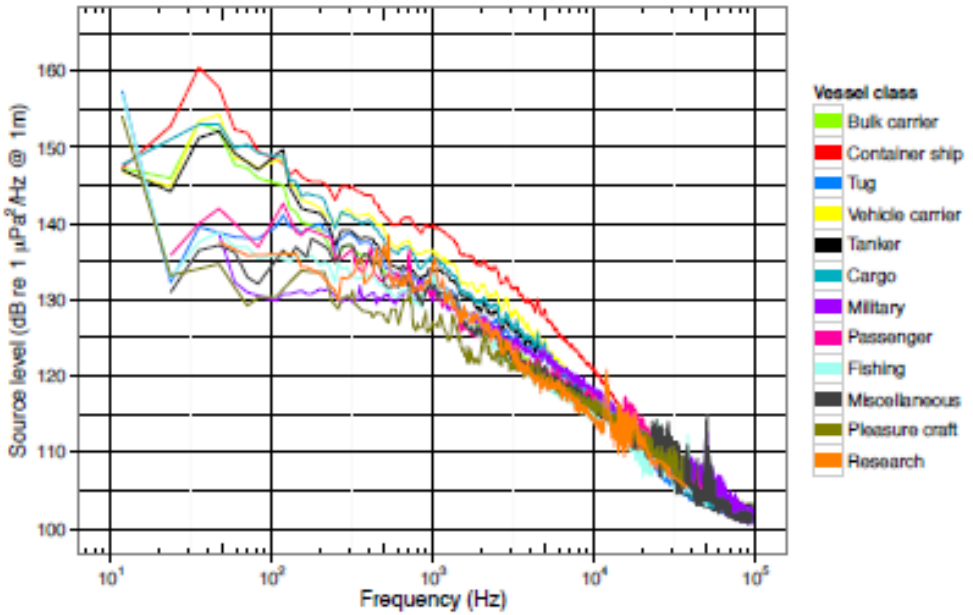


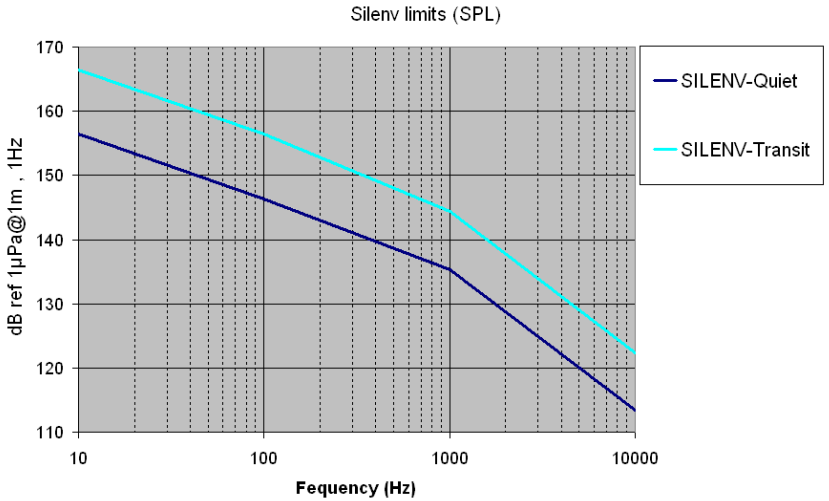
Lime Kiln: Development of standards based on noise output measurements from 1800 ship transits, taken off Lime Kiln Park (WA)

Source: Beam Reach/ NRDC

Reducing impacts: quieting ships

Needed: Noise output standard for individual commercial ships





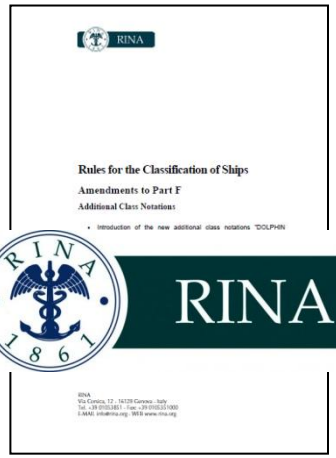
Lime Kiln: Development of standards based on noise output measurements from 1800 ship transits, taken off Lime Kiln Park (WA)

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

Ports

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 fuel efficiency on VLCC (Renilson 2009)
-Cavitation reduced

Kappel propeller

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

PBCF hub modification

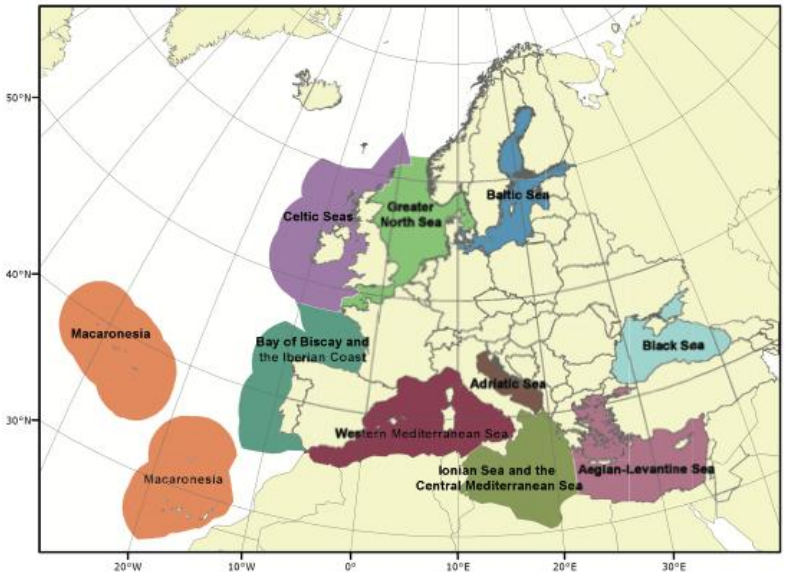
-7% increase in efficiency
-Hub vortex/ cavitation canceled; noise reduction verified in tunnel test

Source: Chekab et al. 2013

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

Regulations

(1) Regional ambient noise targets

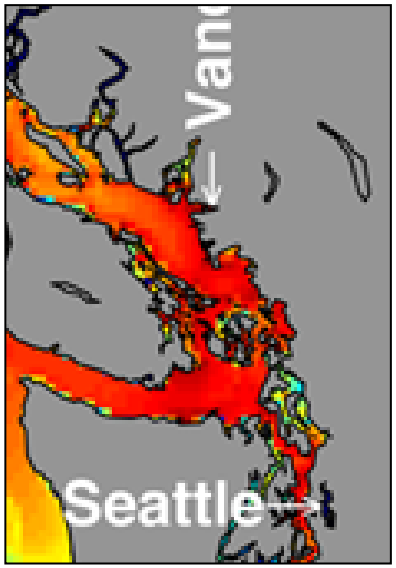


Marine Strategy Framework Directive (EU)

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



Figures: EU; Erbe et al. 2012

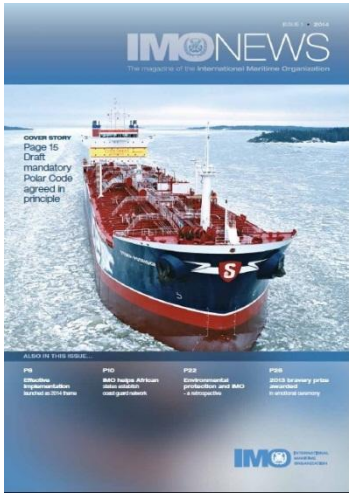
Regulations

(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

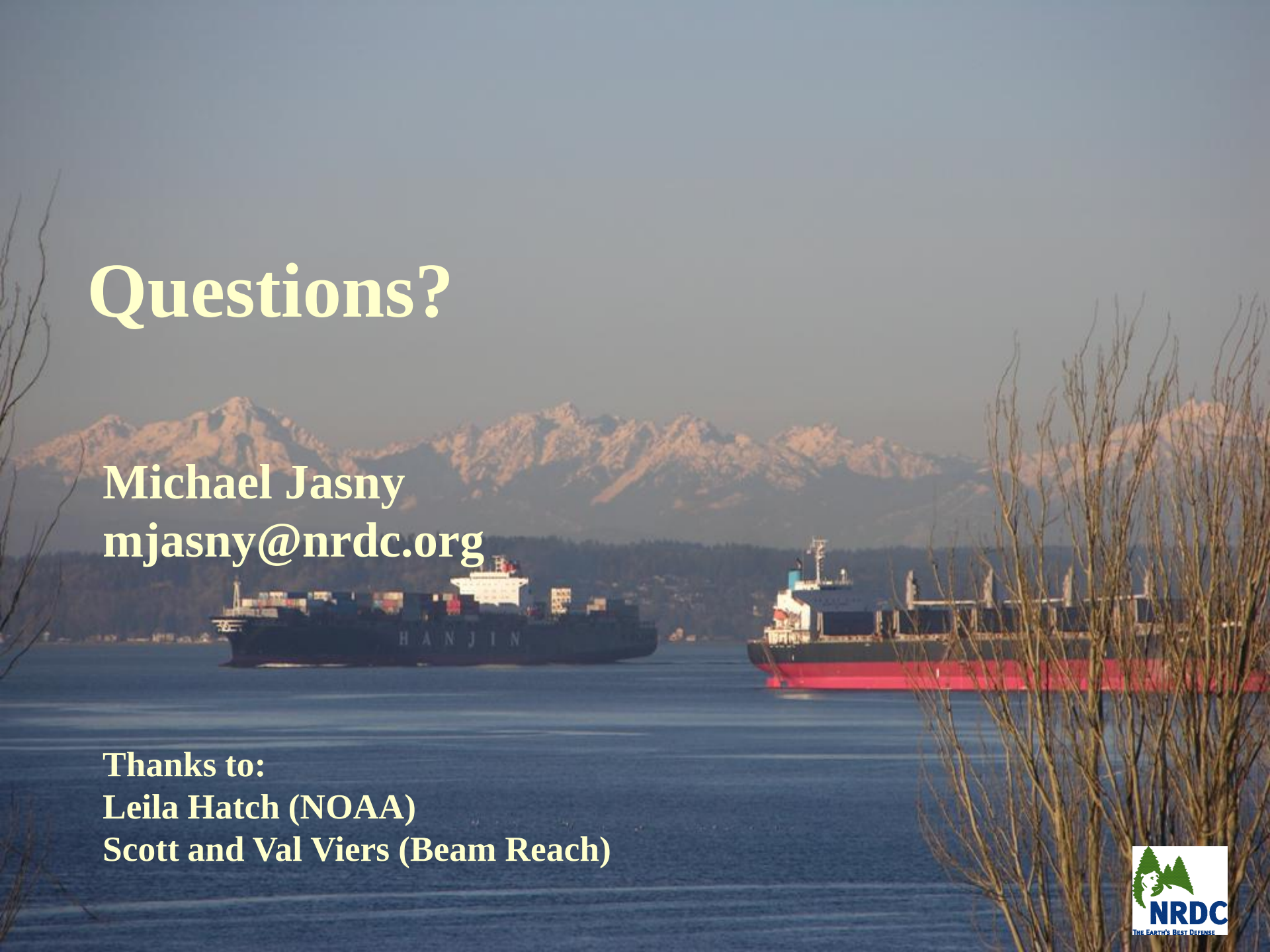
Noise Levels Aboard Ships

Ways Forward

Recommendations to Congress

- Provide tax credit for vessels bearing the underwater noise notation of an 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?

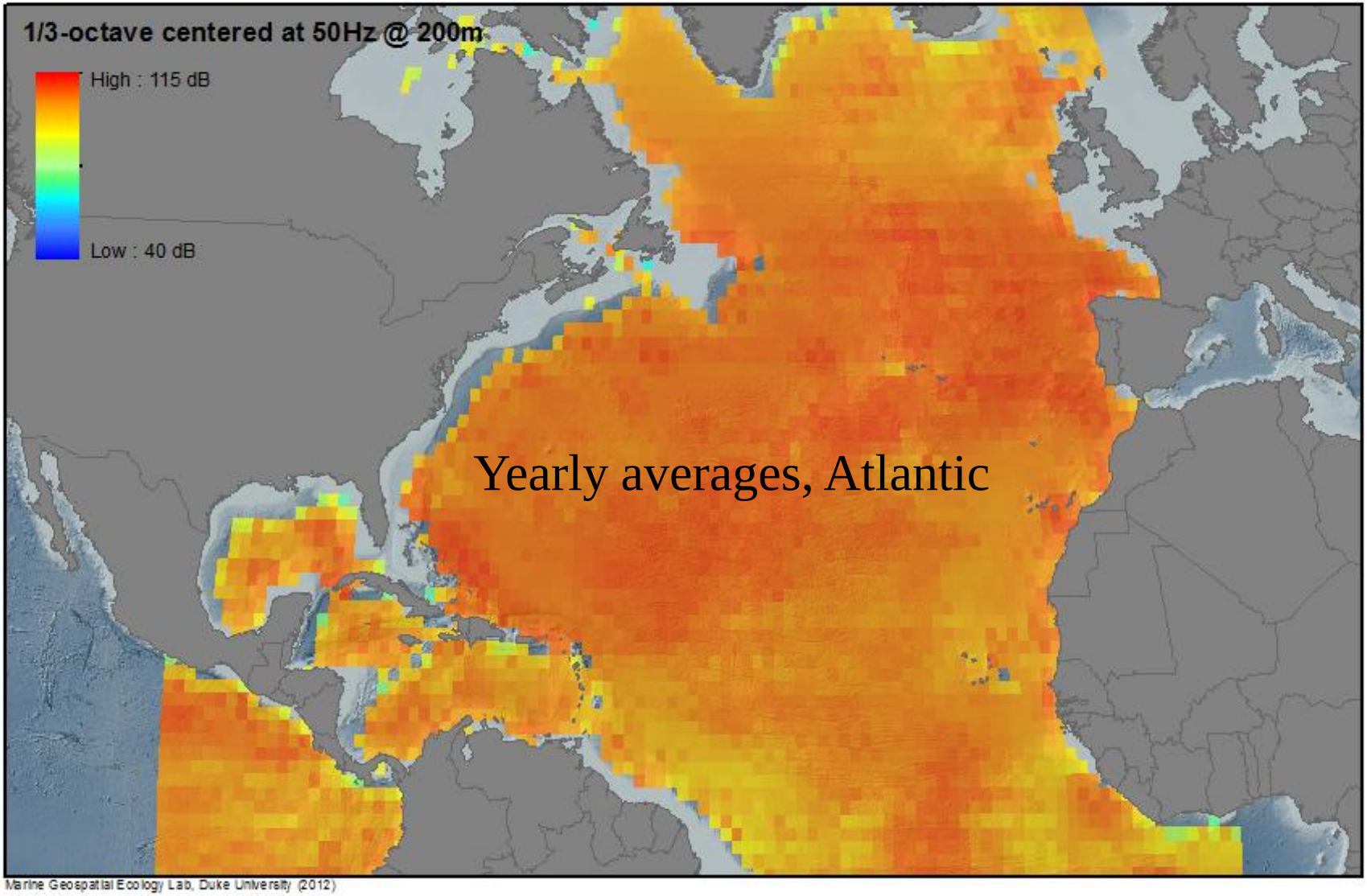
Michael Jasny
mjasny@nrdc.org

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

NRDC
THE EARTH'S BEST DEFENSE

EXTRA SLIDES

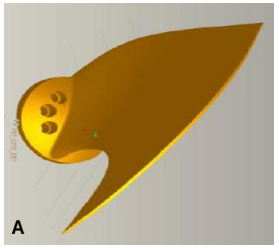
Need for broad solutions

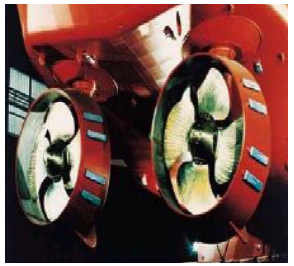


Source: NOAA Sound Map

Reducing impacts: quieting ships

Focal areas for ship quieting (IMO)

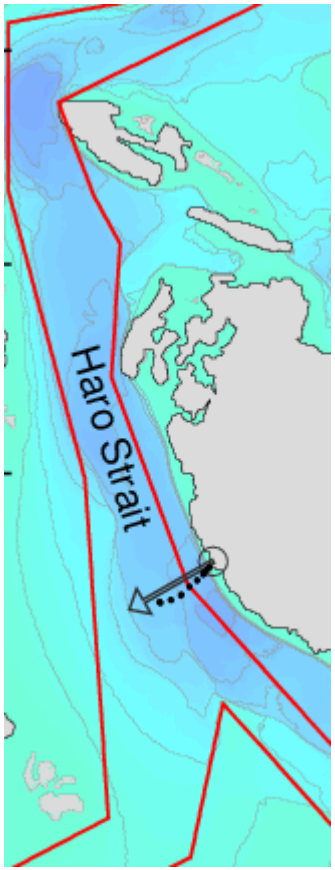


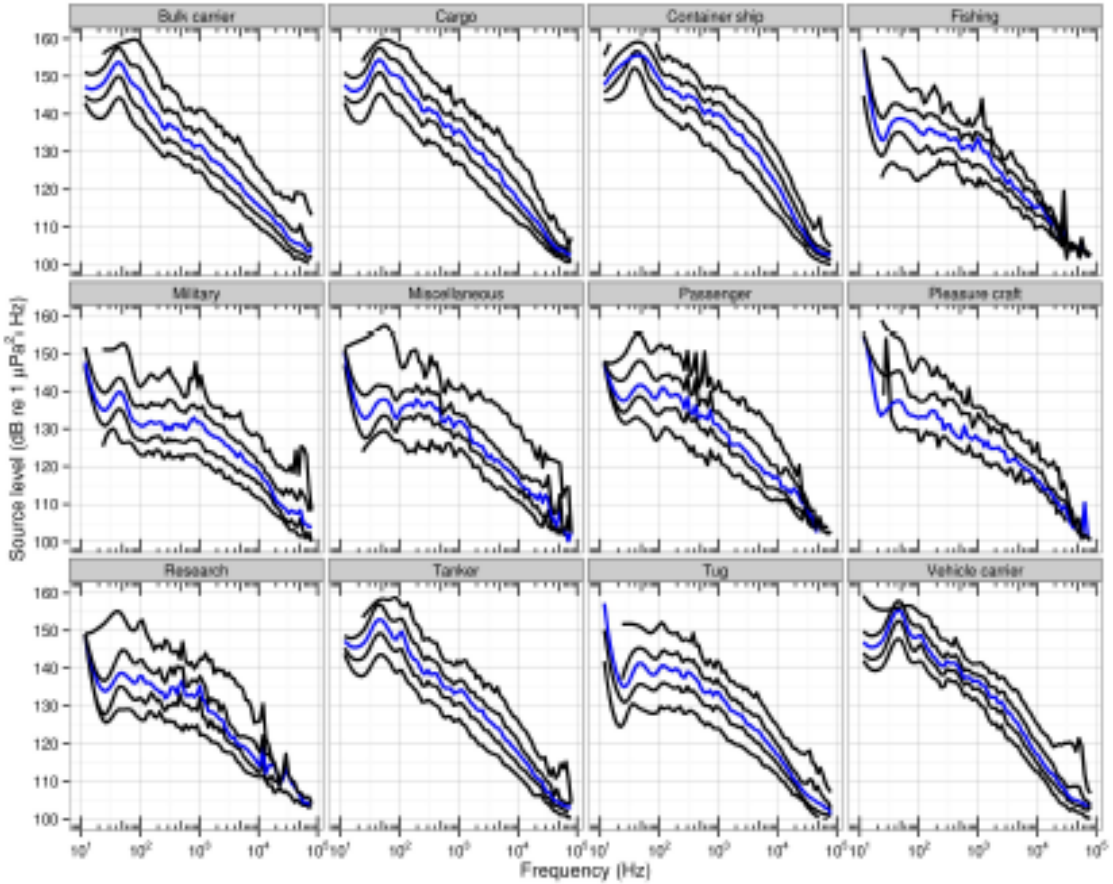


- **Propulsion**
  - Propeller design/modification to reduce cavitation
- **Hull Design**
  - Flow noise reduction
  - Hull/propeller optimization to reduce wake field
- **On-Board Machinery**
  - Damping, mounts, and equipment isolation
- **Operational Modifications**
  - Speed and load variations
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

Reducing impacts: quieting ships

Needed: Underwater noise emission standard for individual commercial ships





Source: Beam Reach/ NRDC