Use of Technologies to Reduce Whale/Vessel Collisions

IWC/ACCOBAMS Workshop on Reducing the Risk of Collision between Vessels and Cetaceans
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Report of a Workshop to Identify and Assess Technologies to Reduce Ship Strikes of Large Whales

Providence, Rhode Island
8-10 July 2008

Generalized summary

Some conclusions:

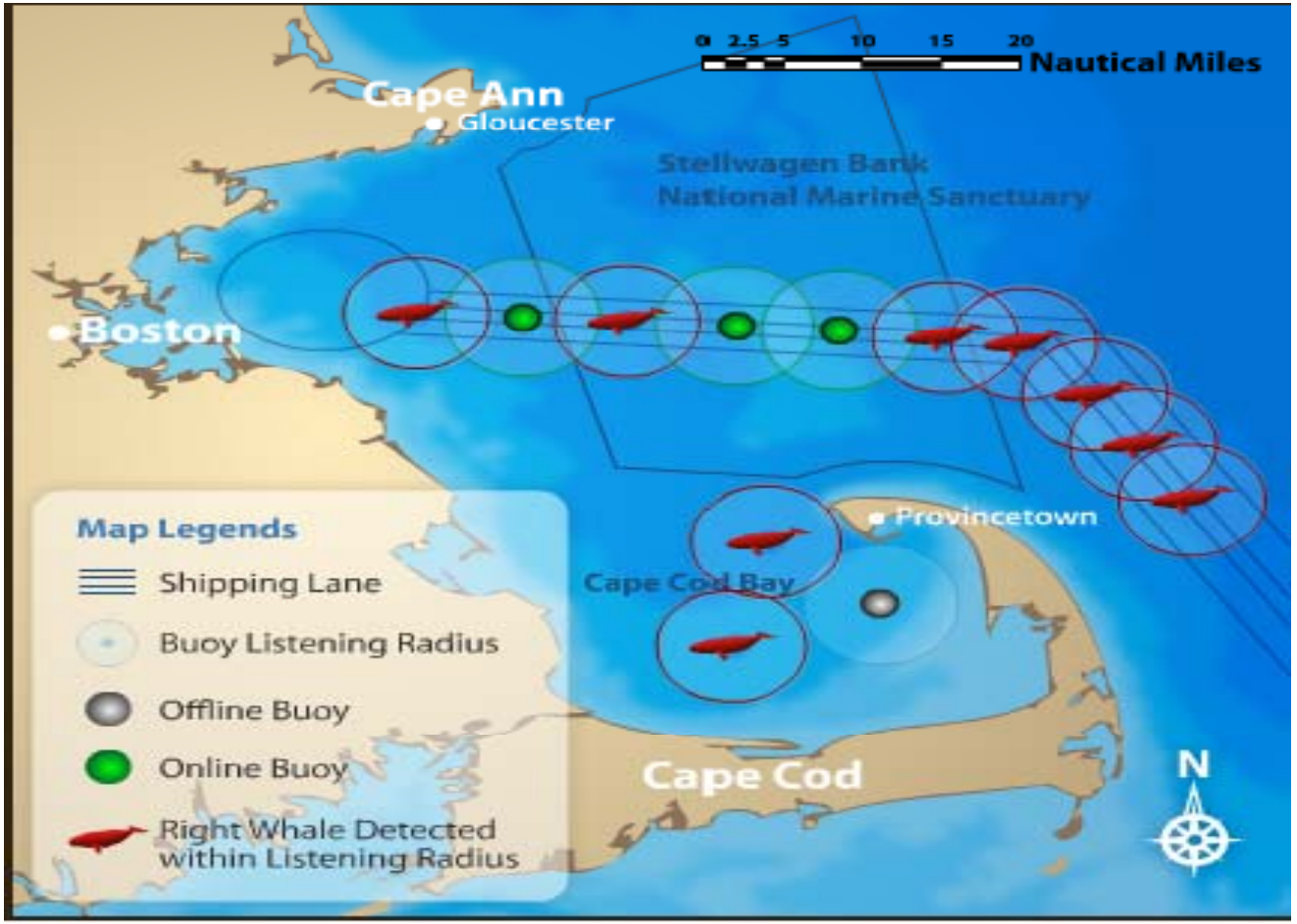
- no simple solutions or existing technological that will completely “fix” the problem; some may be emerging
- some available now, some need more study
- use of modified ship routing and advance voyage planning, perhaps in conjunction with technologies, most desirable
- workshop developed an extensive list of pros/cons for each technology

Use of Technologies to Reduce Whale/Vessel Collisions

- Maritime community “Nobody wants to hit a whale. Tell us where they are, we’ll avoid them.”
- But… even with *complete* knowledge of whale locations, options for response may be limited
- *What is the mariner expected to do??*

For example…

-- Liquified Natural Gas carriers required to travel at 10 knots
-- all others are not



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Use of Technologies to Reduce Whale/Vessel Collisions

Objectives??

1. Moving Whales
   - alarm devices
2. Moving Ships
   - enhanced optics
   - passive acoustics
   - active acoustics
   - predictive modeling
   - tagging

Moving Whales
Use of Alarm Devices

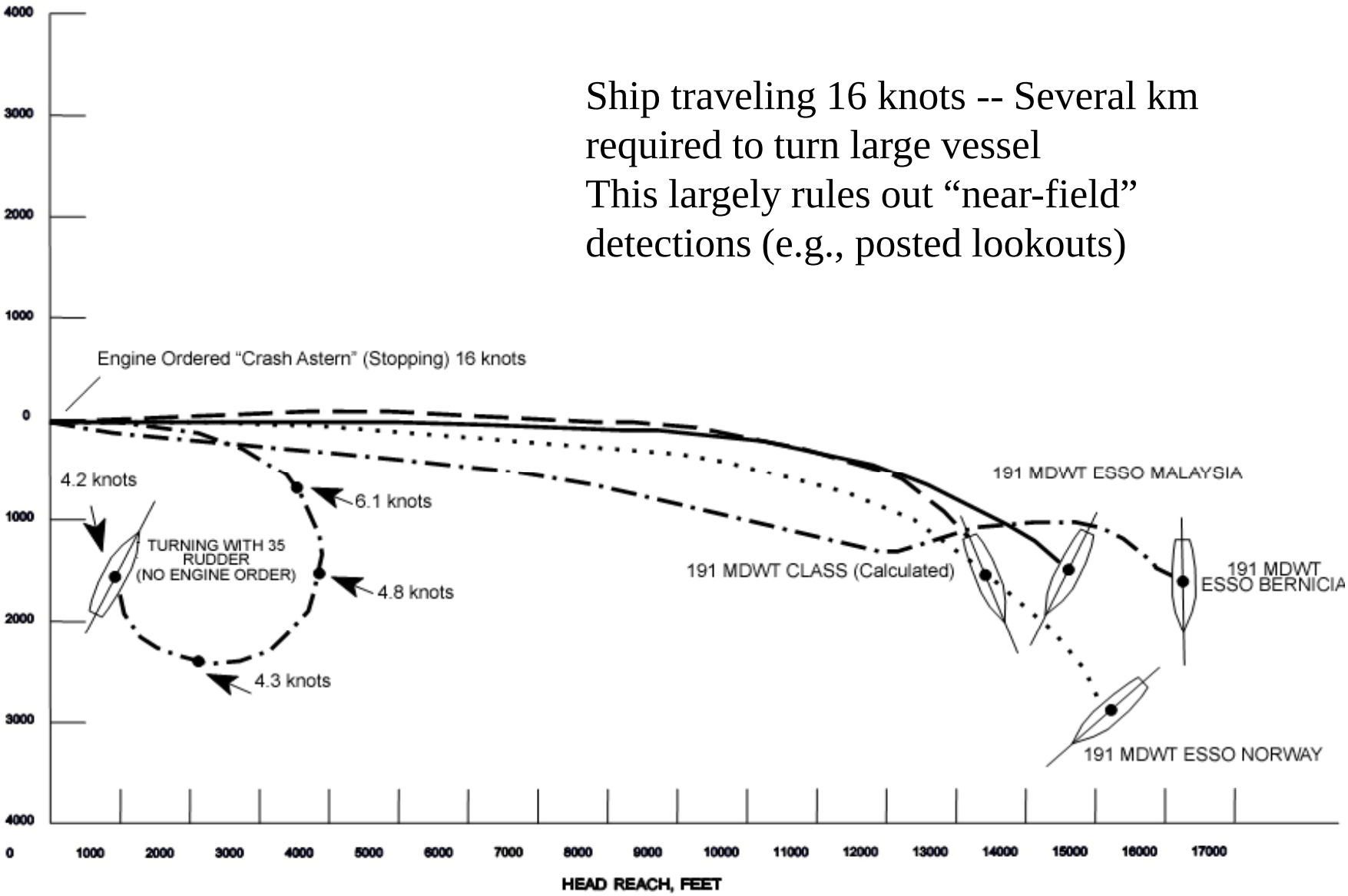
- Introduces additional sound or other stimuli into an already noisy environment
- may involve frequent or chronic disturbance of a depleted species
- habituation may also be a factor
- Nowacek found right whales did not respond or came to the surface when exposed to sound stimuli
- therefore, workshop participants rejected alarm devices as an approach

Use of Technologies to Reduce Whale/Vessel Collisions

- Really talking about improved remote detection
- following detection, notify the mariner or operator
- Ship-board processing and/or watchstanders may be needed; possible resource, personnel issues
- And, then what….?
- Even with notification of whale location(s), mariner options may be limited

Features of a Turning Ship

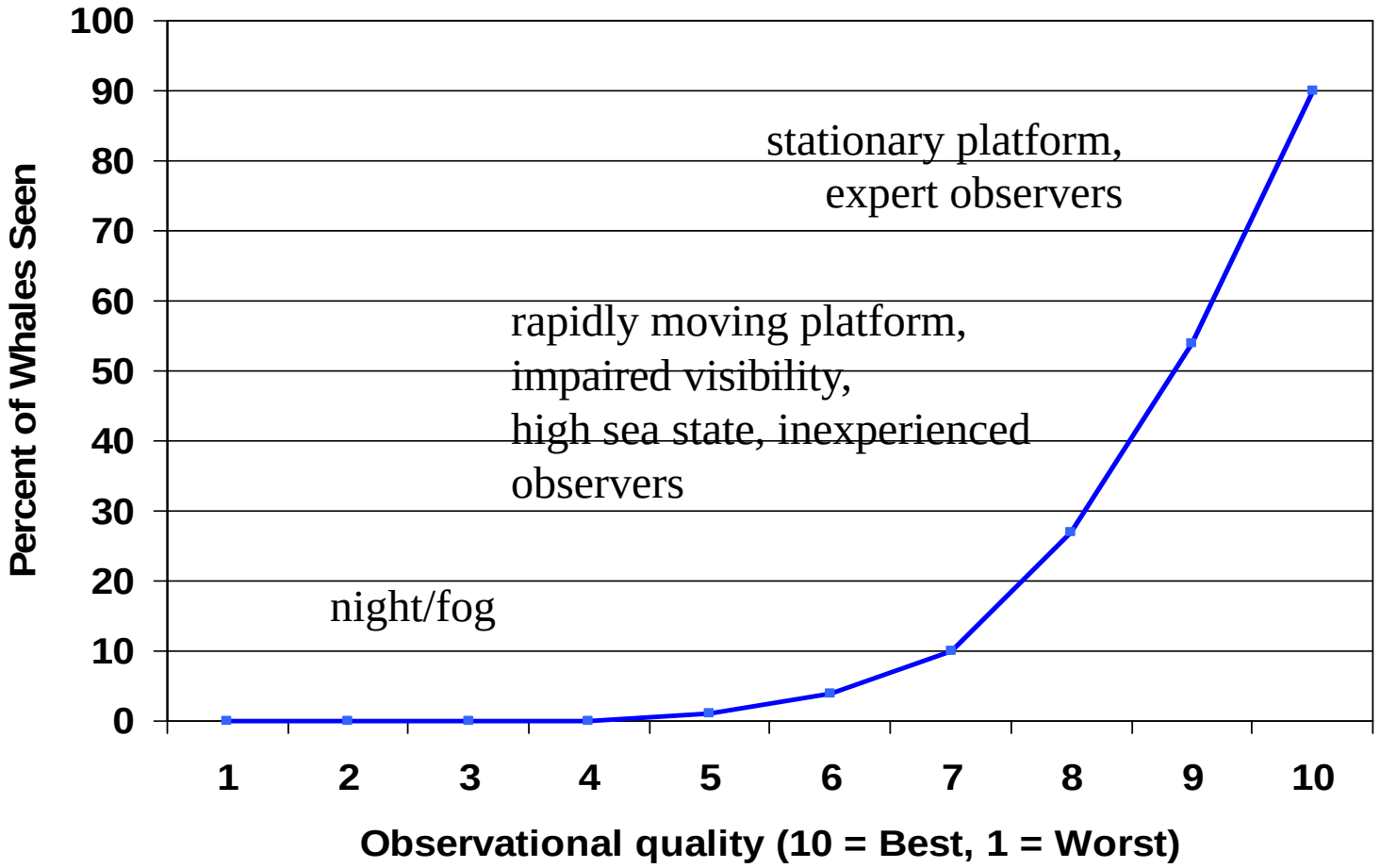
Ship traveling 16 knots -- Several km required to turn large vessel
This largely rules out “near-field” detections (e.g., posted lookouts)



Visual Surveys/Trained Lookouts

- logistically complex; can be expensive
- potentially hazardous
- may be constrained to certain times of the year
- limited by low detection probabilities, poor weather, low-light conditions
- therefore, posting lookouts may have little overall effectiveness

Visual Surveys/Lookouts



Tagging and Telemetry

- expanding field with recent power supply improvements & reducing data transmission costs
- proverbial challenges: tag attachment difficulties & attempts to tag sufficient portion of a population
- therefore, useful for studies of whale natural history & movement, but not for ship collisions

Radar

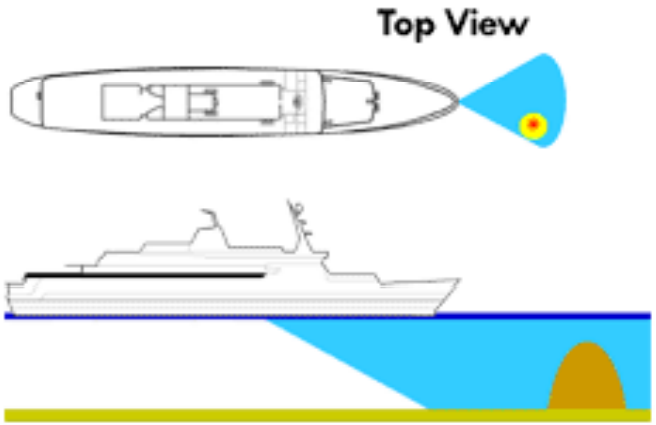
- can be used from ship or shore and has the advantage of operating in poor weather
- range can be quite good
- but false positives (e.g., white caps, small boats) are a potential problem
- requires watchstander

Thermal Imaging (*e.g.*, infrared)

- proved promising in detecting whale blows at significant ranges in experimental studies (e.g., in the Antarctic)
- highly sensitive to, and can be overwhelmed by, natural light & vibration
- 2nd generation prototypes being tested

Active Acoustics

- ship-based vs. sea floor-mounted – two very different approaches
- forward looking range is limited
- some devices appear effective in detecting whales but generally within hundreds of meters (this range may be extended as technology improves)
- costs may be high (esp. if ship retrofitting is considered)
- likelihood of false positives
- may require watchstanders



Passive Acoustics

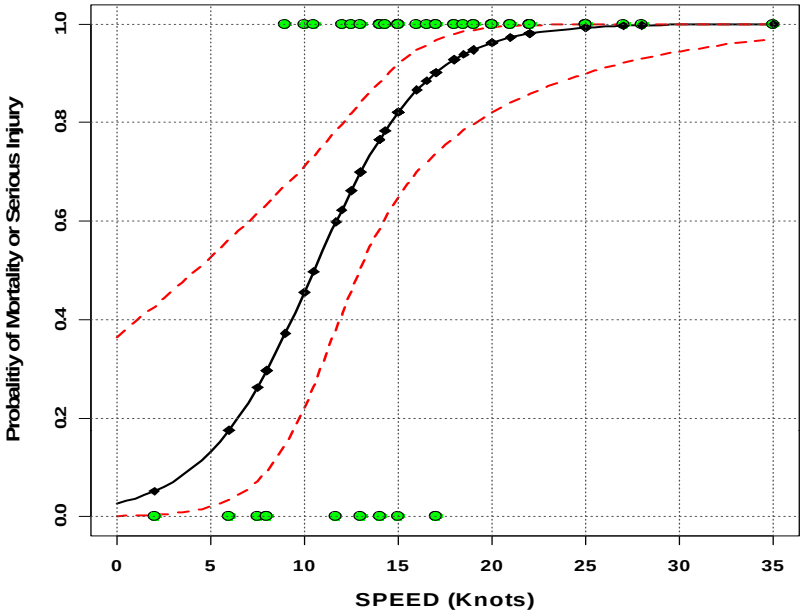
- amount of data returned for cost investment makes this approach one of the most promising
- in wide use currently and becoming an important tool for studying whale occurrence and distribution
- constrained by being able to detect only those whales vocalizing
- determining a specific location (via triangulation) is possible but requires multiple and networked receivers

Predictive Modeling

remotely-sensed oceanographic features provide means to predict where whales may occur over large areas

- relatively low cost; non-invasive; ready for use now
- provide broadscale indications of whale occurrence, not specific locations
- as models, they are prone to uncertainty (*i.e.*, predictive only)
- questions of scale and overall capabilities, given naturally changing oceanographic features

Next steps??



- **Continue work to identify & study improved marine mammal detection technologies (not just for this issue)**
- **Knowns: 1. co-occurrence of whales and vessels may result in strikes; 2. vessel speed is a factor**
- **<u>Suggest</u>: move the vessels (- routing measures -) or slow them (- vessel speed restrictions -)**
- **these are specific directives and removes the onus from mariner & the uncertainty of a response**

Conclusions & Recommendations

- no easy fixes; no existing technologies will eliminate the problem
- some technologies provide improved detection – but, notification of, processing & response by, operator -- a separate issue (!)
- need to ensure pursued technologies: are truly capable of reducing strikes; add no new environmental impacts (e.g., noise); & use is not in lieu of effective ship strike reduction measures in the meantime
- consider use of multiple integrated technologies, e.g., predictive modeling (basin-scale voyage planning); passive acoustics (regional); and active acoustics (100s of meters)
- passive acoustics and predictive modeling are perhaps the most likely (i.e., efficient and cost effective) near-term candidates; others need R&D, cost reductions, and proven capabilities