TRB TRANSPORTATION RESEARCH BOARD

OF THE NATIONAL ACADEMIES

Committee to Review the Buzzards Bay Risk Assessment Report

Presentation to the Marine Board

November 19, 2013

Committee

Chair and
Risk Assessment
Paul S. Fischbeck

Maritime Risk Assessment
& Mitigation
Ali Mosleh, NAE

Risk
Assessment
Milt Levenson, NAE

Naval
Architecture
R. Keith Michel

Safety Regulations and
Environmental Protection
Thomas M. Leschine

Oil Spill Consequence & Modeling
and Cost Analysis
Malcolm L. Spaulding

Tug & Barge
Operations
William L. Hurley, Jr.

Involved Parties

State and Federal Roles

- **MassDEP**

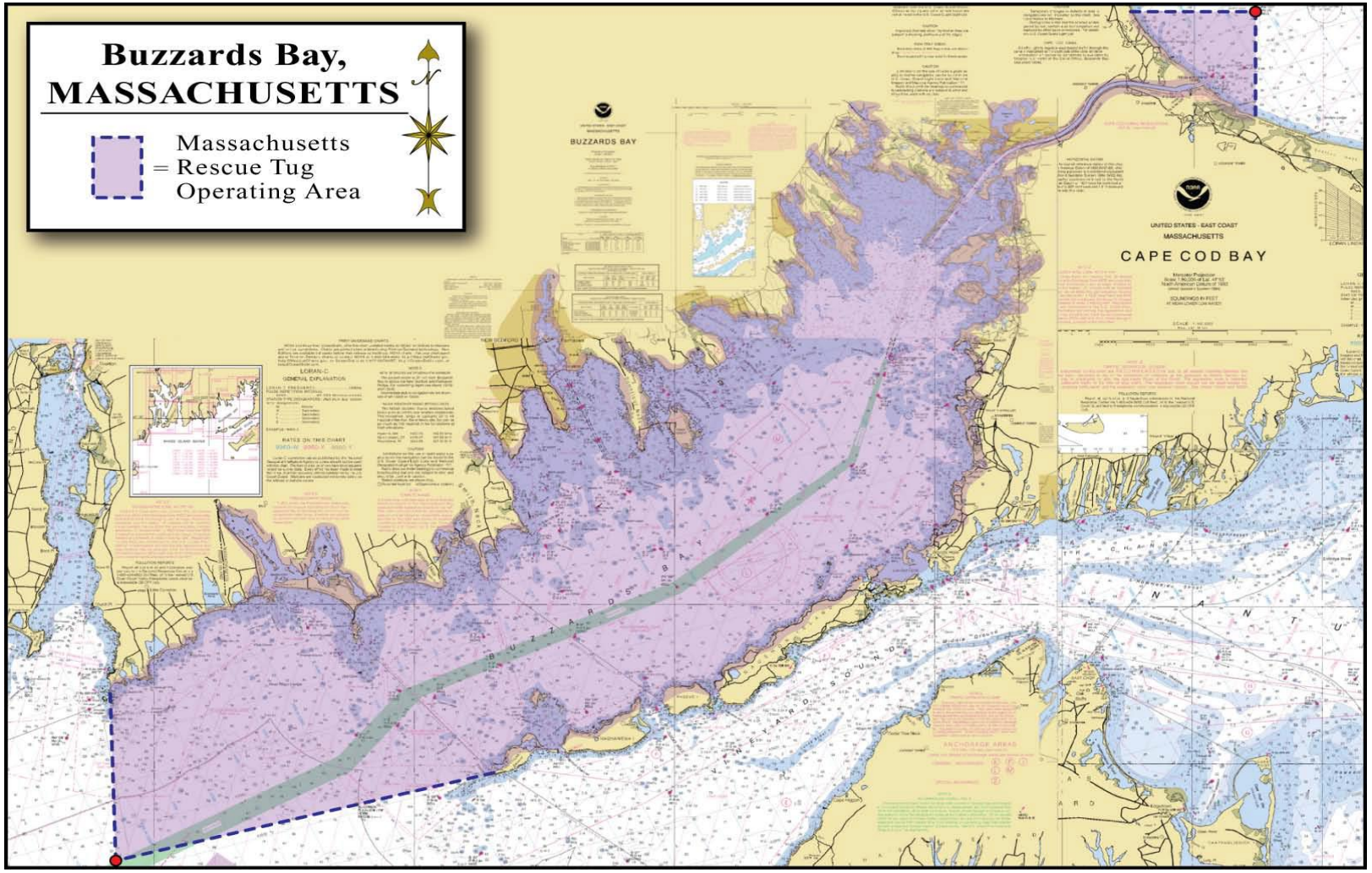
  Responsible for implementing laws and regulations concerning the prevention and remediation of oil spills in Massachusetts and its waters

- **USCG**

  Responsible for developing and implementing policies and procedures that support commerce, improve safety and efficiency, and facilitate dialogue within the maritime community

Although the overall goals are aligned, the agencies have taken different approaches to reducing the risks associated with oil barge traffic through Buzzards Bay and the Cape Cod Canal.

The Study Area



Context

- In April 2003, an single-hull oil barge went aground causing severe environmental damage
- Since then, Massachusetts and USCG have disagreed as to which risk-mitigation alternatives to implement
  - Additional pilots
  - Escort tugs
- The two parties funded a risk assessment to evaluate the options for reducing the risk of oil spills
  - Buzzards Bay Risk Assessment (BBRA)
- The assessment found additional pilots to be more cost effective than escort tugs

Background

In March 2013, representatives of the Commonwealth of Massachusetts Department of Environmental Protection (MassDEP) contacted the Transportation Research Board of the National Academies and requested that it conduct an independent technical evaluation of the Buzzards Bay Risk Assessment (BBRA) that had been performed by Homeland Security Systems Engineering and Development Institute (HS SEDI). TRB appointed a committee and charged it with reviewing the scope, methods, and data of the BBRA.

Study Objectives

The committee was tasked to answer the following:

- Is the **scope** of the analysis (type and extent of data gathered) sufficient to support the decisions that are being made on the basis of its results?

- Are the **methodologies** that are used appropriately applied to estimate the risk-reduction benefits of each alternative?

- Do the **data** support the authors' judgment and ranking of risk mitigation options?

Study Process

- 1 ½ day public meeting
  - August 5-6, 2013
  - National Academies J. Erik Jonsson Conference Center, Woods Hole, MA
- Briefings
  - Nuka Research and Planning Group
  - MassDEP
  - USCG
  - HS SEDI contract team
- Closed-session deliberations

Summary of the Report

The committee found **significant limitations** with the BBRA that bring into question its scope, methods, and data. For example,

- Failure to conduct hazard analysis, so that study could address root causes
- Use of a "change analysis" approach without a base case
- Reliance on irrelevant/out-of-date data
- Application of qualitative measures without defining scales
- Reliance on experts who were neither independent nor representative of the expertise needed
- Failure to include uncertainty or sensitivity analyses
- "Black box" application of economic methods

Bottom Line

The Committee believes that

- The ranking of the risk-mitigation options in the report (i.e., additional pilots, conditional escorting based on weather, and escorting at all times) is not justified and could be reversed with slightly different and more defensible methods and/or assumptions.

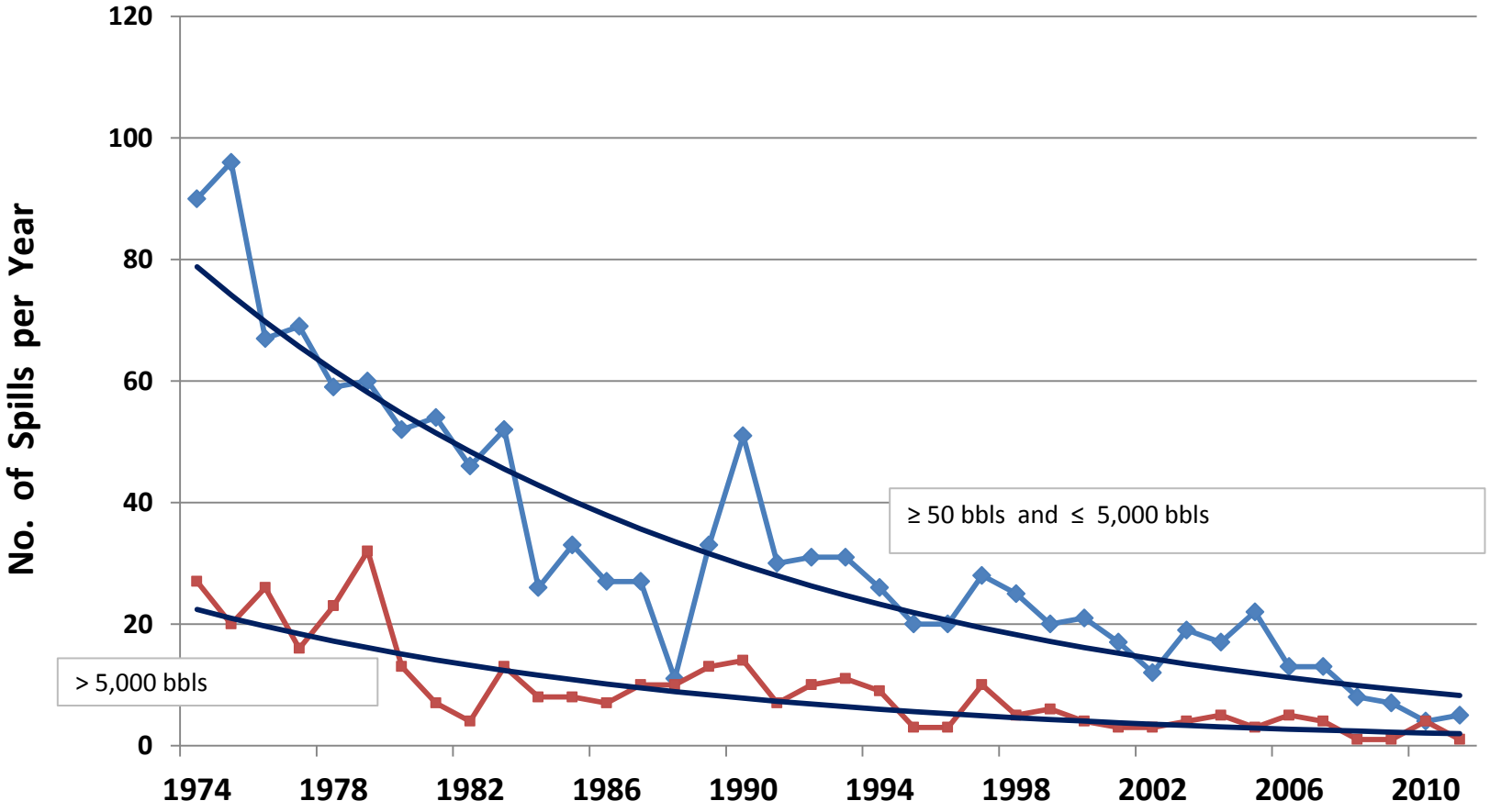
- Policy decisions should **not** be based on this assessment

One Example: Estimating Frequency of A Spill

- Though not a stated requirement of the BBRA, the risk estimate of a spill is critical to the assessment
- Identified 8 spills over the past 72 years and concluded 1 spill every 9 years
  - Huge risk reduction in oil transportation over 72 years
  - Double-hull barges have very different risks
  - Gross overestimation of the risk
- Impact of more accurate spill risk calculation
  - Differences in spill risk by accident type
  - Cost-benefit analysis could be very different

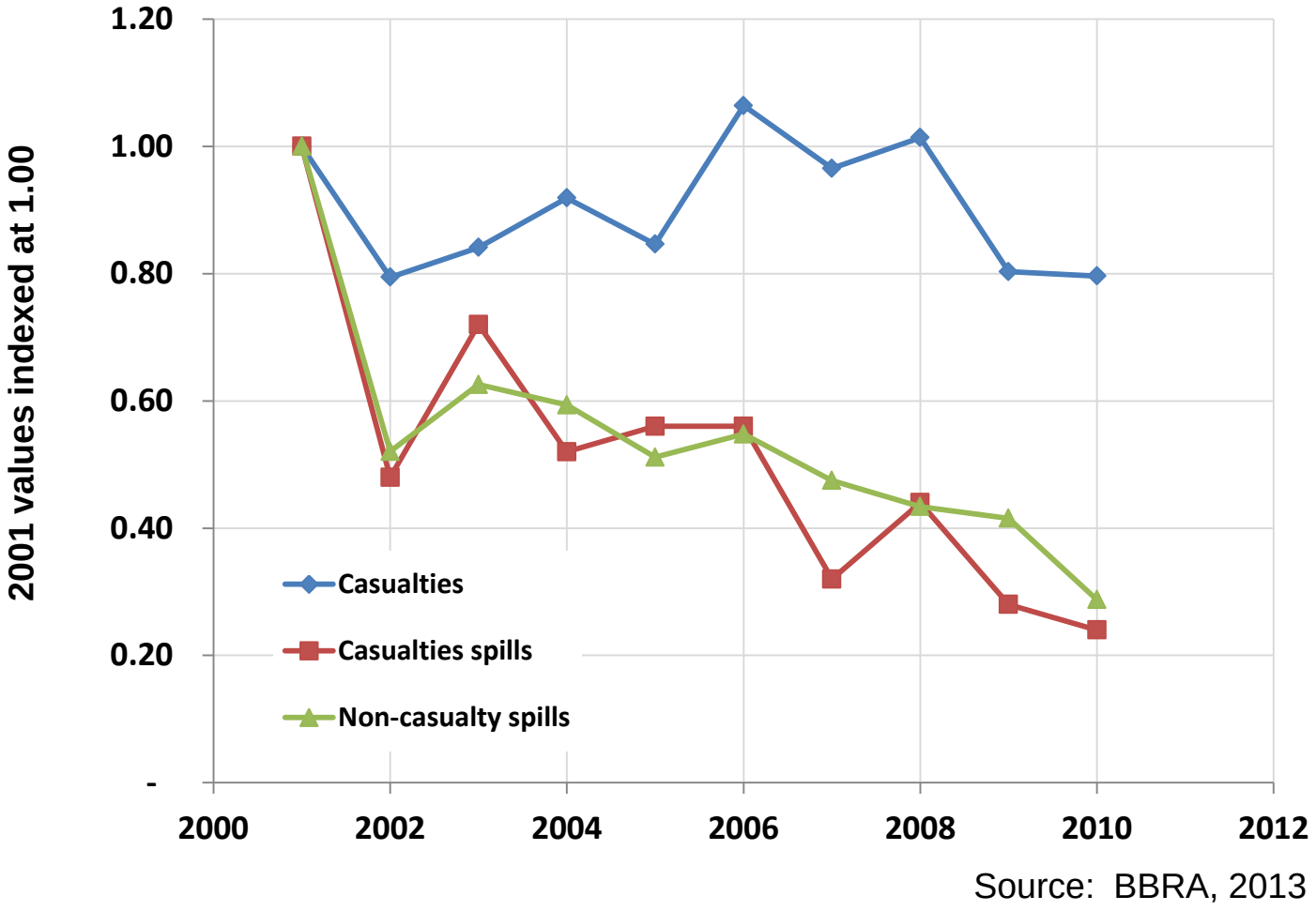
Trend in Oil Spills per Year

International, all tank vessels



Source: ITOPF 2012

Impact of Double-Hull Barges



Source: BBRA, 2013

Comparing Benefits to Costs: Guidelines (A) vs. BBRA (B)

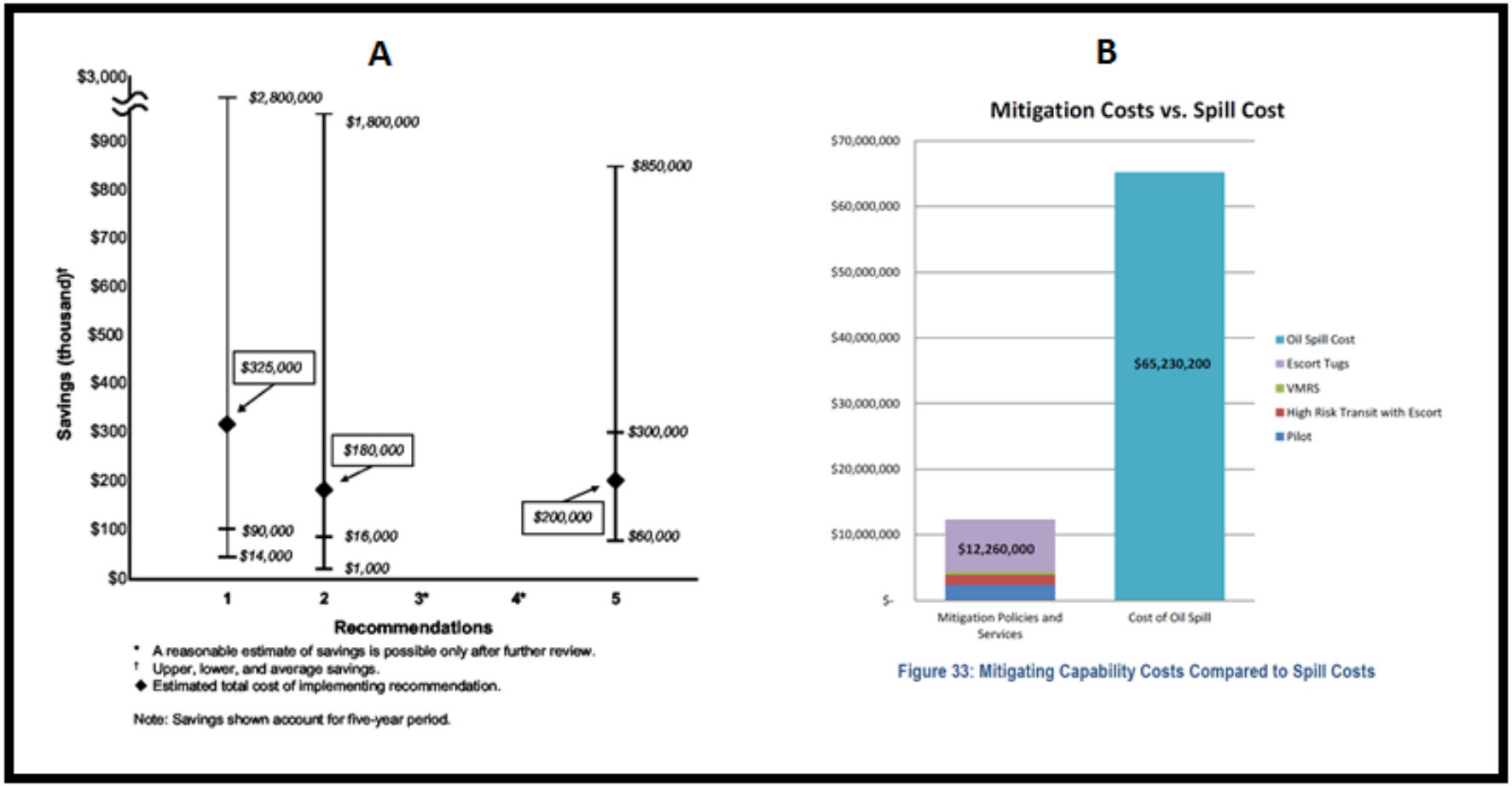


Figure 33: Mitigating Capability Costs Compared to Spill Costs

Conclusions

- The committee's concerns are broad and deep
- The BBRA erred in its scope, methods, and data
- Its conclusion (the ranking of risk-mitigation options) might easily change with slightly different assumptions/elicited values or with modeled uncertainty
- This sensitivity should have been investigated
- Because of these concerns, policies should not be based on the BBRA's conclusions