Calibration of Research Vessels: Implications for MRFSS to MRIP

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March 27, 2012


RV Albatross IV

FRV Henry B. Bigelow

Objectives

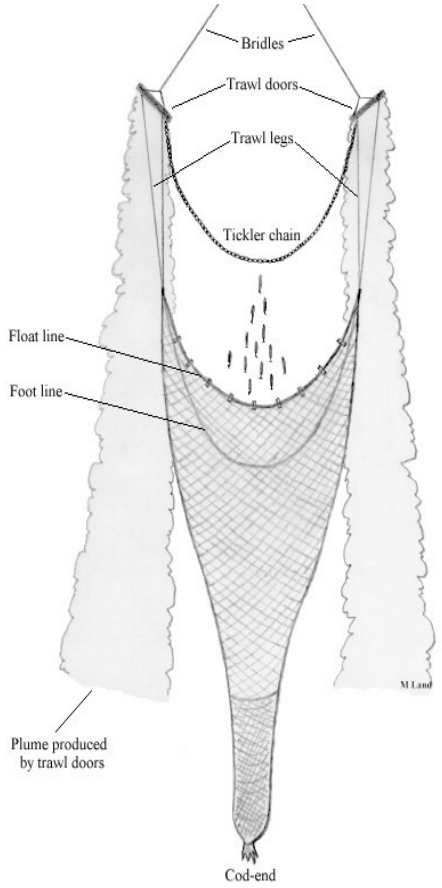
- Draw parallels between inter-vessel calibration and changes in recreational catch survey methodology
- Changing series without breaking them
- Need for Committees, Reviewers and Terms of Reference
- Blend of theory and empiricism
- Transition Process

"Scientists are perennially aware that is it best not to trust theory until it is confirmed by evidence. It is equally true...that it is best not to put too much faith in facts until they are confirmed by theory"

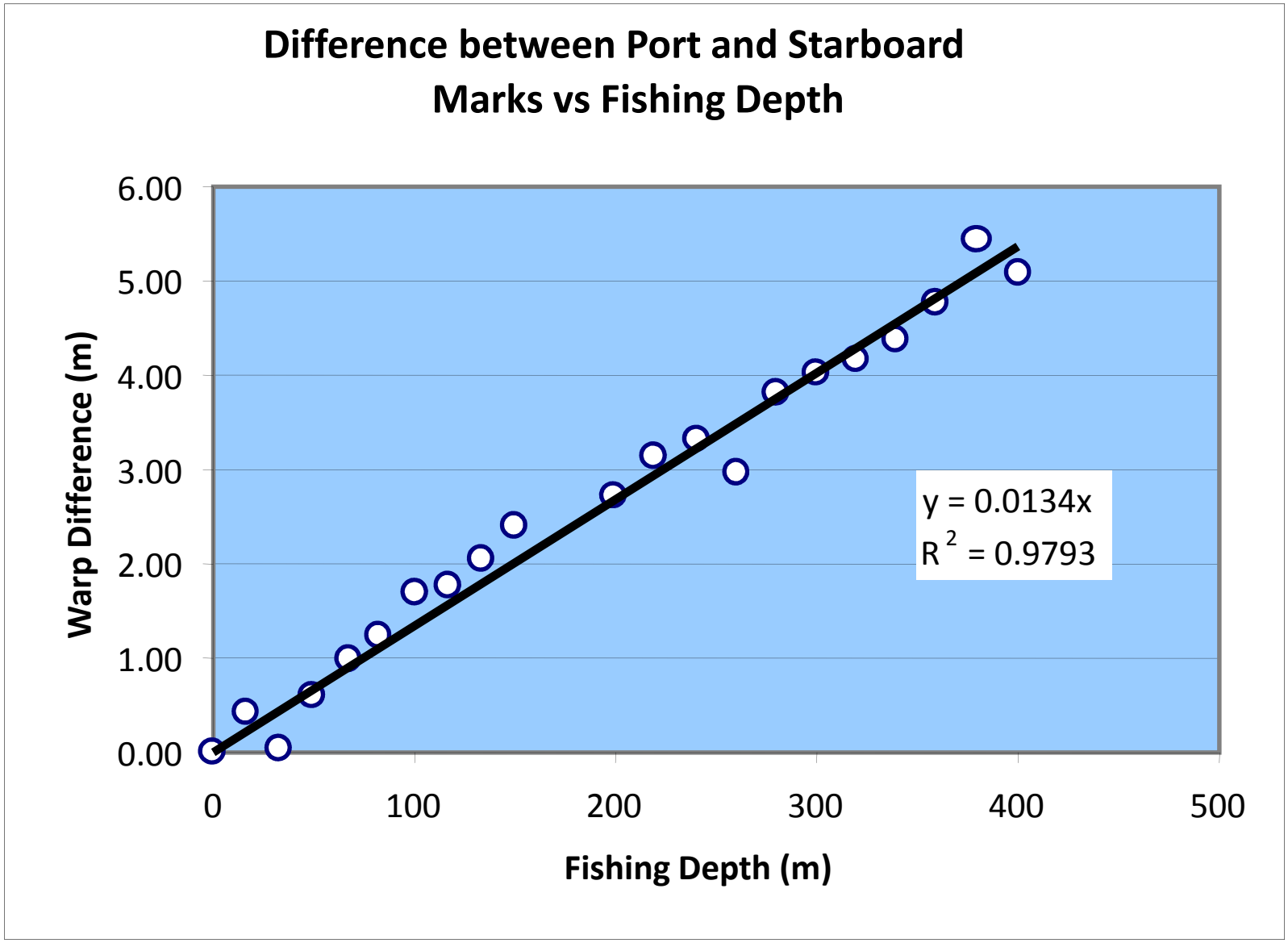
Robert H. MacArthur, 1972

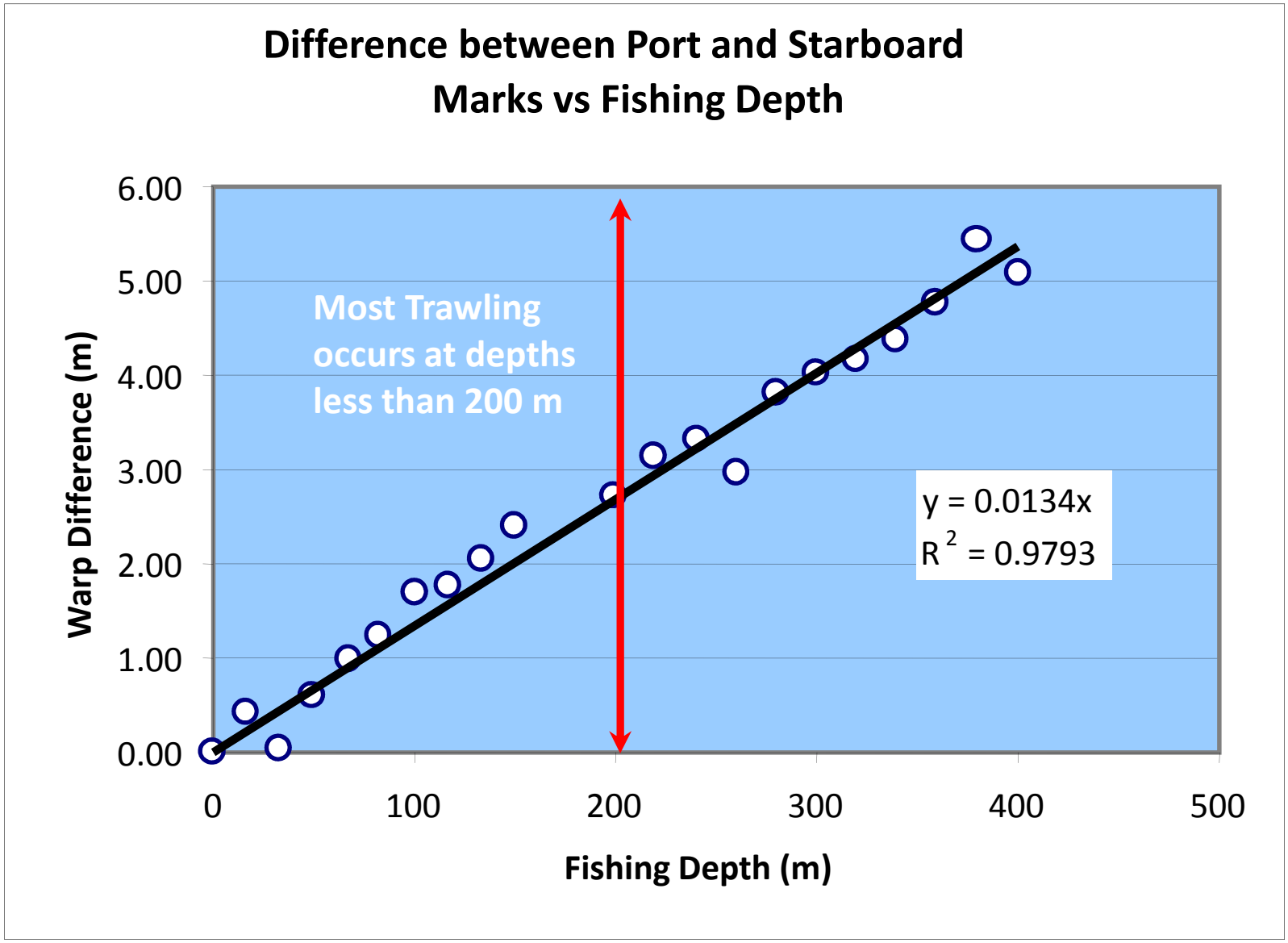
Trawlgate: The Lowlights Section

- **Problem**
  - Cables found to be mismarked
  - Asymmetry Problem affected 8 surveys
  - Unknown effects on catchability
- Severe initial impacts on scientific credibility
- Stimulated wide ranging efforts to
  - Identify magnitude of problem
  - Detection of possible effects
  - Experimental Comparisons
  - Improve QA/QC procedures
  - Engage Industry in design and selection of gear



All sunshine makes the desert
Arab Proverb


Difference between Port and Starboard Marks vs Fishing Depth
Warp Difference (m)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
100
200
300
400
500
Fishing Depth (m)
y = 0.0134x
R 2 = 0.9793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Fishing Depth (m)
Most Trawling occurs at depths less than 200 m
y = 0.0134x
R 2 = 0.9793

Time Line of the Major Events

- Meetings, Workshops and Cruises
  - September 2002: Trawl Warp Video Cruise
  - October 2002: Open workshop to evaluate video cruise
  - October 2002: Groundfish Assessment Review Meeting (GARM)
  - October 2002: Stakeholder input into design of trawl warp experimental cruise
  - October-November 2003: Trawl Warp Experimental Cruise
  - January 2003: Open workshop to review analyses of trawl warp experiment
  - February 2003: Open peer review session to evaluate analyses of trawl warp experiment

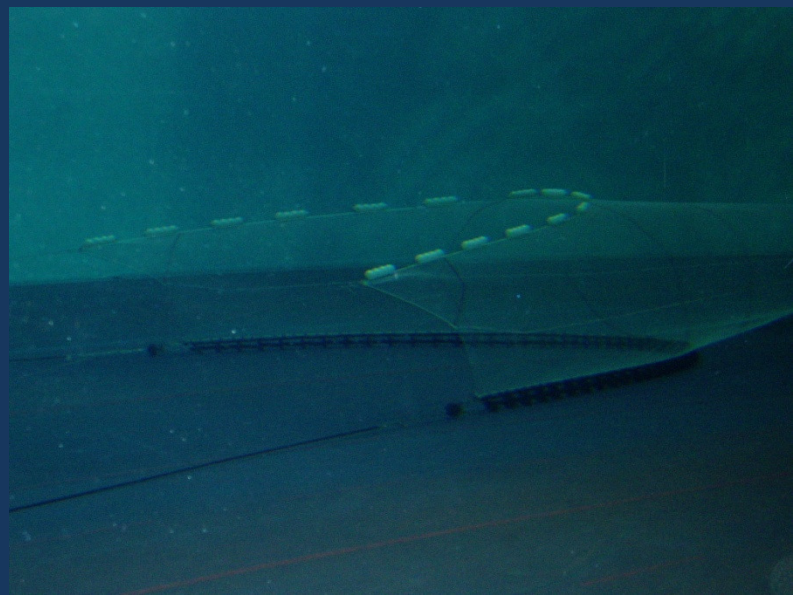
Mid-Atlantic & New England Trawl Survey Advisory Panel

- Joint panel between the Mid-Atlantic and New England Fishery Management Councils and the NE Fisheries Science Center

- <u>Committee Membership</u>
  - Two Members Mid-Atlantic Council
  - Two Members New England Council
  - Four Stakeholders (2 NE, 2 MA)
  - Four Academic members
  - Two Northeast Fisheries Science Center staff

Mid-Atlantic & New England Trawl Survey Advisory Panel

- **Key Accomplishments:**
  - Preliminary trawl system design for the FRV Henry B. Bigelow
  - Key recommendations regarding Bigelow vessel attributes including warp diameter
  - Recommendations concerning net sensor positioning
  - Advice concerning outreach tools and strategies to industry



Need for Calibration

- Bottom trawl surveys have been conducted by Northeast Fisheries Science Center (NEFSC) since 1963 to monitor changes in abundance and distribution of demersal and pelagic fisheries resources from the Gulf of Maine to Cape Hatteras.
- FRV Albatross IV has come to the end of its operational life and was replaced by the FRV Henry B. Bigelow in the spring of 2009.
- Series of experiments were designed to estimate conversion factors for the catch rates of the two vessels.
- Changes to the fishing gear, tow duration, towing speed and operational protocols were also implemented for the Bigelow surveys. The changes arose as part of the Trawl Warp controversy, commonly known as “Trawlgate”

NEFSC Bottom Trawl Changes

- Vessels
  - FV Albatross IV & Delaware II
  - FRV Henry B. Bigelow
- Bottom Trawl Gear
  - Yankee 36 Bottom Trawl
  - Modern Trawl Gear Designed in Conjunction with Stakeholders
- Survey Design
  - Collapse 3 surveys into 2
  - Depth coverage
  - Stratification
- Changes to Survey Protocols


RV Albatross IV

FRV Henry B. Bigelow

Time Line for Conversion

- Internal Discussions on theory/experimental design: 2006
- An expert panel was convened on 25–27 April 2007 to review the experimental designs.
- The actual experiments were conducted in the spring and autumn of 2008.
- 636 pairwise tow comparisons; data analyses, new methods
- A second expert panel was convened on 11–13 August 2009 to review the results of these experiments and the subsequent analysis.
- Beginning in 2009 the bottom trawl surveys were conducted by the FRV Henry B. Bigelow alone.

Ancillary Analyses Necessary

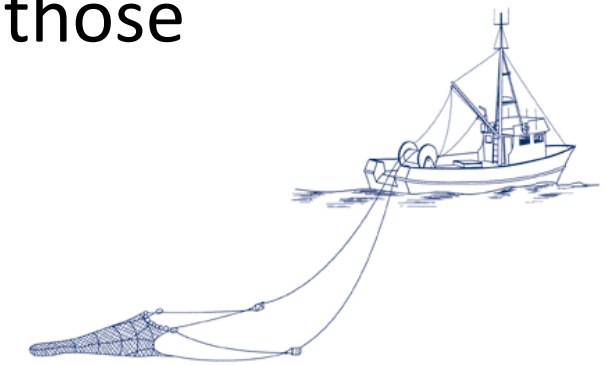
- NEFSC staff on the background for the changes, the experimental design and field data collection process, conversion factor analysis and an analysis of the age-frequency and size-at-age data.
- The latter study was focused on the possibility that changes in the fishing gear (and selectivity) could have an impact on the age/size frequency and the determination of growth characteristics.
- Full implementation of the calibration coefficients has been slow since each benchmark assessment reveals additional issues to consider.

Model Based Conversion Factors?

- Appropriate for Vessel Conversion factors
  - Ratio
  - Overdispersion
  - Random Effects
  - Detailed species specific models
  - Measure of Trend
- Utility for Recreational Catch is questionable
  - Ignores underlying design of survey
  - Long-term hindcast to MRIP equivalents vs short-term conversion to MRFSS
  - Measure of Scale
  - Logical Cul de Sac—why convert to poorer estimates?

Perspective

- Surveys are durable scientific legacies that reflect a long-term commitment to consistent, repeatable and interpretable measures of performance.
- The “Grand Syntheses”, made possible by such commitment, are often the products of very dull, tedious, repetitive tasks
- MRIP, like Fishery Independent surveys, must anticipate future uses well beyond those envisioned at its inception.



Scientific Surveys Must Meet Unanticipated Demands

Fishery Independent

- Advances in population estimation methods.
- Allocation of resources among jurisdictions
- Management demands
  - Season and area closures
  - Effects of gear changes
- Ecosystem monitoring
- Habitat identification

Recreational Surveys

- Allocations by Jurisdiction
- Conservation equivalency
- Economic analyses
- Trade-offs with Commercial Catch
- Distributed data collection programs

Recommendations

- Be specific in Terms of Reference—You will get what you ask for, even if you didn't mean it.
- Be prepared for the unexpected recommendations from reviewers; most scientists are human and fickle. Be wary of small sample sizes.
- Major compromises in protocols may be needed as a result of review process
- Not all questions will be answered by a review; ongoing work is necessary; Need to allow for finalizing the details
- Solutions are not the same everywhere; consider regional differences
- Public and Press require constant attention but neither are likely to be satisfied
- The utility of surveys is one of the most difficult topics to communicate to fishermen
- Transition done without sufficient planning and resources will result in significant disruption to stock assessment and management systems. Essential Coordination {Scientists, Managers, Fishermen}


Ecosystem Survey Branch

Population Dynamics Branch


HENRY B. BIGELOW
Atlantic
The End