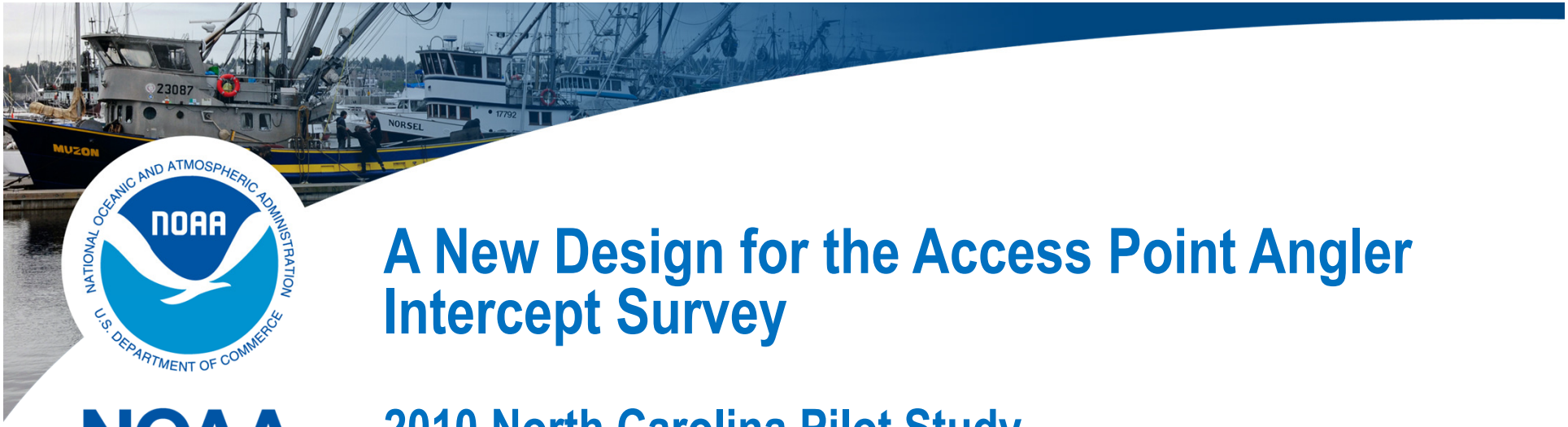

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A New Design for the Access Point Angler Intercept Survey

2010 North Carolina Pilot Study

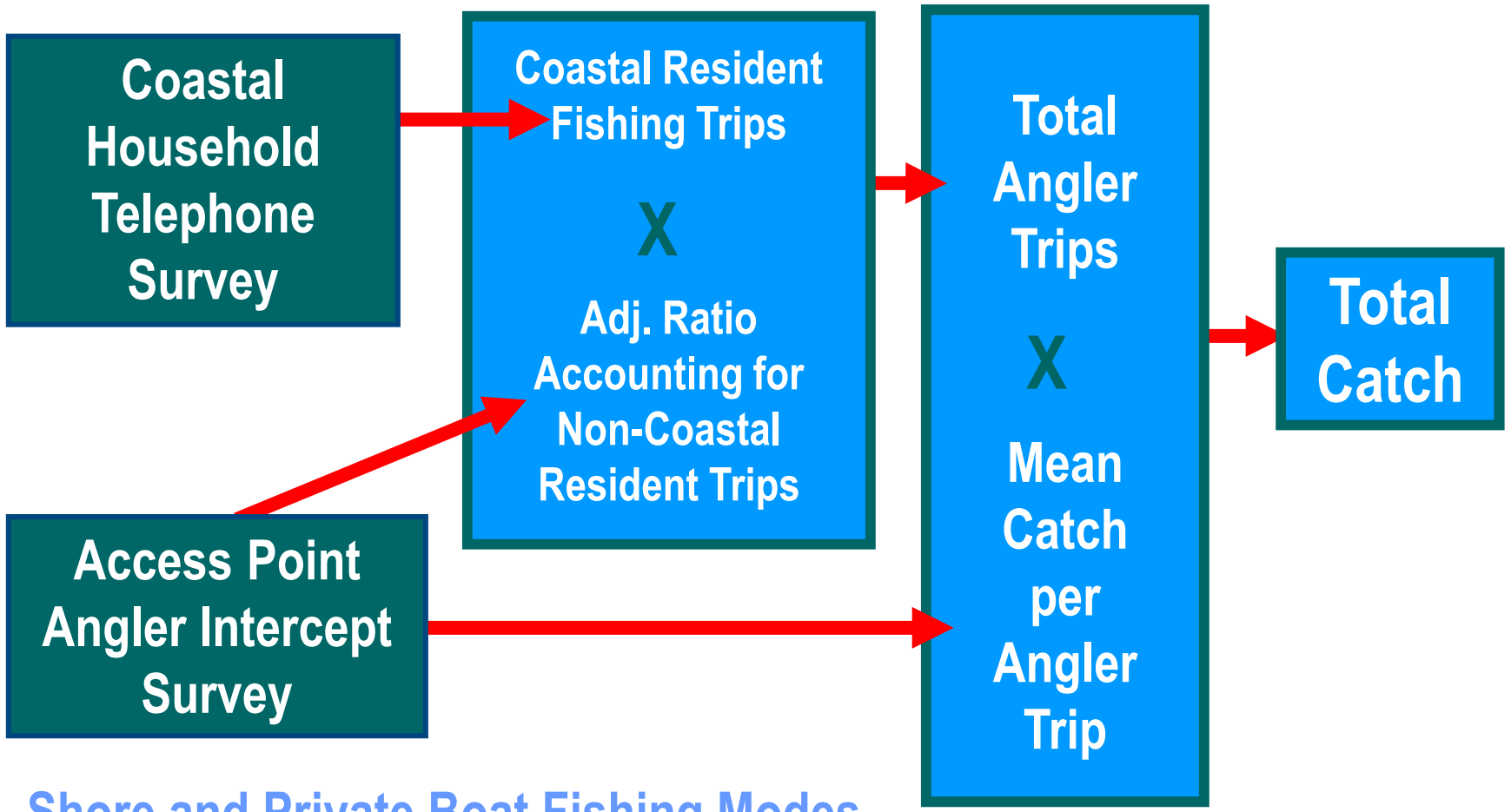
Dave Van Voorhees

Co-authors: Jay Breidt, James Chromy, Kelly Fitzpatrick, Han-Lin Lai, Terri Menzel, Douglas Mumford, Breda Munoz, Jean Opsomer, Ronald Salz, Kevin Sullivan, Chris Wilson, Patricia Zielinski

MRIP Calibration Workshop #2
Charleston, SC
September 8-10, 2014

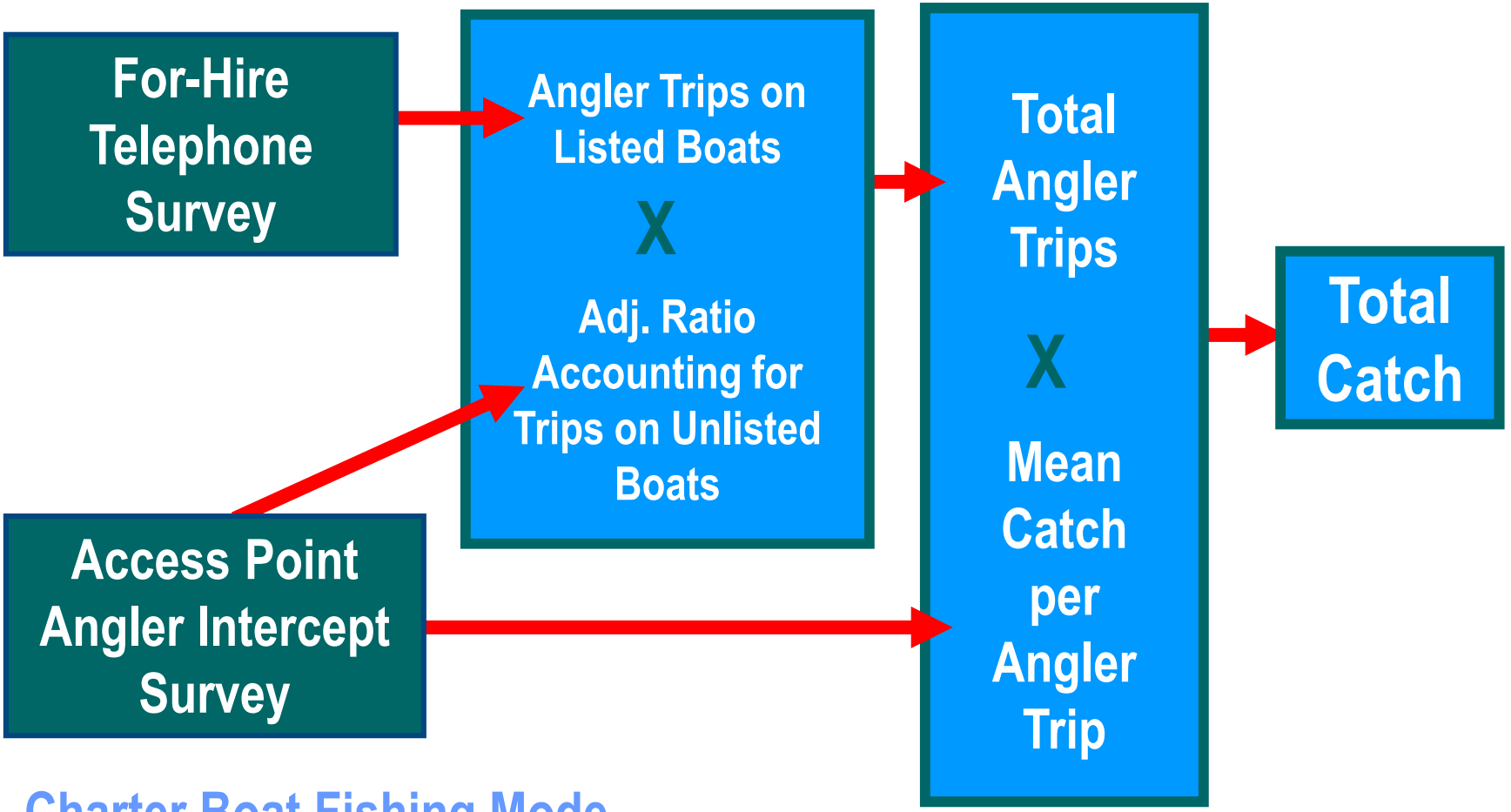
Complemented Surveys Approach

Atlantic Coast & Gulf of Mexico



Shore and Private Boat Fishing Modes

Complemented Surveys Approach
Atlantic Coast & Gulf of Mexico

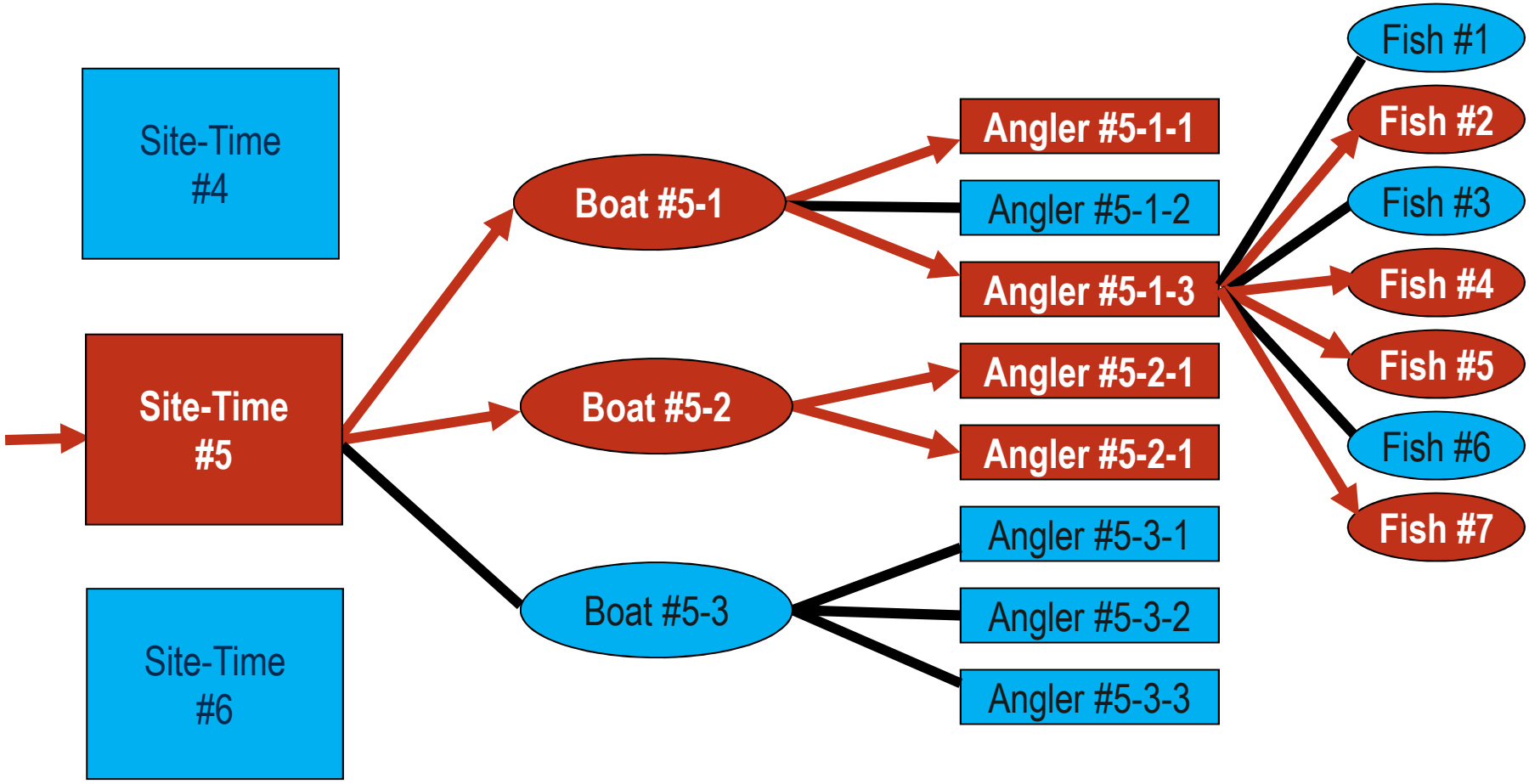


Charter Boat Fishing Mode

What is an Access Point Survey?

- On-site survey to collect catch data
- Sampling of completed angler fishing trips
- Spatiotemporal sampling frame
  - Matrix of fishing access sites and time intervals
- Multi-stage cluster sampling

Multi-Stage Cluster Sampling
of Private Boat Angler Fishing Trips



Stage 1 (PSUs) **Stage 2 (SSUs)** **Stage 3 (TSUs)**

Why a New Design for the APAIS?

2006 National Research Council Review:

- Determine sample inclusion probabilities and use them to weight trip data in estimation
- Develop more formalized probability sampling protocols with known inclusion probabilities for all PSUs
- Expand temporal coverage

New Weighted Estimation Method

- Breidt, et al. (2011) ➔ weighted estimation method
  - Estimated inclusion probabilities for all sampled trips
  - Mix of straight design-based weights and modeled design weights
  - Accounts for both stratum weights and stage weights

- 2012 re-estimation of Atlantic and Gulf of Mexico catch statistics for 2004-2011

- Calibration based on 2004-2011 comparisons used to revise statistics for earlier years

Why a New Sample Design?

- Breidt, et al. (2011)
  - Need to change sampling focus:
    - Too much attention on maximizing number of angler trips intercepted
    - Focus should be on maximizing number of site-days sampled
  - Need to spread out sampling:
    - Emphasis on maximizing interviews per on-site hour and caps on number of interviews per site visit ➔ compressed samples of trips
    - Better to spread out interviews obtained within each site-day assignment
  - Need to eliminate “alternate” sites:
    - Visits allowed to sites not pre-determined in probability sampling design
    - Creates unnecessary difficulty in development of appropriate weights for intercepts collected at alternate sites

Why a New Sample Design?

- Breidt, et al. (2011)
  - Need to get accurate counts of all completed trips on site
    - Maybe too much emphasis on maximizing interviews
    - Equally important to know size of cluster of trips within a sampled site-day
    - Sampling fraction needed for inclusion probabilities used in weighting
  - Should consider approach to cover trips throughout the day
    - Focus on visiting sites during peak activity period of the day
    - Nighttime and off-peak daytime trips generally not sampled and assumed to be similar to peak period trips

New Sampling Design

- Project Team started in 2009
- 2010 North Carolina pilot study:
  - Conducted side-by-side with old design
  - Final Report (Breidt, et al., 2012):
    - Recommended coast-wide implementation
    - Recommended possible further enhancements
  - Independent peer reviews endorsed implementation

What's Different in the New Design?

- Maximize number of site-days observed
  - **Not the number of angler interviews!**
  - Precision of multi-stage survey estimators depends almost exclusively on number of primary sampling units (site-days) observed
- Improved sample frame:
  - Spatial component consists of single sites and multi-site clusters
    - Less active sites combined into 3-site or 2-site clusters
    - More active sites stand alone
  - Increased temporal stratification➔ **6-hour time blocks**
    - Better temporal coverage
  - Increased geographic stratification ➔**some state subregions**
    - Better geographic representation
    - Easier staffing

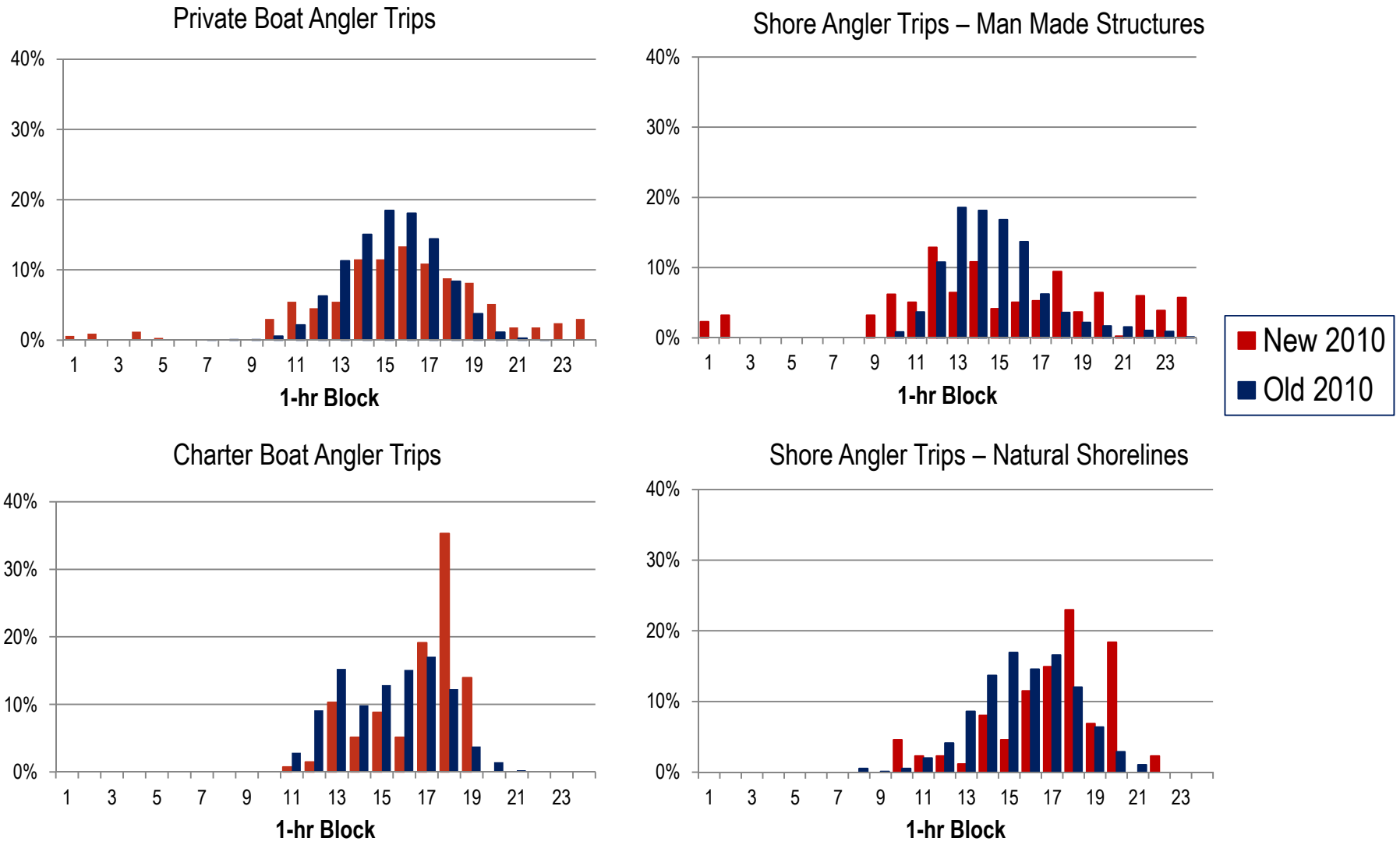
What's Different in the New Design?

- Fully formalized probability sampling:
  - Probability-proportional-to-size sampling of site-time units (PSUs)
    - Size = expected fishing activity
    - Inclusion probabilities for all PSUs known
  - Attempt to intercept all completed angler trips on site
- Accurate counting of all trips within sampled site/time unit
  - Sampling fractions at each stage must be known
  - Important for proper weighting of data

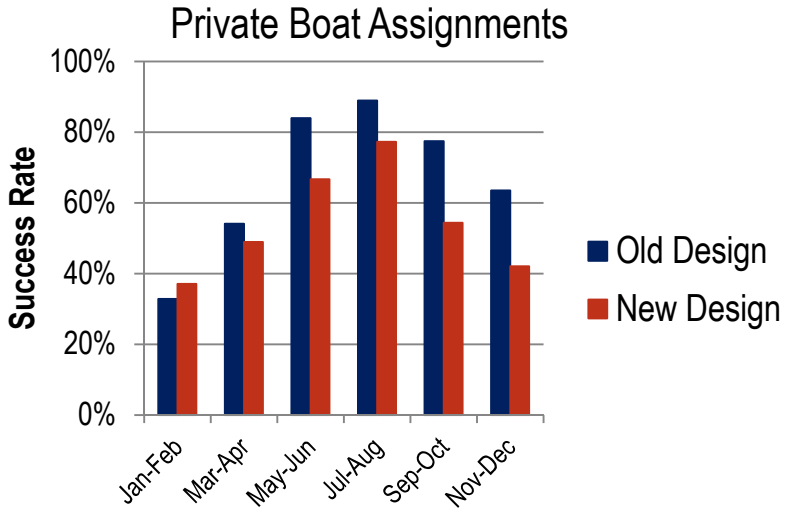
What's Different in the New Design?

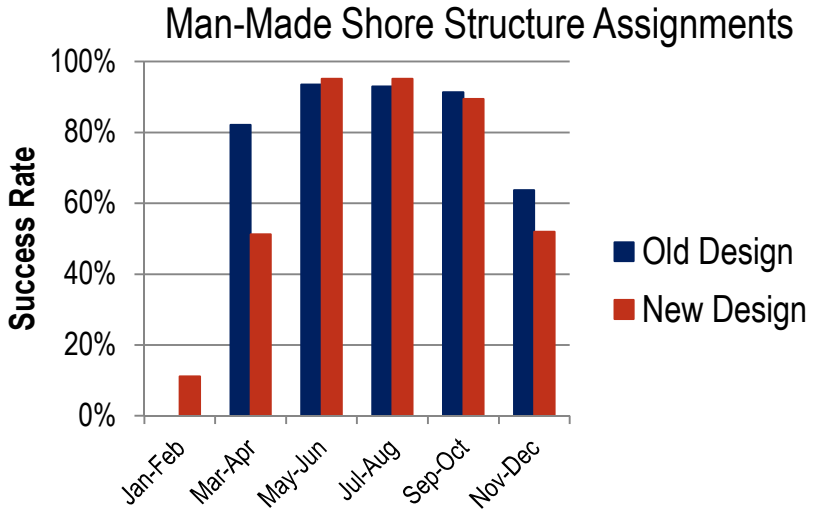
- Emphasis on completing all site-time assignments
  - "Controlled selection" advocated (later developed by John Foster)
    - Draws thousands of possible sets of assignments
    - Eliminates sets that don't match staffing constraints
    - Selects one of remaining sets at random
  - No canceling or re-scheduling of assignments
- Samplers cannot decide when/where to conduct interviews
  - Fixed time interval for each site assignment
  - Fixed order of sites for multi-site assignments
- No limit on number of interviews per assignment

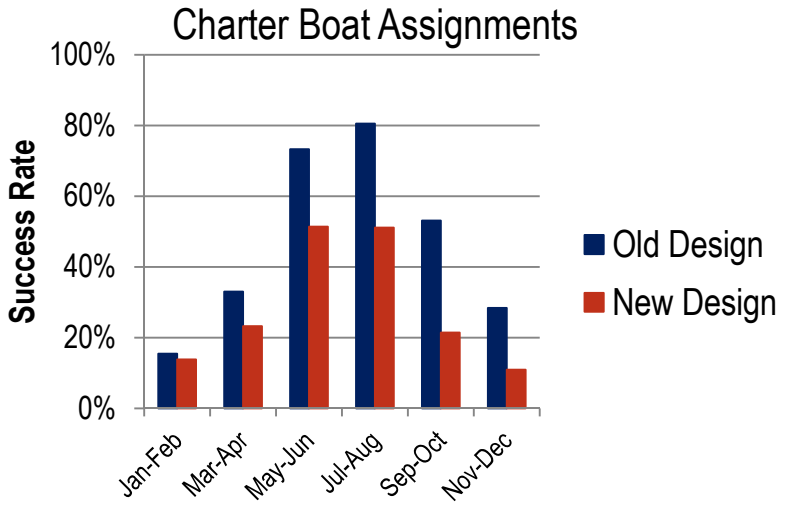
Pilot Study: Enhanced Temporal Coverage

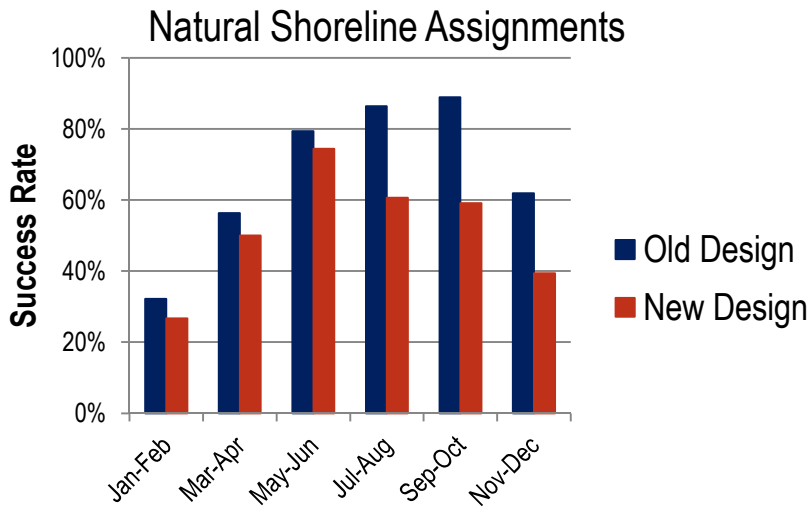


Pilot Study: Reduced Efficiency?

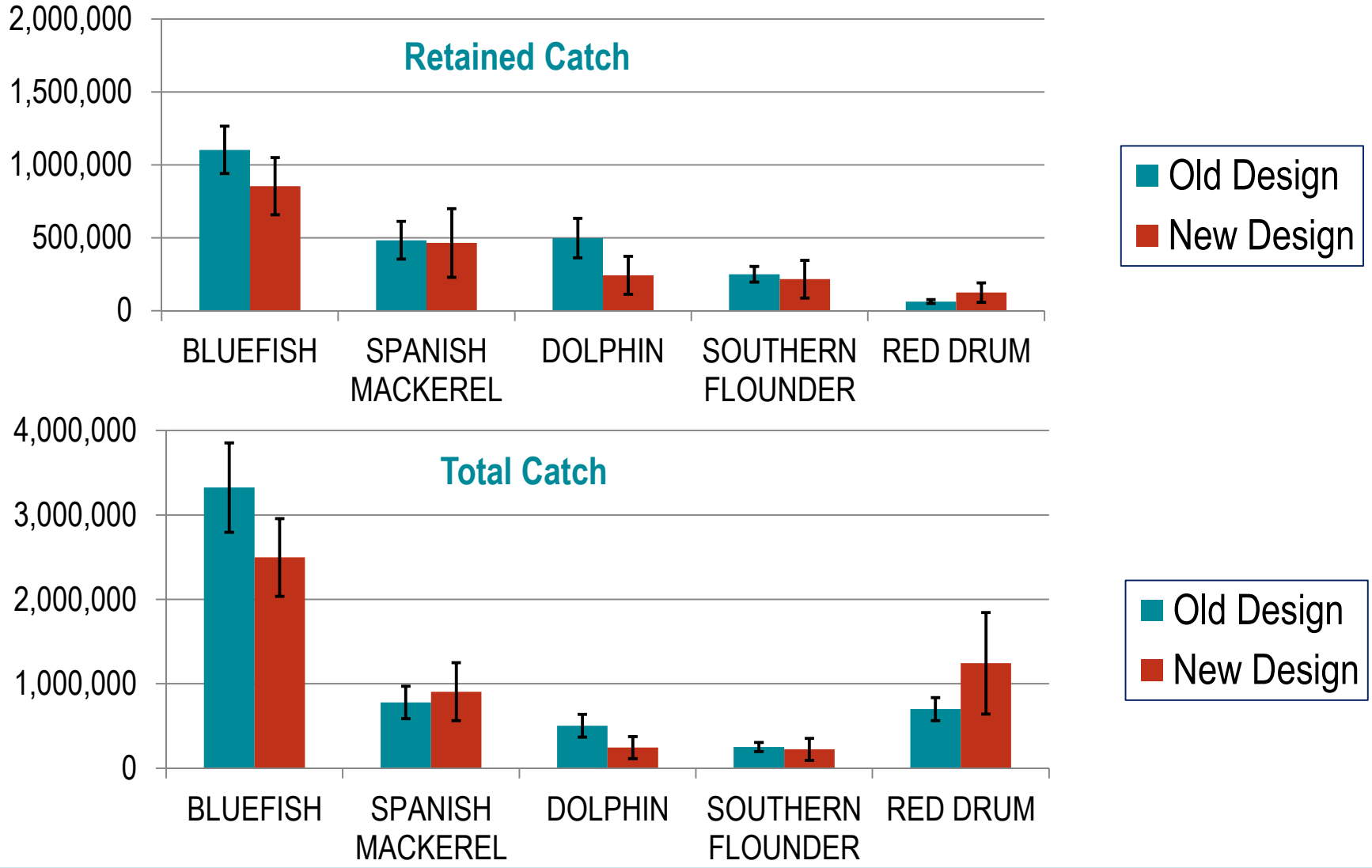








Pilot Study: Estimation Differences?



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Bars indicate 95% confidence intervals

Adequate Statistical Precision?

- Pilot study: New design less “productive” than Old
  - Fewer angler trip interviews per assignment
  - Higher proportion of assignments with no interviews
  - Sampling efficiency not optimized in Pilot
- Simulation studies:
  - New design could provide more statistical precision
    - With equal sample sizes (number of PSUs)
    - With optimized sampling allocations among strata
- Precision could be further improved:
  - Adjustments to PSU selection probabilities in PPS sampling

Conclusions

- New design greatly reduces potential for bias in many ways
- Feasible to sample nighttime and off-peak daytime fishing trips as needed to achieve full temporal coverage
- Performance of new design can be optimized to provide:
  - Higher levels of productivity
  - Higher levels of statistical precision

Thank you!

Consultants:

- F. Jay Breidt, Colorado State University
- Jean D. Opsomer, Colorado State University
- James R. Chromy, RTI International
- Breda Muñoz, RTI International

References

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