NOAA FISHERIES

Office of Science and Technology

MRIP: A New Design of the Access Point Angler Intercept Survey

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What is an Access Point Intercept Survey?

- **On-site survey** to collect catch data (access point)
- **Sampling** of completed angler fishing trips (intercept)
- **Spatiotemporal sampling frame:** matrix of fishing access sites and time intervals
- **Multi-stage cluster sampling** (survey)

National Research Council Review (2006)

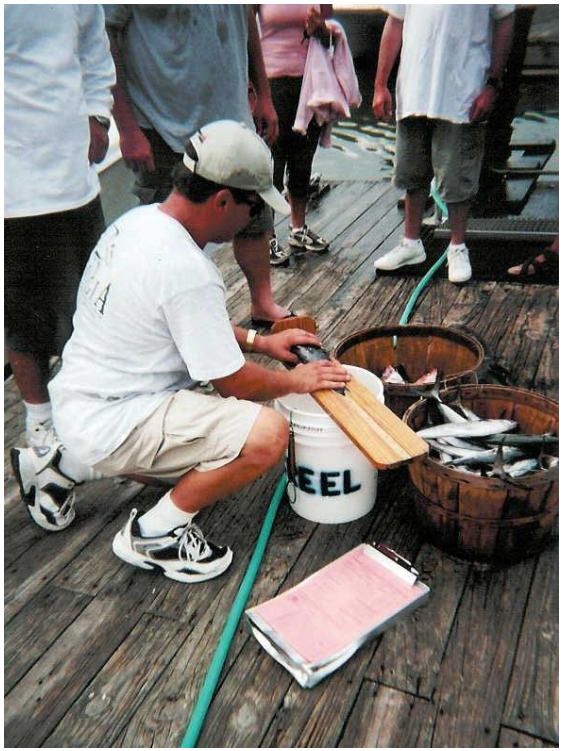
Recommendations for Improvements and Revisions to Access Point Intercept Survey

Need to eliminate "alternate" sites –
unknown and inconsistent selection probabilities

Need to get accurate counts of all completed trips on site –
needed for sample weighting

Should consider approach to cover trips throughout the day –
peak fishing period has been focus, need to cover all time periods

New APAIS Sampling Design



Project Team started in 2009

- Develop new intercept design

2010 North Carolina pilot study:

- Conducted side-by-side with old design (MRFSS)
- Final Report (Breidt, et al., 2012):
  - Recommended coast-wide implementation
  - Recommended possible further enhancements
- Independent peer reviews endorsed implementation

APAIS: MRFSS vs MRIP Design

MRFSS (pre-Mar., 2013)

- Single site sampled
- Alternate sites allowed; use and sites field selected
- "Peak" sampling time selected by sampler
- "Peak" time sampling mandated
- Fishing mode assigned; alternate mode allowed
- Early years did not tally all eligible anglers
- Sampling probability unknown

MRIP (Mar., 2013 – present)

- Site-cluster sampled
- Cluster sites predetermined; mandatory visits
- Sampling time of day and length ot stay predetermined
- All periods of day sampled
- Initial: Single mode stratified interviewing; modified to allow all available modes
- All eligible anglers tallied; supports sample weight computation
- Sampling probability known

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-site and multi-site clusters
- Increased temporal stratification: 6-hour time intervals
- Increased geographic stratification: state sub-regions

What's Different in the New Design?

Fully formalized probability sampling:

- Probability-proportional-to-size sampling of site-time units (PSUs)
- Attempt to intercept all completed angler trips on site

Samplers do not decide when/where to conduct interviews

- Fixed time interval for each site assignment
- Fixed order of sites for multi-site assignments
- Alternate mode sampling eliminated

No limit on number of interviews per assignment

What's Different in the New Design?

Accurate counting of all trips within sampled site/time unit

- Sampling fractions at each stage known
- Important for proper weighting of data

Emphasis on completing all assignments

- "Controlled selection"
  - Draws thousands of possible sets of assignments
  - Eliminates sets that don't match constraints
  - Selects one of remaining sets at random
- No canceling or re-scheduling of assignments

2013 Design Overview

Complex Stratified Multi-stage with Clustering	
Strata	• Sub region, State, Mode, Month, Kind-of-Day, Interval
Primary Stage Units	• Site cluster-day-interval • A:2am-8am, B:8am-2pm, C:2pm-8pm, D:8pm-2am
PPS Selection	• Estimated Measure-Of-Size defined as expected fishing activity or “pressure” (counts of angler-trips per time period)
SRS at lower stages	

2013 Design Adjustments

Goals

- Accommodate field staff constraints
- Improve interviewing productivity
- Improve spatial and temporal sample distribution
- Maintain same temporal and spatial coverage

How

- Adjustments to site/cluster pressures & clustering rules
- Adjustments to sampling strata and allocation of sample to strata
- Addition of temporal and spatial sorting variables to assignment draw

New replication-based draw program

Generate large set (S_u) of replicate sample draws using uncontrolled (base) design

Filter S_u replicates through constraints to create survivor subset of replicates (S_c)

Select one replicate (a) from S_c using simple random sampling

Replicate a is official sample draw for intercept survey

Standard definition of inclusion probability

$$\pi_i = P(i \in A) = \sum_{a \in A_{(i)}} p(a)$$

(Fuller, 2009)

Modify definition to condition on survivor subset S_c

$$\pi_i = P(i \in A | \boldsymbol{S_c}) = \sum_{a \in A_{(i)} | \boldsymbol{S_c}} p(a)$$

π_i is proportion of survivor draws that contain i

2013 Design Adjustments - Conclusions

Effectiveness of 2013 Changes

- Substantive improvements in interviewing productivity
- Improvements to Charter mode not satisfactory

Additional changes warranted in 2014

- How can we better target sample to productive times of day but still maintain full temporal coverage?
- What else can be done for Charter mode?

APAIS 2014 Design

2 Primary changes

- **Peak interval** – Period of day with highest fishing activity
- **Mixed boat sampling** – both Private/Rental and Charter Boat modes sampled on each assigned day/site-cluster/time

APAIS 2014 Design: Peak Interval

Create a new sample interval

that more closely corresponds to peak fishing activity

Minimize disruption to existing design

P:11AM-5PM

- 6-hour interval
- Covers 2nd half of B interval and 1st half of C interval

APAIS 2014 Design: Peak Interval

Keep existing B and C intervals

- Maintain full coverage 8AM-8PM

Overlapping Intervals

- Possible to draw same site/3-hr time block/date in two intervals
- Requires adjustments to inclusion probabilities, strata definitions

$$\pi_{BP} = \pi_B + \pi_P - (\pi_B * \pi_P)$$
$$\pi_{CP} = \pi_C + \pi_P - (\pi_C * \pi_P)$$

- Requires special field procedures

APAIS 2014 Design: Mixed Boat Sampling

Improve Charter mode
efficiency and productivity

Allow samplers to interview
both Private boat and
Charter boat anglers
during the same assignment

Treat mode of fishing
as domain variable
instead of stratification variable

Replace mode
with site group stratification
in sample frame

APAIS 2014: Mixed Boat Sampling

Existing PR and CH mode strata replaced with site groups

- **Site groups are exclusive** – a site can only belong to one group
- **Site groups are still related to mode**
  - CH sites (only CH, primarily CH, or high CH activity)
  - PR sites (only PR, all other sites not in CH site group)

Site groups have separate clustering, sample allocation, draws

Led to improved productivity particularly for smaller guide boats in Charter sector

APAIS 2016: All Mode Mixed Sampling

Shore Mode added to Mixed Boat mode sampling

- **Site groups are still related to mode**
- **Sites exclusively assigned to a group - hierarchical**
  - CH sites (only CH, primarily CH, or high CH activity)
  - PR sites (only PR, PR relatively high)
  - SH sites (only SH, SH high, low PR and/or CH, what's left)

APAIS 2016: Offshore Stratum (PR mode)

- **Sites with PR activity assigned to a new group**
- **Historical site-intercept data suggests relatively high proportion of PR trips returning fished in offshore (Federal) waters**
- **Improves sampling of trips with rarer occurrence fishes**
- **Strategically used by state (FL, AL, NC?) – assists state surveys**

Thank you!

Questions?