



NOAA
FISHERIES

An Integrated Approach for Allocating Observer Coverage: Standardized Bycatch Reporting Methodology (SBRM)

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What is SBRM?

- A combination of sampling design, data collection procedures and analyses used to estimate bycatch in multiple fleets.
- A structured approach for evaluating the efficacy of the allocation of observer days to multiple fleets to monitor a large number of species under NE and MA FMPs
- 56 separate fleets, 14 FMP species groups + 1 Sea Turtle

- Integrated allocation approach for observer coverage is based on relative precision AND the relative importance of discards
- Methods ensure that sea day allocations are not driven by imprecise estimates of small quantities.
- Includes new fleets as they emerge, e.g. Ruhle Trawl in 2010 and Haddock Separate Trawl in 2011
- Allocations are based on FMP species BUT all species are monitored.
- Responds to new demands, e.g., river herring

Overview

- Data Sources and Stratification
- Discard Estimation and Sample Size
 - Baseline Sea Days
- Importance Filter
 - Filtered Sea Days
 - Expected Achieved CV
- Reporting Cycle
- Summary of strengths and challenges

Data Sources

Northeast Fisheries Observer Program (NEFOP)

- multi-purpose program
- ~14,000 sea days representing ~5,000 trips
- discard ratios

Vessel Trip Reports (VTR)

- define the sampling frame of commercial fleets
- expand discard ratios to total discards

Commercial Landings (Dealer)

Marine Recreational Information Program (MRIP)

Stratification

- Broad stratification scheme is used
- Trips are partitioned in fleets by
 - Geographic region
 - Gear type and mesh size
 - Access area and trip category (scallop fleets)
 - Calendar quarter
- These attributes are known *before* the vessel departs - not based on outcome of the trip
- 56 fleets and 15 species groups
 - Fish, invertebrates, and sea turtles

Discard Estimation and precision

A combined ratio estimator is used

where d = discarded pounds of a species group

k = kept pounds of all species

$$r_{c,j} = \frac{\sum_{h=1}^Q N_h \sum_{i=1}^{n_h} \frac{d_{jih}}{n_h}}{\sum_{h=1}^Q N_h \sum_{i=1}^{n_h} \frac{k_{ih}}{n_h}}$$

Total discards of each species group and fleet

$$\hat{D}_j = \sum_{h=1}^Q K_h r_{c,j}$$

Variance

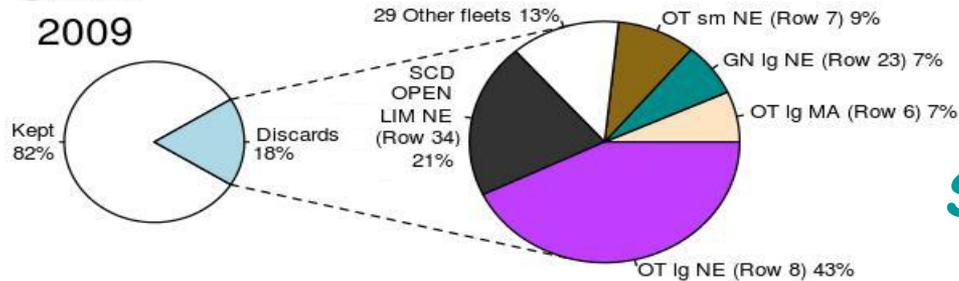
$$V(\hat{D}_j) = \sum_{q=1}^4 K_{qh}^2 \left(\frac{N_{qh} - n_{qh}}{n_{qh} N_{qh}} \right) \frac{1}{\left(\frac{\sum_{i=1}^{n_h} k_{iqh}}{n_{qh}} \right)^2} \left[\frac{\sum_{i=1}^{n_{qh}} \left(d_{jiqh}^2 + (r_{c,j})^2 k_{iqh}^2 - 2r_{c,j} d_{jiqh} k_{iqh} \right)}{n_{qh} - 1} \right]$$

CV

$$CV(\hat{D}_j) = \frac{\sqrt{V(\hat{D}_j)}}{\hat{D}_j}$$

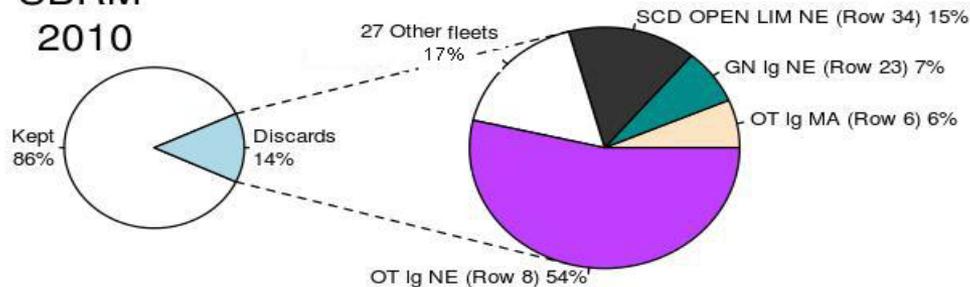
SPECIES: LARGE MESH GROUNDFISH

SBRM
2009

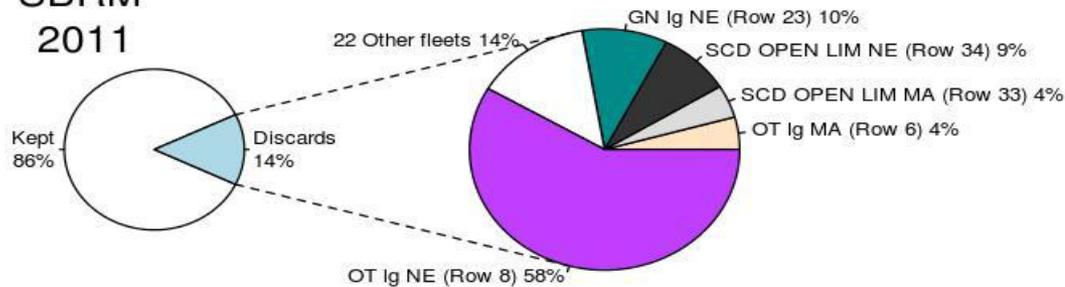


Species Group Discards by fleet

SBRM
2010



SBRM
2011



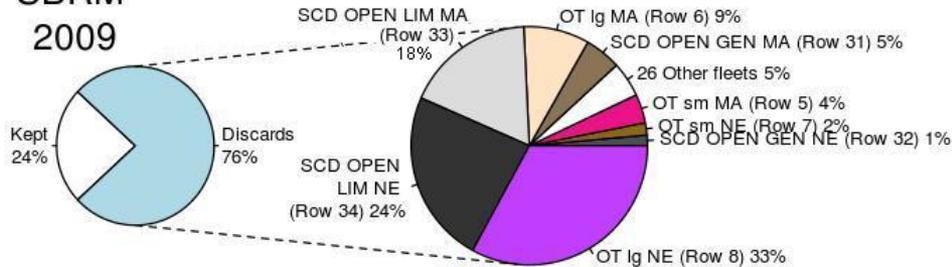
Total

Discards

Taken from CRD 12-17 Figure 6A. Percentage of Vessel Trip Report landings (kept) and estimated discards (left pie) and the percentage of estimated discards by fleet (right pie) for each of the 14 SBRM **species groups** for SBRM 2009 (July 2007 through June 2008), SBRM 2010 (July 2008 through June 2009), and SBRM 2011 (July 2009 through June 2010).

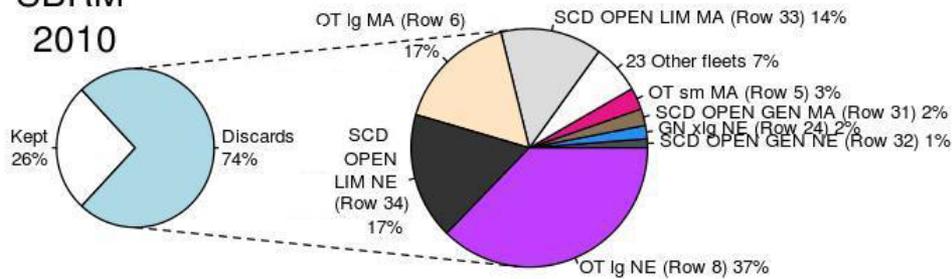
SPECIES: SKATE COMPLEX

SBRM
2009

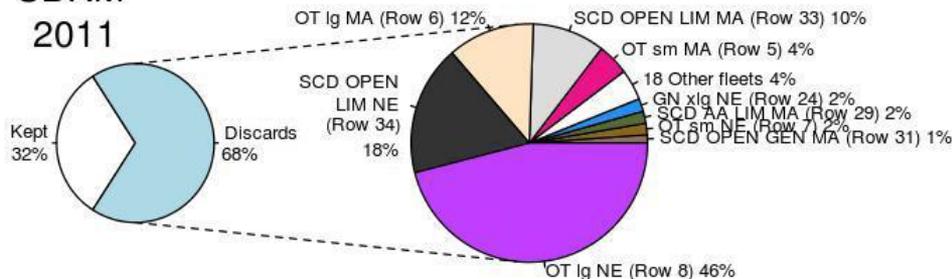


Species Group Discards by fleet

SBRM
2010



SBRM
2011

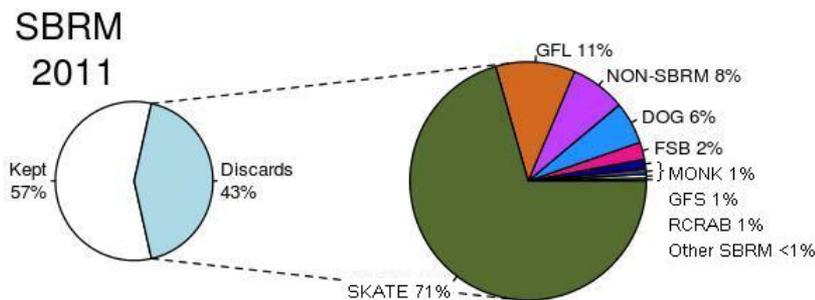
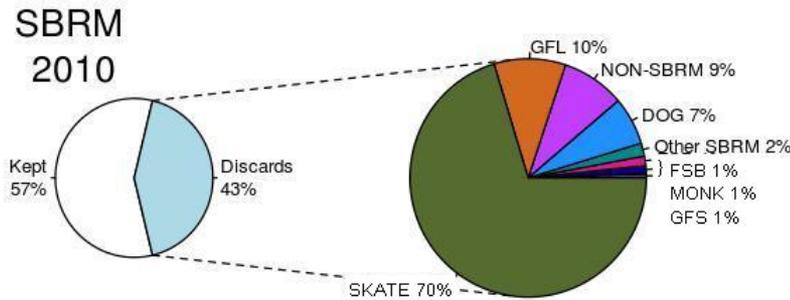
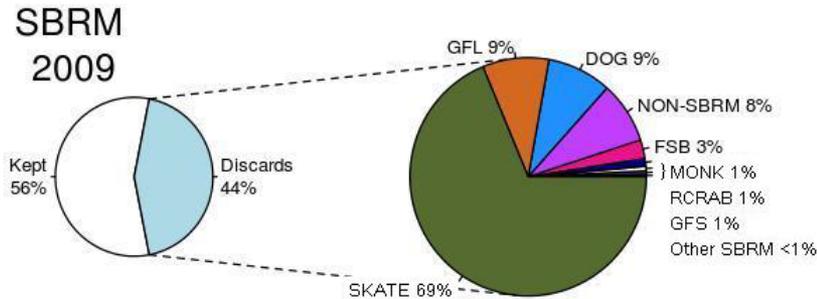


Total

Discards

Taken from CRD 12-17 Figure 6A. Percentage of Vessel Trip Report landings (kept) and estimated discards (left pie) and the percentage of estimated discards by fleet (right pie) for each of the 14 SBRM species groups for SBRM 2009 (July 2007 through June 2008), SBRM 2010 (July 2008 through June 2009), and SBRM 2011 (July 2009 through June 2010).

FLEET: Otter Trawl OPEN all NE lg (Row 8)



Total

Discards

Fleet Discards by Species Group

Taken from CRD 12-17

Figure 7. Percentage of Vessel Trip Report landings (kept) and estimated discards (left pie) and the percentage of estimated discards by SBRM species groups, non-SBRM species (right pie) for 26 **selected fleets** for SBRM 2009 (July 2007 through June 2008), SBRM 2010 (July 2008 through June 2009), and SBRM 2011 (July 2009 through June 2010).

SBRM species groups that were filtered out through the importance filter have been aggregated and labeled 'Other SBRM' species groups; non-SBRM species have been grouped and labeled 'Non-SBRM'.

CVs by fleet

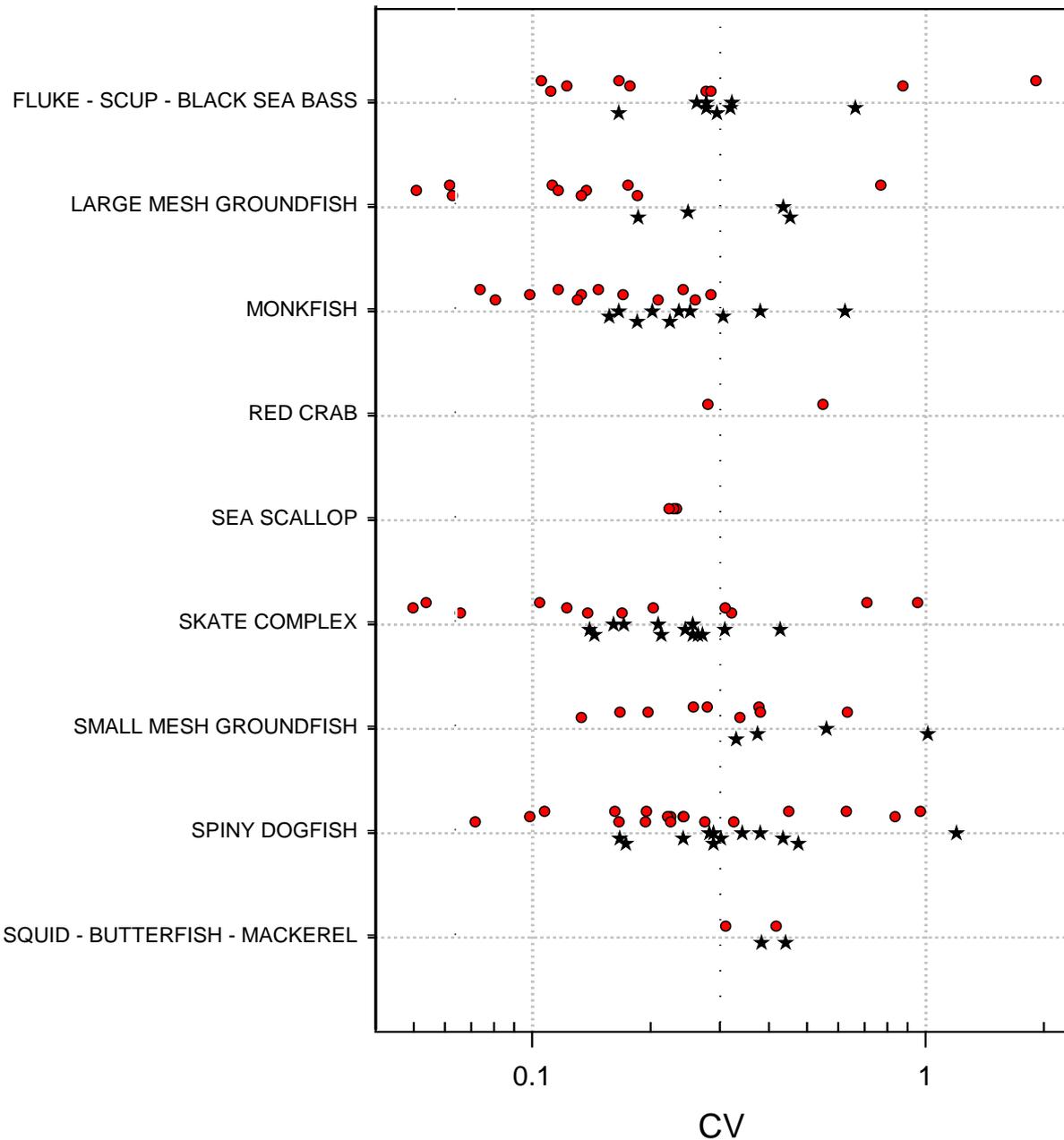
Figure 9A. Precision (coefficient of variation, CV) of estimated discards for 9 of the 14 SBRM species groups by selected fleet for all SBRM years (2009 through 2011).

The 24 selected fleets are: Rows 2, 4-8, 16, 19-24, 26-36.

Each point represents a separate fleet and SBRM year.

Red circles denote New England fleets and black stars denote Mid-Atlantic fleets.

Dash line represents 30 % CV.



Species Group CVs by fleet

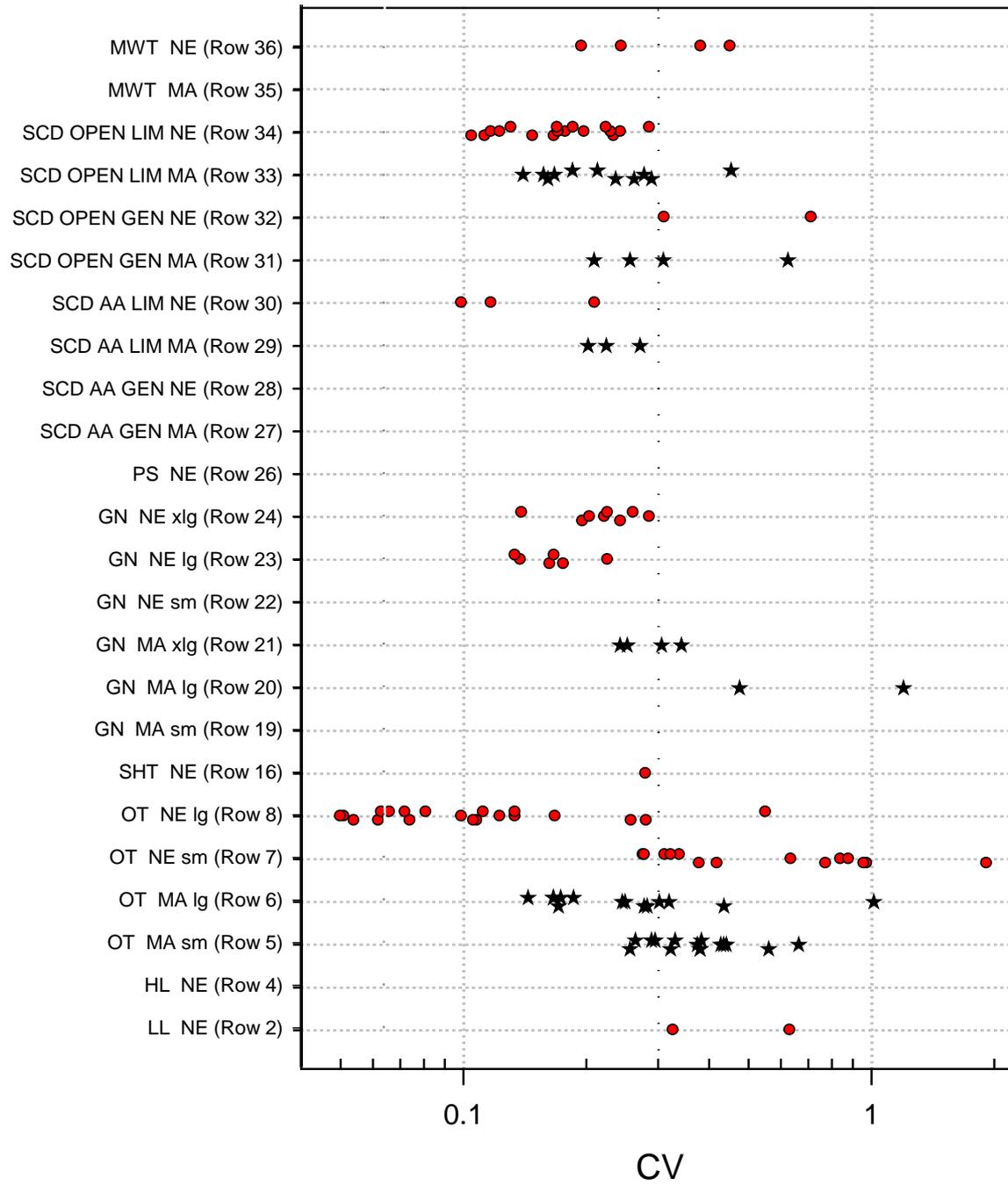
Figure 8A. Precision (coefficient of variation, CV) of estimated discards for each of the 14 SBRM species groups by selected fleet for all SBRM years (2009 through 2011).

The 24 selected fleets are: Rows 2, 4-8, 16, 19-24, 26-36.

Each point represents a separate species group and SBRM year.

Red circles denote New England fleets and black stars denote Mid-Atlantic fleets.

Dash line represents 30 % CV.



Sample Size Analysis

- The precision standard is 30% CV
- Number of trips needed to achieve a 30% CV on total discards for each species group and fleet are derived

$$\hat{T}D_{30jh} = \frac{\sum_{q=1}^4 \left(\frac{K_{qh}^2}{\bar{k}_{qh}^2} \hat{S}_{jqh}^2 \frac{1}{\delta_{qh}} \right)}{(0.09)D_{jh}^2 + \frac{\sum_{q=1}^4 \frac{K_{qh}^2}{\bar{k}_{qh}^2} \hat{S}_{jqh}^2}{N_h}}$$

- Sea days are derived using the mean trip length (days absent)

$$\hat{S}D_{30jh} = \hat{T}D_{30jh} * \overline{DA}_h$$

- 'Pilot' coverage: 2% of VTR trips

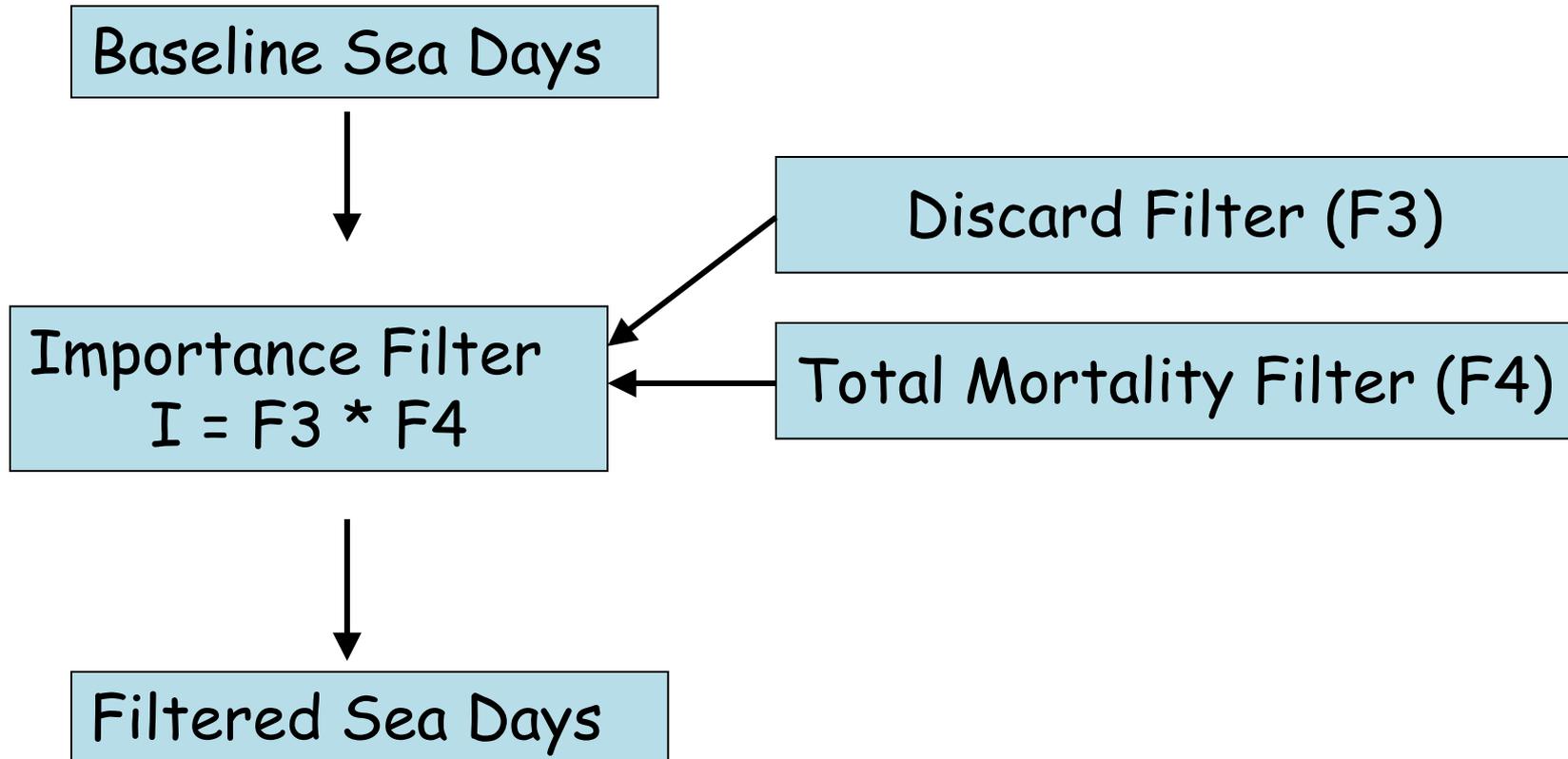
Sample Size Analysis continued

Baseline Sea Days

| ROW | FLEET | HERRING | RED CRAB | SCALLOP | GROUND FISH-LM | GROUND FISH-SM | FLUKE, SCUP, BSB | TURTLES | PILOT Days | BASELINE Days | |
|-----|---------------------|---------|--------------|--------------|----------------|----------------|------------------|--------------|------------|---------------|--------|
| 2 | Longline, NE | 426 | 25 | 2,501 | 29 | 152 | 25 | 25 | ... | 25 | 2,501 |
| 5 | Otter Trawl, MA sm | 3,077 | 3,348 | 2,103 | 436 | 533 | 1,359 | 1,415 | ... | 180 | 3,348 |
| 6 | Otter Trawl, MA lg | 2,141 | 1,458 | 216 | 163 | 2,175 | 265 | 240 | ... | 240 | 2,175 |
| 8 | Otter Trawl, NE lg | 1,479 | 1,201 | 786 | 64 | 668 | 370 | 9,950 | ... | 520 | 9,950 |
| 22 | Sink Gillnet, NE lg | 776 | 1,473 | 207 | 60 | 378 | 1,044 | 207 | ... | 207 | 1,473 |
| 35 | Mid-water Trawl, NE | 575 | 44 | 44 | 697 | 379 | 1,096 | 44 | ... | 44 | 1,096 |
| ⋮ | | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | | ⋮ | ⋮ |
| | Total | 26,270 | 24,017 | 13,584 | 8,106 | 11,362 | 11,408 | 20,422 | ... | 4,165 | 51,256 |

- Sea days are additive within a column, not within a row
- Maximum value within a row determines the days needed within a fleet

Importance Filter



Importance Filter

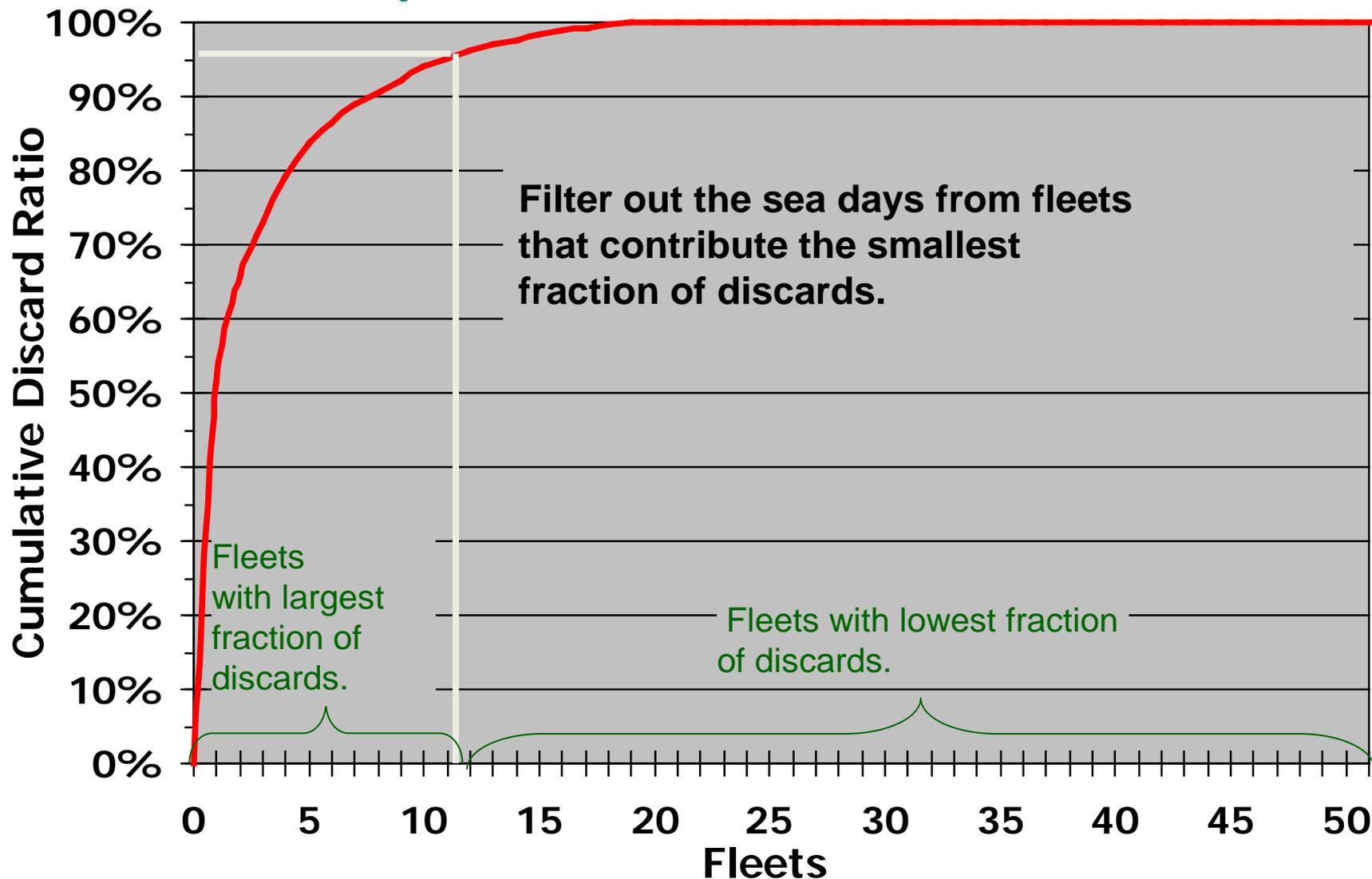
Discard Filter

- $D_{jh} / \sum D_j$ where j = species group and h = fleet
- Rank in ascending order and then derive cumulative percentages
- Using 5% a cut-point, assign '1' to fleets above 5% and '0' to all others

Total Mortality (due to discards) Filter

- $D_{jh} / (\sum D_j + \sum L_j)$ where j = species group and h = fleet
- Rank in ascending order and then derive cumulative percentages
- Using 2% a cut-point, assign '1' to fleets above 2% and '0' to all others

Example of Discard Filter



- The top 95% of the discards occur in 11 fleets and the remaining 5% occur in 40 fleets. Applying the discard filter at the 5% threshold, the sea days associated with top 11 fleets will be kept while the other sea days will be eliminated for this species group.

Baseline Sea Days



Filtered Sea Days

| ROW | FLEET | HERRING | RED CRAB | SCALLOP | GROUNDFISH-LM | GROUNDFISH-SM | FLUKE, SCUP, BSB | TURTLES | PILOT Days | BASELINE Days | FILTERED Days | |
|-----|---------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|------------|---------------|-------------------|--------|
| 2 | Longline, NE | 426 | 25 | 2,501 | 29 | 152 | 25 | 25 | ... | 25 | 2,501 | 25 |
| 5 | Otter Trawl, MA sm | 3,077 | 3,348 | 2,103 | 436 | 533 | 1,359 | 1,415 | ... | 180 | 3,348 | 1,415 |
| 6 | Otter Trawl, MA lg | 2,141 | 1,458 | 216 | 163 | 2,175 | 265 | 240 | ... | 240 | 2,175 | 2,175 |
| 8 | Otter Trawl, NE lg | 1,479 | 1,201 | 786 | 64 | 668 | 370 | 9,950 | ... | 520 | 9,950 | 668 |
| 22 | Sink Gillnet, NE lg | 776 | 1,473 | 207 | 60 | 378 | 1,044 | 207 | ... | 207 | 1,473 | 159 |
| 35 | Mid-water Trawl, NE | 575 | 44 | 44 | 697 | 379 | 1,096 | 44 | ... | 44 | 1,096 | 379 |
| ⋮ | | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | Total Baseline | 26,270 | 24,017 | 13,584 | 8,106 | 11,362 | 11,408 | 20,422 | ... | 4,165 | 51,256 | |
| | Total Filtered | 534 | 940 | 970 | 1,736 | 5,969 | 5,568 | 8,508 | ... | 4,165 | | 14,147 |

- Shaded cells have been filtered out by the importance filter
- New fleet maximum values are determined

Expected Achieved CV

In the Northeast region for 2012:

- 20,856 filtered days and 12,392 funded days
- shortfall in funding and funding constraints

Trade-offs in sea day allocations can be identified by deriving the expected achieved CVs based on funded days

$$\hat{T}F_h = \hat{S}F_h / \overline{DA}_h$$

$$CV(\hat{D}_{jh}) = \sqrt{\frac{\sum_{q=1}^4 \left(\frac{K_{qh}^2}{\bar{k}_{qh}^2} \hat{S}_{jqh}^2 \frac{1}{\delta_{qh}} \right) - \hat{T}F_h \frac{\sum_{q=1}^4 \left(\frac{K_{qh}^2}{\bar{k}_{qh}^2} \hat{S}_{jqh}^2 \right)}{N_h}}{\hat{T}F_h * \hat{D}_{jh}^2}}$$

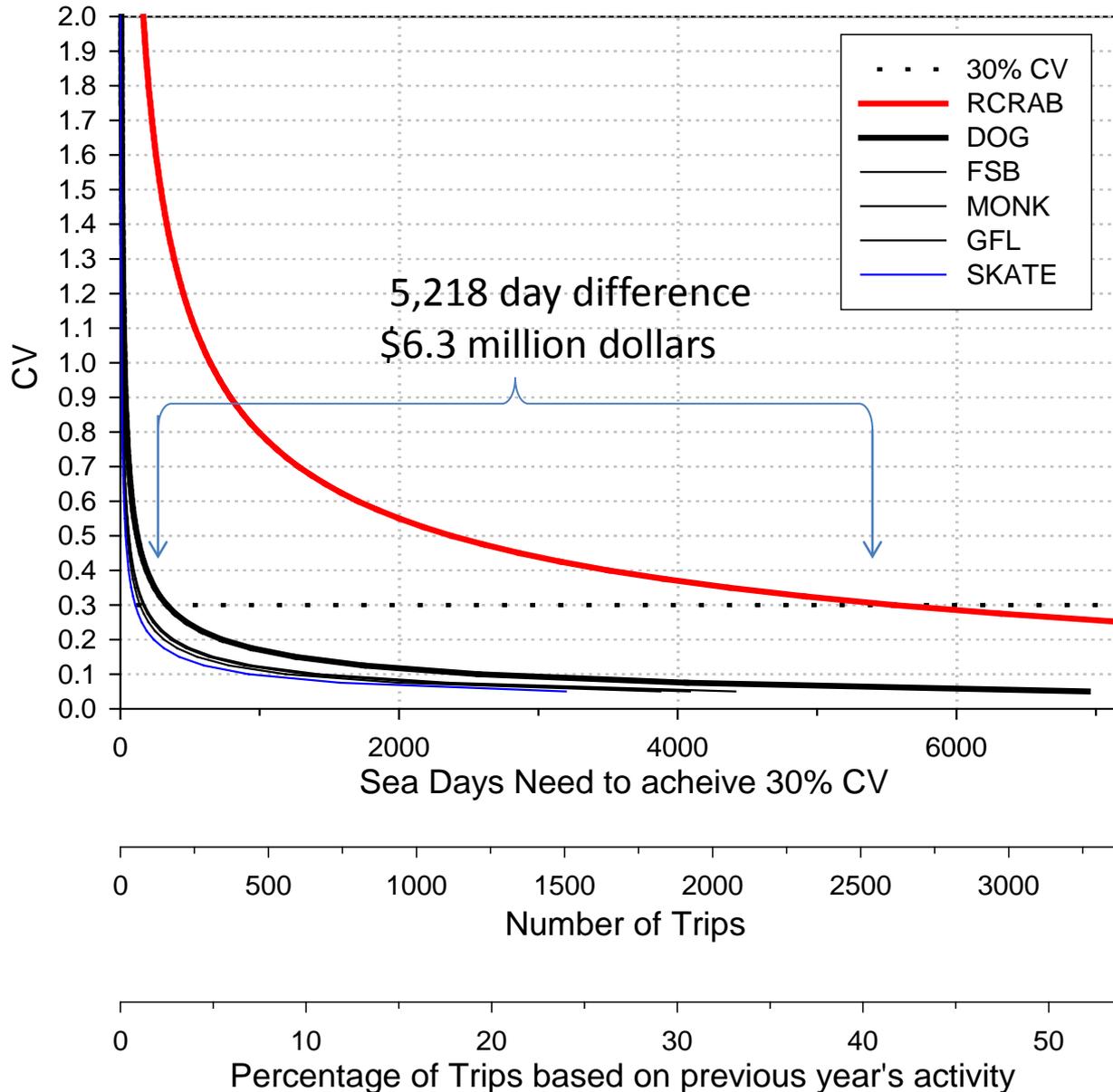
Expected Achieved %CV

| ROW | FLEET | HERRING | RED CRAB | SCALLOP | GROUND FISH-LM | GROUND FISH-SM | FLUKE, SCUP, BSB | TURTLES | FUNDED Days | FILTERED Days |
|-----|---------------------|---------|----------|---------|----------------|----------------|------------------|---------|-------------|---------------|
| 2 | Longline, NE | * | * | * | * | * | * | * | 178 | 25 |
| 5 | Otter Trawl, MA sm | * | * | * | * | 29 | 52 | 51 | 553 | 1,415 |
| 6 | Otter Trawl, MA lg | * | * | * | 9 | 36 | 12 | * | 1,582 | 2,175 |
| 8 | Otter Trawl, NE lg | * | * | * | 4 | 12 | 9 | * | 4,019 | 668 |
| 22 | Sink Gillnet, NE lg | * | * | * | 6 | * | * | * | 1,595 | 159 |
| 35 | Mid-water Trawl, NE | * | * | * | * | 30 | * | * | 379 | 379 |
| ⋮ | | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | Total | | | | | | | | 13,950 | 14,147 |

* indicates cells filtered out by Importance Filter

Example of expected CVs in one fleet

MA OTTER TRAWL LARGE-MESH (ROW 6)



In 2012

5,551 days Needed

333 days Prioritized

Impact:

Red crab 140% CV

Other FISH

species grps \leq 30% CV

Accuracy Analyses

Annual summary of observer coverage

by statistical area and calendar quarter in terms of kept weight

| Row | Gear Type | Access Area | Trip Cat | Region | Mesh | Kept Weight (mt) | Percentage of Kept Weight | Kept Weight with NEFOP coverage (mt) | Percentage of Kept Weight with NEFOP coverage |
|-----|-----------------------------|-------------|----------|--------|--------------|------------------|---------------------------|--------------------------------------|---|
| 1 | Longline | OPEN | all | MA | all | 723 | 0.1 | 0 | 0 |
| 2 | Longline | OPEN | all | NE | all | 881 | 0.1 | 807 | 91.6 |
| 3 | Hand Line | OPEN | all | MA | all | 343 | <0.1 | 0 | 0 |
| 4 | Hand Line | OPEN | all | NE | all | 414 | 0.1 | 321 | 77.6 |
| 5 | Otter Trawl | OPEN | all | MA | sm | 18,453 | 2.7 | 16,225 | 87.9 |
| 6 | Otter Trawl | OPEN | all | MA | lg | 8,721 | 1.3 | 7,662 | 87.9 |
| 7 | Otter Trawl | OPEN | all | NE | sm | 26,728 | 3.9 | 23,409 | 87.6 |
| 8 | Otter Trawl | OPEN | all | NE | lg | 32,549 | 4.7 | 31,529 | 96.9 |
| : | : | : | : | : | : | : | : | : | : |
| 22 | Sink, Anchor, Drift Gillnet | OPEN | all | MA | sm | 1,804 | 0.3 | 0 | 0 |
| 23 | Sink, Anchor, Drift Gillnet | OPEN | all | MA | lg | 2,130 | 0.3 | 850 | 39.9 |
| 24 | Sink, Anchor, Drift Gillnet | OPEN | all | MA | xlg | 4,032 | 0.6 | 3,018 | 74.9 |
| 25 | Sink, Anchor, Drift Gillnet | OPEN | all | NE | sm | 11 | <0.1 | 0 | 0 |
| 26 | Sink, Anchor, Drift Gillnet | OPEN | all | NE | lg | 6,794 | 1 | 6,380 | 93.9 |
| 27 | Sink, Anchor, Drift Gillnet | OPEN | all | NE | xlg | 8,304 | 1.2 | 8,092 | 97.4 |
| : | : | : | : | : | : | : | : | : | : |
| | | | | | Total | 687,436 | 100 | 386,311 | 56.2 |

Accuracy Analyses

Comparison of Average Trip Duration

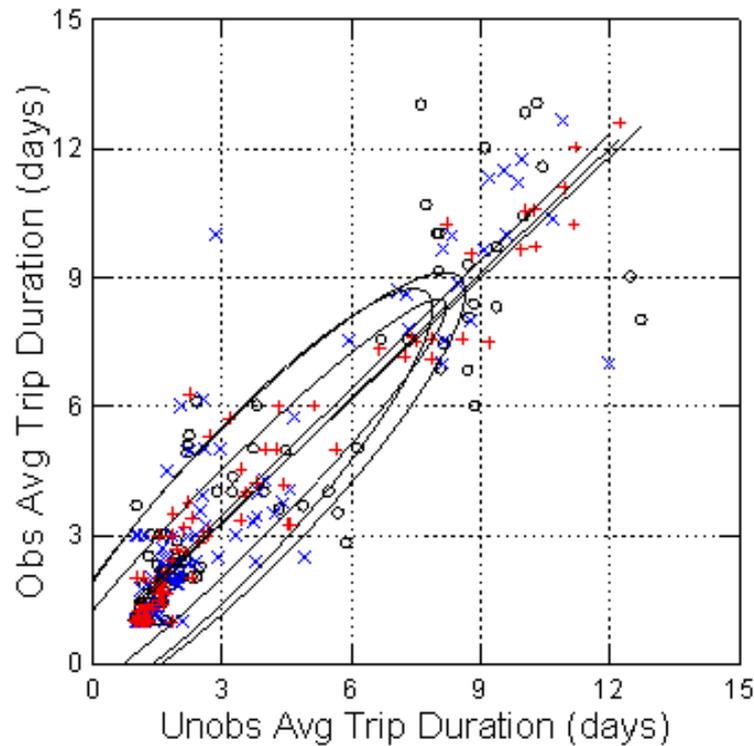


Figure 8. Comparison of average trip duration (days) for unobserved and observed trips for SBRM 2009 (July 2007 through June 2008; black circle), SBRM 2010 (July 2008 through June 2009; red +), and SBRM 2011 (July 2009 through June 2010; blue x). Each symbol represents the mean of an individual stratum (SBRM year, fleet and calendar quarter) for all trips. Ellipse represents 68% confidence interval for each year.

Comparison of Average Trip Duration

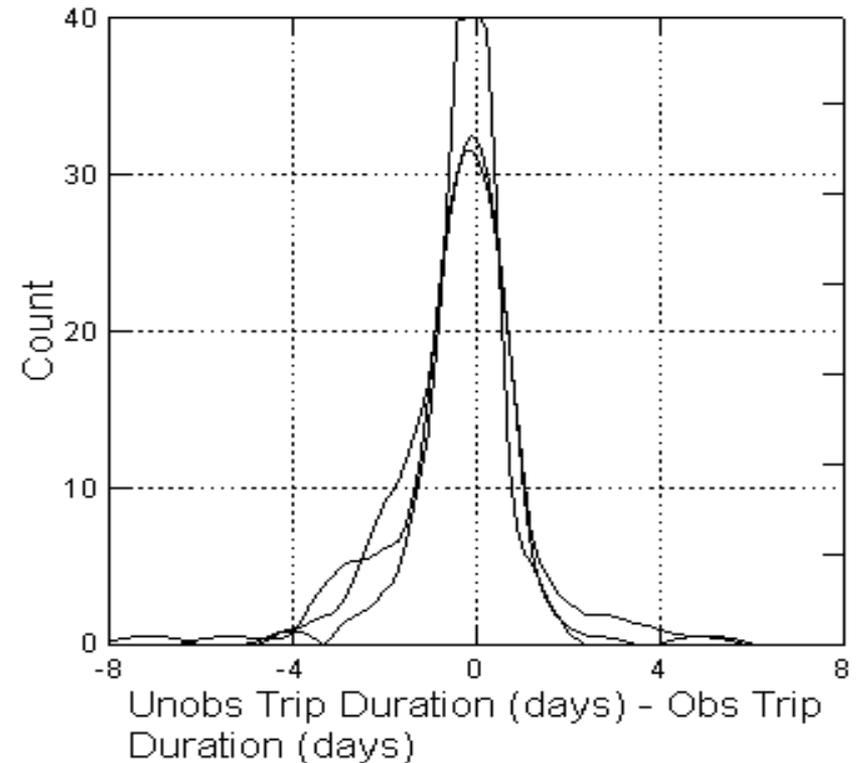


Figure 9. Distribution of differences between the average trip duration of unobserved and observed trips using VTR data for SBRM 2009 (July 2007 through June 2008), SBRM 2010 (July 2008 through June 2009), and SBRM 2011 (July 2009 through June 2010).

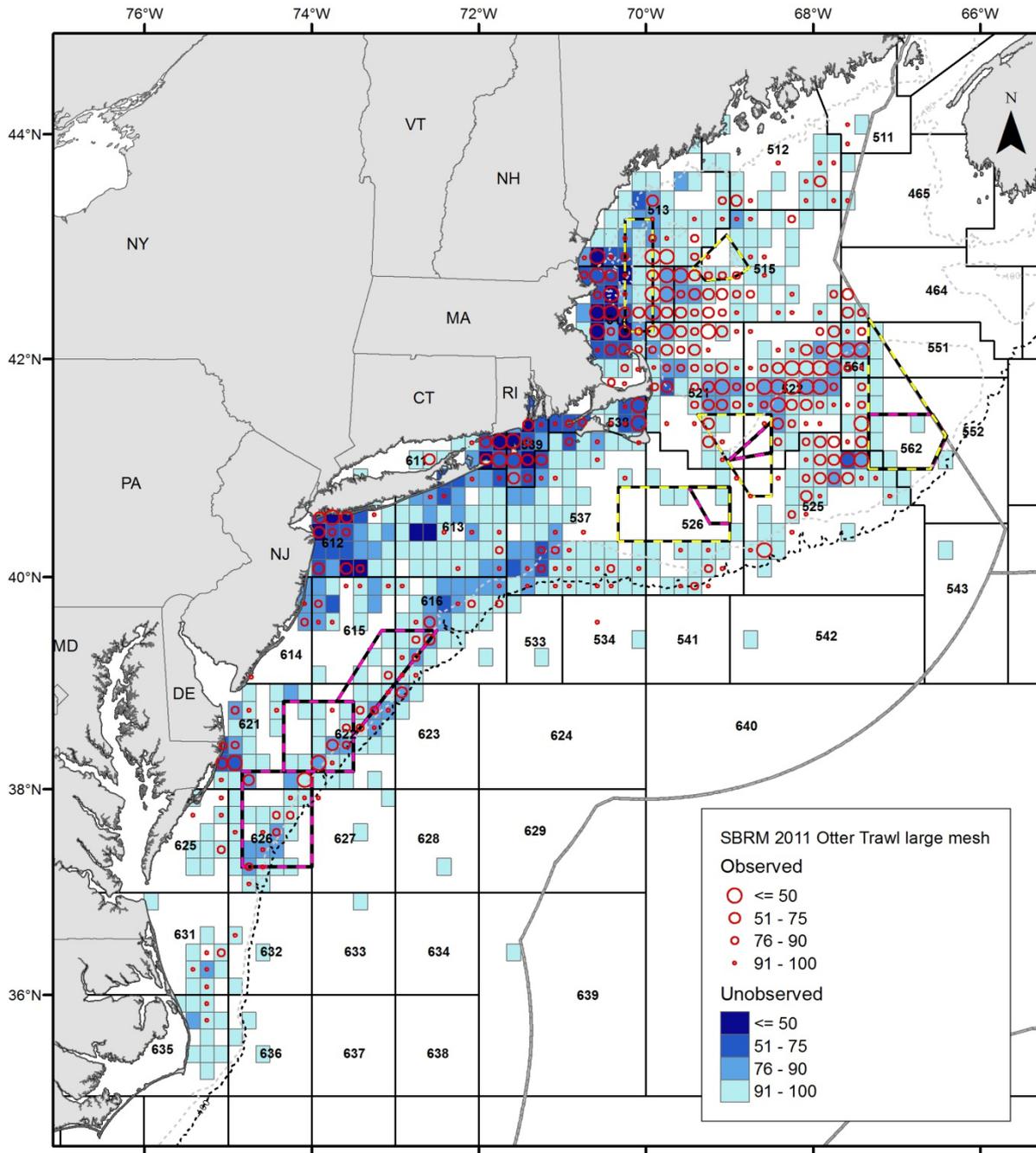


Figure 11, continued. Distribution of observed (NEFOP data; circles) and unobserved (VTR data; squares) subtrips for 8 grouped fleets (16 selected fleets) aggregated to 10' square and classified into the lower 50th, 75th, 90th or 100th cumulative percentiles of total number of subtrips, by grouped fleet and SBRM year. Dashed lines indicate access areas. *Note: Selected fleets include Rows 1, 2, 5-8, 19-24, and 27-30. Fleets have been combined across region into grouped fleets.*

SBRM Reporting Cycle

| Annual SBRM Reporting Cycle | SBRM 2009 | SBRM 2010 | SBRM 2011 | | | 2012 | 2013 | | SBRM 2014 |
|--|---------------------|---------------------|---------------------|---|---|---|---|------------------------------------|--|
| Data Used (12-month period) | Jul 2007 - Jun 2008 | Jul 2008 - Jun 2009 | Jul 2009 - Jun 2010 | SBRM 3-year Review Report CRD 11-09 CRD 12-17 | SBRM Omnibus Amendment vacated (prioritization process) | Jul 2010 - Jun 2011 | Jul 2011 - Jun 2012 | SBRM Omnibus Amendment implemented | Jul 2012- Jun 2013 |
| Data Analysis and Document Preparation | Oct 2008 - Jan 2009 | Oct 2009 - Jan 2010 | Nov 2010- Jan 2011 | | | Oct 2011 - Jan 2012 | Oct 2012 - Jan 2013 | | Oct 2013 - Jan 2014 |
| Annual Report, Sea Day Analysis, and Prioritization documents available on-line; | | | | | | Discard estimation, precision and sample size CRD 12-27 CRD 12-26 | Discard estimation, precision and sample size CRD in press | | Discard estimation, precision and sample size CRD |
| Presentations to each Council (NEFMC and MAFMC); | Jan 2009 - Mar 2009 | Jan 2010 - Mar 2010 | Jan 2011 - Mar 2011 | | | | | | |
| Prioritization Comment Period; | | | | | | | | | |
| Final Budget received, Consideration of Comments, Re-prioritization | | | | | | | | | |
| Response to Comments and Re-prioritization document to NRCC | Apr 2009 | May 2010 | Apr 2011 | | | Mar 2012 Prioritize sea days Status Quo | Mar 2013 Prioritize sea days Status Quo | | Mar 2014 Prioritize sea days Formulaic |
| NEFOP Sea Day Schedule (12 month period) | Apr 2009 - Mar 2010 | Apr 2010 - Mar 2011 | Apr 2011- Mar 2012 | | | Apr 2012 - Mar 2013 | Apr 2013 - Mar 2014 | | Apr 2014- Mar 2015 |



NOAA

FISHERIES SERVICE

Northeast Fisheries Science Center
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Fisheries Sampling Branch

Fisheries Sampling Branch

Northeast Fisheries Observer Program

Training and Manuals

Notification for Fishermen

Industry-Funded Scallop Program

At-Sea Monitoring Program

Safety Requirements

Electronic Monitoring

Data and Forms

FAQs and Photos

Memos and Documents

Reports and Publications

News and Press Releases

Standardized Bycatch Reporting Methodology



The following are PDF files which require free **Adobe Acrobat Reader software** to view, navigate and print. Adobe also offers **free tools for the visually disabled**.

- [Northeast Region Standardized Bycatch Reporting Methodology Omnibus Amendment](#)

Three-Year Review Reports

- [SBRM 3-Year Review Report 2011; Part 1 \(NE Fisheries Science Center Reference Document 11-09\)](#)
- [SBRM 3-Year Review Report 2011; Part 2 \(NE Fisheries Science Center Reference Document 12-27\)](#)

Annual Discard Reports

| | | |
|------|------|------|
| 2011 | 2010 | 2009 |
|------|------|------|

- [Section 1 \(Text and Species Groups\)](#) (File Size 3.54 MB)
- [Section 2 \(Individual Species\)](#) (File Size 27.22 MB)

Additional Documents

| | | | |
|------|------|------|------|
| 2012 | 2011 | 2010 | 2009 |
|------|------|------|------|

- [Proposed 2012 Observer Sea Day Allocation to NRCC \(document\)](#)

Summary - strengths

- A quantitative approach to allocate sampling coverage is useful when balancing sampling needs for a variety of species among various fleets and examining trade-offs
- Flexibility in the stratification and discard estimation method can support both design-based or model-based estimation
- Allocation of sampling effort must consider both the precision and the magnitude of discards

Summary - strengths continued

- Use of importance filters to refine the number of sea days helps ensure that sea day allocations are not driven by imprecise estimates of small quantities of discards
- The filter method ensures that the cumulative effects of discarding are consistently treated across species and fleets
- On-line reports summarize input data and results

key words: comprehensive, quantitative, transparent

Summary - Challenges

Competing demands

between discard estimation and compliance monitoring

FMPs have/are considering varying observer requirements for compliance and quota monitoring independent of SBRM

Summary - Challenges continued

Database issues

- Joining trips between databases remains a challenge
Need universal trip identifier in all databases;
current vtr serial number is 'weak' link; further auditing needed
- Gear & mesh are no longer sufficient data elements for fleet stratification
Need gear modification field to caption dredge deflectors, grates, raised footropes, etc.
Need Special Access Program (SAP) info (e.g. exempted fisheries)
Need eVTR dynamic data element capability; high priority
- Data quality - reporting compliance, data auditing
Need improved data leveraging and audits;

key words: competing demands, VTR data limitations/quality

Examples of data limitations/quality

More trips in NEFOP than VTR in two fleets

2011 NE Ruhle trawl: 27 NEFOP trips, 9 VTR trips (Row 13 Table 2 CRD 11-09)
NE Haddock Separator trawl: 54 NEFOP trips, 13 VTR trips

Cannot easily identify trips using Nordmore grate in shrimp trawl

2012 Shrimp Trawl Q3 Q4 Q1 Q2 (Row 19 Table 2 CRD 12-27)
158 559 2307 41

Q1 probably all shrimp trawl with grate; Q3 probably all without grate; Q2 and Q4 is a mix (northern shrimp season Dec - Apr requires grate) - use species assemblage

Cannot include twin trawl gear in analysis

2013 MA Twin Trawl: 8 NEFOP trips, 2 VTR trips (Table 2 CRD in press)
NE Twin Trawl: 2 NEFOP trips, 0 VTR trips

Confusion in use of gear codes OTS, OTC, OTF, OTT gear, mesh, species assemblages kept

Impacts discard estimates and sea days? Can not quantify

Estimation may not be uni-directional

misclassification of trips contribute to variability resulting in overestimation of sea days needed

Example of Need: SAP, Gear, and Gear Mods.

SAP, Gear, and gear mods are needed in Dealer (VTR) and NEFOP data to estimate discards, precision, and sample sizes (number of observed trips) to achieve 30% CV for SBRM and ACLs

Discard ratio

$$r_{c,j} = \frac{\sum_{h=1}^Q N_h \sum_{i=1}^{n_h} \frac{d_{jih}}{n_h}}{\sum_{h=1}^Q N_h \sum_{i=1}^{n_h} \frac{k_{ih}}{n_h}}$$

Can not accurately identify SAP fleets
Stratification by fleet (h) is needed

N_h = number of trips

K_h = Kept pounds of all species

Discard estimate

$$\hat{D}_j = \sum_{h=1}^Q K_h r_{c,j}$$

Discard variance and precision (CV)

$$V(\hat{D}_j) = \sum_{q=1}^4 K_{qh}^2 \left(\frac{N_{qh} - n_{qh}}{n_{qh} N_{qh}} \right) \left(\frac{1}{\left(\frac{\sum_{i=1}^{n_h} k_{iqh}}{n_{qh}} \right)^2} \left[\frac{\sum_{i=1}^{n_{qh}} \left(d_{jih}^2 + (r_{c,j})^2 k_{iqh}^2 - 2r_{c,j} d_{jih} k_{iqh} \right)}{n_{qh} - 1} \right] \right)$$

$$CV(\hat{D}_j) = \frac{\sqrt{V(\hat{D}_j)}}{\hat{D}_j}$$

Observer sample sizes needed for a 30% CV

$$\hat{TD}_{30jh} = \frac{\sum_{q=1}^4 \left(\frac{K_{qh}^2}{k_{qh}^2} \hat{S}_{jqh}^2 \frac{1}{\delta_{qh}} \right)}{(0.09) D_{jh}^2 + \frac{\sum_{q=1}^4 \frac{K_{qh}^2}{k_{qh}^2} \hat{S}_{jqh}^2}{N_h}}$$

$$\hat{SD}_{30jh} = \hat{TD}_{30jh} * \overline{DA}_h$$

Summary - Potential Solutions

Competing demands

Need 'buy-in' from all parties to support one comprehensive system for all managed species.

Database issues

Previous Northeast data reviews (National Research Council 2000 and Pate Report 2010) have made recommendations about similar data issues;

Recently, a joint Center and Regional Office working group was formed to address these data issues.



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SBRM documentation

2009 – 2011 SBRM documents, reports, presentations

<http://www.nefsc.noaa.gov/femad/fsb/SBRM/>

2012 Annual Reports links

2012 Discard Estimation, Precision and Sample Size for fish
(14 species groups 56 fleets)

<http://www.nefsc.noaa.gov/publications/crd/crd1217/>

Sample Size requirements in the Mid-Atlantic region to monitor Loggerhead Sea Turtles
(1 species and three gear types)

<http://www.nefsc.noaa.gov/publications/crd/crd1226/>

2012 Sea Day Allocations

http://www.nefsc.noaa.gov/femad/fsb/SBRM/2012/Proposed_2012_Observer_Sea_Day_Allocation_3-23-2012_v3.pdf

SBRM 3-year Review Report links

Part 1 <http://www.nefsc.noaa.gov/publications/crd/crd1109/>

Part 2 <http://www.nefsc.noaa.gov/publications/crd/crd1227/>

SBRM Omnibus Amendment links

SBRM Omnibus Amendment

<http://www.nefmc.org/issues/sbrm/index.html> two files (Amendment and Appendices)

Federal Register Final Rule: SBRM Implementation

<http://www.gpo.gov/fdsys/pkg/FR-2008-01-28/pdf/E8-1436.pdf>

Analytic Component to the SBRM Omnibus Amendment: Sampling Design, and Estimation of Precision and Accuracy

<http://www.nefsc.noaa.gov/publications/crd/crd0709/>

Federal Register Final Rule: SBRM removal

<http://www.gpo.gov/fdsys/pkg/FR-2011-12-29/pdf/2011-33302.pdf>



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Questions?