

# **An Overview of the Northeast Region's Groundfish Study Fleet** **Pilot Program**

*A Northeast Cooperative Research Partners Program (NCRPP) Project*

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**Woods Hole, MA**



**NOAA Fisheries - NEFSC**

National Marine Fisheries Service



## What are Study Fleets?

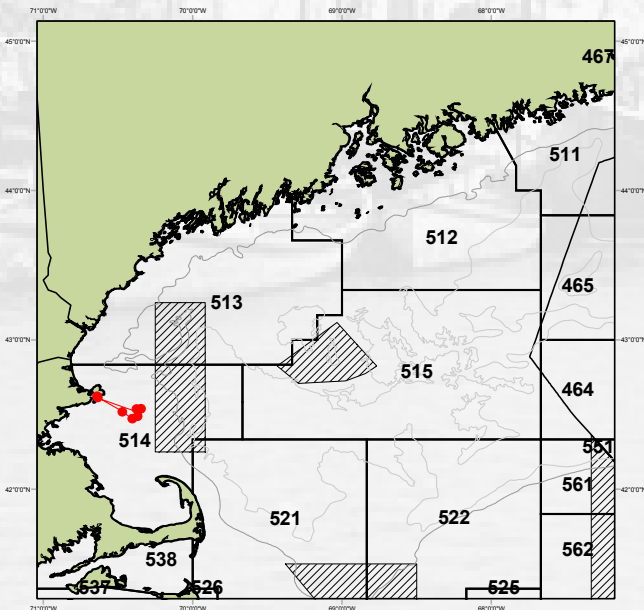
- “A sample of fishing vessels from which **high quality** [self-reported] data on catch, fishing effort, gear characteristics, area fished and biological observations are collected. These vessels fish in “normal” commercial mode, and are selected to be representative of the larger fleet over time.” — Perkins Report

## Did we manage to create a Study Fleet?

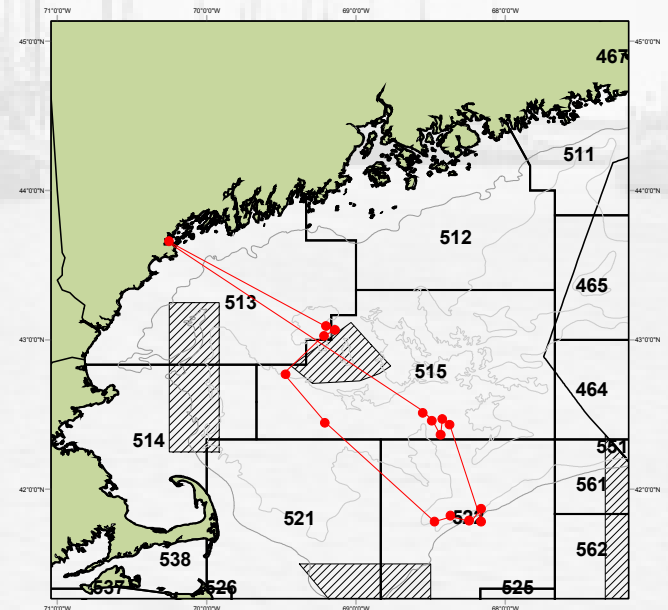
- The central question to answer is: “By partnering directly with fishermen, did we construct a data collection program comparable to the Observer program (i.e., collects detailed effort and catch data), but one that can be operated at a reduced cost?”
- We must understand that this was a pilot project and be reasonable in our expectations:
  - Did we lay the groundwork for an operational Study Fleet?
  - Do the collected data offer improvements over traditional self-reported fisheries dependent data?
  - Do we recognize which areas are in need of further improvement?
  - Have we developed plans to improve these areas?

## Definitions

- **Effort** - The primary unit of fishing activity. Each individual otter trawl tow/haul, longline set, string of pots or harpoon throw, etc. constitutes a single effort. A more generic term applicable to many gear types.
- **Subtrip** - An aggregate summary of fishing activity occurring during a fishing trip stratified by gear configuration (gear type, mesh/ring size) and statistical area. For example; all fishing activity for a trip occurring in a single statistical area and using a single gear configuration (bottom fish otter trawl, 5.5" mesh) would be summed up to constitute a subtrip. **For the purpose of FVTR paper logbook reporting, each subtrip must be filled out on a separate logbook sheet.**



Single-subtrip



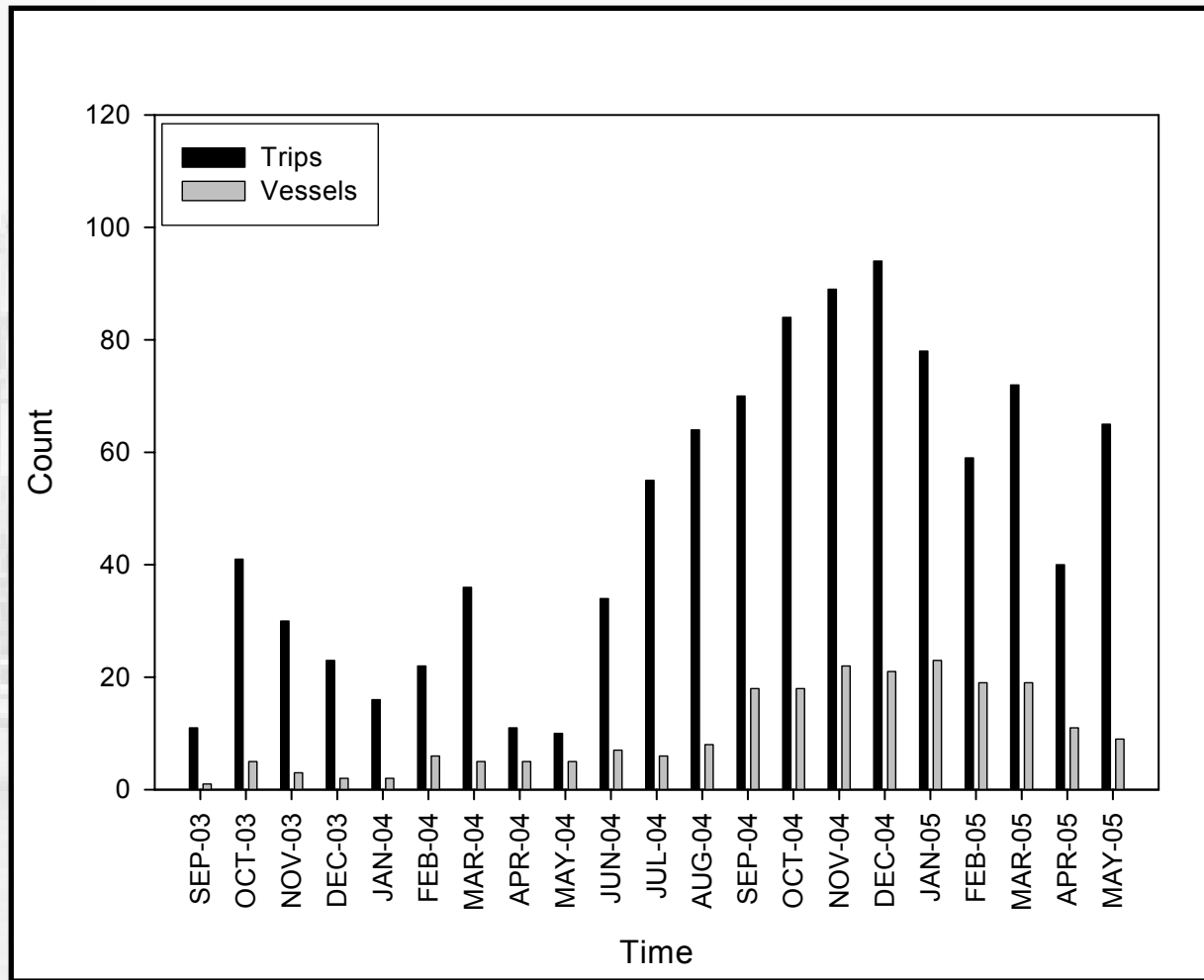
Multi-subtrip

## Study Fleet Data Collection - Summary

- Summary of data collected (September 2003 to August 2005):
  - 1,107 trip data files (*not including Thistle trips*)
    - 32 different vessels averaging 34 trips/vessel (range = 1 – 250+ trips/vessel)
    - 17 different ports of sailing
  - 5,634 effort records
    - 7 gear types: fish otter trawl, shrimp trawl, fish pot, lobster pot, sink gillnet, demersal longline, clam dredge
    - > 17 statistical areas spanning from mid-Atlantic to northeastern Gulf of Maine
  - 39,776 catch (kept/discarded) records
    - 10.6 million pounds of catch distributed among 67 species
  - 6,680 landing/dealer allocation records
    - 8.0 million pounds landed in 15 different ports and sold to 18 different dealers

# Study Fleet Data Collection - Summary

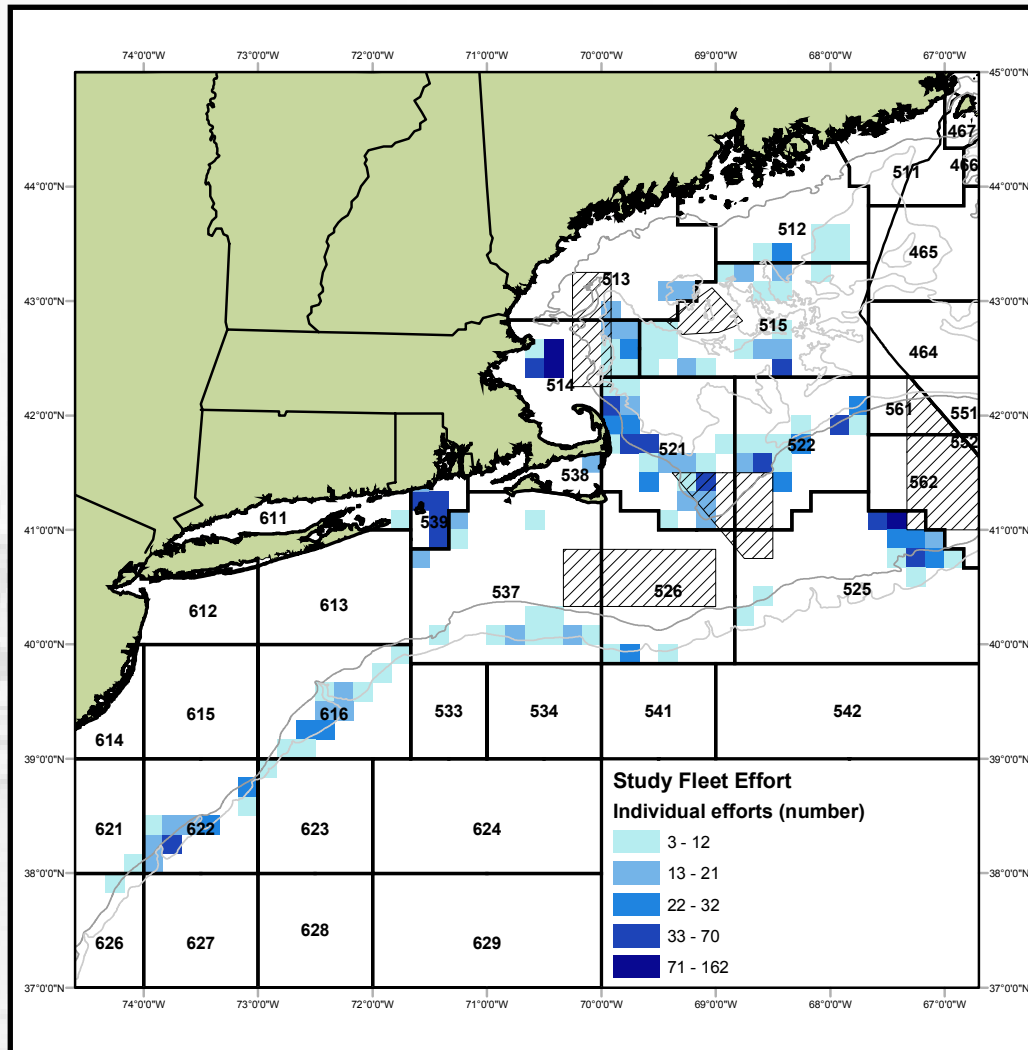
- Phase I / Phase II data collection and vessel participation.



*Fig. 1. Number of trips received and vessels reporting over Phase I and II of the Study Fleet project (compensation period only). Data are binned according to the start date of the trip.*

# Study Fleet Data Collection - Summary

- Summary of effort distribution by ten minute square



*Fig 2. Plot of individual Study Fleet fishing effort (all trips). To protect data confidentiality, efforts are binned to ten minute squares and only those bins including effort from  $\geq 3$  vessels are shown.*

# Study Fleet Data Collection - Summary

- Summary of catch by species — top 20 species

Species	Catch (1000's lb.)
Illex squid	2,176
Skates, unclassified	1,530
Loligo squid	1,069
Monkfish	956
Atlantic herring	698
Haddock	583
Spiny dogfish	569
Yellowtail flounder	350
Atlantic cod	338
Atlantic pollock	307
Witch flounder	262
Atlantic rock crab	223
Silver hake/whiting	193
Atlantic mackerel	185
Summer flounder/fluke	175
American plaice/dab	162
Scup	152
Shrimp, unclassified	119
White hake	112
Winter flounder	112

*Table 1. Top twenty species caught by Study Fleet vessels from September 2003 to August 2005 ranked by total live weight in pounds (000's).*

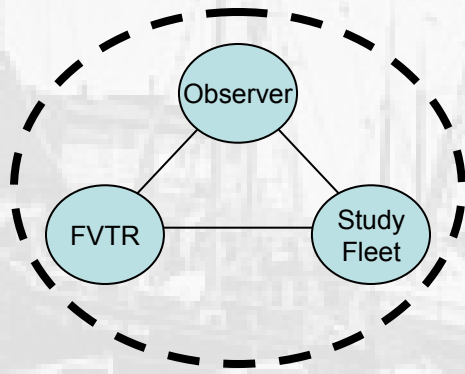
## Study Fleet Data Analysis

- One of the primary goals of the Study Fleet project was to develop and implement electronic reporting technology (software and hardware) for the collection, recording, and transferring of **more accurate and timely** fishery-based data.
- Compared to what? What are the benchmarks?
  - We are trying to improve on the traditional method fishermen use to reported catch and effort data and develop a program that facilitates fishermen's ability to report detailed information about individual efforts and the associated catch.
    - FVTR → Observer-like data collection program
- Our analyses focused on comparing the collected Study Fleet data to these other data collection programs to assess whether we were successful in accomplishing the above objective.
  - Was Study Fleet data more timely?
  - Was Study Fleet data more accurate?; more precise?

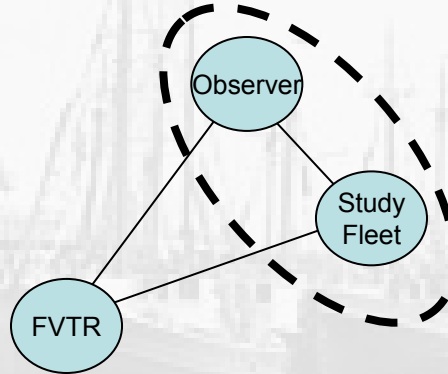


# Study Fleet Data Analysis

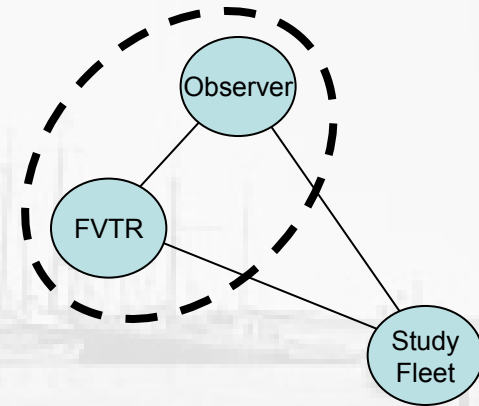
- How did we compare the Study Fleet data to FVTR and Observer data?
- Used a triangulation method to validate the collected data
  - 1) Assembled a list of matching trips
  - 2) Compared the data collected during these trips to its counter part in the other data collection program(s)



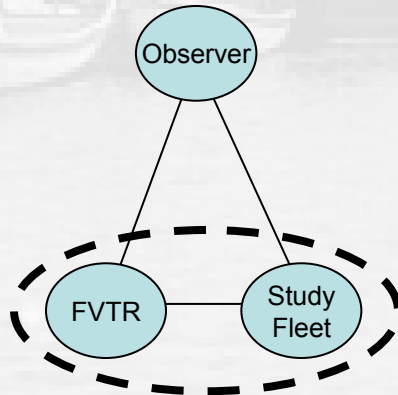
**Outcome 1**



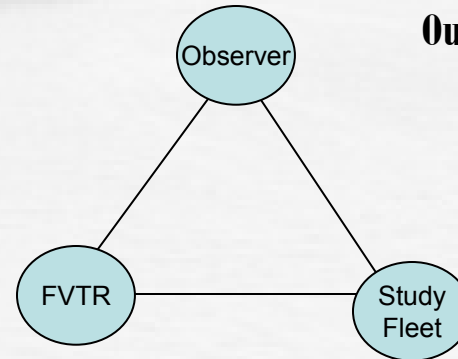
**Outcome 2**



**Outcome 3**



**Outcome 4**



**Outcome 5**

# Study Fleet Data Analysis

- This presentation will focus on three specific areas of Study Fleet reporting:
  - Trip: how quick can we get the data?
  - Effort: where did it happen, how many and how long was each effort?
  - Catch: what was caught and how much?

*\*Addressing the effort and catch questions are those that are most important for improving stock assessments.*

# Study Fleet Data Collection

- How soon after a trip can we receive and process trip reports and make them available to end users?
  - Electronically entered/submitted data are available 29 - 76 % faster than traditional paper FVTR data.

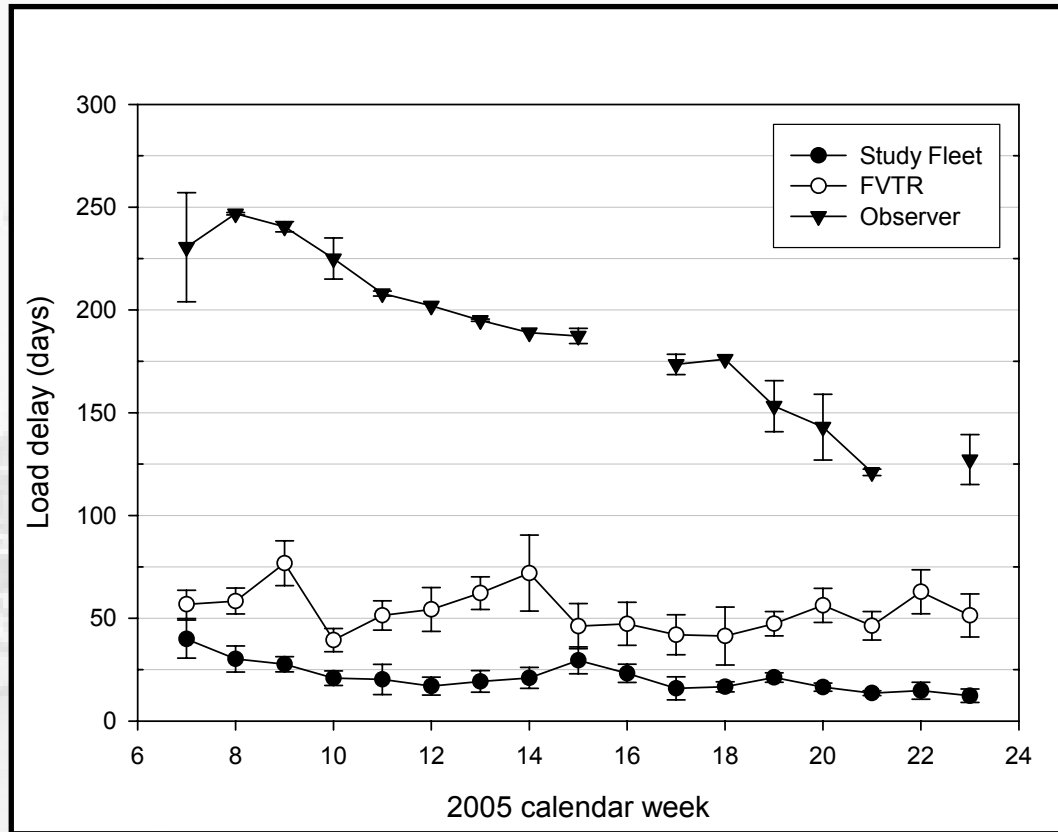


Fig. 1. Weekly average ( $\pm$  std. error) data load delays for the three primary vessel-based fisheries-dependent data sets used in the Northeast Region; Study Fleet, FVTR and Observer. Load delay is defined as the number of days passed from the end of the fishing trip to the data being loaded into Northeast Region's databases and available to end users.

\*Note: during the period shown the Observer program was undergoing office relocation and transitioning through a period of high staff turnover and retraining (D. Potter pers. comm.). The 2004 annual average load delay for the Observer program was approximately 90 days (88.5  $\pm$  0.6).

# Study Fleet Data Collection

- Effort location - where did the fishing effort occur?
  - More accurate estimates of individual efforts — improve stock area area assignment of catch.

NOAA Form No. 88-30 OMB No. 0649-0072 Expires 7/31/05

**FISHING VESSEL TRIP REPORT**

DID NOT FISH DURING MONTH/YEAR

1. VESSEL NAME	2. USCG. DOC. or STATE REG. NO.	3. VESSEL PERMIT NUMBER
4. DATE/TIME SAILED DATE (mm/dd/yy) TIME (24 hrs.)	5. TRIP TYPE (CHECK ONE) <input type="checkbox"/> COMMERCIAL <input type="checkbox"/> PARTY <input type="checkbox"/> CHARTER	6. NO. of CREW 2
7. NO. of ANGLERS 0		

FILL OUT A NEW PAGE FOR EACH CHART AREA OR GEAR OR MESH/RING SIZE FISHED

8. GEAR FISHED OTF	9. MESH/RING SIZE 5/12	10. QUANTITY OF GEAR 1	11. SIZE OF GEAR 50'
12. CHART AREA 515	1-4. LATITUDE/LONGITUDE or LORAN LATITUDE LONGITUDE	15. NO. of HAULS 15	16. AVERAGE TOW/SOAK TIME hrs mins 3 00
13. AVG. DEPTH 30 fms	5. STATION-BEARING #1	6. STATION-BEARING #2	

17. SPECIES CODE NAME	18. KEPT POUNDS (Comm)	19. DISCARDED POUNDS (Comm)	20. DEALER PERMIT NO.	21. DEALER NAME	22. DATE SOLD (mm/dd/yy)
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Not an actual FVTR

23. PORT and STATE LANDED	24. DATE LANDED (mm/dd/yy)	TIME LANDED
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I certify that the information provided on this form is true, complete and correct to the best of my knowledge, and made in good faith. Making a false statement on this form is punishable by law (18 U.S.C. 1001).

25. OPERATOR'S NAME (printed) and PERMIT NUMBER (if required)	DATE	26. OPERATOR'S SIGNATURE
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Fig. 2. Example of a single page FVTR trip. FVTR resembles actual observed FVTR submitted by Study Fleet participants.

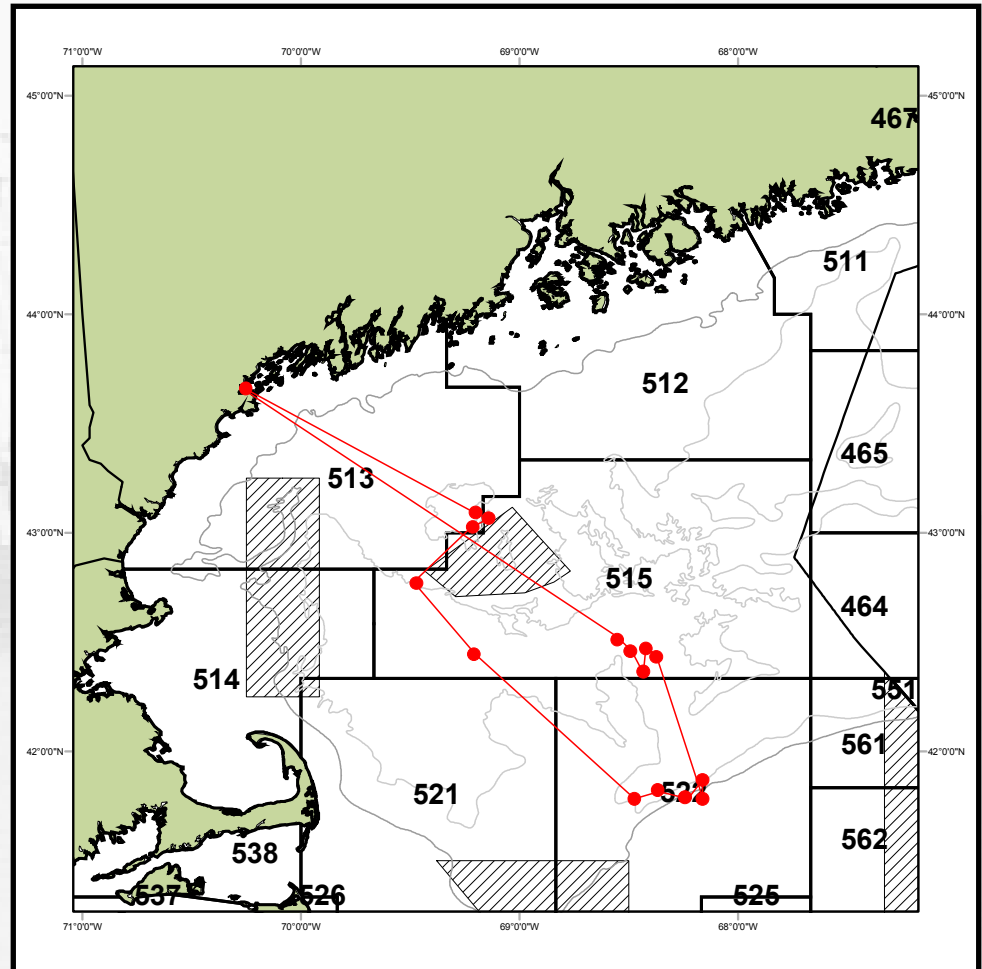


Fig. 3. Example of a fishing trip with catch occurring in multiple statistical areas. Data resemble those from actual observed Study Fleet trips.

# Study Fleet Data Collection

- Effort location - where did the fishing effort occur?
  - Study Fleet reporting trends similar to observer reporting trends (90.6 % match rate).

Study Fleet vs. Observer

Trip type	Quality	Trips	Percent
All	reported correctly	48	90.6
All	reported incorrectly	5	9.4
<b>Total trips</b>		<b>53</b>	
Trip type	Quality	Trips	Percent
1 subtrip	reported correctly	35	100.0
<b>Total trips</b>		<b>35</b>	
2+ subtrips	reported correctly	13	72.2
2+ subtrips	reported incorrectly	5	27.8
<b>Total trips</b>		<b>18</b>	

*Table 1. Comparative analyses of statistical area reporting using Study Fleet reported data and Observer reported data for matching trips. Trips are categorized based on quality of reporting. Correct Study Fleet trip reports are those where both the number and identity of statistical areas fished on a given trip match those statistical areas reported in Observer data.*

# Study Fleet Data Collection

- Effort location - where did the fishing effort occur?
  - Statistical area on multi-subtrip trips is correctly reported on FVTRs < 5% of time.
  - Finding agrees with comparison of FVTR and Observer data.

FVTR vs. Study Fleet

Trip type	Quality	Trips	Percent
All	reported correctly	472	73.8
All	reported incorrectly	168	26.2
<b>Total trips</b>		<b>640</b>	
Trip type	Quality	Trips	Percent
1 subtrip	reported correctly	466	94.1
1 subtrip	reported incorrectly	29	5.9
<b>Total trips</b>		<b>495</b>	
2+ subtrips	reported correctly	6	4.1
2+ subtrips	reported incorrectly	139	95.9
<b>Total trips</b>		<b>145</b>	

Table 2. Comparative analyses of statistical area reporting using FVTR reported data and Study Fleet reported data for matching trips. Trips are categorized based on quality of reporting. Correct FVTR trip reports are those where both the number and identity of statistical areas fished on a given trip match those statistical areas reported in Study Fleet data.

FVTR vs. Observer

Trip type	Quality	Trips	Percent
All	reported correctly	119	72.6
All	reported incorrectly	45	27.4
<b>Total trips</b>		<b>164</b>	
Trip type	Quality	Trips	Percent
1 subtrip	reported correctly	118	94.4
1 subtrip	reported incorrectly	7	5.6
<b>Total trips</b>		<b>125</b>	
2+ subtrips	reported correctly	1	2.6
2+ subtrips	reported incorrectly	38	97.4
<b>Total trips</b>		<b>39</b>	

Table 3. Comparative analyses of statistical area reporting using FVTR reported data and Observer reported data for matching trips. Trips are categorized based on quality of reporting. Correct FVTR trip reports are those where both the number and identity of statistical areas fished on a given trip match those statistical areas reported in Observer data.

# Study Fleet Data Collection

- Effort number - how many efforts per trip?
  - Mobile-gear — slight underestimation of number of efforts but relatively close to Observer and FVTR.
    - Likely due to technical problems/frustration with logbook or forgetting to record an effort.
  - Fixed-gear — substantial underestimation of number of efforts both in FVTR and Study Fleet.
    - Likely due to miscommunication regarding instructions on reporting.

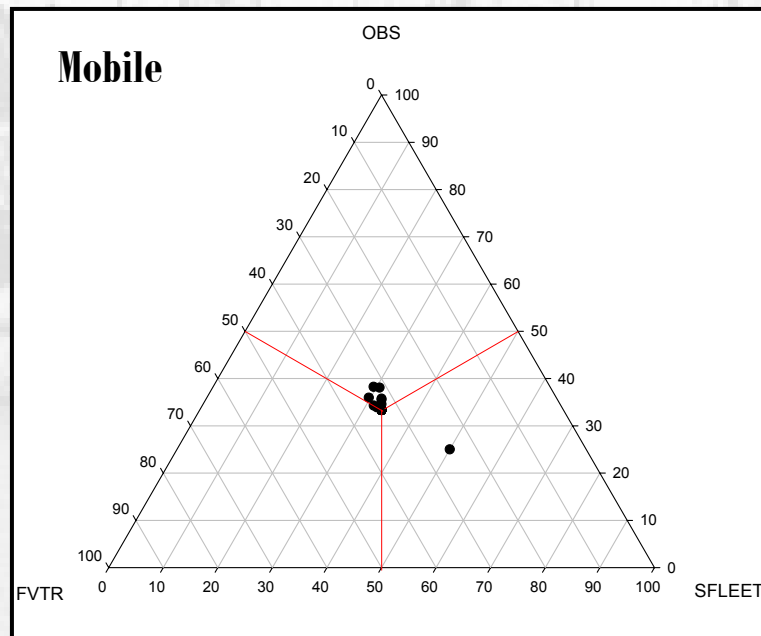


Fig. 4. Ternary plot of the number of efforts per trip comparison for fish otter trawl trips that could be matched across all three fisheries-dependent databases; Study Fleet, FVTR and Observer. Comparison based on 28 matched trips.

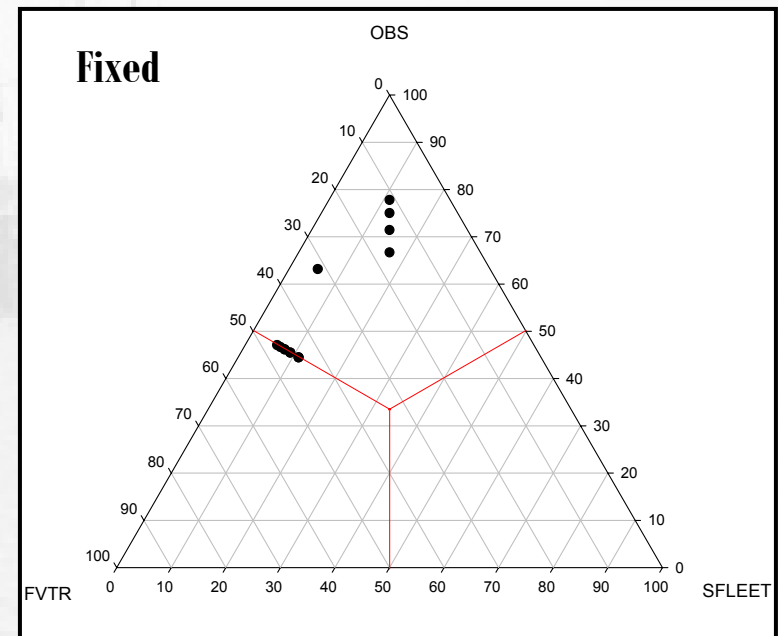


Fig. 5. Ternary plot of the number of efforts per trip comparison for demersal longline trips that could be matched across all three fisheries-dependent databases; Study Fleet, FVTR and Observer. Comparison based on 13 matched trips.

# Study Fleet Data Collection

- Effort duration - how long did each effort last?
  - More accurate estimates of individual efforts — effort-level data captures the variability in effort duration.

NOAA Form No. 88-30 OMB No. 0647-0212 Expires 7/31/05

**FISHING VESSEL TRIP REPORT**

DID NOT FISH DURING MONTH/YEAR

1. VESSEL NAME 2. USCG. DOC. or STATE REG. NO. 3. VESSEL PERMIT NUMBER

4. DATE/TIME SAILED DATE (mm/dd/yy) TIME (24 hrs) 5. TRIP TYPE (CHECK ONE)  COMMERCIAL  PARTY  CHARTER 6. NO. OF CREW 7. NO. OF ANGLERS

FILL OUT A NEW PAGE FOR EACH CHART AREA OR GEAR OR MESH/RING SIZE FISHED

8. GEAR FISHED 9. MESH/RING SIZE 10. QUANTITY OF GEAR 11. SIZE OF GEAR

12. CHART AREA 1-4. LATITUDE/LONGITUDE or LORAN 15. NO. OF HAULS 16. AVERAGE TOW/SOAK TIME

13. AVG. DEPTH 17. SPECIES CODE NAME 18. KEPT POUNDS COUNT 19. DISCARDED POUNDS COUNT 20. DEALER PERMIT NO. 21. DEALER NAME 22. DATE SOLD (mm/dd/yy)

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Not an actual FVTR

Fig. 6. Example of a single page FVTR trip. FVTR resembles actual observed FVTR submitted by Study Fleet participants

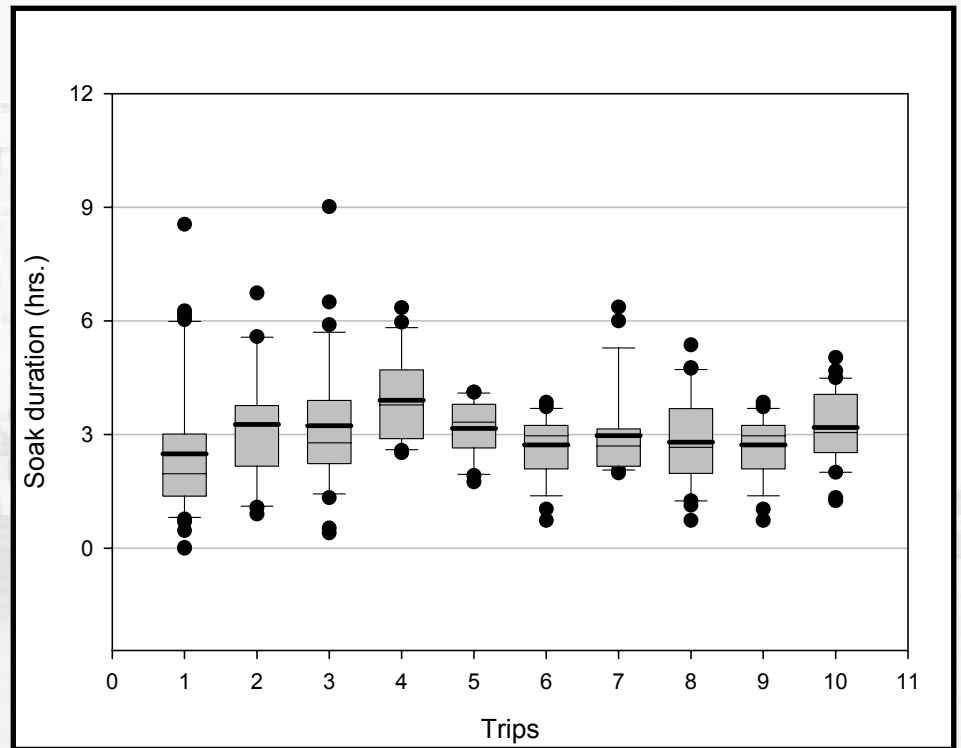


Fig. 7. Box plot showing the distribution of Study Fleet haul durations for trips taken with otter trawl gear where an average haul duration of 3 hours was reported on the FVTR logbook. For all trips shown the total number of hauls/trip > 20. Study Fleet trip average haul duration is indicated by the bold horizontal line in each box plot.



# Study Fleet Data Collection

- Effort duration - how long did each effort last?
  - Study Fleet (large and small) outliers associated with mobile gear which is likely due to forgetting to press 'start' or 'stop' effort button.
  - Good agreement between Study Fleet and FVTR for fixed gear, but estimates are much higher (2-3 hours, 33-50 %) compared to Observer estimates.

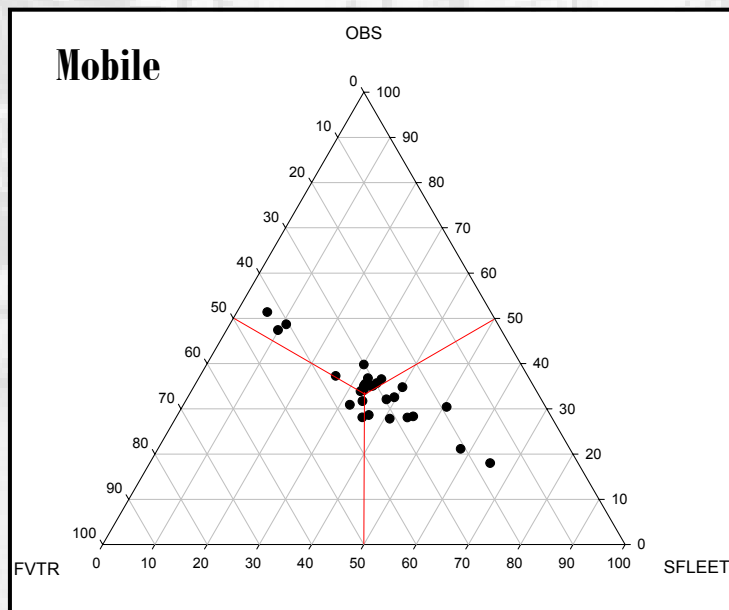


Fig. 8. Ternary plot of the average effort durations comparison for fish otter trawl trips that could be matched across all three fisheries-dependent databases; Study Fleet, FVTR and Observer. Comparison based on 28 matched trips.

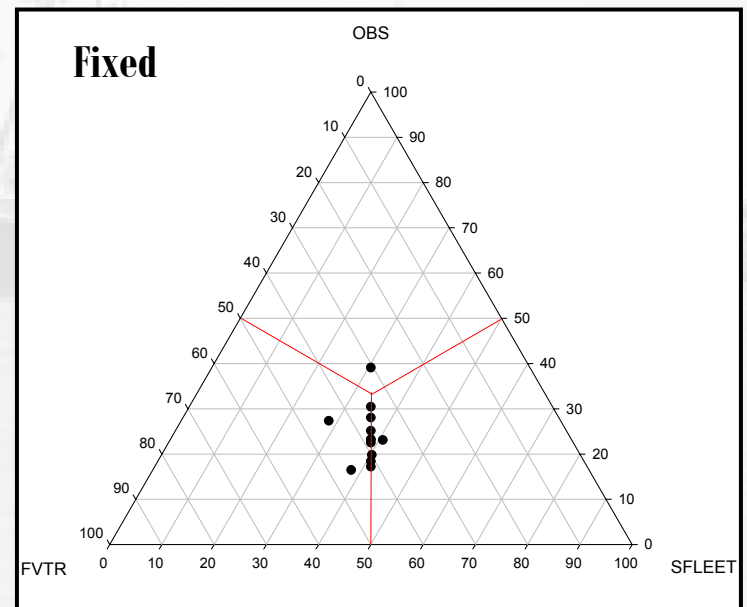
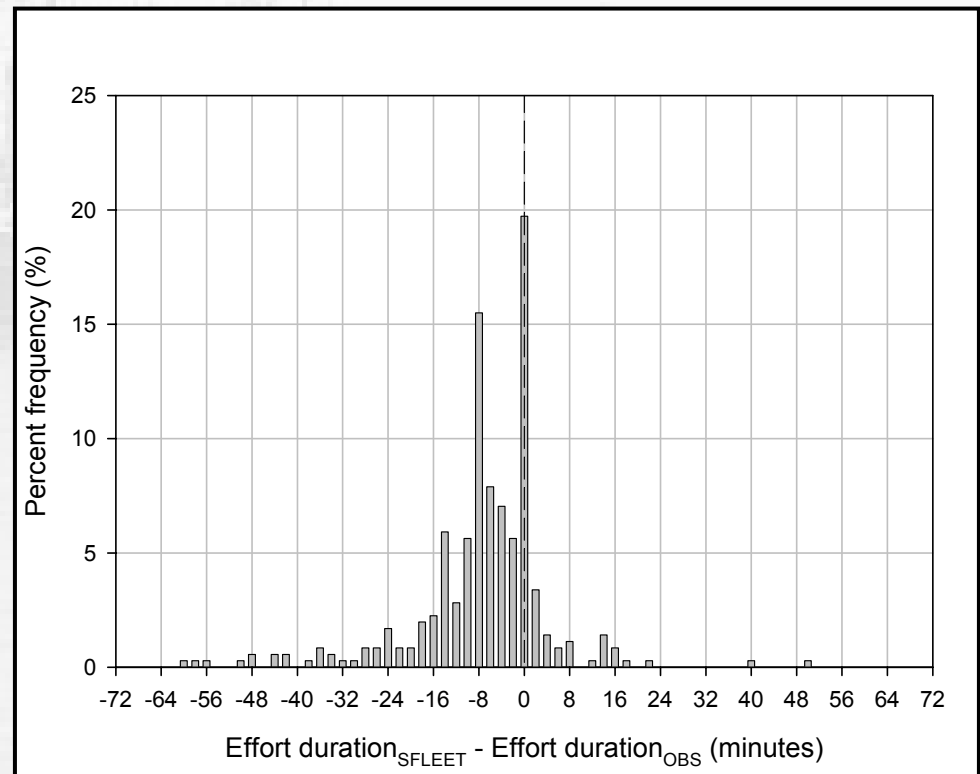


Fig. 9. Ternary plot of the average effort durations comparison for demersal longline trips that could be matched across all three fisheries-dependent databases; Study Fleet, FVTR and Observer. Comparison based on 13 matched trips.

# Study Fleet Data Collection

- Effort duration - how long did each effort last?
  - The comparisons may be affected by differences in protocol or miscommunication regarding reporting instructions.
    - Example in protocol differences is evident when Study Fleet trawl durations are compared with Observer estimates.

*Fig. 10. Distributions of the differences between effort durations reported to the Study Fleet program compared to that recorded by the Observer program for fish otter trawl gear. All comparisons have been made by matching effort at the effort level as determined by the effort-matching procedure. No other gear types could be matched at the effort level.*



# Study Fleet Data Collection

- Catch – how often were species reported?
  - Improved discard reporting rate.

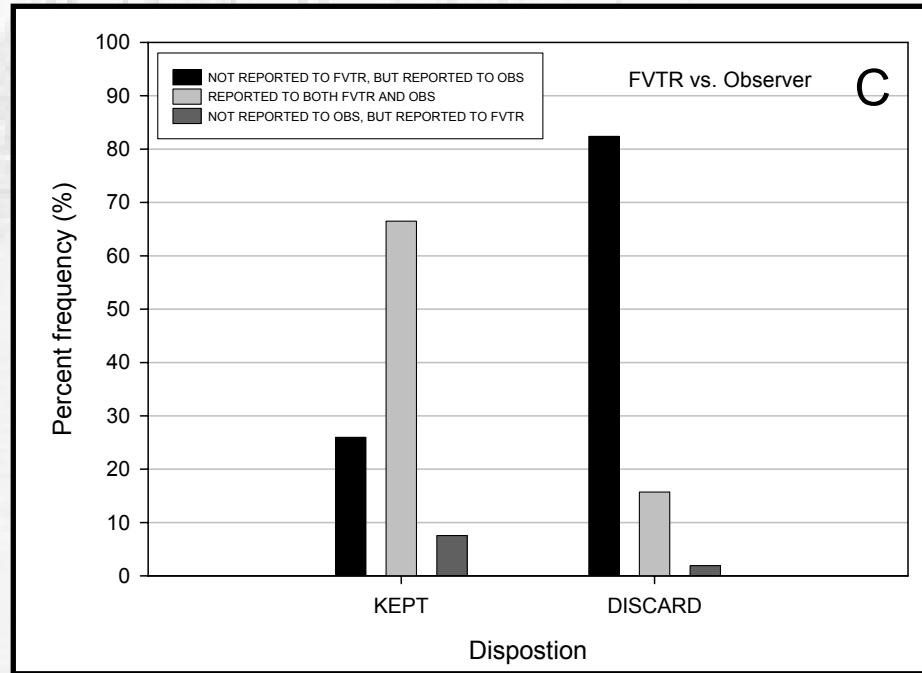
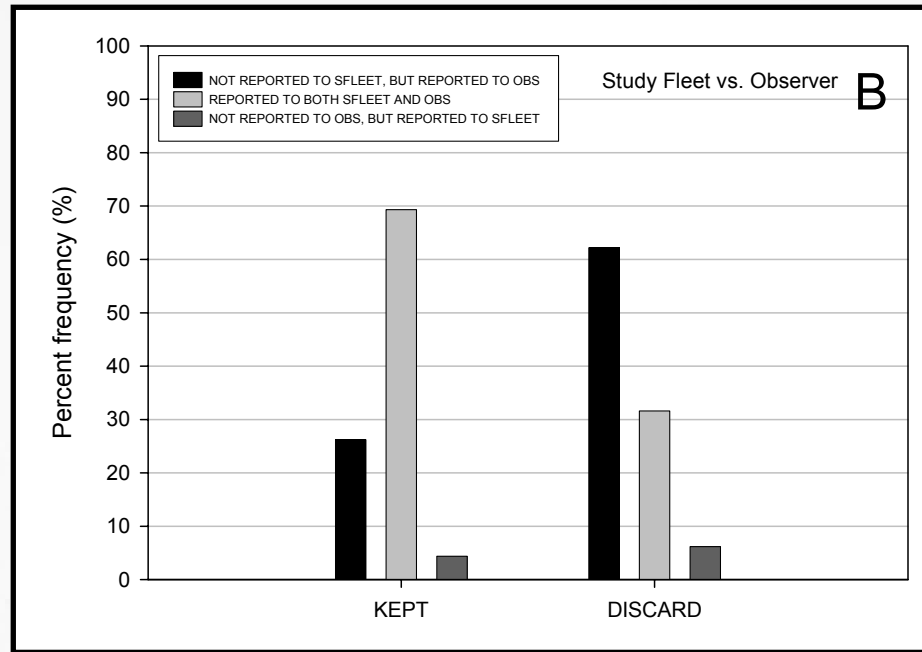
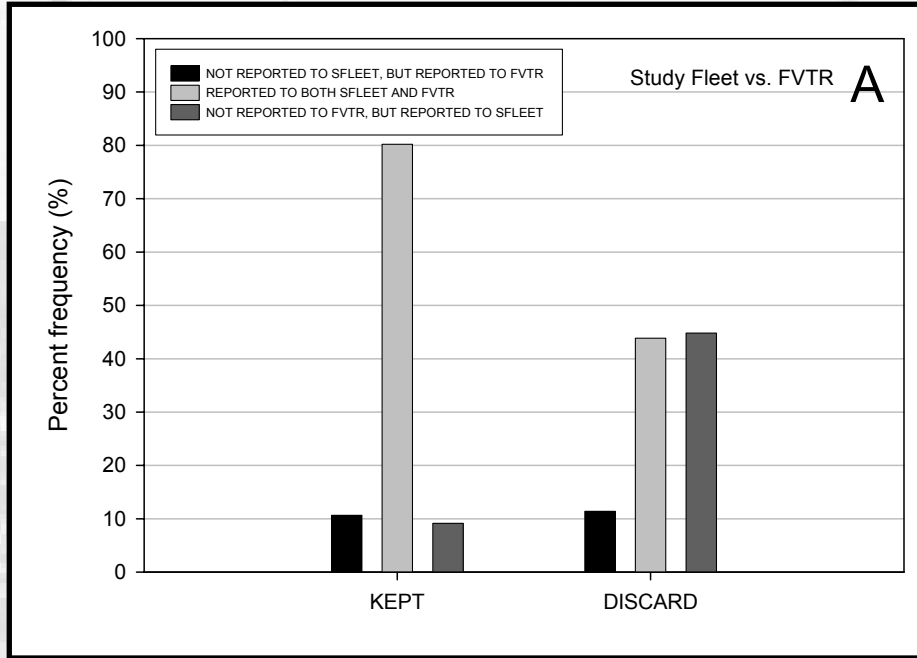


Fig. 11. Reporting patterns observed in catch records (kept and discarded) reported to Study Fleet (SFLEET) and FVTR databases (A), Study Fleet (SFLEET) and Observer (OBS) databases (B) and FVTR and Observer (OBS) databases. Comparisons are based only on catch records from matched trips. Study Fleet/FVTR percentages are based on a total of 3959 kept and 3243 discard records. Study Fleet/Observer percentages are based on a total of 362 kept and 629 discard records. FVTR/Observer percentages are based on a total of 1083 kept and 1661 discard records.

# Study Fleet Data Collection

- Catch — how much of each species were reported?
  - When comparing **kept** amounts, Study Fleet had the lowest estimates (A). FVTR was slightly closer but still much lower compared to Observer.
  - When comparing **discarded** amounts (B), Study Fleet and FVTR were identical, but lower than Observer estimates.
    - ❖ *When compared at the effort-level, no significant differences in discarded estimates were observable between Study Fleet and Observer.*

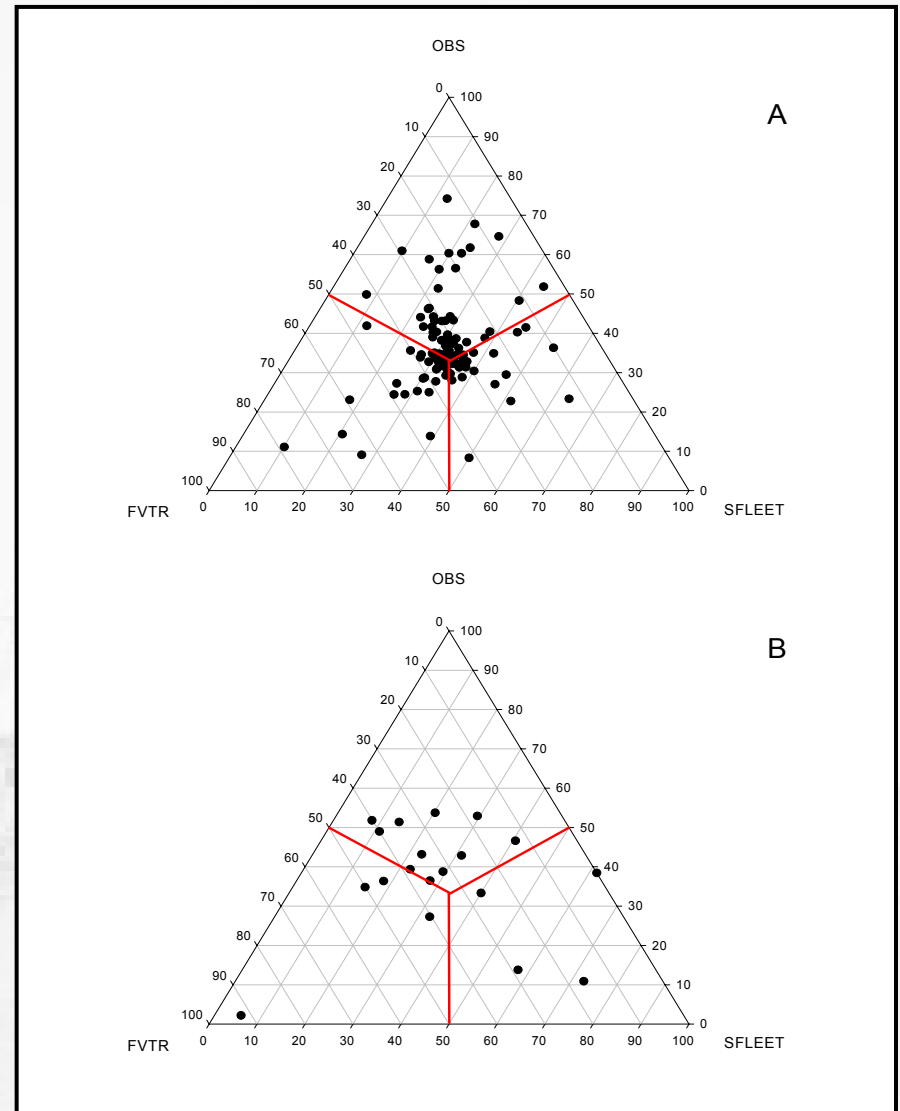


Fig. 12. Ternary plots of matching Study Fleet, FVTR and Observer catch records. All records where weights were equal between sources have been excluded. Red lines indicate lines of conformity between data sources. Kept catch record ( $n=110$ ) comparisons are shown in (A) and discarded catch records ( $n=19$ ) shown in (B).

## Summary of Study Fleet Analysis

- Data are more timely.
- Data have greater spatial accuracy and precision.
- The number of efforts was underestimated, particularly in the fixed-gear fisheries.
  - We need to improve through logbook enhancements and better training.
- Study Fleet data does provide us with estimates of effort duration variability within a trip, but comparisons suggest improvements needed.
  - We need to be clear in our training and instruction as to when fishermen should be recording effort starts and stops and what to do when fishermen forget to press a button.
- Catch reporting slightly improved compared to FVTR, but substantial room for improvement.
  - In particular, improvements are needed in the areas of estimating kept catch amounts and reporting discarded catch.
  - We need to develop catch reporting methodology to make estimation easier and more accurate.

# **Thank you!**

- Special thanks to the Study Fleet participants and the three management organizations:
  - Gulf of Maine Research Institute
  - Cape Cod Commercial Hook Fisherman's Association
  - Manomet Center for Conservation Sciences



**NOAA Fisheries - NEFSC**

National Marine Fisheries Service

