NEFSC Review
of the
Cooperative Research Partners Initiative
Study Fleet Pilot Program

5 May, 2005

Executive Summary

Background: The Study Fleet (SF) program goal was to provide high resolution fishery dependent (self-reported) data for stock assessments and fishery management purposes. The program would capitalize on fishermen's desire to improve the data quality and minimize record keeping burden. The SF concept assumed a phased implementation, particularly with respect to the ultimate fleet size. The initial objective was to develop an electronic logbook, with commercial fishermen, that would be capable of collecting haul by haul data on catch, fishing effort, gear characteristics, area fished and biological observations in a near-real time fashion. The SF program would use technology to achieve faster data processing and delivery, would be integrated with biological port sampling, and would create a feedback loop for fishermen to report their observations.

SF System Evaluation Phase II: Given the multi-year investment made by NMFS in development of the SF system, the improvements in logbook performance and data processing systems achieved during the past year have been fully successful. Tasks associated with development and implementation of a web accessible confirmation process and full deployment of satellite communication capabilities were not as successful. Timely implementation of the system was delayed and this has limited the operational monitoring period. While these issues deserve attention, they should not detract from the overall accomplishment that ***a very capable electronic logbook, the UNH logbook, has been developed and deployed***. While data collection is on-going, operational performance is being monitored. Additional data analyses comparing SF data to VTR and observer records are underway. These analyses will provide additional information relative to the performance of the SF logbooks in terms of collecting fishery assessment and monitoring statistics as compared to the VTR and observer programs. ***The SF system as currently structured can provide more detailed temporal and spatial data in a timelier manner than the VTR system***.

Remaining tasks to achieve original objectives and to increase future options for deployment:

To increase options for future deployment, especially with respect to evaluating replacing VTR reporting with SF reporting and any real-time monitoring (quota sharing agreements) at less than the trip level, the following system development tasks (not in priority order) should be considered as high priorities:

- Implement database and load routine changes necessary to deploy UNH Logbook V4.2;
- Increase capability of system to record time and location of start set, end set, start haul, end haul for fixed gear fisheries;
- Expand capabilities for tracking in-situ temperature encountered by the gear;
- Develop capability to allow daily or haul-by-haul reporting via satellite from sea;
- Develop and test secure web access system and confirmation process that would satisfy electronic signature requirements;
- Integrate the SF system with port sampling to improve the precision of biological samples with respect to area of capture;
- Develop standard discard estimation protocol with SF captains to improve the quality of self-reported discard data.

Recommendations: NEFSC recommends extending the SF pilot program from June 2005 through December 2006. Assuming the growth of the SF during the extension would be modest and fall short of the proposed 20% sample (~250 vessels), the emphasis should be placed on deploying units aboard vessels participating in fisheries that are characterized by small fleets, or sectors of fleets where the higher resolution data could improve catch characterization (size samples) and precision of fishery dependent catch rates.

Background

The Study Fleet (SF) program goal was to provide higher resolution fishery dependent (self-reported) data for stock assessments and fishery management purposes. The project would capitalize on the desire of fishermen to improve the quality of such data, while minimizing record keeping burden. Development and testing of an onboard electronic logbook system was a necessary precursor to the proposed deployment on a statistically representative sample (@ 20%) of the groundfish fleet that accounted for a disproportionate share of total aggregated landings. The electronic logbook was identified as an industry incentive, since it would provide an option to replace the paper based VTR system. Initial SF logbook development focused on near real-time collection of high resolution effort-level (haul by haul versus sub-trip) data on catch, fishing effort, gear characteristics, area fished and biological observations "relevant to biological assessments of the stocks (e.g. catches, catch locations, biological samples)." (*CRPI Website – S. Murawski summary of SF considerations – April 2001*)

SF System Status

The current SF system satisfies many of the original objectives. The system includes electronic logbooks, related satellite communication and e-mail components, and the database system running at NERO. The system has the capability of collecting high resolution effort-level data on catch, fishing effort, gear characteristics, and area fished.

- Two electronic logbooks were developed, UNH and P-Sea Windplot (PSW). The UNH software is further developed and currently deployed on 31 of the 33 participating vessels (30 owners). Enhancements coordinated between software developers, Perot Systems and NEFSC and NERO technical staff were directed toward resolving many data-capture, code-conversion and quality issues leading to improved data quality and streamlined data entry.

- Perot Systems delivered and installed the database management system, data received through mid-February 2005, and e-mail loading scripts at the end of contract Phase II (Feb. 28, 2005). Satellite e-mail messages, or e-mails from SF field staff, are regularly loaded into Oracle tables at NERO with views provided to the NEFSC.

- The contract for Perot Systems field staff was extended through May 31, 2005 to continue data collection for vessels that lack satellite communication capabilities, continue satellite communication installations, and for ongoing outreach and trouble-shooting support for cooperating vessel owners and operators.

- Currently 12 out of 22 vessels that have reported since NMFS assumed control of the system on 28FEB2005 have reported via satellite at least once. Of the 11 vessels of the 33 participating SF vessels that have not yet reported; most have satellite capability, but are waiting set up and testing. It is important to note that the SF system is trip based and additional software development will be required to allow for daily or tow by tow reporting from sea, comparable to the NEFSC *Illex* SF system project.

- SF reporting timeliness is near real-time. The NEFSC has been able to review trip, effort (tows, hauls, sets, etc.) records and trip landings and dealer utilization data in standard table formats within days of landing since the system was installed at NERO. For satellite transmitted data received from SF vessels since February 28, 2005 the ***mean delay from the date the trip ended***

before it shows up in the RO database is 8.09 days ± 5.92 (range: 1 – 25 days, n=34) compared to a mean delay of 44.84 days ± 37.62 (range: 1 – 311 days, n=2131) for all VTR's reported by SF vessels since their involvement in the SF project.

- Water temperature records associated with specific tows are available for a portion of the fleet equipped with temperature probes. Temperature probe use has increased over time, however before scientifically useful data can be gathered from these data; standard protocols for probe attachment to the various gear types within the fleet must be developed and implemented.

- The integration of the SF system with port sampling has not developed. The objective was to improve the precision of biological samples with respect to time and area of capture. This remains a high priority assessment need, especially with respect to assigned locations for samples from long (> 1 week) offshore trips that cover a series of reporting areas and potentially distinct stocks.

- Development of a secure web based system providing vessel operators secure access to their specific trip records and a systematic confirmation process that would satisfy electronic signature requirements was not completed. These components are significant precursors that must be developed and tested before SF reporting can be considered as a substitute for VTR reporting (an industry incentive).

    - NERO/FSO and NEFSC/DMS guidance and implementation plan for both obstacles: electronic signature and web-based data viewing system, will be needed as both have been previously implemented for Dealer Electronic Reporting (DER) and the Illex Study Fleet systems).

- Direct NEFSC staff outreach and contacts with cooperating captains have increased significantly since the system was installed at NERO. Vessel trip report and data quality summaries have been delivered to one third of the vessels. Subsequent discussions have identified a number of system enhancements as well as data quality issues that can be improved through continued outreach.

- IRM, DMS and cooperative research staff are coordinating ongoing system maintenance as well as planning for additional automation and upgrades.

- With the exception of field staff support, the delivered SF system has been successfully internalized within NMFS

System Characteristics, Capabilities, and Data Summaries

The SF system collects all of the critical data elements collected by the VTR program and more, and does so at a finer spatial and temporal scale (**Appendix I** contains a comparison of SF and VTR variables). **Table 1** lists the number of trip, effort, catch, and utilization records by logbook version received. Different versions of the UNH and PSW logbooks account for 878 trips with 4,673 distinct efforts and 32,519 species catch-disposition records and 5279 utilization records.

- The SF logbook would collect on the order of 5 times the number of catch-effort observations compared to the VTR system. This figure is based on a comparison of the subtrip reporting frequency found within the VTR records of SF participants and the number of individual effort

records (containing duration, location and catch detail) contained with the SF database. **Figures 1 and 2** display the set locations for effort (haul, tow, set, etc.) records prior to and after January 1, 2005.

- Compared to the VTR program, the SF system provides finer scale spatial (exact effort location vs. a single point location for aggregated efforts) and temporal (duration of individual efforts vs. average effort duration) resolution for catch and effort observations.

- The SF data shows an increase in the number of spatially explicit effort locations per trip compared to the VTR data for the same vessels over a similar time period, illustrating the ability of the SF system to deliver higher precision effort locations.

    - Mean number of ten minute squares reported per trip by SF vessels is 2.5 ± 2.7 ten minute squares/trip with a range: 1 - 25 ten minute squares compared to a VTR mean of 1.0 ± 0.2 ten minute squares/trip, range 1 – 4 ten minute squares.

- The finer scale temporal data in SF provides opportunities to evaluate catch and discard rate differences based on environmental influences not possible with VTR data, potentially providing data to support bycatch avoidance programs.

- Since January 1, 2005, more than 7,000 species-disposition-weight records have been recorded, accounting for more than 2.4 million pounds live weight.

    - 453 have records have been identified as problems records, most caused by invalid species-unit of measure combinations submitted by the operator that were not recognized by the data loading routines. This problem has been corrected in a UNH logbook version (V4.2) that is available for deployment once necessary database and load script changes are made.

- Data quality has improved with newer versions of the UNH and PSW logbooks, which include more data elements and data entry processes that minimize reporting errors.

    - NEFSC staff and Perot field staff are reviewing a number of data entry issues with vessel captains to address those problems that can be resolved by providing clearer instructions on software use.

    - The majority of existing data quality issues are associated with optional variables, not currently required by the software to complete a trip. These variables include: VTR serial numbers; sailing or landing ID numbers; departure, landing and home ports, and federal dealer permit numbers. All could easily be corrected during a web-based confirmation process and entry of port and federal dealer permit numbers has been tightened in the afore mentioned UNH logbook V4.2.

    - Errors with respect to disagreement between GPS locations and operator-provided statistical areas as well as disagreements between operator-provided soak (effort) durations and durations calculated from the start and ending time of individual efforts, while not extensive, are being tracked and ways to improve the logbook software to prohibit their occurrence are being investigated.

- One system limitation that must be noted is that the current PSW software cannot handle multiple open effort records. This situation occurs on vessels that set multiple strings or sections of bottom longlines and gillnets in close proximity and then haul those separate sections in rapid succession.

Conclusion - SF System Evaluation Phase II

- Although additional SF system upgrades and process improvements have been identified, ***the SF system as currently structured can provide more detailed temporal and spatial data in a more timely manner than the mandatory VTR system.***

- Given the multi-year investment made by NMFS in development of the SF system, the improvements in logbook performance and data processing systems achieved during the past year have been fully successful. Tasks associated with development and implementation of a web accessible confirmation process and full deployment of satellite communication capabilities were not as successful. Timely implementation of the system was delayed and this has limited the operational monitoring period. While these issues deserve attention, they should not detract from the overall accomplishment that ***a very capable electronic logbook, the UNH logbook, has been developed and deployed***.

- Additional data analyses comparing SF data to VTR and observer records are underway. These analyses will provide additional information relative to the performance of the SF logbooks in terms of collecting fishery assessment and monitoring statistics as compared to the VTR and observer programs.

Identification of SF System Enhancements

To increase options for future deployment, especially with respect to evaluating replacing VTR reporting with SF reporting and any real-time monitoring (quota sharing agreements) at less than the trip level, the following system development tasks (not in priority order) should be considered as high priorities:

- Implement database and load routine changes necessary to deploy UNH V4.2.

- Increase capability of system to track strings of gears in fixed gear fisheries and to record time and location variables for all 4 effort steps (e.g. start set, end set, start haul, end haul).

- Expand capabilities for tracking in-situ temperature encountered by the gear.

- Develop capability to allow daily or tow-by-tow reporting via satellite from sea and require satellite communication capability as a condition of participation in the SF.

- Develop and test secure web access system and confirmation process that would satisfy electronic signature requirements.

- Develop process to allow linkage with port sampling so that tow specific samples identified by cooperating captains can improve the precision of stock specific biological samples.

- Develop standard discard estimation protocol with cooperating SF captains so that the quality of the self reported discard data can be adequately evaluated.

NEFSC Deployment Suggestions

- Given the subsequent assumptions relating to costs, the *NEFSC would recommend an extension of the SF pilot program from June 2005 through December 2006*. The extension will allow time for NMFS IT staff to complete the identified system development tasks, allow for collecting better cost and performance information, while providing NMFS senior mangers and interested constituencies an opportunity to consider how the SF system might fit into regional electronic vessel reporting.

- Assuming that the growth in the SF during the extension would be modest and fall short of the proposed 20% sample (@250 vessels), the NEFSC Population Dynamics Branch staff recommend that an emphasis be placed on deploying units aboard vessels participating in fisheries that are characterized by small fleets, or sectors of fleets where higher resolution data could improve catch characterization and precision of fishery-dependent catch rates.

    - Fleet sectors that bear consideration include whiting day boats, northern shrimp, tilefish, and two offshore port based trawl sectors that exploit diverse groundfish stocks.

    - Participating SF vessels, should be compensated for providing fish totes with labels that identify specific tows documented by the SF software and 24 hour prior notification of landing so that port agents could access the totes for biological sampling. With this in mind, SF expansion should pay particular attention to ports where biological samplers are stationed, as they currently are.

- Finally, development of standard procedures in cooperation with SF captains for improving estimated discard volume and comparison of those estimates to observer generated data could provide an additional component of an enhanced bycatch monitoring program or data that industry would support for use in a near real-time bycatch avoidance program. Additional pilot phase work on catch characterization and discard data would close the loop on addressing all of the biological data needs identified in the early facilitated constituent workshops.

Assumptions Relating to Deployment Options: The SF system could be deployed to satisfy a variety of monitoring and assessment needs. However, many of these options and the utility of the resulting data are constrained by the size of the SF that could be deployed given budget constraints and assumptions about cost drivers.

- The major SF cost drivers include equipment costs (@$4,000 - $5,200 per vessel depending on satellite communication system chosen and installation costs), monthly vessel contracts ($850 per month/boat), management organization overhead, and contract support for field staff. In contrast, the smooth take over by NMFS of the Perot Systems maintenance and operational tasks seem well within existing Cooperative Research, DMS, and IRM staff capabilities for the near-term.

- Additional funding would be required by NMFS, but this would be contingent on the size of the deployed SF and primarily reflect administrative costs to maintain vessel and field staff contracts, support equipment purchases, and added funds for DMS and IRM once SF system requirements exceeded available IT infrastructure capacity.

    - Cost savings could be achieved by direct contracts between NMFS and participating vessels and by supplementing the contract field staff with Cooperative Research technicians who could participate in a variety of research projects in addition to SF.

- The major program cost will remain the monthly vessel contracts and the number of vessels in the SF. Vessel fees were justified by the time invested by captains in working through software versions, as well as trouble-shooting system configurations and installations, and payment for duplicate reporting since both SF and VTR reports were required for all trips. Captains perceive a value added benefit from temperature probes and the UNH trip report capability. While preceding statements identify the need to complete work on web access and data confirmation processes necessary to support formal reporting requirements under existing FMPs, the inevitable transition from paper to electronic reporting remains a strong incentive that provides a basis for negotiating cost containment with interested vessel operators, fishery sector representatives and fishery managers.

Immediate Tasks for Extension of SF Program

- Seek comments from NERO FSO, IRM, and other divisions to develop a schedule for SF system upgrades and detailed requirements for SF capabilities that would allow consideration of VTR replacement for SF capable vessels and integration with biological sampling.

- Provide combined NEFSC and NERO review comments to cooperating partners and seek immediate meetings to discuss options for SF expansion during Nov. –Dec. 05 (FY06) so an expanded fleet could be operational on January 1, 2006. Meetings must address cost containment, and result in identification of target vessels by mid-September.

- Develop contract for single managing organization or develop direct NMFS-vessel contracts.

- Develop contracts for 2 field technicians. Immediate need to retain remaining experienced SF field staff.

- Develop detailed plan for UNH V4.2 upgrades and required automation of satellite communication e-mail uploads and database support. Logbook and system upgrades must first allow V4.2 deployment by July 2005, with subsequent enhancements required by December 2005. Develop sole source short term contract for UNH system upgrade, specifically to add the capacity to track a biological sampling program.

- Develop plan to implement web access and data confirmation processes that will build on NEFSC *Illex* SF programs. Available for testing by December 2005.

- Initiate equipment purchase to deploy 10-15 units on southern New England / Mid-Atlantic vessels by September 2005 using National Cooperative Research funds (NEFSC June 05).

- October 1, 2005 initiate FY06 SF expansion plan for vessels that would come on line by January 1, 2006.

Table 1. Summary of the number of trip, effort, catch and utilization records in the SF database, by logbook software version (PSW = P-Sea Windplot, UNH = University of New Hampshire).

LOGBOOK	TRIP	EFFORT	CATCH	UTILIZATION
PSW, 7.08	18	41	388	
PSW, 7.09	2	20	96	18
PSW, 7.10	8	10	72	1
UNH, 1	16	31	227	101
UNH, 1.1	72	263	1813	553
UNH, 1.2	23	55	378	144
UNH, 2.0	81	444	3698	425
UNH, 3.0	375	2010	14999	2422
UNH, 4.0/4.1	283	1799	10848	1615
TOTAL	878	4673	32519	5279

Figure 1. Haul locations of Study Fleet vessels prior to January 1, 2005, by coordinating program participants (GOM = Gulf of Maine Research Institute, CCCHFA = Cape Cod Commercial Hook Fishermen Association, Manomet = Manomet Center for Conservation Sciences).

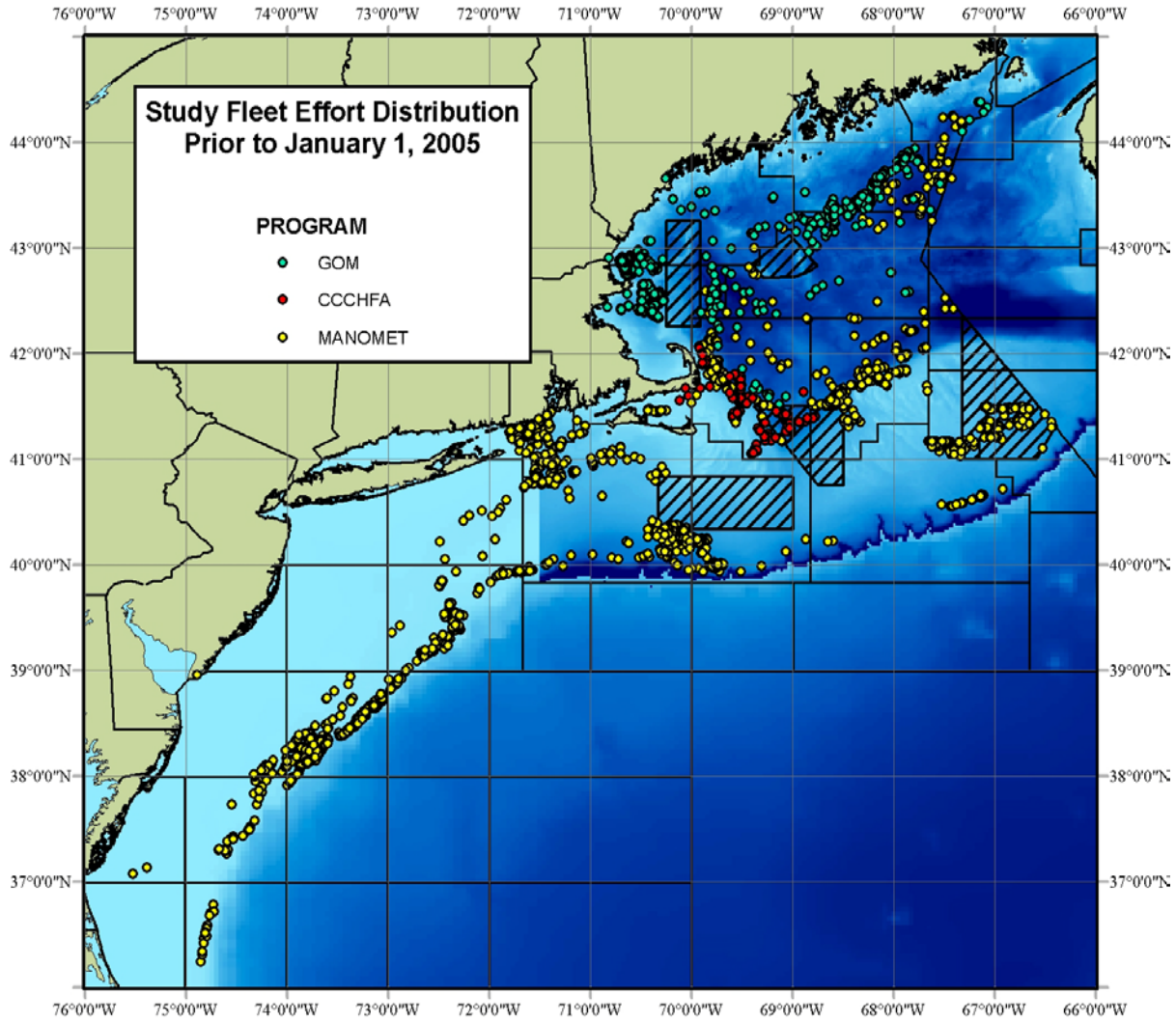
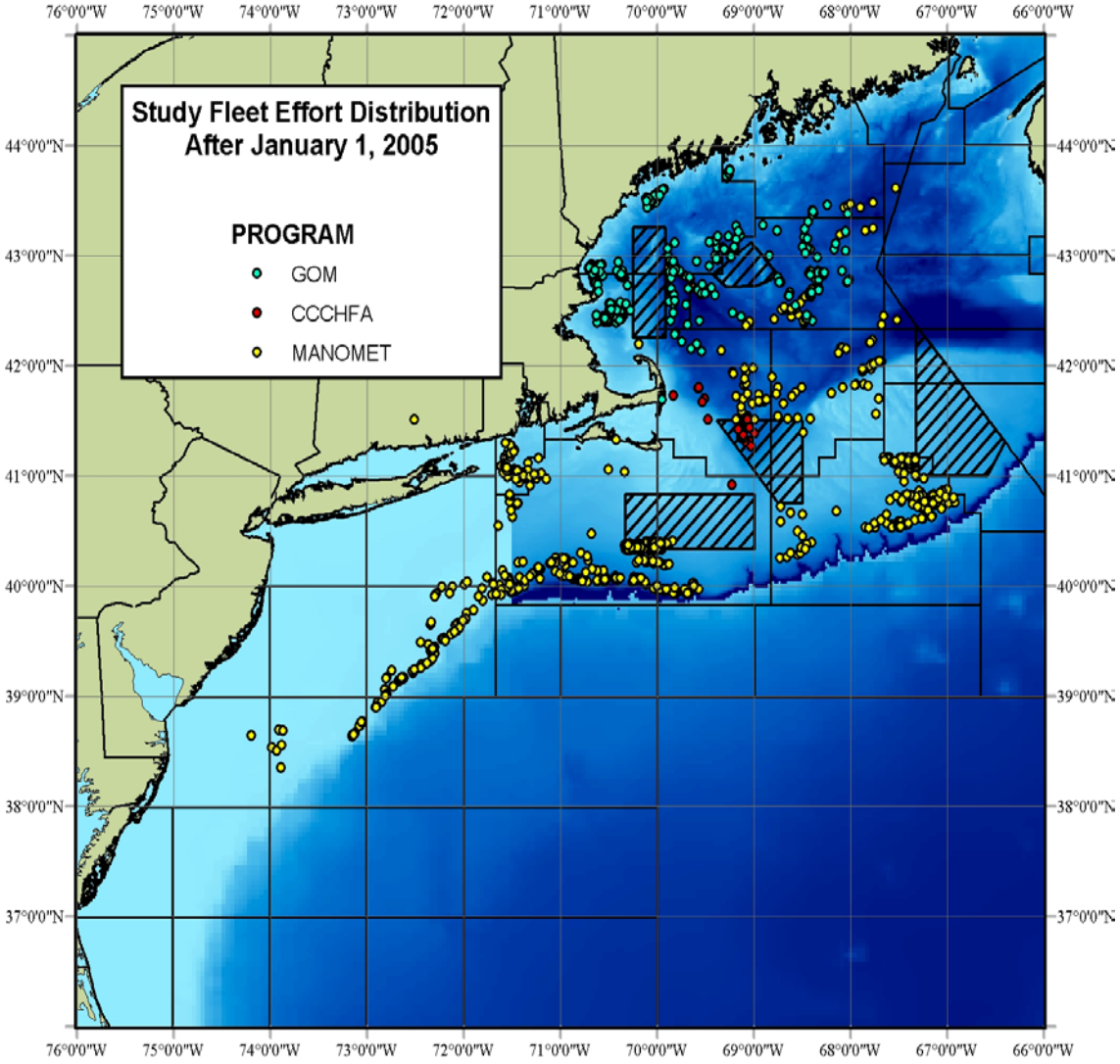


Figure 2. Haul locations of Study Fleet vessels after January 1, 2005, by coordinating program participants (GOM = Gulf of Maine Research Institute, CCCHFA = Cape Cod Commercial Hook Fishermen Association, Manomet = Manomet Center for Conservation Sciences).



Appendix I. Comparison of the variables contained within the SF and VTR databases. Some of the variables shown below are derived variables that have been added to conditioned datasets to facilitate data quality analysis of effort location and duration.

TRIP-EFFORT RECORDS			
SFLEET_DB_EQUIVALENT	SFLEET	VTR	VTR_DB_EQUIVALENT
WORK_TRIP.TRIP_SEQ	trip_seq	docid	DOCUMENT.DOCID
WORK_EFFORT.EFFORT_ID	effort_id	imgid	IMAGES.IMGID
WORK_CATCH.CATCH_ID	catch_id	catch_id	CATCH.CATCH_ID
WORK_VESSEL_DATA.VESSEL_NAME	vessel_name	vessel_name	derived from SFLEET.WORK_VESSEL_DATA based on VESSELS.HULL_NUM (macthing was checked for accuracy first)
WORK_VESSEL_DATA.PERMIT_NUM	permit_num	permit_num	derived from SFLEET.WORK_VESSEL_DATA based on VESSELS.HULL_NUM (macthing was checked for accuracy first)
WORK_TRIP.HULL_NUM	hull_num	hull_num	VESSELS.HULL_NUM
concatenation of WORK_TRIP.OPERATOR_FIRST_NAME and WORK_TRIP.OPERATOR_LAST_NAME	operator	operator	DOCUMENT.OPERATOR_NAME
WORK_TRIP.OPERATOR_PERMIT_NUMBER	operator_permit_number	operator_permit_number	DOCUMENT.OPERATOR_NUM
WORK_TRIP.VTR_SERIAL_NUMBER	vtr	vtr	IMAGES.SERIAL_NUM
WORK_TRIP.START_DATE_TIME	trip_start_date_time	trip_start_date_time	DOCUMENT.DATE_SAIL
WORK_TRIP.END_DATE_TIME	trip_end_date_time	trip_end_date_time	max(DOCUMENT.DATE_LAND, DOCUMENT.DATELND2)
WORK_TRIP.START_PORT	start_port		
WORK_TRIP.END_PORT	end_port	end_port	PORT1 or PORT2 (select port with max date land)
WORK_TRIP.TRIP_TYPE	trip_type	trip_type	DOCUMENT.TRIPCATG
WORK_TRIP.CREW_SIZE	crew_size	crew_size	IMAGES.CREW
WORK_EFFORT.CHART_AREA	given_area	given_area	IMAGES.AREA (may be NEMAREA or AREA)
derived from WORK_EFFORT.CHART_AREA (uses AREA equivalent of NEMAREA in SOLE.CFDBS.LOC)	given_stat_area	given_stat_area	derived from IMAGES.AREA (uses AREA equivalent of NEMAREA in SOLE.CFDBS.LOC)
derived from WORK_EFFORT.START_LATITUDE/LONGITUDE (uses AREA from SOLE.CFDBS.LOC)	derived_start_area	derived_start_area	derived from start_latitude/longitude
derived from WORK_EFFORT.END_LATITUDE/LONGITUDE (uses AREA from SOLE.CFDBS.LOC)	derived_end_area		
WORK_EFFORT.START_LATITUDE	start_latitude	start_latitude	derived from IMAGES.LATITUDE or IMAGES.CLATITUDE (not actual fields, concatenation of deg, min, sec fields)
WORK_EFFORT.START_LONGITUDE	start_longitude	start_longitude	derived from IMAGES.LONGITUDE or IMAGES.CLONGITUDE (not actual fields, concatenation of deg, min, sec fields)
derived from WORK_EFFORT.START_LATITUDE/LONGITUDE (is TENMSQ value)	start_loc	start_loc	derived from IMAGES.LONGITUDE or IMAGES.CLONGITUDE (not actual fields, concatenation of deg, min, sec fields) (is TENMSQ value)
WORK_EFFORT.END_LATITUDE	end_latitude		
WORK_EFFORT.END_LONGITUDE	end_longitude		
derived from WORK_EFFORT.END_LATITUDE/LONGITUDE (is TENMSQ value)	end_loc		
WORK_EFFORT.START_DATE_TIME	effort_start_date_time		
WORK_EFFORT.END_DATE_TIME	effort_end_date_time		
calculated from WORK_EFFORT.START_DATE_TIME and END_DATE_TIME	derived_soak_duration		
WORK_EFFORT.SOAK_DURATION	soak_duration	soak_duration	derived from IMAGES.TOWHRS and IMAGES.TOWMIN
WORK_EFFORT.GEAR_CODE	gear_code	gear_code	IMAGES.GEARCODE
		ntows	IMAGES.NTOWS
WORK_EFFORT.MESH_SIZE	mesh_size	mesh_size	IMAGES.MESH
WORK_EFFORT.MESH_TYPE	mesh_type		
WORK_EFFORT.GEAR_SIZE	gear_size	gear_size	IMAGES.GEARSIZE
WORK_EFFORT.GEAR_QTY	gear_qty	gear_qty	IMAGES.GEARQTY
WORK_EFFORT.AVG_DEPTH	avg_depth	avg_depth	IMAGES.DEPTH
WORK_EFFORT.AVG_TEMP	avg_temp		
WORK_EFFORT.AVG_SPEED	avg_speed		
WORK_EFFORT.LUMPED	lumped	lumped	value=Y
WORK_CATCH.SPECIES_IMG_CODE	db_species_id	db_species_id	CATCH.SPECIES_ID
derived using SOLE.MPALMER.SPECIES_MASTER to map CATCH.SPECIES_ID to ACCSP equivalent (MPALMER.SPECIES_MASTER table will replace the SFLEET.SPECIES_MASTER table when Study Fleet Phase III is implemented)	species_combined	species_combined	derived using SOLE.MPALMER.SPECIES_MASTER to map CATCH.SPECIES_ID to ACCSP equivalent (MPALMER.SPECIES_MASTER table will replace the SFLEET.SPECIES_MASTER table when Study Fleet Phase III is implemented)
	species_itis	species_itis	
	market_code	market_code	
	grade_code	grade_code	
WORK_CATCH.AMOUNT	amount	amount	CATCH.AMOUNT
WORK_CATCH.UNIT_OF_MEASURE	unit_of_measure	unit_of_measure	derived from SOLE.MPALMER.SPECIES_MASTER
derived from SOLE.CFDBS.SPECIES_ITIS_NE (multiplies amount w/ CF_RPT_QTY_LNDLB conversion factor based on itis/market/grade/unit)	landed_pounds	landed_pounds	derived from SOLE.CFDBS.SPECIES_ITIS_NE (multiplies amount w/ CF_RPT_QTY_LNDLB conversion factor based on itis/market/grade/unit)
derived from SOLE.CFDBS.SPECIES_ITIS_NE (multiplies live_wt_lb w/ CF_LNDLB_LIVLB conversion factor based on itis/market/grade/unit)	live_wt_lb	live_wt_lb	derived from SOLE.CFDBS.SPECIES_ITIS_NE (multiplies live_wt_lb w/ CF_LNDLB_LIVLB conversion factor based on itis/market/grade/unit)
WORK_CATCH.DISPOSITION_CATEGORY	disposition_category	disposition_category	derived from CATCH.KEPT and CATCH.DISCARDED fields
WORK_TRIP.ENTRY_DATE_TIME	trip_entry_date_time	trip_entry_date_time	DOCUMENT.DATE_SIGNED
WORK_EFFORT.ENTRY_DATE_TIME	effort_entry_date_time		
WORK_CATCH.ENTRY_DATE_TIME	catch_entry_date_time		
WORK_TRIP.UPLOAD_DATE_TIME	date_loaded	date_loaded	IMAGES.DE
concatenation of WORK_TRIP.SOURCE_TYPE and WORK_TRIP.SOURCE_VERSION	source	source	value=VTR

TRIP-UTILIZATION RECORDS			
SFLEET_DB_EQUIVALENT	SFLEET	VTR	VTR_DB_EQUIVALENT
WORK_UTIL.TRIP_SEQ	trip_seq	docid	IMAGES.DOCID (must use the CATCH.IMGID to find corresponding IMAGES.DOCID)
WORK_UTIL.UTIL_ID	util_id	catch_id	CATCH.CATCH_ID
WORK_UTIL.SPECIES_IMG_CODE	db_species_id	db_species_id	CATCH.SPECIES_ID
derived using SOLE.MPALMER.SPECIES_MASTER to map CATCH.SPECIES_ID to ACCSP equivalent (MPALMER.SPECIES_MASTER table will replace the SFLEET.SPECIES_MASTER table when Study Fleet Phase III is implemented)	species_combined	species_combined	derived using SOLE.MPALMER.SPECIES_MASTER to map CATCH.SPECIES_ID to ACCSP equivalent (MPALMER.SPECIES_MASTER table will replace the SFLEET.SPECIES_MASTER table when Study Fleet Phase III is implemented)
	species_itis	species_itis	
	market_code	market_code	
	grade_code	grade_code	
WORK_UTIL.UTILIZED_AMOUNT	amount	amount	CATCH.AMOUNT
WORK_UTIL.UNIT_OF_MEASURE	unit_of_measure	unit_of_measure	derived from SOLE.MPALMER.SPECIES_MASTER
derived from SOLE.CFDBS.SPECIES_ITIS_NE (multiplies amount w/ CF_RPT_QTY_LNDLB conversion factor based on itis/market/grade/unit)	landed_pounds	landed_pounds	derived from SOLE.CFDBS.SPECIES_ITIS_NE (multiplies amount w/ CF_RPT_QTY_LNDLB conversion factor based on itis/market/grade/unit)
derived from SOLE.CFDBS.SPECIES_ITIS_NE (multiplies live_wt_lb w/ CF_LNDLB_LIVLB conversion factor based on itis/market/grade/unit)	live_wt_lb	live_wt_lb	derived from SOLE.CFDBS.SPECIES_ITIS_NE (multiplies live_wt_lb w/ CF_LNDLB_LIVLB conversion factor based on itis/market/grade/unit)
WORK_UTIL.DISPOSITION_CATEGORY	disposition_category	disposition_category	derived from CATCH.KEPT and CATCH.DISCARDED (assign disposition based on whether value KEPT or DISCARDED)
WORK_UTIL.DEALER_NUM	dealer_permit_number	dealer_permit_number	CATCH.DEALER_NUM
WORK_UTIL.PORT_OF_UTILIZATION	port_util		
WORK_UTIL.DATE_UTILIZED	date_sold	date_sold	CATCH.DATE_SOLD
WORK_UTIL.ENTRY_DATE_TIME	util_entry_date_time	util_entry_date_time	CATCH.DE