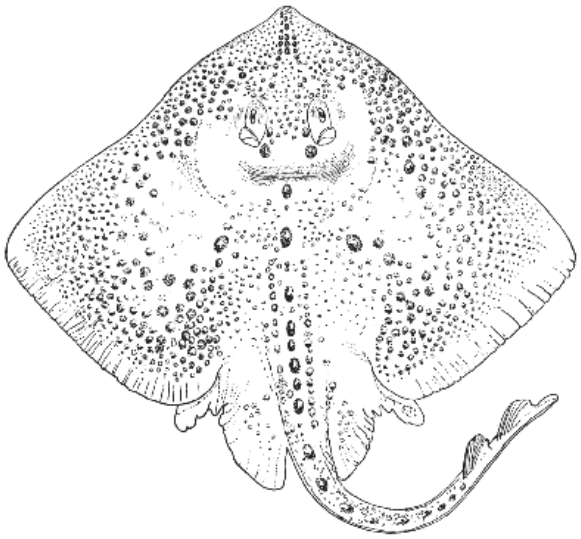
Maine – New Hampshire

Inshore Groundfish Trawl Survey



Procedures and Protocols

By

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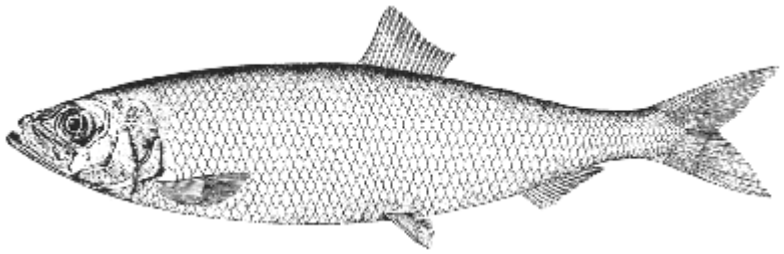
INTRODUCTION

This manual is intended to ensure consistency and standardization of the Maine-New Hampshire Inshore Trawl Survey as crews and gear components are added and replaced. It serves as a reference document to survey staff, crew, and other interested users on specific procedures, methods and guiding principles. We strongly recommend that all members of the crew be familiar with these procedures before participating on a cruise. As in any fieldwork, improvisation and exceptions will be necessary in order to complete the overall objective of the survey. Where such deviations occur, they must be documented in the cruise log to enable proper interpretation of the data.

Many people helped contribute to this manual. We would like to thank Captain Curt Rice, Robert Tetrault, Jeff Flagg, Hannah Smith, Vincent Manfredi, and Jeanne Brown for their valuable input.



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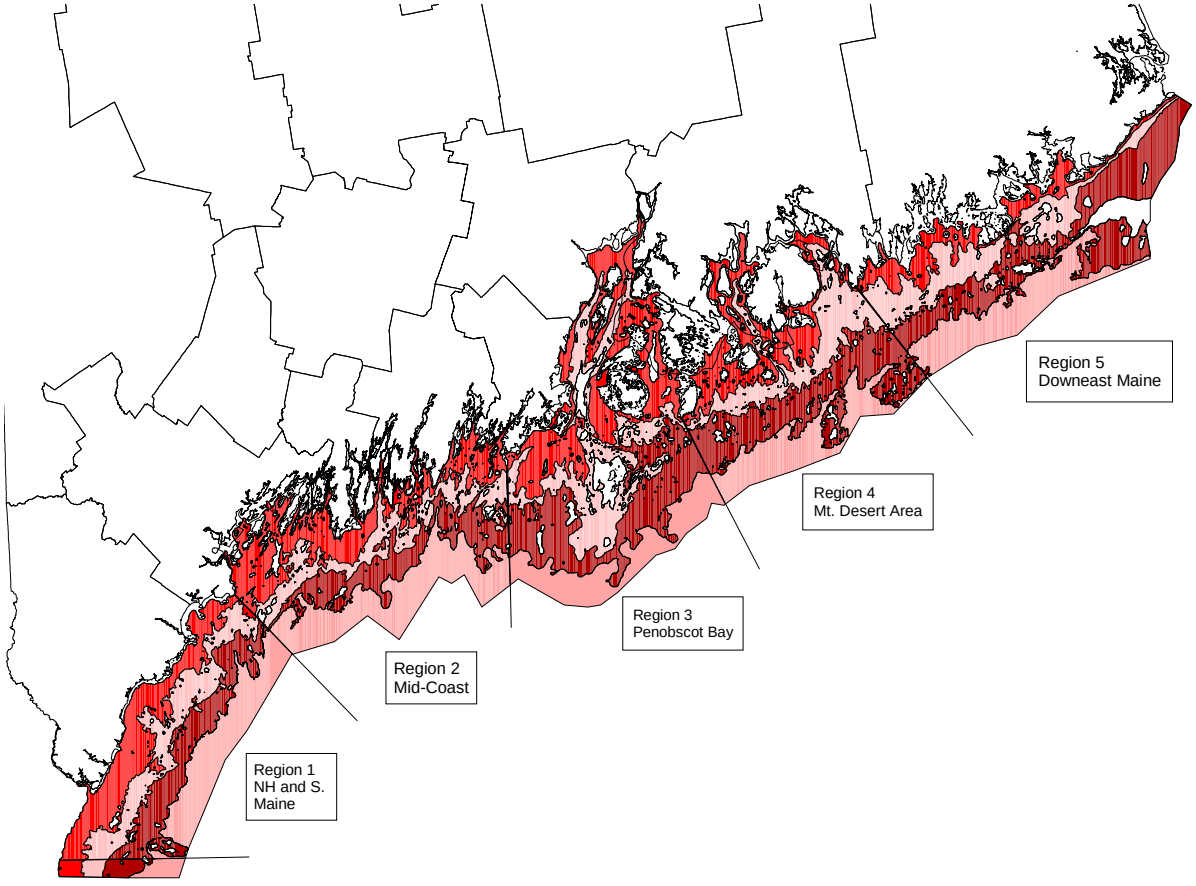
DESIGN

The Maine-New Hampshire Inshore Trawl Survey is a stratified random survey with a fixed component. The inshore area sampled includes four[1] depth strata: 5-20 fathoms, 21-35 fathoms, 36-55 fathoms, and >56 fathoms out to approximately the 12-mile limit, and five longitudinal regions based on oceanographic, geologic, and biological features (Figure 1). Together, 20 separate strata exist.

Figure 1. Regional and Depth Strata for the Maine-New Hampshire Inshore Trawl Survey



[1] From Fall 2000 to Fall 2002, the outer depth stratum was not sampled. The fourth stratum, 56 fathom to the 12-mile limit was added in the Spring 2003 survey. It expands our coverage area to approximately equal that area covered by the Atlantic States Marine Fisheries Commission (ASMFC) and allows more overlap between this survey and the NMFS survey area.

With the addition of the fourth strata, the total survey area increased from ~3,626 nautical miles (NM^2) to ~4,665 NM^2. To keep sampling density of the original strata roughly equivalent with previous surveys, an additional 15 stations were added to the original goal of 100 stations per survey. A target of 115 stations is selected for sampling in each survey resulting in a sampling density of 1 station for every 40 NM^2. Number of tows per stratum is apportioned according to its total area (Tables 1 and 2).

Table 1. Area in square miles of the 20 strata of the ME/NH Trawl Survey

Region	5-20 fathoms	21-35 fathoms	36-55 fathoms	>56 fathoms	Total
1	253.27	214.22	227.35	225.65	920.50
2	279.63	191.23	211.66	263.49	946.02
3	259.62	262.90	280.03	183.69	986.25
4	205.30	206.12	310.49	170.72	892.63
5	138.54	220.49	365.04	196.11	920.19
Total	1136.37	1094.96	1394.59	1039.66	4665.58

Table 2. Number of tows per stratum of the ME/NH Trawl Survey

Region	5-20 fathoms	21-35 fathoms	36-55 fathoms	>56 fathoms	Total
1	6	6	6	5	23
2	7	5	6	5	23
3	6	7	7	4	24
4	5	5	8	4	22
5	4	6	9	4	23
Total	28	29	36	22	115

SELECTION OF RANDOM STATIONS

Random stations are selected from a NOAA nautical chart in Arc View™ GIS overlain with 1-NM^2 grids. Each grid within each region is assigned a unique identification number that serves as a call number. Grids are selected using an Excel™ random number generator. Tows approximately 1 NM long are proposed in each grid and plotted in P-Sea Windplot™ (using charts of the NAD 1983 datum). From prior experience and local knowledge, some grids are classified as untowable during the plotting process. Due to the large amount of fixed gear and the appeal to fishermen to cooperate with the survey by clearing the tows, identifying good tow locations is a priority. If no towable bottom can be found within a 2-mile radius, a new random number is chosen within the same stratum. Beginning and end points of each tow are identified in P-Sea Windplot. To the extent possible, for ease of identification by lobster industry members, tows follow loran lines. Loran C coordinates are converted to latitude/longitude degrees to the nearest 0.001 decimal minutes.[2]

SELECTION OF FIXED STATIONS

After the initial survey in the fall of 2000, two stations per stratum were designated as fixed stations to be sampled on each subsequent survey. In areas where previous work had been done, the stations were selected due to their historical importance[3]. In areas with no history, one station was selected as being roughly representative of the average catch for its respective stratum and the other was randomly selected. After the addition of the fourth stratum in the spring of 2003, fixed stations were designated for that stratum using the same criteria.

VESSELS

Two virtually identical commercial fishing vessels, the F/V Tara Lynn and F/V Robert Michael, are used for this survey. Both vessels are Down East 54's constructed of a combination of solid and sandwich fiberglass, with full displacement hulls taken from the

[2] This conversion is not exact due to the distortion LORAN signals experience coming over land. The distortion is constant, so the position is repeatable in LORAN TD's. The final conversion to an accurate geographical position takes place when the area is visited and the vessel's equipment records the true geographical position using differentially corrected GPS.

[3] Historical data for several of these sites exists from previous surveys conducted by Maine DMR.

same mold. They are powered by 8-cylinder GMC diesel engines producing 365 H.P. Reverse gear is a Twin Disc, Model 514, with a 4.5 to 1 ratio. A 3-inch stainless steel shaft turns a 47x45-inch, 4-bladed power propeller housed in a 48-inch Michigan nozzle. The vessel's hull displacement is 73 gross tons, allowing it to perform well in sea states up to eight feet. While only one vessel at a time is planned for each survey, the other nearly identical sistership is immediately available in the event of an equipment breakdown, allowing the survey to be completed on schedule.

Since the fall 2000 survey, the two vessels have alternated between spring and fall surveys (Table 3), with the intent of alternating spring and fall vessel participation in blocks of 2 years (4 surveys). Starting with the spring 2004 survey, all future surveys will be conducted by the F/V Robert Michael, with the F/V Tara Lynn available as backup.

Table 3 – Survey schedule for the F/V Robert Michael (RM) and the F/V Tara Lynn (TL)

	SPRING	**FALL**
2000	**------**	Robert Michael
2001	Tara Lynn	Robert Michael
2002	Tara Lynn	Robert Michael
2003	Robert Michael	Tara Lynn
2004	Robert Michael	Robert Michael

FISHING GEAR

Trawl design considerations for the survey include effectiveness of the gear for sampling the complex bottom in the nearshore areas of the Gulf of Maine and comparability with previous and ongoing surveys by NMFS and Massachusetts Division of Marine Fisheries. The net is a modified version of the shrimp net design used in Maine waters (Appendix A), designed to fish for a variety of near-bottom dwelling species without targeting any specific component. Robert Tetrault, the vessels' owner, and net designer Jeff Flagg designed the net to fish effectively, be easily maintained, and be towed by vessels ranging from 45 to 70

feet in length with nominal horsepower. Three identical nets were constructed for this survey in the event of tearing or loss. Net tapers were cut to permit the shape of the net to get maximum height while allowing the net to remain tight on the bottom. The net is shackled from the footrope to the frame with two 3/8th inch shackles to a banded wire that runs parallel with the footrope. Heavy rubber wing bobbins retard bottom wing lift at the net end of the bottom leg. Top legs are 7/16th wire, 60 feet in length with soft eyes at each end, and bottom legs are 5/8th inch wire, 58 feet in length with two feet of 5/8th inch chain at the end where the leg attaches to the bottom wing for a total of 60 feet. Bottom legs are covered with 2 -3/8" cookies to prevent them from digging into the mud. The net is constructed of 2-inch #24 polyethylene mesh, with a 1-inch (stretched measure) mesh liner in the cod end. Otter boards are #7.5 Bisons. Attached to the 70-foot, 5/8th inch Rander's Combination Wire Rope footrope is a roller frame strung onto ¾" IPS of 6x19 construction with a fiber core. The ten-foot wide bosom section is made up of eight-inch rubber discs on six-inch centers along with eight evenly spaced toggles. Spacing is maintained by smaller four-inch cookies strung between the discs. The two 29-foot wing sections are made up of six-inch rubber discs spaced 4 ½ inches apart, with the same four inch cookies used to maintain spacing. Each wing section contains twelve toggles spaced evenly to facilitate footrope attachment. The 5/8" Rander's combination rope headrope has twenty-eight 8" center-hole, deep-sea net floats strung with 5/8" yellow polyethylene float line. Between surveys, the net is sent back to the manufacturer where it is returned to specification (Appendix B). Nets will be replaced as they age to keep the gear in good working condition and insure consistency.

II. SURVEY PREPARATION

PERMITS AND US COAST GUARD NOTIFICATION

Prior to each survey, permits are acquired from the New Hampshire Fish and Game Department, the Maine Department of Marine Resources, and the National Marine Fisheries Service.

The United States Coast Guard Law Enforcement and Fisheries Office is also contacted and notified of our survey schedule.

MAILINGS

Two separately designed mailings are issued prior to each survey with the intent that the schedules arrive two weeks prior to the actual survey.

- All mailings include staff and boat contact information, as well as the number for our toll free information line and the trawl survey web site.
- General mailings go to all Class I, II, III, and IV lobster license holders consisting of a folding 11x17 page with tentative daily schedules of tows in Loran C (9960 WX chains) coordinates and a large-scale map with all tows.
- Zone council mailings have more detailed maps, 1 to 3 tows per map with a cover letter and Loran C and latitude/longitude coordinates.

Council mailings (days of the survey are counted 1 though 25 from the set start date)
The detailed zone council member mailings are comprised of a set of charts of tows and proposed dates within each zone. As many lobstermen fish across zone lines, charts of adjacent areas are also included. The actual days that each zone receives their mailing depends on the location of the proposed tows, as these change from survey to survey. This can be determined by looking at the ArcView™ layouts of the proposed tows.

Zone G

Zone G usually receives days 1 through 6 (their zone overlaps with F at Cape Elizabeth)

Their mailings should arrive 2 weeks before survey start date.

Zone F

Zone F usually receives days 5 thru 8 (their zone covers Cape Elizabeth to Small Pt.)

They should get mailings 2 weeks before day 5 of survey.

Zone E

Zone E usually receives days 7 thru 9 (their zone covers Small Pt. To Pemaquid)

They should get mailings 2 weeks before day 6 of survey.

Zone D

Zone D usually receives days 10 thru 13 (their zone covers Pemaquid to Metinic and West Penobscot Bay)

They should get mailings 2 weeks before day 10 of survey.

Zone C

Zone C usually receives days 13 thru 16 (their zone covers E. Penobscot Bay to Blue Hill Bay)

They should get mailings 2 weeks before day 13 of the survey.

Zone B

Zone B usually receives days 15 thru 21 (their zone covers Isle au Haut to Schoodic)

They should get mailings 2 weeks before day 15 of survey.

Zone A

Zone A usually receives days 20 thru 25 (their zone covers Schoodic to Canada)

They should get mailings 2 weeks before day 20 of survey.

General mailings

General mailings, split into three geographic areas, are sent to all Class I, II, III, and IV license holders. They only receive the mailing associated with their primary zone. Maine State Printing prepares, labels and mails these mailings for us from the template and label file that we provide electronically. A hard copy sample needs to be provided to them along with the hard copy of the work requisition form.

Schedule

To be mailed 3 weeks before start date:

Zone G, F, and E Council letters

First large mailing…for Zones G, F, E, includes regions 1,2,3 (weeks 1,2,3)

To be mailed 2 weeks before start date

Zones D and C Council letters

Second large mailing…for zones D, and C, includes regions 2,3,4 (weeks 2,3,4)

They should get these 2 weeks before day 13 of the survey

To be mailed right before we leave:

Zones B and A Council letters

Third large mailing…for zones B and A, includes regions 4 and 5 (weeks 4,5)

NOAA MARINE WEATHER RADIO ANNOUNCEMENTS

The National Weather Service has voluntarily assisted by including recorded announcements of the survey schedule as part of their broadcast. The Gray NWS covers New Hampshire through Penobscot Bay, Maine, while the Caribou NWS covers Penobscot Bay to Canada..

INTERNET MAPS

Before each survey, the DMR trawl survey web page (http://www.maine.gov/dmr/rm/trawl/trawl.htm) is updated to provide a tentative schedule and links to detailed maps (1-3 tows) with coordinates.

TOLL FREE INFORMATION LINE

The DMR maintains a toll free information line (1-888-317-4666) that is updated weekly with trawl survey location information. Callers can also leave messages to request further information or express concerns.

NET AND GEAR MENSURATION AND INSPECTION

The week before each survey, the scientific staff meets with the boat crew and shore engineer to make sure all gear is present and in serviceable condition. The Chief Scientist or designee ensures that the net and ground gear is measured and matches specifications listed below prior to it being loaded onto the vessel.

- Trawl warps need to be in serviceable condition and clearly marked at 25 fathom intervals. A tolerance of plus or minus three inches is allowed between sides at each mark.
- Top and bottom legs must not be excessively worn or frayed, and are of equal measure, 10 fathom (60 feet, +/- 3 inches).
- Trawl doors are in good condition, the towing angle is set to achieve a 15^{o} wing angle to the direction of the tow, and the shoes are not worn beyond 15% of their original weight.
- Trawl doors are rigged with two 7'6" bridles terminating in a 7' tail chain to facilitate attachment to the rig when hauling and setting. The bridles and tail chain are 3/8" long-link trawl chain terminating in a ½-inch trawlex "G-hook." A ½" swivel is rigged between the backstraps and tail chain.

In addition, trawl warps are laid end-to-end and side-to-side every six months and adjustments are made if necessary. They are replaced every year. Net frames are replaced as needed, as judged by the manufacturer. Entire nets are replaced every five years, or when the cost of repair is within 75% of the value of a new net. This decision is made by the manufacturer and Chief Scientist.

SCIENTIFIC EQUIPEMENT

Prior to each survey, the scientific staff inspects and tests all instruments to ensure they are in proper working condition. A checklist (Appendix D) is used to ensure that there are adequate supplies (batteries, log sheets, recorders and cassettes, etc.) and that all the necessary equipment makes it on board.

III. SHIPBOARD OPERATIONS

SAFETY COMMAND STRUCTURE

Boat Captain, 1st Crew, 2nd Crew, Chief Scientist, Scientist I and Specialist I.
The Captain is in charge of all shipboard activities, including vessel and gear operation, safety, and radio communication. The Chief Scientist is in charge of research workflow, quality assurance, tow selection, etc. The Captain and Chief Scientist share the responsibility to assure that each crewmember has been briefed on their individual duties and emergency procedures, including location of fire extinguishers, survival suits, and safety stations, and the proper deployment of life rafts and EPIRBs.

SAFETY BRIEFING

As required by the Fishing Vessel Safety Act, the Captain shall conduct a safety briefing at the beginning of each survey for the core crew. Individual briefings shall be issued to all guests, observers, and new crewmembers as the vessel departs. All crewmembers must feel they have received adequate instruction on safety issues. Crew members are advised to talk to the Captain at any time regarding issues or areas they feel need to be clarified. Emergencies can be safely managed as long as everyone understands what to do, is prepared to do it, and does not panic. The Captain's instructions should be followed slowly, thoroughly, and with purpose.

RADIO OPERATION

The radio is the domain of the Captain or his delegate. All crew members should be familiar with procedures in the event assistance is needed. There are two types of communication: non-emergency and emergency.

Non-emergency conversation may be done with the Captain's permission. Generally, such conversation will be with other fishermen, Marine Patrol officers, or US Coast Guard in the area who are inquiring into the nature of the cruise, intentions, etc. If a situation arises where controversy or tempers flare up, the Captain should relinquish the

radio to either the Chief Scientist or Marine Patrol officer. In no instance will we engage in verbal assault or argument.

In the event of an emergency, the Captain or crewmember in charge will issue a call for assistance. In the event you need to issue a Mayday, tune to Channel 16, state the vessel name, location, and nature of emergency and number of persons on board. Speak into the microphone slowly, in a clear and firm voice.

Example:
"Mayday, Mayday, Mayday. This is the fishing vessel Robert Michael, (give your position, lat/lon if possible) 2 miles southeast of Boon Island, at *latitude/longitude*, on fire with 3 souls on board."
If the call is not acknowledged within ten seconds, repeat. If you receive no reply after three attempts, using a second radio try one of the local working channels but do not leave Channel 16 unattended, as it is the primary emergency channel and is continuously monitored by the US Coast Guard and all vessels at sea.

FIRE

Report any smoke or fire to the Captain immediately. Be prepared to follow the Captain's orders. Once the fire is located and assessed, the Captain will assign safety stations.

GROUNDING

The boat Captain shall give instruction as to what action to take.

COLLISION AND AVOIDANCE

Every person on board shall at all times keep a look out for other vessels or obstructions to the boat's path. Any sighting that remotely appears to be a collision course should immediately be reported to the Captain. If a collision occurs, retrieve your survival suit and stand by while the Captain assesses the damage.

MAN OVERBOARD

Report situation to the Captain immediately. Do not take your eyes off the person in the water, and deploy a life ring or other floatation device. The Captain will assign his crew as to the proper action to retrieve the person in the water.

LIFEJACKETS

Lifejackets are available for any crewmember to use. Because they can be bulky, we also have inflatable Sospenders. Any time the sea state makes standing on the deck difficult, we recommend that at a minimum, Sospenders be worn.

SURVIVAL SUITS

Each crewmember shall have a suit assigned to them and must know the location of that suit. Each person should practice putting his or her suit on at least once prior to each survey, as well as inspect it for holes, zipper function, etc. If it becomes necessary to disembark the vessel to a life raft or to another vessel, survival suits shall be worn.

It is also important that each crewmember, guest and observer be familiar with the interior spaces of the vessel and think about potential obstacles in the event an evacuation is necessary. If the vessel should roll to either side or turn completely upside down, orientations change.

Prior to each survey, the survival suits are inspected for leaks, and the zippers are lubricated. Plastic bags (for donning ease) are rolled into the suits before they are repacked. Each survival suit is fitted with a whistle, Cyalume® personal marker light, and C-Light™ signaling emergency light. Following each survey, the suits are again inspected for leaks and moisture, dried if necessary, repacked in their bags, and stored until the next survey.

LIFE RAFT AND EPIRB

The life raft is affixed to the roof of the wheelhouse. All crew should be familiar with the proper deployment of the life raft and EPIRB. Only trained personnel shall deploy the life raft. In the event that the crew must use the raft, the Captain shall instruct the crew as to where they should be on deck so that an orderly and safe evacuation is ensured. The

EPIRB will be activated if assistance is required and standard lines of communication are not available. If the life raft is deployed, the person deploying the raft (or a person assigned by the Captain) shall attach the EPIRB to the life raft.

GEAR HANDLING

Handling of fishing gear by science personnel is prohibited. While setting and hauling back the net, the scientific crew should be primarily concerned with being out of the way of the fishing crew.

HANGS AND ENGANGLED GEAR

"Hangs" are when the net has caught something on the bottom. This is a potentially deadly situation. Note that wires already under severe tension are now further stressed by the strain of the vessel's momentum. The scientific crew is to stand well clear of wires and winches, and away from the boat crew as they manage the situation. Although we make every attempt to avoid entangling lobster or other fixed gear, this will occasionally occur. Releasing lobster gear is the responsibility of the fishing vessel personnel. If gear can be released safely without cutting then do so. If necessary, cut the line, untangle it from the net, reattach the warp and buoy, and release. Gear is cut for safety reasons and only as a last resort. If the line is lost, coordinates are recorded, and Marine Patrol and local lobstermen are notified. If possible, gear is brought on board and returned to the lobstermen. Ghost gear can be returned to Marine Patrol.

NET REPAIR

If a net is damaged while conducting tows, an initial assessment is made by the Captain and crew, and extent of the damage is reported to the Chief Scientist. It is imperative that the net is repaired before subsequent use. Minor damage may be repaired on board. Minor damage is defined as a tear restricted to a single panel of the net that can be repaired in four hours or less. Otherwise, the net is swapped for one meeting specifications before the survey resumes. Cases where the net cannot be repaired on board include:

- Damage involving any missing twine.
- Damage involving more than one panel.
- Damage involving severed gores.
- Tears extending up into the salvage.
- Any severe damage, such as parting, to the framework (headrope, footrope, siderope, traveler wire) as listed in Appendices A and B.
- Any damage that affects the shape of the net, including distortion from hanging.

The damaged net is returned to the manufacturer for repair. NO adjustments in lengths or design are permitted.

OBSERVERS

Consultants and observers may occasionally be invited, with the approval of the Captain, to assist the crew with their knowledge of a specific area, local fishermen's practices, or to assist the scientific crew with their responsibilities.

Normal insurance rates for the vessel are based on a fishing crew of three. The project funds the added insurance costs for up to four science personnel. With three scientists on board at all times, this leaves room for only one observer at a time. Observers must provide direct benefit to the project as described above. Observers must agree to adhere to the rules of the Captain and Chief Scientist. Observers are responsible for securing their own survival suit and must be briefed on safety areas as the vessel leaves port. Alternatives to being an on board observer exist for the public and press to view operations from private boats, boats for hire, and interviewing the crew at the dock. These arrangements are up to the individuals and are not the responsibility of the scientific or boat crew.

IV. SCIENTIFIC OPERATIONS

SCIENTIFIC COMMAND STRUCTURE

Chief Scientist, Scientist I, Specialist I, Captain, crew.

LOG BOOK

The Chief Scientist or designee will keep a log book with detailed information about each tow, including (but not limited to):

- Presence and quantity of fixed gear at proposed station.
- Tow identifier (TOWID) for each tow and designated grid number.
- Any fixed gear entanglement including 'ghost' gear.
- Duration of tow if it does not make the 20 minute requirement and why it was cut short.
- Tow orientation to tidal currents.
- Any vessel's or captain's (if available) names that are encountered in the process of conducting the survey, and any complaints or question those individuals had and how they were handled.
- Any comments of the captain regarding factors affecting the consistency of a tow.
- Any other pertinent information about that sea day.
- Any damage done to the net during a tow.[4]
- Any problems with the NetMind™ net mensuration equipment.
- Sequential number of plankton tow (if applicable).
- Sequential day of the survey and times of departure and return to port.

MARINE SCALES

At the beginning of each sea day, before the first tow is made, the two Marel™ marine scales (6kg and 60kg capacities) are calibrated using 5kg and 20kg weights. The scales

[4] Each of the three nets has a designated number. At the beginning of the survey, the number of the net used is marked in the log book, and a note is made each time the net must be switched.

are also calibrated each time the sea state changes. See Marel™ owner's manual for calibration procedure.

SURVEYING A TOW

Before each tow at least one pass, and often two passes, is made along each planned towline to locate fixed gear and assess bottom conditions. The target for tow duration is 20 minutes at a speed of 2.2-2.3 knots to cover about 0.8 NM. When a station is encountered that cannot be towed, either due to gear proliferation or insufficient distance of suitable bottom, an attempt is made to discover an alternate tow site nearby before proceeding to the next site. A laptop computer with Arc View™ and P-Sea Windplot™ software is available onboard to assist in this process.

WARP TO DEPTH RATIOS

Trawl warps are marked every 25 fathoms (150 feet). Currently, a minimum 3:1 warp to depth ratio is used at all depths, following this rule: whenever possible stays less than a 3:1 ratio instead of greater than. Marks are placed "on deck", "at the block", or "at the waterline" to accomplish this. Normal position of the marks is "at the blocks".

TOWING

All tows should be attempted in a manner that allows twenty minutes of tow time to be attained. Tow start is defined by when the winch brakes are set and tow end is when the winches begin to power back, NOT the beginning of net drop or the end of haul-back[5]. Start and end times and DGPS coordinates of each tow are recorded. Both Loran C and latitude/longitude are recorded from the GPS. The magnetic compass course, start and end depths (and any major change in depth), wire out, and weather conditions are recorded on the trawl logs. To the extent possible, all tows should be aligned with the dominant currents, and as straight as possible. Only if it is impossible to do so for safety reasons, bathymetry or fixed gear will a tow be accepted otherwise. Tows will NEVER be made against the dominant current.

[5] Preliminary analysis of NetMind data indicates that the net does not actually open up to fishing position until a minute or two after the brakes are set, and continues to fish for a short period of time after haulback has begun. The net fishes for 20 minutes.

HAULBACK

During haulback, the vessel maintains minimum speed to ensure satisfactory retrieval of the net. The Chief Scientist or designee will oversee the haulback to ensure that fish do not escape the cod end due to lack of correct puckering, or liner or cod end damage. The boat and scientific crew inspect the net for damage as it is brought on board. All individuals are removed and kept as the net is hauled in, and the cod-end is shaken down so that everything is included in the catch work-up. The scientific crew ensures that the net is clean and repaired before the next tow is made.

NETMIND TRAWL MONITORING SYSTEM

Spring 2004 was the first survey to use net mensuration gear. The NetMind^{TM} Trawl Monitoring System allows continuous monitoring of net dimensions during towing to assess consistency, maintain quality control, and provide swept area for biomass calculations. The NetMind^{TM} system is utilized on every tow possible. Towing protocols are not altered based on the real time NetMind^{TM} display.

Prior to each survey, the NetMind^{TM} junction box and receiver are wired and the vessel's shore engineer rigs the towed hydrophone. Before the start of each survey week, the NetMind^{TM} sensors are charged for approximately ten hours. The sensors are also checked every two to three days during the survey and recharged if necessary. Prior to charging, the sensors must be rinsed in fresh water and dried completely.

The Chief Scientist or designee oversees the placement of the sensors on the net, ensuring they are shackled securely into position. The bottom contact sensor is secured in a sled shackled to the footrope between the cookies, directly in the middle of the sweep. The wing sensors are sewn into mesh bags secured inside the headrope towards the top apex of the wings. The headrope sensor is sewn into a mesh bag attached to the net just behind the center of the headrope. The headrope sensor should ride at a 10-degree downward angle. The door sensors are secured into brackets that were welded into the doors at a 30-degree outward angle to assure they are parallel, and a 10^{o} vertical angle upward to

facilitate communication with the hydrophone. The towed hydrophone is rigged to a snatchblock attached to the starboard outrigger.

The Chief Scientist or designee is responsible for making sure the towed hydrophone enters the water immediately after the winches are locked at the start of the tow. The hydrophone is towed at a depth of approximately 15 feet. After each tow is completed, the Chief Scientist or designee ensures the hydrophone is removed from the water, and the five Excel™ files created on the laptop are moved into a new folder and renamed with a unique identifier (e.g. TiltSP0401.xls for the tilt file on the first tow of the Spring 2004 cruise).

CTD

A Sea-Bird Electronics™ 19plus SEACAT profiler is deployed on each tow to collect data on salinity, temperature and depth. The CTD is shackled to the starboard door wire, turned on, and lowered overboard. The CTD must sit at the surface for approximately 45 seconds to get the water pump circulating before it is lowered to the bottom. The Captain ensures the instrument reaches the bottom, and signals when to reverse the winch and bring it back up. The CTD is then turned off until the next tow. At the end of each week the CTD data is downloaded into a laptop computer and the files saved to disk.

CATCH HANDLING

The cod-end will be emptied onto the sorting table, unless the catch is too large to fit in the table, in which case it will be emptied onto the deck. If the catch is too large to be worked up within a reasonable amount of time (approximately three hours), then the contents of the cod end are split into halves (or quarters, if necessary) and the remainder is discarded. The whole catch will be evenly mixed before splitting. The total catch quantities will be expanded by volume in this situation based on the sub-sample that is worked up.

LOBSTERS

The designated scientist begins to sample lobsters as soon as deck conditions are safe. Lobsters will be handled with care to assure the maximum survivorship. Precautions are taken to limit the amount of movement within the pile so that lobsters are not unnecessarily agitated, causing an increase in damage by pinching and/or crushing. The use of shovels to move lobsters is prohibited. If lobsters are moved while sorting other species, care is taken to prevent further damage to the lobsters.

Lobster data are recorded per Maine DMR sea-sampling protocols via voice recordings onto mini-cassette tapes (Appendix E). To hasten the recording process, a crewmember may hand lobsters to the scientist recording data. Lobster carapace length is recorded in millimeters. Sex, presence of eggs or v-notches, and damage are all noted. Berried females are notched on board. Lobsters are gently placed in baskets according to sex, one on top of another, so that they do not cause more injury to themselves after being measured and enumerated. Full baskets of lobsters are weighed and the weight recorded as soon as they are filled, and the lobsters are immediately released.

FISH AND OTHER INVERTEBRATES

Crew not involved in lobster processing sort the remaining catch by species into bushel baskets and buckets, depending on size and quantity. Species determinations are made for all of the catch whenever possible. Keys are carried on-board for identification of rare or non-native species. Occasionally samples will be preserved and returned to the lab for identification. The crew attempts to release some species alive (Appendix F). This includes rare, protected or endangered animals, or tagged individuals.

All species are enumerated, weighed for an aggregate weight, and measured for length. Data is recorded on provided data sheets (Appendix G). Finfish are measured to the nearest centimeter using total central length for all species except those with heterocercal caudal fins, such as dogfish (*Squalus acanthias*) and sturgeon. Dogfish and all sturgeon are measured to the nearest centimeter at the terminus of the upper caudal lobe.

If the catch of a certain species is over 150 individuals, sub-samples may be taken of 100 randomly selected individuals. Randomization of sub-samples is achieved by homogenizing the catch and withdrawing greater than 100 individuals. This minimizes bias caused by hand-selecting individuals. An aggregate weight of the measured individuals is necessary to estimate total number caught.

Little skate (*Raja erinacea*) and winter skate (*Raja ocellata*) are identified according to the following criterion established by the NMFS[6] (see NOAA Technical Report NMFS Circular 431) due to extreme similarities in structures and colors in juveniles and adults of both species. Skates of both species are measured; if the skate is sexually mature and between 35 and 55 centimeters, it is classified as a little skate, if it is NOT sexually mature and is between 35 and 55 cm, or above 55 cm at all it is classified a winter skate, if it is below 35 centimeters it is classified a little skate.

Other invertebrates are measured as follows:

- Shrimp are mixed together and weighed in the same manner as the rest of the catch. A 1-kilogram sub-sample is taken from the mixed total to determine an aggregate weight of each species. From the sub-sample, shrimp are separated by species, then enumerated and weighed.
- Squid (Order Teuthoidea) are measured for mantle length to the nearest centimeter.
- Octopi (Order Octopoda) are measured in total length to the nearest centimeter from mantle anterior to the terminus of the longest tentacle without stretching.
- Bivalve mollusks are weighed and counted. Scallops are measured to the nearest millimeter.
- Crabs will be measured by carapace width to the nearest centimeter.
- Sea urchins are measured to the nearest centimeter in width.

[6] Flescher, D. D., 1980. Guide to Some Trawl-Caught Marine Fishes From Maine to Cape Hatteras, North Carolina. NOAA Technical Report NMFS Circular 431.

- All other commercially or ecologically important species of invertebrate are enumerated, counted and weighed whenever possible, as permitted by workload.

BIOLOGICAL MEASURES

Selected finfish species may be examined for maturity. The chief scientist determines what species and number of samples to process. When a maturity sample is processed, a sub-sample of ~25 individuals is examined, and consists of at least one fish per centimeter of lengths present. All sexual maturity stages are determined as described in Burnett, et. al. (1989)[7].

Otoliths may be collected for selected species for later aging. When an otolith sample is taken, it is placed in a small envelope marked with the following information: Date, region, Tow ID, grid, fish length, weight, and sexual maturity.

ICHTHYOPLANKTON

A plankton survey for fish larvae and eggs was conducted in the fall of 2001 and in each spring since 2002. The target number of plankton tows is two per stratum per region, preferably the fixed stations.

Samples are collected with a 1-meter plankton net of 333 µm mesh. A General Oceanics flowmeter model 2030R is attached to the mouth of the plankton net to determine the amount of water filtered by the net for each tow, and a depressor weight (11 lbs.) is shackled to the bottom of the net ring to prevent the net from spinning while towing.

The net is towed off the starboard side of the vessel for twenty minutes. A stepped-oblique fashion at a speed of less than 2 knots provides five minutes at each of 10, 20 and 30 meter depths, and five minutes retrieval. In areas of less than 30 meters, sampling

[7]Burnett, J., L. O'Brien, R. K. Mayo, J. A. Darde, and M. Bohan. 1989. Finfish Maturity Sampling and Classification Schemes Used During Northeast Fisheries Center Bottom Trawl Surveys, 1963-89. NOAA Tech. Memo. NMFS-F/NEC-76.

protocols are revised. Date, grid, start/end times, start/end depths, and flowmeter begin/end values are recorded for each plankton tow (Appendix H).

Upon haulback, the net is rinsed down from the outside, and the contents of the cod end emptied into a 1-liter container. The larvae are preserved in 10% formalin for later identification by the Atlantic Reference Centre of the Huntsman Marine Lab in New Brunswick.

V. Data Entry and Management

DATA ENTRY

At the end of each survey leg (week), tow coordinates and station information are entered into an Excel ™ spreadsheet on board the boat and tow locations are displayed in Arc View™, checked for accuracy, and adjusted for grid identification number. After each tow, data on the cruise forms for that tow is proofread by one of the scientific crew to identify and correct errors.

Cruise information is entered directly into the DMR's Oracle database (MARVIN), including stratum, tow location, start/stop times for each tow, start/stop coordinates for each tow in Loran C and latitude/longitude (in decimal degrees), and start/stop depths in fathoms. Raw data (collected via trawl log or mini-cassette) are entered into a Microsoft Access™ database (Appendix I) immediately following each cruise by the trawl survey scientists or a DMR data entry technician. Species are identified by the numeric code system used by the National Marine Fisheries Service (Appendix J). After entry, the data is proofread and edited again, then uploaded into the Oracle database. Bottom temperature and salinity information is downloaded from the CTD into CNV files, converted into text files, and then uploaded into the Oracle database. NetMind™ data are cleaned of erroneous values and kept in Excel files.

DATA REPORTING AND PRESENTATION

Data is reported to the public through annual reports submitted to our funding agencies and department. These reports are available online, through the DMR Trawl Survey web page. Scientists at the department utilize the data in presentations and assessments as they require it, and the survey boat and science crew report data to lobster associations and zone councils annually. Each year a presentation, display, or handout is given at the annual Maine Fishermen's Forum.

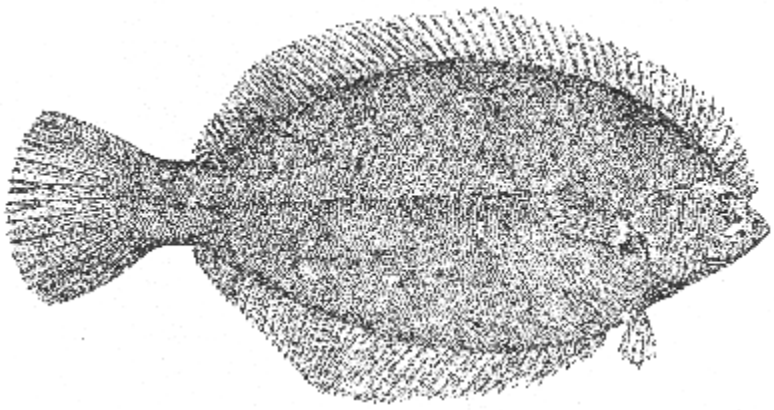
CONFIDENTIALITY

When the Maine - New Hampshire Inshore Groundfish Trawl Survey was first proposed, we made a commitment to do everything legally and reasonably possible to not "harm" local fishing communities. Concern was raised at a Downeast Lobsterman's Association meeting where it was suggested that release of detailed data and information from individual tows might result in economic loss to small Downeast fishing communities. The fear was that boats not from the area would take advantage of stock abundance knowledge to the detriment of the small communities.

The following policy was developed regarding the release of tow specific trawl data.

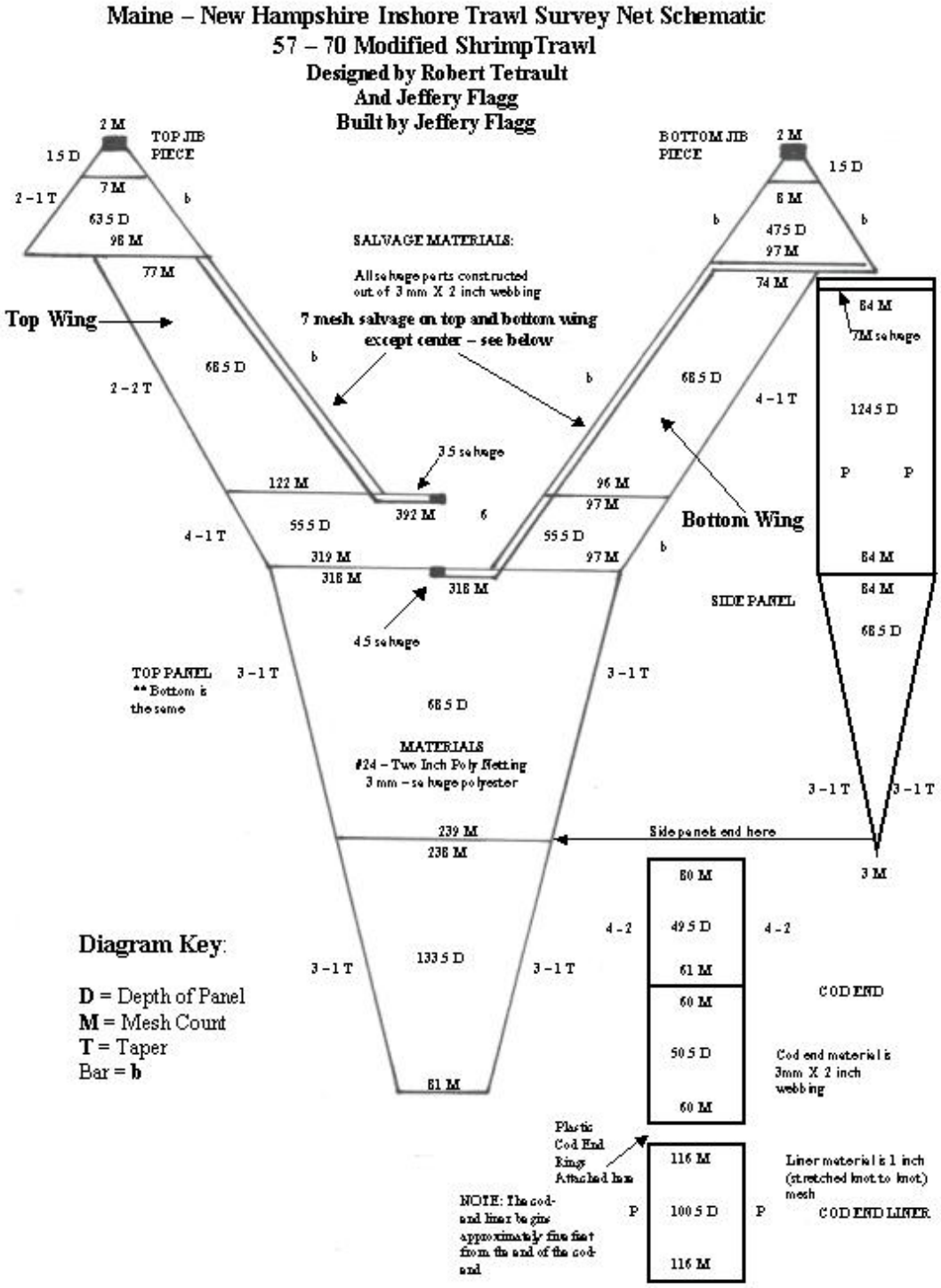
1. No data will be released to the general public until it has passed all Quality Assurance / Quality Control checks.
2. Excepting #3 below, tow specific data on lobsters will not be released to the general public until it is one year old.
3. Where management/policy/regulatory decisions may benefit, provisional data may be released to decision makers upon written specific request. The request must justify why that information has bearing on the decision and how the information will be used, and who will have access to that information.

APPENDICES



Appendix A

Inshore Trawl Survey Net Schematic



Appendix B

Specifications for Inshore Trawl Survey Nets

Bottom Panel:

52	RM @ 1”	=	51”
12	1-1 @ 1.5”	=	18”
16	2-1 @ 2.5”	=	42.5”
150	bars @ 2.08”	=	312”
1.5	bars @ 4”	=	6”
	ext. @ 16”	=	16”
	Footrope	=	70’ of 5/8” Randers combination wire rope

Top Panel:

74	RM @ 1”	=	73”
12	1-1 @ 1.5”	=	18”
18	2-1 @ 2.5”	=	47.5”
108	bars @ 2.08”	=	225”
1	bar @ 4”	=	4”
	ext. @ 16”	=	16”
	Headrope	=	57’ 10” of 5/8” Randers combination wire rope

Side Panel:

22	RM @ 1”	=	21”
4	1-1 @ 1.25”	=	5”
6	2-1 @ 2.25”	=	15.75”
	bars @ 78”	=	78” (36 @ 2”, 1.5 @ 4”)
	taper @ 108”	=	108” (52 @ 2”, 1 @ 4”)
	ext. @ 16”	=	16”
	Siderope	=	23’ 8.5” of 5/8” Randers combination wire rope

*Note: Panels are sewn to other panels mesh-to-mesh, with double twine.

Appendix C

Scripts provided to the National Weather Service for broadcast on NOAA Marine Weather Radio.

Week 1 Broadcast:

FOR BROADCAST beginning *insert day,month, date, year*.
"This is a reminder to the lobster and fixed gear fishing industries. The inshore trawl survey conducted by the State of Maine is proceeding from west to east. You can assist by clearing the area of gear on the day of the tow.
Beginning the week *insert day, month, date,* the survey will be conducted between *insert area scheduled to be covered*. For the most up to date information on tows and current position report, hail the Robert Michael on Channel 16."

Each week the announcements are updated to include the correct dates and areas of the survey.
Week 1 – New Hampshire to Cape Elizabeth
Week 2 – Cape Elizabeth to Port Clyde
Week 3 – Penobscot Bay
Week 4 – Isle au Haut to Schoodic Point
Week 5 – Schoodic Point to Canada

Appendix D

Equipment Checklist

This checklist should be consulted prior to each cruise to ensure all necessary equipment makes it on board, and once again after each survey to account for all items. Lost or damaged equipment should be replaced or repaired as soon as possible after each survey.

Buckets (~30)

Baskets (~30)

Measuring Boards (3)

Marel Balances (6 kg, 60 kg)

Stand for large scale

Calibration weights (5 kg, 20 kg)

CTD (and syringe)

Carboy of distilled water (for CTD)

Measuring table

NetMind sonar net mensuration system:

- 6 chargers w/ power strip, digital multi-meter
- 6 sensors (headline, wing slave and master, door slave and master, bottom)
- warp-mounted tow-fish hydrophone and deck cable
- snatch block
- sled and hardware for bottom contact sensor
- mesh sensor bags and heavy duty twine and shackles
- fresh water vat and drying table with paper towels
- receiver and junction box, with serial cables
- dedicated laptop w/ power strip

Heavy duty extension cord and extra power strips (2)

Life raft

Extra cod ends

Extra twine for nets

Chatillon scales (50 kg, 25 kg, 12 kg, 1 kg) for backup

Data sheets (125 each of weight/number and tic marks)

Appendix D

Equipment Checklist

Gloves

Oil gear

Boots

Floppy disks and R/W CD's

SPRING SURVEYS ONLY:

Plankton sample slips

Plankton data sheets (~10)

Ichthyoplankton sample box with 1-L sampling bottles (~50)

Ichthyoplankton net and cod end

Flowmeter

Warp

Depressor weight

10% formalin

Syringe, funnel, spraybottles

Appendix D

Equipment Checklist

Pencils, lab markers, pens

Recorders (3)

Cassette Tapes

Calipers (1 large, 3 small)

Batteries (AA and D)

Electrical tape and duct tape

WD-40

Re-closable sandwich bags

Quart and gallon Ziploc bags for samples

Cooler

Clipboards (4) with binder clips

Knives (2 or 3 small, 2 large)

Forceps (large and small)

Envelopes for otoliths

Logbooks (old and new)

Charts for each region with proposed tow locations

Loran C's and latitude/longitude for proposed tows

Loran C's and latitude/longitude for old tows with charts

Copies of detailed charts and schedules sent to lobstermen

Travel vouchers and info on per diem rates

Purchase orders

Permits (Maine, New Hampshire, and Federal)

Cell Phone

Cameras (digital and video)

Tags and tagging needles/guns for Atlantic Halibut and Atlantic Cod

Taxonomic keys (fish, invertebrates, skates, shrimp, etc.)

Contact list

Survival suits (3)

Appendix E

Lobster Data Entry Codes

The following information for lobsters is collected via micro-cassette on survey cruises, and the corresponding codes are used for entry into an Access database.

LENGTH – carapace (back shell) length in nearest whole centimeters

SEX **1 = Male**
0 = Female

CULL – measured lobster has missing and/or regenerated claws
1 = one claw missing (or bud regrowth)
2 = both claws missing or with bud regrowth
3 = one claw regenerated
4 = one claw missing (or bud) and one regenerated claw
5 = both claws regenerated

V-NOTCH
1 = new manmade mutilation with scar tissue.
2 = old manmade mutilation with shell.
3 = new natural mutilation with scar tissue.
4 = old natural mutilation with shell.
5 = missing new flipper (prior to shed).
6 = missing old flipper (following shed or small regenerated flipper).
21 = renotched new manmade mutilation with scar tissue.
22 = renotched old manmade mutilation with shell.
23 = renotched new natural mutilation with scar tissue.
24 = renotched old natural mutilation with shell.
25 = renotched missing new flipper (prior to shed).
26 = renotched missing old flipper (following shed or small regenerated flipper).
31 = notched on board

EGG STAGE – estimate the number of infertile eggs (orange-red or yellow-white), record in comment section
1 = recently extruded “black” eggs.
2 = eyed eggs (black specks or turquoise).
3 = hatching (furry abdomen, few eggs present).

MOLT
0 = soft (new shell, current year’s shed)
1 = hard (old hard shell, previous year’s shed)

Appendix F

Designated Species

This list serves as a rough guideline for which species the crew attempts to release alive if at all possible. Most are are physoclisous fish (mostly Gadidiae) that require their swim bladders to be purged of gases so that they may swim toward the seafloor instead of floundering on the surface. Others are rare or protected species that are endangered or close to being so. Here are a few examples of species that commonly receive this treatment.

Hippoglossus hippoglossus, Atlantic halibut*
Acipenser brevirostrus, Short-nosed sturgeon
Acipenser oxyrhynchus, Atlantic sturgeon
Gadus morhua, cod**
Melanogrammus aeglefinus, haddock***

*Atlantic halibut are often tagged by the scientific crew to assist efforts of the DMR's halibut tagging program.

**Cod are sometimes examined for maturity, in which case they are rarely released alive. If maturity is not examined, the cod are often tagged by the scientific crew to assist efforts of the Northeast Regional Cod Tagging Program.

***Haddock are sometimes examined for maturity, in which case they are rarely released alive. If maturity is not examined, the scientific crew attempts to release them alive.

Appendix G

Inshore Trawl Survey Trawl Log

Date		Start Co-ord.		Start Time	
Region				End Time	
Location		End Co-ord.		Start Depth	
TowId				End Depth	
Grid		Weather		Tow Dir.	
Vessel		Crew		Wire Out	

Species	Weight (kg.)	Number	Length (cm)
102-Dab			
105-Yellowtail			
106-Blackback			
107-Grey sole			
108-Windowpane			
155-Redfish			
073-Cod			
074-Haddock			
075-Pollock			
072-Whiting			
077-Red Hake			
076-White Hake			
193-Ocean pout			
083-4-B Rockling			
197-Monkfish			
032-Herring			
033-Alewife			
034-Blueback Her.			
035-Shad			
045-Smelt			
163-Long. Sculpin			
026-Little Skate			
027-Smooth Skate			
028-Thorny Skate			
164-Sea Raven			
168-Lumpfish			
183-Daubed Shanny			
182-Snakeblenny			
191-Wrymouth			
165-Alligatorfish			
401-Scallop			
301-Lobster- male			
301-Lobster- female			
312-Crab, Jonah			
313-Crab, Rock			
305-Shrimp			

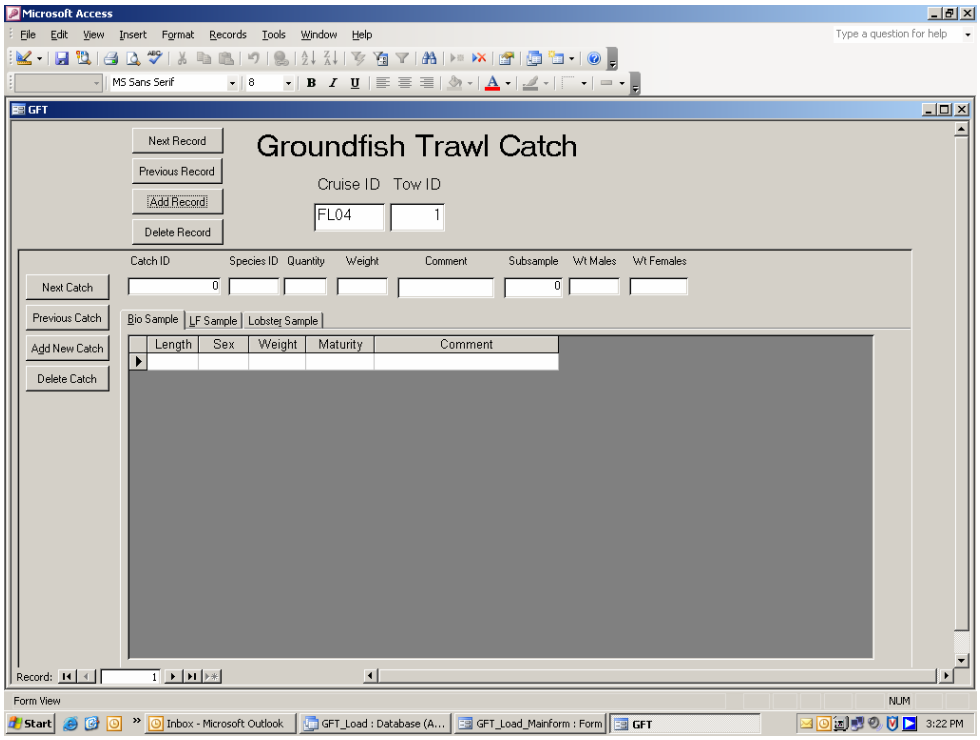
Appendix H

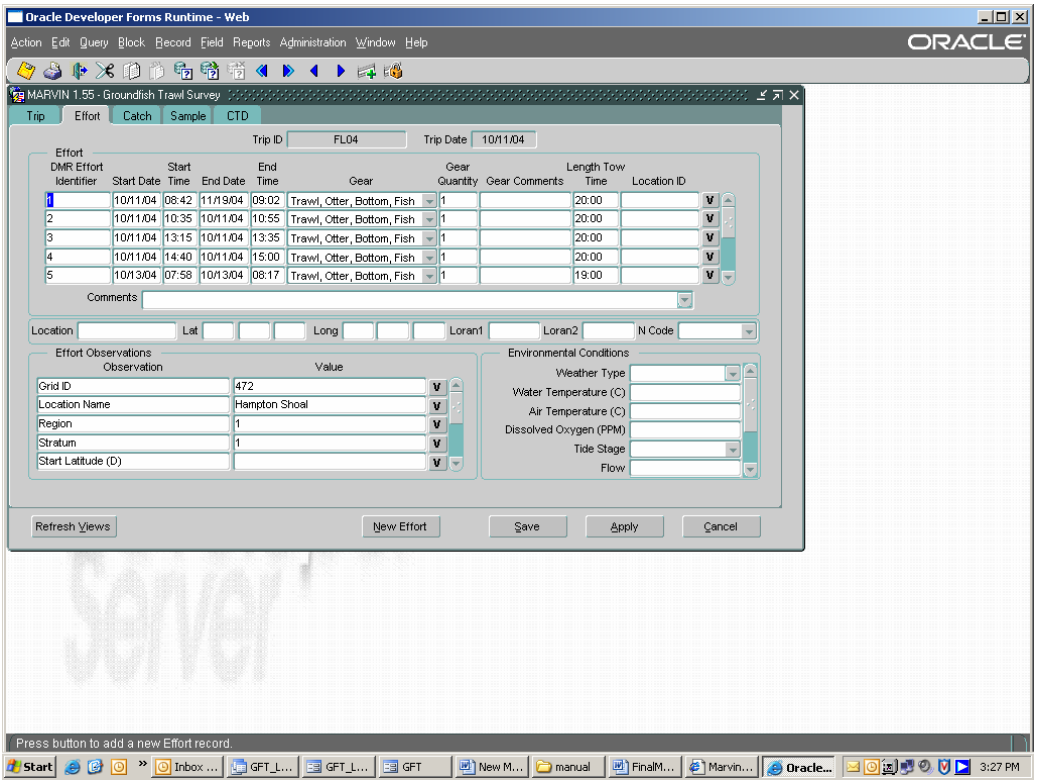
Ichthyoplankton Tow Log

DATE	TOW	GRID	DEPTH	FLOWMETER START	FLOWMETER END	TIME START	TIME END	WIRE

Appendix I

Access™ and Oracle™ data entry screen





Appendix J

Species Identification Codes

This is a partial listing of the coding used by the National Marine Fisheries Service Resource Survey Branch.

Only the species caught by the ME/NH Inshore Trawl Survey are listed here.

COMMON NAME	*SCIENTIFIC NAME*	XCOMNAME	FISHID	RATING	FINFISH
Atlantic Hagfish	*Mxyine glutinosa*	Slime eel	001	I	TRUE
Sea Lamprey	*Petromyzon marinus*		002	A	TRUE
Spiny Dogfish	*Squalus acanthias*	Dogfish	015	S	TRUE
Atlantic Torpedo	*Torpedo nobiliana*	Torpedo Ray	021	A	TRUE
Barndoor Skate	*Raja laevis*		022	I	TRUE
Winter Skate	*Raja ocellata*	Big Skate	023	S	TRUE
Little Skate	*Raja erinacea*		026	S	TRUE
Smooth Skate	*Raja senta*		027	I	TRUE
Thorny Skate	*Raja radiata*		028	S	TRUE
Herring (unclass.)			030	I	TRUE
Atlantic Herring	*Clupea harengus*		032	S	TRUE
Alewife	*Alosa pseudoharengus*	Kayaks	033	S	TRUE
Blueback Herring	*Alosa aestivalis*		034	S	TRUE
American Shad	*Alosa sapidissima*		035	S	TRUE
Atlantic Menhaden	*Brevoortia tyrannus*	Pogy	036	I	TRUE
Hickory Shad	*Alosa mediocris*		037	A	TRUE
Rainbow Smelt	*Osmerus mordax*		045	S	TRUE
Lanternfish unclass.	*Myctophid spp.*		056	A	TRUE
Slender Snipe Eel	*Nemichthys scolopaceus*		067	I	TRUE
Silver Hake	*Merluccius bilinearis*	Whiting	072	S	TRUE
Atlantic Cod	*Gadus morhua*		073	S	TRUE
Haddock	*Melanogrammus aeglefinus*		074	S	TRUE
Pollock	*Pollachius virens*		075	S	TRUE
White Hake	*Urophycis tenuis*		076	S	TRUE
Red Hake	*Urophycis chuss*		077	S	TRUE
Spotted Hake	*Urophycis regia*		078	I	TRUE
Fourbeard Rockling	*Enchelyopus cimbrius*		083	S	TRUE
Cusk	*Brosme brosme*		084	A	TRUE
Greenland Halibut	*Reinhardtius hippoglossoides*		099	A	TRUE
Atlantic Halibut	*Hippglossus hippoglossus*		101	S	TRUE
American Plaice	*Hippoglossoides platessoides*	Dab	102	S	TRUE
Summer Flounder	*Paralichthys dentatus*	Fluke	103	S	TRUE
Fourspot Flounder	*Paralichthys oblongus*		104	S	TRUE
Yellowtail Flounder	*Limanda ferruginea*		105	S	TRUE
Winter Flounder	*Pseudopleuronectes americanus*	Blackback	106	S	TRUE
Witch Flounder	*Glyptocephalus cynoglossus*	Grey Sole	107	S	TRUE
Windowpane	*Scophthalmus aquosus*	Sand Dab	108	S	TRUE
Gulf Stream Flounder	*Citharichthys arctifrons*		109	I	TRUE
Buckler Dory	*Zenopsis conchifera*	John Dory	112	I	TRUE
Atlantic Silverside	*Menidia menidia*		113	S	TRUE
Threespine Stickleback	*Gasterosteus aculeatus*		115	I	TRUE
Northern Pipefish	*Syngnathus fuscus*		116	I	TRUE
Atlantic Mackerel	*Scomber scombrus*		121	S	TRUE
Butterfish	*Peprilus triacanthus*		131	S	TRUE
Atlantic Moonfish	*Vomer setapinnis*		132	I	TRUE
Bluefish	*Pomatomas saltatrix*		135	I	TRUE

	Appendix J				
	Species Identification Codes				
Striped Bass	*Morone saxatilis*		139	I	TRUE
Black Sea Bass	*Centropristis striata*		141	A	TRUE
Scup	*Stenotomas chrysops*		143	S	TRUE
Acadian Redfish	*Sebastes fasciatus*		155	S	TRUE
Hookear Sculpin uncl.	*Artediellus sp.*		159	A	TRUE
Moustache Sculpin	*Triglops murrayi*		161	A	TRUE
Shorthorn Sculpin	*Myoxocephalus scorpius*		162	I	TRUE
Longhorn Sculpin	*Myoxocephalus octodecemspinosus*		163	S	TRUE
Sea Raven	*Hemitripterus americanus*		164	S	TRUE
Alligatorfish	*Aspidophoroides monopterygius*		165	S	TRUE
Grubby	*Myoxocephalus aenaeus*		166	I	TRUE
Striped Seasnail	*Liparis liparis*		167	I	TRUE
Lumpfish	*Cyclopterus lumpus*		168	S	TRUE
Seasnail	*Liparis atlanticus*		170	I	TRUE
Northern Searobin	*Prionotus carolinus*		171	A	TRUE
Striped Searobin	*Prionotus evolans*		172	A	TRUE
Armored Searobin	*Peristedion miniatum*		173	I	TRUE
Cunner	*Tautogolabrus adspersus*		176	S	TRUE
Rock Gunnel	*Pholis gunnellus*		180	I	TRUE
Snakeblenny	*Lumpenus lumpretaeformis*		182	S	TRUE
Daubed Shanny	*Lumpenus maculatus*		183	S	TRUE
Radiated Shanny	*Ulvaria subbifurcata*		184	I	TRUE
Wolf Eelpout	*Lycenchelys verrillii*		190	I	TRUE
Wrymouth	*Cryptacanthodes maculatus*		191	S	TRUE
Atlantic Wolffish	*Anarhicas lupus*		192	S	TRUE
Ocean Pout	*Macrozoarces americanus*		193	S	TRUE
Goosefish	*Lophius americanus*	Monkfish	197	S	TRUE
Bigeye Scad	*Selar crumenopthalmus*		209	I	TRUE
Round Scad	*Decapterus punctatus*		211	I	TRUE
Rough Scad	*Trachurus lathami*		212	I	TRUE
Pearlsides	*Maurolicus muelleri*		229	A	TRUE
Parrot Shrimp	*Spirontocaris spinus*		286	I	FALSE
Sevenspine Bay Shrimp	*Crangon septemspinosa*	Sand Shrimp	287	I	FALSE
Pink Glass Shrimp	*Pasiphaea multidentata*		292	I	FALSE
Spiny Lebbeid	*Lebbeus groenlandicus*	Greenland Shrimp	293	I	FALSE
Polar Lebbeid	*Lebbeus polaris*		294	I	FALSE
Bristled Longbeak	*Dichelopandalus leptocerus*	Dichelo	296	A	FALSE
Aesop Shrimp	*Pandalus montagui*	Montagui	297	A	FALSE
Propinquus	*Pandalus propinquus*		298	I	FALSE
American Lobster	*Homarus americanus*		301	S	FALSE
Shrimp (unclass)	*Pandalus spp.*		305	S	FALSE
Northern Shrimp	*Pandalus borealis*	Boreal Shrimp	306	S	FALSE
Red Crab	*Geryon quinquedens*		310	I	FALSE
Jonah Crab	*Cancer borealis*		312	S	FALSE
Rock Crab	*Cancer irroratus*		313	S	FALSE
Spider Crab unclass.	*Majidae spp.*		317	A	FALSE
Mantis Shrimp	*Stomatopod sp.*		323	I	FALSE
Northern Stone Crab	*Lithodes sp.*		324	I	FALSE
Snow Crab	*Chionectes opilio*		325	I	FALSE
Green Crab	*Carcinus maenus*		326	A	FALSE
Sand Dollar	*Echinoidae sp.*		330	I	FALSE
Sea Urchin	*Stronglyocentrotus droebachiensis*		331	S	FALSE

	Appendix J				
	Species Identification Codes				
Starfish unclass.	*Stelleroideae sp.*		332	I	FALSE
Boreal Asterias	*Asterias vulgaris*	Sea Star	333	A	FALSE
Hermit Crab (unclass.)	*Diogenidae/Paguridae sp.*		335	I	FALSE
Iceland Scallop	*Chlamys islandica*		340	I	FALSE
Horse Mussel	*Modiolus modiolus*		342	A	FALSE
Blue Mussel	*Mytilus edulis*		343	A	FALSE
Ten-Ridged Whelk	*Neptunea decemcostata*		345	I	FALSE
Stimpson's Whelk	*Colus stimpsoni*		346	I	FALSE
Dog Whelk (unclass.)		used for unk whelk	347	I	FALSE
Moon Snail	*Lunatia heros*		348	I	FALSE
Shortnose Sturgeon	*Acipenser brevirostrum*		379	I	TRUE
Atlantic Sturgeon	*Acipenser oxyrhynchus*		380	S	TRUE
American Eel	*Anguilla rostrata*		384	A	TRUE
Sea Scallop	*Placopecten magelanicus*		401	S	FALSE
Ocean Quahog	*Arctica islandica*	Mahoganny Quahog	409	I	FALSE
Quahog	*Mercenaria mercenaria*	hard clam	413	I	FALSE
False Quahog	*Pitar morrhuana*		415	I	FALSE
Northern Cardita	*Venercardia borealis*		419	I	FALSE
Waved Astarte	*Astarte undata*		420	I	FALSE
Atlantic Tomcod	*Microgadus tomcod*		453	I	TRUE
Cusk-eel unclass.	*Ophidiidae spp.*		461	A	TRUE
Mummichog	*Fundulus heteroclitus*		473	A	TRUE
Fourspine Stickleback	*Apeltes quadracus*		488	A	TRUE
Squid (unclass.)			501	I	FALSE
Shortfin Squid	*Illex illecebrosus*		502	S	FALSE
Longfin Squid	*Loligo pealei*		503	S	FALSE
Octopus unclass.	*Cephalopoda spp.*		510	I	FALSE
Short Bigeye	*Pristigenys alta*		557	I	TRUE
American Sand Lance	*Ammodytes americanus*		734	S	TRUE
Silver Anchovy	*Engraulis eurystole*		865	I	TRUE
Atlantic Salmon	*Salmo salar*		894	A	TRUE
Barracudina sp.	*Paralepidae spp.*		896	I	TRUE
Blackspotted Stickleback	*Gasterosteus wheatlandi*		901	A	TRUE
Ninespine Stickleback	*Pungitius pungitius*		902	A	TRUE
Toad Crab	*Hyas araneus*		956	I	FALSE
Sea sponges	*Demospongiae sp.*		957	I	FALSE
Gelationous Seasnail	*Liparis fabricii*		958	I	TRUE
Gulf Seasnail	*Liparis coheni*		959	I	TRUE
Ax Head Clam	*Yoldia thraciaeformis*		960	I	FALSE
Rat-tail Cucumber	*Caudina arenata*		961	I	FALSE
Sea Cucumber	*Cucumaria frondosa*		962	I	FALSE
Krill	*Euphausuid spp.*		963	I	FALSE
Inqualine seasnail	*Liparis inqualinus*		964	I	TRUE
	Eaulus fabricii		965		
Anemone	*Anemonia sp.*		970	I	FALSE
Barnacle	*Cirripediae sp.*		989	I	FALSE
Unknown			999		