Appendix C

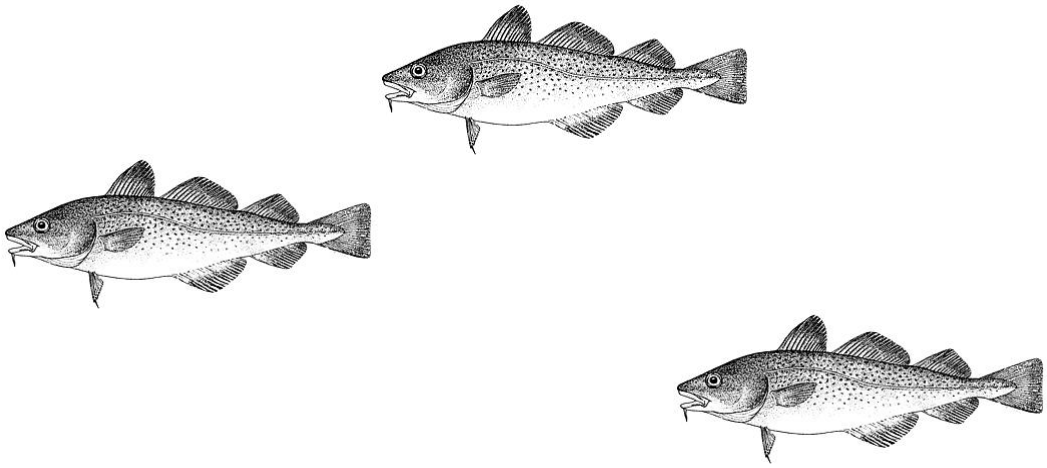
Industry-Based Survey
for
Gulf of Maine Cod
Pilot Study

Chief Scientist Guide

Massachusetts Division of Marine Fisheries
Industry Based Survey

For

Gulf of Maine Cod



Chief Scientist Guidelines

2005 - 2006

MarineFisheries
A Commonwealth of Massachusetts Agency

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1. PRIOR TO DEPARTURE:

1.1 MaxSea Marine Software (Appendix B)

Laptop computer should be turned on and set up so it is ready for the first haul of the day. Attach GPS cable to USB port of computer and open MaxSea to make sure the computer and GPS interface is working.

1.2 StowAway TidbiT Temperature Logger (Appendix C)

The temperature tidbit recorder should be initialized with the DESCRIPTION:

VCMMDDYY (vessel code, month, day, year)

Ex: **JK030505** (Jocka, March 5th,2005)

In order to initialize the tidbit, the Optic Base Station cable must be connected to the laptop through the serial port. After initialization, the tidbit is to be secured in a baitbag and attached to the inboard side of the port door prior to the first haul of the day. Make sure it is out of the way of the door arm.

1.3 NETMIND Trawl Monitoring System (if onboard) (Appendix D)

Detach the Optic Base Station cable and attach the NETMIND Trawl Manager System cable to the laptop serial port and attach the cable from hydrophone into the NETMIND Trawl Manager System. Charged NETMIND sensors should be attached to the net & doors before leaving the dock, as this is an easier process than attaching the sensors at sea. For the door sensors, the master goes on the starboard side and the slave goes on the port side of the gear. The hydrophone should be set up off a block from an outrigger. **Remember to leave the hydrophone inboard during steaming.**

1.4 Marel Shipboard Scale

Marel scale should be plugged in and allowed to warm up. Calibration of the scale is to be conducted before the first tow of the day but it **cannot** be done while the vessel is tied to the dock or while the vessel is still in the harbor.

To calibrate the scale:

- Confirm that the platform is empty and clean.
- Press MENU and ZERO simultaneously
- When display shows: **"*Put 20 kg*"**, place calibration weight on the center of the platform.
- Press PRINT and wait for message: **"*Fit XX*"**.

A good calibration should have a Fit Number (***XX***) of 25 or less. If higher, then recalibrate.

2. BEFORE THE START OF A TOW:

2.1 Survey Area

Upon arrival at the station, ensure that the tow path is free of fixed gear and untowable bottom. This may require the captain to make at least one pass along the planned tow path to ensure that the tow can be completed successfully and with no fixed gear interactions. **All attempts should be made to avoid all fixed gear.** It would be extremely helpful to the captain if the chief scientist remains in the wheel house during this time period to assist in sighting fixed gear.

Confirm that the captain surveys the area and attempts to cover the entire tow area for that station before dropping and moving on to the next station. If time and/or safety are a factor, consult with the captain and make a decision on how long to spend searching for a tow.

If a station is not going to be completed, indicate in the 'Stations Done.xls' file the reason for not attempting the tow. Remember to be specific as to why the tow was not completed. For example, a tow was not completed because of hard bottom. Did the whole survey area have hard bottom or did the only area left because of fixed gear have hard bottom? Scenario #1 is hard bottom; scenario #2 is fixed gear.

2.2 Gear Identification

Check and record the door and net numbers on the Trawl Haul Log. The net number will be welded on the tri-plate on the lower leg. The door numbers will be welded on the interior of the door.

2.3 NETMIND Trawl Monitoring System

Turn on NETMIND Trawl Manager System and open NETMIND on the laptop. Have the sea sampler or vessel crew stand-by for hydrophone deployment.

3. START OF THE TOW:

3.1 Start of tow protocol:

The survey tow begins when the brake on the winch is locked.

Upon **"winch break lock"**:

- Start the Egg timer (located on the desktop of the laptop. Make sure it is placed on the screen so both you and the captain can clearly see it.
- Begin vessel tracking in MaxSea. (Appendix B)
- Deploy the NETMIND hydrophone. Make sure the excess hydrophone cable is secured and will not be pulled overboard.

3.2 During tow

The chief scientist should remain in the wheel house unless the catch work up from the previous station needs to be finished.

4. END OF TOW:

The survey tow ends once the brakes on the winches are disengaged and the winches begin haul back. The required tow time should be 30 minutes in duration. Tow durations between 20 and 30 minutes are acceptable; less than twenty minutes is not acceptable and should be redone.

4.1 MaxSea Marine Software (Appendix B)

- Stop vessel tracking on MaxSea.
- Convert vessel track to a route and save.
- Use track route to determine start and end latitude / longitude coordinates (**DD MM.MMM**) and track line length (**x.xx** nm).

4.2 NETMIND Trawl Monitoring System

Haul aboard the NETMIND hydrophone. This may be done just before the end of the tow in order to prevent the hydrophone cable from becoming entangled in the survey gear or vessel propeller. Neatly stow the cable and deployment line so that is out of the way from deck activities.

4.3 Haul Value

Determine if the haul was a successful tow or not ((HAUL VALUE) based on:
- Time (tow must be a minimum of 20 minutes)
- Gear Condition (large or many holes in the net is probably not a successful tow)
- Interaction with large amounts of fixed gear (NETMIND may help here)
- Captains discretion

If it is determined that the haul was not successful (HAUL VALUE = 4), then the catch is not recorded, legal size fish (see section 9.1) should be collected for sale, and the remainder of the catch returned overboard. The tow should be repeated if possible. Indicate on the Trawl Haul Log that there is a second attempt and add detailed comments explaining the reason why the tow is being attempted for a second time. Save the initial vessel track for future reference.
If the haul can't be completed again, then fill in the Trawl Haul Log as necessary, do not record any species information and record the # CODED SPECIES as 0 even if there was a catch.

4.4 Gear Damage

If there is any gear damage, record the appropriate gear condition code. Also, please record in the 'GEAR LOG.xls' file the date, the net or door number, a detailed explanation of the damage, and any attempts made to repair/fix the problem.
**** Please Note: IF ANY NET DAMAGE IS PRESENT, IT MUST BE REPAIRED PRIOR TO DEPLOYMENT FOR THE NEXT HAUL.** If the damage is too severe to be repaired at sea, contact the project coordinator to arrange for delivery of a new survey net.

4.5 Fixed Gear

All fixed gear that comes up in or on the trawl net should be indicated on the Trawl Haul Log along with any detail information such as buoy color, numbers or names on buoy, or trap tag information along with the total number to traps entangled with the survey gear. All gear should be returned to the sea with minimal cutting of lines if possible. If a line or warp is needed to be cut in order to release the fixed gear, then all attempts should be made to retie it together after untangling it from the survey gear. If traps come up in the net without warp lines, then the traps should kept onboard and returned to Massachusetts Division of Marine Fisheries, Gloucester Office.

5. CATCH WORK UP:

When the gear comes aboard, all species must be removed from the net. This may require the crew to back down the net on deck and shake all fish down into the cod end. When the catch is dumped on deck, take a moment to assess how you will sample the catch – is it a small or relatively easy catch to sample or do you need to subsample? Are there species that should be quickly dealt with and returned overboard alive? Will you need baskets or will fish totes be required?

5.1 Photographs

Photographs and movie clips should be taken as time permits. Subjects should include the catch, unique or unidentifiable species, vessel operations, gear damage, and sampling.

5.2 Scales

The Marel Shipboard Scale is to be tared with a clean, empty orange basket before each tow. If fish totes are needed make sure the Marel Shipboard Scale is tared with a fish tote and not an orange basket. The Pesola 10 kg Spring Scale should be zeroed with an empty small bucket before each tow. The Pesola 10 kg Spring Scale is to be used when weights are 3 kg or less.

5.3 Sorting and Weighing the Catch

All species are to be separated into individual baskets. Dogfish and crab species are to be separated by sex. American Lobsters are to be separated by male, female and female egg bearers. All species are weighed to the nearest 0.1 kg. Small amounts should be weighed in the small buckets with the Pesola 10 kg Spring Scale; however, make sure that all water has been drained out of the bucket before weighing.

There are a few species that should be pulled out of the pile, weighed and measured and returned to the water as quickly as possible. These include Atlantic sturgeon, Atlantic halibut and lumpfish.

5.4 Sampling

Refer to the Species Sampling Priorities List (Appendix E) and Supplementary Sampling List (Appendix F) for information on which species is to be sampled and for what data is to be collected. Sampling should be conducted on all species of priority as time permits but keep in mind that this is an Atlantic cod survey; therefore, this species will always be sampled whenever it appears in the catch. All supplementary samples will need a water proof label which will include cruise number, station number, species and sample type.

5.5 Length Frequencies

Length frequencies are initially recorded as stroke tallies on the Trawl Haul Log and then each line is totaled when you are done recording lengths. Make sure you leave yourself enough room on the Trawl Haul Log so all sizes can be recorded in numerical order.

If there are only a small number (12 or less) of fish, lengths can be recorded in the LENGHTS OF INDIVIDUAL FISH column. Please **do not** try to cram 20 – 30 individual lengths in this box as it is difficult to read for the data entry process.

5.6 Age Structure and Envelopes

Age structure envelopes are to be filled in for each tow with the corresponding cruise code, station number and individual detail number. Two otoliths should be retained for each fish, even if they break during extraction. When binding the envelopes together, try to prevent crushing the otoliths by using a paper clip or using rubber bands as loosely as possible. Do not use electrical or duct tape. Allow envelopes to dry before sealing them in a plastic bag.

5.7 Subsampling

If the catch is large or there is a large quantity of a single species, subsampling may be easier and more time efficient. Subsampling techniques will generally vary depending on the species and circumstance but the following scenarios should help the work up of large catches.

Remember to record all subsample weights in the SAMPLING box of the Trawl Haul Log or circle the subsample basket weights recorded in WEIGHED PART OF CATCH column. Also, show all work used to calculate subsampling expansion factors.

1. Discard by Count Subsample Method:

Large amount of dogfish: Fill four to six baskets by sex and record a weight for each basket. Count the number of individuals per basket to calculate an average weight per fish in the subsample. Have the crew and sea sampler discard the remaining dogfish while counting the number of each by sex. You now have a total number of dogfish discarded. Multiply this number by the average weight per dogfish from the subsample to calculate an estimated weight of dogfish discarded. The discarded weight is then added to the subsample weight for a total catch weight of dogfish.

Example: Female Spiny Dogfish

	additional #'s counted:	
Basket 1: 30.2 kg = 14 dogs		avg. 2.26 kg/dog
Basket 2: 25.5 kg = 12 dogs	125	* 491 dogs
Basket 3: 32.7 kg = 15 dogs	148	(est disc wt) 1109.7 kg
Basket 4: 45.2 kg = 18 dogs	218	(sub wt) + 133.6 kg
subsample totals: 133.6 kg = 59 dogs	491	(est total wt) **1243.3 kg**
133.6 kg ÷ 59 dogs = 2.26 kg/dog		(total num) **550 dogs**

2. Mix Subsample Method

Large mix species that would take a long time to separate: Fill only the mix of species into the baskets and record a total weight for the mix. Take random samples out of each basket and put into an empty basket and fill at least a third full. This is your subsample; record the weight of the subsample. Sort the subsample by species and record a subsample weight for each species. Use these weights to determine the percentage of each species in the mix catch. Multiply each species percentage by the total mix weight for a total catch weight of each species in the mix.

Example: mix of Atlantic herring, silver hake, alewife

total weight = 126.2 kg

subsample weight: 25.4 kg		total species weight
Atlantic herring:	12.5 kg → 49.2 % * 126.7 =	**62.3 kg**
silver hake:	11.8 kg → 46.5 % * 126.7 =	**58.5 kg**
alewife:	1.1 kg → 4.3 % * 126.7 =	**5.4 kg**

3. Straight Weight Subsample Method

Large amount of a single species in which lengths will be recorded: Fill all fish into baskets or totes (remember to tare for tote) and record a total weight. The subsample should be representative in lengths of the catch; therefore, try to obtain it from different portions of the pile or from a random mix of the weighed baskets. Record the weight of the subsample. Divide the total catch weight by the subsample weight to determine the length frequency expansion factor. Record the length frequency of the subsample and use the subsample total number to calculate an estimated total number of fish.

Example: total weight of redfish = 226.4 kg

subsample weight of redfish = 55.4 kg

LF expansion factor = 226.4/55.4 = 4.09

subsample number of redfish = 218

estimated total number of redfish = 4.09 * 218 = 892

4. Single Species by Length Subsample Method

Single species with distinct size categories and one or more size categories can be subsampled. This method is similar to the Straight Weight Method because each size category will be initially treated as separate species until the data is expanded. While sorting the catch, fill baskets according to a definitive length separation point and record as large and small fish. Record a total weight for each size category. Obtain a representative subsample from each size category and record the weight. Divide the total

weight by the subsample weight to determine the length frequency expansion factor for each size category. Record the length frequency of the subsample in separate columns of the Trawl Haul Log and use the subsample total number to calculate an estimated total number of fish for each size category.

Example 1: small and large haddock

	small haddock	large haddock	**total haddock**
weight	45.2 kg	457.2 kg	45.2 + 457.2 = **502.4 kg**
subsample weight	15.3 kg	266.9 kg	
L/F expansion factor	$\frac{45.2}{15.3}$ = **2.95**	$\frac{457.2}{266.9}$ = **1.71**	
subsample number	65	320	
total number	65 * 2.95 = 192	320 * 1.71 = 548	192 + 548 = **740**

Example 2: mostly large but some small pollock

	small pollock	large pollock	**total pollock**
weight	10.9 kg	3217.2 kg	10.9 + 3217.2 = **3228.1 kg**
subsample weight	none	306.9 kg	
L/F expansion factor	none	$\frac{3217.2}{306.9}$ = **10.48**	
subsample number	none	84	
total number	36	84 * 10.48 = 880	36 + 880 = **916**

6. AFTER CATCH IS WORKED UP:

6.1 Deck Clean up

After weighing, measuring and sampling all of the catch, the sea sampler should help clear the deck. If the crew is still processing the portion of the catch that is to be sold, assist them as best as possible. If help is not required, then proceed to hosing down the work station, removing fish guts and blood from the sampling equipment, baskets, table, and work area. If there is an exceptionally large catch, the watch chief should also assist in clearing the deck after finishing with the data logs.

6.2 Log Clean Up

Unless needed on deck, the watch chief should finish and clean up the data logs before the next tow. All fields must be completed before the logs are turned in. If you plan to code the logs please us a **red pencil** to fill in the species and sex codes. This is to aide in the data entry process. All length frequencies should be tallied up and the total number is to be recorded in the TOTAL CATCH NUMBER column and the total weight for each species is to be recorded in the TOTAL CATCH WEIGHT column. The total cod weight for each tow, the date, station number and any comments should be entered into the 'Stations Done.xls' file on the desk top of the laptop.

6.3 Expansions

If the tow was shortened or a subsample was taken, an expansion factor must be calculated.

* Time Expansion Factor (EF_{time}) = 30 / xx.x, where xx.x = length of tow

* Subsample Expansion Factor (EF_{sub}) = total weight / subsample weight

* Subsample on a shortened tow, expansion factor = EF_{time} * EF_{sub}

A. Rules for Expansions:

1. Do not expand the recorded length frequency data on the log.

2. Record the calculated expansion factor in the LF EXPAN FACTOR column.

3. Record the calculated expanded total number in the TOTAL CATCH NUMBER column. Use the 'AUDIT.xls' spreadsheet file (located on the desk top of the laptop) to obtain the expanded total number.

B. Additional Rules for Time Expansion:

1. If there are no lengths or number of species recorded then total weight is expanded by time expansion factor.

2. If only **1** animal, then there is **no expansion** of weight or length frequency, **regardless of expansion factor.**

3. If more than **1** animal, weight is expanded **only** if the length frequency will be expanded.

C. Exception to expansion rules:

When using the Single Species by Length Subsample Method., the size categories are initially treated as separate species and the length frequencies are collected in separate columns. The 'Audit.xls' spreadsheet file should be used with the appropriate length frequency data and corresponding expansion factor to obtain the expanded length frequency distribution for each size category. The expanded length frequency distributions must now be combined and recorded as a single length frequency distribution on the data log for the data entry process.

7. END OF THE DAY:

7.1 Gear

All deck equipment is to be cleaned. Scrub any dried blood or fish guts off the table, length boards, baskets and anywhere also as needed. The calipers and Pesola Spring Scale should be rinse with fresh water (if available) and given a coating of WD-40.

7.2 StowAway TidbiT Temperature Logger

The tidbit temperature logger needs to be removed and the data downloaded onto the laptop. All temperature data is to be saved in the **2005-2006** folder.

7.3 NETMIND Trawl Monitoring System

If the vessel is tying up for the night at the dock, please remove the NETMIND door sensors and stow them inside the vessel for the night. Also, remove any NETMIND sensors that need to be charged. These should be rinsed off with fresh water and placed on the chargers overnight. Disconnect the hydrophone cable from the NETMIND Trawl Manager System and stow the hydrophone and cable inside the vessel for the night.

7.4 Marel Shipboard Scale

Rinse and clean off the platform. If possible, leave the scale plugged in, replace the cover back on the scale box and place a large ziplock over the digital readout screen. If the scale is to be broken down for the night, make sure all components are dried and the scale is wiped down with WD-40.

7.5 Electronic Data Backup

At the end of each day, all electronic data should be backed up onto the USB memory key. This included all NETMIND files, the bottom temperature data file downloaded from the tidbit logger, the current cruise MaxSea layer file, Stations Done.xls and Gear Log.xls files.

7.6 Call In of Stations Done

A daily report for all stations completed should be called in to the program manager. This is to include both stations completed and those not completed.

8. END OF THE TRIP:

8.1 Gear

All equipment that is going to be left onboard the vessel must be thoroughly cleaned, packed up and stowed out of the way for normal vessel operations. Take an inventory of all supplies and include a list of needs for the next survey cruise with the package of data logs.

8.2 NETMIND Trawl Monitoring System

All sensors must be removed from the fishing gear. Neatly, pack the sensors and hydrophone cable into fish totes. Leave the sensor bags on the net.

8.3 Return to the Office

The following equipment must be return to the Massachusetts Division of Marine Fisheries Office:

- data sheets
- age structures
- specialty samples
- laptop computer
- USB memory key
- digital camera
- briefcase with all miscellaneous equipment and files
- complete NETMIND System (sensors, hydrophone, trawl manager computer, shackles, sled, chargers, voltmeter, adjustable wrenches)

9. REFERENCE TABLES

9.1 Legal Fish Sizes

American Plaice (dab)	35.6 cm (14“)
Atlantic Cod	55.9 cm (22“)
Atlantic Halibut	91.4 cm (36“)
Black Sea Bass	30.5 cm (12“)
Goosefish (monkfish)	43.2 cm (17“)
Haddock	48.3 cm (19“)
Pollock	48.3 cm (19“)
Redfish	22.9 cm (9“)
Scup	22.9 cm (9”)
Summer Flounder (fluke)	35.6 cm (14“)
Tautog (blackfish)	40.6 cm (16“)
Windowpane Flounder (sand dab)	30.5 cm (12“)
Winter Flounder (blackback)	30.5 cm (12“)
Witch Flounder (grey sole)	35.6 cm (14“)
Yellowtail Flounder	33.0 cm (13“)

9.2 Seconds to Tenths of Minutes

Seconds	Minutes
0 – 2	0.0
3 – 8	0.1
9 – 14	0.2
15 – 20	0.3
21 – 26	0.4
27 – 32	0.5
33 – 38	0.6
39 – 44	0.7
45 – 50	0.8
51 – 56	0.9
57 – 59	1.0

9.3 Wire Out Chart

Fathoms	Meters
25	46
50	91
75	137
100	183
125	229
150	274
175	320
200	366
225	411

9.4 Scope Chart

Depth (Fa)	Wire Out (Fa)
10 – 12.5	25
12.6 – 20.8	50
20.9 – 29.2	75
29.3 – 37.5	100
37.6 – 45.8	125
45.9 – 54.2	150
54.3 – 62.5	175
62.6 – 70.8	200
70.9 – 79.2	225

9.5 Fathoms to Meters

Fathoms	Meters
10.0 - 10.1	18
10.2 - 10.6	19
10.7 - 11.2	20
11.3 - 11.7	21
11.8 - 12.3	22
12.4 - 12.8	23
12.9 - 13.3	24
13.4 - 13.9	25
14.0 - 14.4	26
14.5 - 15.0	27
15.1 - 15.5	28
15.6 - 16.1	29
16.2 - 16.6	30
16.7 - 17.2	31
17.3 - 17.7	32
17.8 - 18.3	33
18.4 - 18.8	34
18.9 - 19.4	35
19.5 - 19.9	36
20.0 - 20.5	37
20.6 - 21.0	38
21.1 - 21.5	39
21.6 - 22.1	40
22.2 - 22.6	41
22.7 - 23.2	42
23.3 - 23.7	43
23.8 - 24.3	44
24.4 - 24.8	45
24.9 - 25.4	46
25.5 - 25.9	47
26.0 - 26.5	48
26.6 - 27.0	49
27.1 - 27.6	50
27.7 - 28.1	51
28.2 - 28.6	52
28.7 - 29.2	53
29.3 - 29.7	54
29.8 - 30.3	55
30.4 - 30.8	56
30.9 - 31.4	57
31.5 - 31.9	58
32.0 - 32.5	59
32.6 - 33.0	60
33.1 - 33.6	61
33.7 - 34.1	62
34.2 - 34.7	63

Fathoms	Meters
34.8 - 35.2	64
35.3 – 35.8	65
35.9 – 36.3	66
36.4 – 36.8	67
36.9 - 37.4	68
37.5 - 37.9	69
38.0 - 38.5	70
38.6 - 39.0	71
39.1 - 39.6	72
39.7 - 40.1	73
40.2 - 40.7	74
40.8 - 41.2	75
41.3 - 41.8	76
41.9 - 42.3	77
42.4 - 42.9	78
43.0 - 43.4	79
43.5 - 44.0	80
44.1 - 44.5	81
44.6 - 45.0	82
45.1 - 45.6	83
45.7 - 46.1	84
46.2 - 46.7	85
46.8 - 47.2	86
47.3 - 47.8	87
47.9 - 48.3	88
48.4 - 48.9	89
49.0 - 49.4	90
49.5 - 50.0	91
50.1 - 50.5	92
50.6 - 51.1	93
51.2 - 51.6	94
51.7 - 52.2	95
52.3 - 52.7	96
52.8 - 53.2	97
53.3 - 53.8	98
53.9 - 54.3	99
54.4 - 54.9	100
55.0 - 55.4	101
55.5 - 56.0	102
56.1 - 56.5	103
56.6 - 57.1	104
57.2 - 57.6	105
57.7 - 58.2	106
58.3 - 58.7	107
58.8 - 59.3	108
59.4 - 59.8	109

59.9 - 60.4	110
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61.0 - 61.4	112
61.5 - 62.0	113
62.1 - 62.5	114
62.6 - 63.1	115
63.2 - 63.6	116
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64.8 - 65.3	119
65.4 - 65.8	120
65.9 - 66.4	121
66.5 - 66.9	122
67.0 - 67.5	123
67.6 - 68.0	124
68.1 - 68.6	125
68.7 - 69.1	126
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69.8 - 70.2	128
70.3 - 70.8	129
70.9 - 71.3	130
71.4 - 71.9	131
72.0 - 72.4	132
72.5 - 72.9	133
73.0 - 73.5	134
73.6 - 74.0	135
74.1 - 74.6	136
74.7 - 75.1	137
75.2 - 75.7	138
75.8 - 76.2	139
76.3 - 76.8	140
76.9 - 77.3	141
77.4 - 77.9	142
78.0 - 78.4	143
78.5 - 79.0	144
79.1 - 79.5	145
79.6 - 80.1	146
80.2 - 80.6	147
80.7 - 81.2	148
81.3 - 81.7	149
81.8 - 82.2	150
82.3 - 82.8	151
82.9 - 83.3	152
83.4 - 83.9	153
84.0 - 84.4	154
84.5 - 85.0	155

9.6 Selected Species Code List

Code	Sex	Species
015	1	spiny dogfish, male
015	2	spiny dogfish, female
022		barndoor skate
023		winter skate
026		little skate
027		smooth skate
028		thorny skate
032		atlantic herring
033		alewife
034		blueback herring
035		american shad
036		atlantic menhaden
045		rainbow smelt
072		atlantic cod
074		haddock
075		pollock
076		white hake
077		red hake
078		spotted hake
083		4 beard rockling
084		cusk
099		greenland halibut
101		atlantic halibut
102		american plaice
103		summer flounder
104		4-spot flounder
105		yellowtail flounder
106		winter flounder
107		witch flounder
108		windowpane flounder
112		buckler dory
113		atlantic silverside
121		atlantic mackerel
131		butterfish
139		striped bass
143		scup
155		acadian redfish
162		shorthorn sculpin
163		longhorn sculpin
164		sea raven
168		lumpfish
171		northern searobin
172		striped searobin
176		cunner
177		tautog
181		northern sandlance
191		wrymouth
192		atlantic wolffish
193		ocean pout
197		goosefish

Code	Sex	Species
301	0	lobster, unsexed
301	1	am. lobster, male
301	2	am. lobster, female
301	3	am. lobster, female, egger
305		shrimp unclassified
306		northern shrimp
310	0	deepsea red crab
312	0	jonah crab, unsexed
312	1	jonah crab, male
312	2	jonah crab, female
313	0	rock crab, unsexed
313	1	rock crab, male
313	2	rock crab, female
324	0	stone crab
325	0	snow crab
348		moonsnail
401		sea scallop
502		illex squid
503		loligo squid
510		octopus

Appendix A. Trawl Haul Log Instructions, Front

1-4 Cruise Code:	**2565** (leg 5)**, 2661** (leg 1)**, 2662** (leg 2)**, 2663** (leg 3)**, 2664** (leg 4)
5-8 Station:	**[*Assigned Station #*]**
9-13 Stratum:	**01010**
17 Station Value:	**2** = industry tow **7** = grid tow
18 Haul Value:	**1** = Good tow. No gear/tow duration problems. **2** = Representative, but some gear/tow duration problems. **3** = Problem tow. May/may not be representative due to gear/tow duration. **4** = Not representative due to gear/tow duration.
19 Gear Condition:	**1** = No damage to insignificant damage. **2** = Wing twisted or tears in upper or lower wings not exceeding 10 ft; tear in square not exceeding 5 ft; tears not exceeding 3 ft in upper belly, or 6 ft in lower belly; cod-end or liner with tears not exceeding 2 ft; parted idler; liner hanging out of cod-end. **3** = Hung up with no to minor damage. **4** = Parted legs, sweep or head rope; cod-end liner untied; wire out slippage; other gear hung on door. **5** = Tear up exceeding limits for code 2, but not total. **6** = Significant obstruction in trawl, such as fixed gear, rocks, mud, coral, tires, old anchors, timber, etc. Problem with third wire; unmatched doors; strong current. **7** = Crossed doors. Net was not on bottom or did not perform due to currents or other factors. **8** = Open gear. **9** = Hung up with major damage; total tear up, rimrack; loss of all gear; loss of trawl; loss of 1or both doors.
20–22 Stat Area:	**467, 511**, **512**, **513**, **514, 515, 521** (from MaxSea stat area layer file)
Vessel (on line)	**LE** = Lady Jane **L2** = Lisa Ann II **TO** = Titan **JK** = Jocka
23–24 Cruise:	**[*Assigned Leg #*]** (05, 01, 02, 03, 04)
27 EST/EDT:	**1** = Eastern Standard Time **2** = Eastern Daylight Time
28–33 YR-MO-DA:	**[*YY, MM, DD*]**
34–35 Gear Type:	**18**
36–39 Time:	Set time using 24 - hour clock

40-42 Min Out: Actual tow time, to 0.1 minutes (see section 9.2)

43-46 Depth Start: Depth @ start in meters (see section 9.5)

47-50 Depth End: Depth @ end in meters (see section 9.5)

Latitude/Longitude both start and end positions are to recorded in **SHIP OPERATIONS** Box
DD MM.MMM (from MaxSea track line)

99-102 Cable in Water: Wire out from block in meters. (see section 9.3)

115-117 Doppler Bottom: Actual tow length from track line created (from MaxSea Planning Route).

121-122 DSGN SPD: **3.0**

123-124 Gear ID: **01, 02, 03, 04, 05, 06** (Check for number welded on lower wing tri-plate.)

125-126 Door ID: **01**, **02**, **03**, **04** (Check for number welded on door.)

137-138 Cloud:
00 = clear
01 = 10 % coverage
02 = 20 – 30 % coverage
03 = 40 % coverage
04 = 50 % coverage
05 = 60 % coverage
06 = 70 – 80 % coverage
07 = 90 % coverage
08 = 100 % coverage
09 = Obscure (cannot be estimated)

147-149 Wind Dir: **000-359** (if no wind = **999**)

150-151 Wind Speed: Wind speed in knots (if no wind = **00**)

152-153 Weather:
00 = clear
01 = partly cloudy
02 = continuous layer of clouds
03 = blowing snow, sand/dust storm
04 = fog, thick dust or haze
05 = drizzle
06 = rain
07 = snow or snow / rain mix
08 = showers
09 = thunderstorms
99 = can't be determined

154-155 Wave Ht: Wave height to 0.1 meters

156-158 Swell Dir: **000-359** (confused seas or no swell = **999**)

159-160	Swell Ht:	Swell height to 0.1 meters
161-163	Ref Surf Temp:	Sea surface temperature to 0.1°C (from bucket thermometer)
183-184	Coded Species:	Number of species recorded on log (Male, female, eggers are considered separate species.)
185-188	Trash:	Amount of trash in liters

Trawl Haul Log Instructions, Back

Special Sampling:
* Leave this column blank.

Lengths of Individual Fish:
* Record individual lengths of fish in centimeters when only a few are present (less than 12).
* Lobsters are recorded in millimeters.

Species:
* Record species name.
* Spiny dogfish, crabs and lobsters are recorded by sex on separate lines.
* Additionally, female lobsters with eggs are recorded on a separate line.

Sex:
* Record the appropriate sex code for species to be sexed.
* 1 = male, 2 = female, 3 = eggers.
* These codes **must** be filled in with **red pencil**.

SPP Code:
* Record the species code. (see section 9.6)
* These codes **must** be filled in with **red pencil**.

Weighed Part of Catch:
* Record all bushel and bucket weights in these columns.
* Remember to circle the weights that are used when subsampling.

Portion Discarded:
* Leave this column blank.

LF Expansion Factor:
* Record the time or subsample length frequency expansion factor.
* If you expand the length frequency by hand on the log, **do not** record the expansion factor .

Total Catch Weight:
* Record the total weight of each species to the nearest 0.1 kg.
* If a time expansion is used, record the expanded weight.

Total Catch Number:
* Record the total number of each species.
* If a time or subsample expansion is used, record the expanded number.

APPENDIX B: MaxSea Marine Software

*** To turn on/off layers**: - click the **[Layer zone]** button 

- check/uncheck the layers needed.

*** To set active layer**: - click the **[Layer zone]** button 

- select **[Set active file]**
- click the layer file you wish to activate.

*** To turn on Tracking**: - click: 

- Before Tracking is initiated, make sure you have the correct layer active. This should be the layer with the corresponding present cruise number (2565.ptf for cruise 2565).

*** To save track line**: - click off Tracking 

- You will be prompted to select a file to save the track in. The active layer (current cruise layer) will already be highlighted; hit enter to save to the active file.

*** To establish start / end positions**: - use the **[Select Point]** tool 

- double left click the start / end position
- record latitude / longitude positions on Trawl Haul Log
- enter the appropriate label for position (**station# S/E**)

*** To determine length of a track line**: - use the **[Select Point]** tool 

- right click on the line to get the larger dialogue box
- select **Convert to Planning Route**
- left click on last point

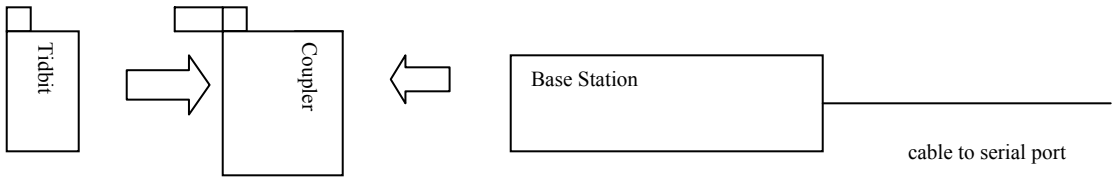
*** To save route**: - under **Routes**: click **Save Planning Route As**

- save in **My Documents** => **Planning Routes**
- save as Vessel Code Cruise # Station # (ex. **JK 2465 345**)
- double click  to delete the route (it will still be saved in **Planning Routes** Folder)

APPENDIX C: StowAway TidbiT Temperature Logger

* Connect cable into serial port (Comm1, detach NETMIND cable).

* If you encounter troubles with the Optical Connection, check to make sure all the physical connections are attached in the following manner:



* To launch logger:

  - double click BoxCar 3.7

  - click **Logger** => **Launch**

  Settings are: Description: **Vessel Code Month Day Year** (ex**. L2112505**)
  Interval: **30 sec (11 Days 7 Hrs)**
  Meas. Units: **Temperature (°C)**

  - click start and follow prompt

  - ok light on recorder should be blinking green when ready

* For consistency between vessels, always place the logger in a bait bag and attach to the port door.

* The temperature recorders are programmed to record for 11 + days. However, it should be downloaded at the end of everyday to prevent data loss.

* To download data:

  - double click BoxCar 3.7

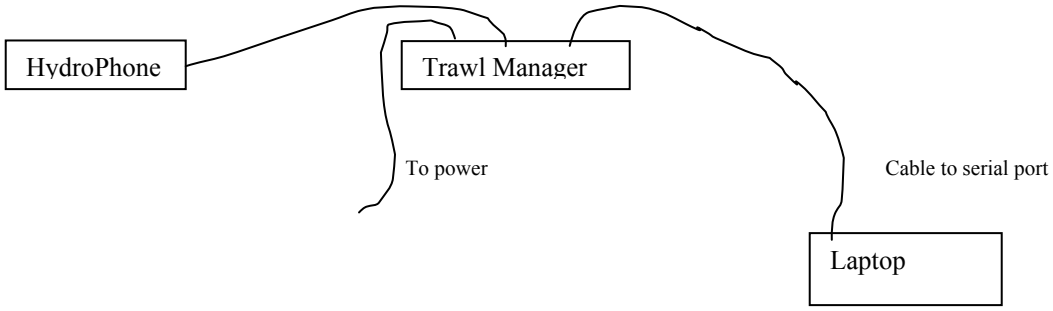
  - click **Logger** => **Readout**, follow prompt

* Save As: **Vessel Code Month Day Year.dtf** (ex. L2112505.dtf) in **2005-2006** folder

MUST RELAUNCH LOGGER AFTER EVERY DOWNLOAD

APPENDIX D: NETMIND Trawl Monitoring System

* Attach computer connecting cable to the laptop serial port (Com1).



* Hydrophone must be inboard while steaming.

* Sensor Placement:
  - Headrope sensor is placed in the sensor bag on the inside of the net at the center of the headrope with the rounded end facing the vessel and the **Sonar** mark facing downward. There should be at least two shackles attaching the sensor through the lug to the net. Line of sight positioning to the sea floor can be adjusted with heavy cable ties.
  - Door sensors are shackled to the links welded to the inside of the door. The Master Sensor is attached on the starboard door and the Slave Sensor is attached to the port door. The rounded ends must face towards the vessel and the **Sonar** marks facing each other.
  - Bottom Contact sensor is bolted into its casing and chained to the center of the ground gear with the rounded end facing the vessel.

* Settings: these settings should already be in place and not changed.

- System => HydroPhone Type => Single
ComPort => COM1
Scheduling => Auto
SystemNumber => 8

- Sensors => Headline
Transducer => Primary

√ **Enabled**	Minimum	Maximum	
Delay Time	**5000**	**6905**	mSec
Measured Value	**2.20**	**13.70**	Meters
Status Delay	**0**	**0**	mSec
Alarm Limits	**0.00**	**0.00**	Meters
Alarm State	• **Disabled**		

√ **Data Logging Enabled**
Transducer Log File Name: *VC*HR.CSV *

Doorspread

Transducer => DoorSpread

√ **Enabled**	Minimum	Maximum	
Delay Time	**12000**	**14000**	mSec
Measured Value	**0.00**	**150.00**	Meters
Status Delay	**11850**	**11950**	mSec
Alarm Limits	**0.00**	**0.00**	Meters
Alarm State	• **Disabled**		

√ **Data Logging Enabled**
Transducer Log File Name: *VC*DS.CSV *

Grid

Transducer => Tilt

√ **Enabled**	Minimum	Maximum	
Delay Time	**7230**	**8770**	mSec
Measured Value	**3.00**	**93.00**	°
Status Delay	**0**	**0**	mSec
Alarm Limits	**0.00**	**0.00**	°
Alarm State	• **Disabled**		

√ **Data Logging Enabled**
Transducer Log File Name: *VC*T.CSV *

* where ***VC*** = vessel code (JK, TO, L2, LE)

* Can create a real time display for each sensor by clicking **CREATE HISTORY DISPLAY**
(double click the display screen to change units & values)

* Turn on NETMIND Trawl Manager System before the first tow. This unit can be left on during the day but should be turned off at night.

* Charging
- The sensors should hold their charge for 3 – 4 days.
- Test senor charge: red voltmeter wire to S lug; black voltmeter wire to negative lug
- Charging sensors requires removing them from the gear, rinsing with fresh water and drying before proceeding. Attach the red cable to the positive lug and the black cable to the negative lug. The charger status LED will go from amber to green when done (max charge ~9 + volts).

Appendix E. Species Sampling Priority List

1	Atlantic Cod:	fork length
		sex & maturity – 1 fish / 3 cm <= 40 cm, 3 fish / 1 cm => 41 cm
		otoliths – 1 fish / 3 cm <= 80 cm, 3 fish / 1 cm => 81 cm
2	American Lobster	carapace length by sex
	American Plaice (dab)	total length
	Atlantic Halibut	fork length
	Haddock	fork length
	Pollock	fork length
	Winter Flounder (blackback)	total length
	Witch Flounder (grey sole)	total length
	Yellowtail Flounder	total length
3	Atlantic Wolffish (catfish)	total length
	Goosefish (monkfish)	lower jaw to tip of tail length
	Greenland Halibut (turbot)	fork length
	Redfish	fork length
	White Hake	total length

Appendix F. Supplementary Sampling List

1. Winter Flounder — Paul Nitschke (NOAA/NEFSC)

what: frozen whole samples; 12 fish per cm in the 19 – 42 cm range
where: Massachusetts Bay and Cape Cod Bay
when: Leg 1 and Leg 2

Samples separated by date and region

2. Atlantic Cod — Mass DMF CCZ Study

what: whole stomachs; 1 sample per 3 cm interval (with otolith)
where: Ipswich Bay, Jeffreys, Outer MA, Mass Bay; Stellwagen; CC Bay
when: Leg 5 and Leg 1

Individual samples with cruise code, station and individual ID number