

Northeast Regional Cod-tagging Program: End of Year 1 Review Meeting

Date: Wednesday 3rd and Thursday 4th December, 2003

Venue: Portland Regency Hotel, Portland, ME.

The Gulf of Maine Research Institute recently coordinated a two-day End of Year 1 Meeting for the Northeast Regional Cod Tagging Program. The meeting took place on the 3rd and 4th December, at the Portland Regency Hotel, in Portland's old port area.

The meeting was well attended. On Day 1, each program partner organization was represented, amounting to a total of 20 individuals. Additional stakeholders, fishermen and scientists joined this group for Day 2, and although the turnout was slightly lower than anticipated, those who were present had traveled considerable distances and their input and presence was greatly appreciated. A list of all attendees is presented in Annex 1.

The agenda followed is presented in Annex 2. Essentially, Day 1 focused on program logistics, while Day 2 paid attention to the future direction of the Northeast Regional Cod Tagging Program.

As will become evident on reading this document, considerable ground was covered over the course of the two days. For clarity, the key areas discussed and decisions made will be presented within the structure of meeting agenda.

Table of Contents

Day 1

| | | |
|-------|--|----|
| 1. | Presentations and progress to date | 4 |
| 1.1 | GMRI | 4 |
| 1.1.1 | Data Management | 4 |
| 1.1.2 | Outreach | 5 |
| 1.1.3 | Feedback to participants | 5 |
| 1.2 | Canada Department of Fisheries and Oceans (DFO)..... | 5 |
| 1.3 | Island Institute | 6 |
| 1.4 | Maine Department of Marine Resources (DMR) | 6 |
| 1.5 | Cape Cod Commercial Hook Fishermen’s Association (CCCHFA)..... | 7 |
| 1.6 | School for Marine Sciences and Technology, University of Massachusetts, Dartmouth (SMAST) | 8 |
| 2. | Program Logistics..... | 9 |
| 2.1 | Tagging procedure review..... | 9 |
| 2.1.1 | Infection in tagged cod..... | 9 |
| 2.1.2 | Use of live wells | 9 |
| 2.1.3 | Use of circle hooks..... | 9 |
| 2.1.4 | Use of comments on datasheets..... | 9 |
| 2.1.5 | Freezing conditions and tagging | 9 |
| 2.1.6 | Tagging mortality..... | 9 |
| 2.1.7 | Tag return rates | 10 |
| 2.2 | Equipment for Year 2..... | 10 |
| 2.3 | Review of tagging locations | 10 |
| 2.4 | Data collection and data entry | 12 |
| 2.4.1 | Database tweaks and enhancements for Year 2 | 12 |
| 2.5 | Bycatch – what to do with it? | 12 |
| 2.6 | Contract Management | 12 |
| 2.6.1 | Unused tagging days from 2003 | 12 |
| 2.6.2 | Progress reports | 13 |
| 2.6.3 | Permitting requirements | 13 |
| 3. | Outreach | 13 |
| 3.1 | Lottery review | 13 |
| 3.2 | Website..... | 14 |
| 3.3 | Particular areas of concern - tag returns..... | 14 |
| 3.3.1 | Feedback from tag returnees | 14 |
| 3.3.2 | Is the message getting out? | 15 |
| 4. | Feedback to Participants..... | 15 |
| 4.1 | Trip summary reports..... | 15 |
| 4.2 | Recaptured tagged cod report | 15 |

Day 2

| | | |
|-------|---|----|
| 5. | Introduction and overview..... | 16 |
| 5.1 | Cooperative Research Partners Initiative presentation..... | 16 |
| 6. | Data analysis..... | 17 |
| 6.1 | What questions can we answer with the current data?..... | 18 |
| 6.2 | Do we need to modify data collection for Year 2 to address any data gaps? | 18 |
| 6.2.1 | Stock size/assessments..... | 18 |
| 6.2.2 | Numbers of tagged cod released per area..... | 18 |
| 6.2.3 | Tagging Mortality..... | 18 |
| 6.2.4 | Tag Detection | 19 |
| 6.2.5 | Bias in tag returns | 19 |
| | Tag type..... | 19 |
| | Effects of size at release on tag reporting rate..... | 19 |
| | Effects of fishing effort on tag reporting rate..... | 19 |
| | High-reward tags | 19 |
| 6.2.6 | Resolution of recapture position data | 19 |
| 6.2.7 | Physical return of the tag reported..... | 20 |
| 6.2.8 | Cod assemblages..... | 20 |
| 7. | Review of Day 1 & Additional research questions | 20 |
| 7.1 | Bycatch | 20 |
| 7.2 | Success of the program so far | 20 |
| 7.3 | Geographic holes? | 20 |
| 7.4 | Temporal holes?..... | 21 |
| 7.5 | What’s the word? | 21 |
| 7.6 | How can we improve tag returns? | 22 |
| 7.7 | Additional studies..... | 22 |
| 8. | Summary..... | 23 |

Annexes

| | |
|---|----|
| Annex 1: Meeting Attendants..... | 24 |
| Annex 2: Meeting Agenda | 25 |
| Annex 3: A sample “Tagging Trip Summary Report”..... | 27 |
| Annex 4: A sample “Recaptured Tagged Cod Report”. | 28 |

Day 1

1. Presentations and progress to date

Day 1 began with each organization giving a presentation on progress to date in their tagging area. These presentations were repeated on Day 2; the key points for each organization are presented below.

1.1 GMRI

GMRI has been responsible for coordinating the Northeast Regional Cod Tagging Program (NRCTP) on a regional scale. Specifically, GMRI has achieved the following goals since January 2003:

- Developed a standard tagging technique for use throughout the program,
- Researched, purchased and distributed tagging supplies (e.g. tags, tagging guns, datasheets, tagging protocols) to tagging organizations.
- Designed and contracted Northern Geomatics Inc. to develop an online database for the data collected between March 2003 and March 2005.
- Designed and produced a variety of outreach materials for distribution throughout the region to commercial and recreational fishermen
- Established a reward system for tagged cod returns; individuals are sent a T-shirt, hat or mug after reporting a tag and are entered into a monthly lottery
- Undertaken seven tagging trips with various tagging organizations
- DMR sub-contract: Has assisted DMR with their recruitment of Area Coordinators and vessels. In addition, GMRI recruits and trains field technicians for DMR.

1.1.1 Data Management

- The online database is now in full working order. The design and development of this significant aspect of the program has been more complex than anticipated, with the result being that data entry is somewhat behind schedule. One of GMRI's major tasks for the next few months will be to catch up with the approval of tagging trip data.
- By December 2003, approximately **47,269 cod had been tagged**; this number represents **approximately 95% of the Year 1 target** (50,000 tagged cod) and just under 50% of the program's 2-year goal (100,000 tagged cod over 2 years) (Table 1). Of these 47,269 cod, approximately 39,743 had been entered into the database, and approximately 16,168 had been approved (i.e. error-checked and committed to the database).
- The number of recaptured tagged cod reported by December 2003 was 681; this equates to an overall program recapture report rate of approximately 1.4% (excluding recaptures caught during tagging trips) (Table 1). While this level was considered respectable for this phase of the program, it is hoped that the rate will increase in future months. Of the returns to date, approximately 70% are reported by fishermen with the remaining 30% being reported by fish processors or observers.

Table 1: Tagging achievements summarized

| | Tagged cod | % of target quantity | Recaptures reported | % Recaptures reported |
|-------------------------|-------------------|-----------------------------|----------------------------|------------------------------|
| DFO | 4,497 | 90% | 231 | 5.1% |
| Island Institute | 972 | 39% | 10 | 1.0% |
| DMR | 11,605 | 58% | 141 | 1.2% |
| SMAST | 8,669 | 87% | 144 | 1.6% |
| CCCHFA | 21,506 | 107% | 155 | 0.7% |
| Totals | 47,269 | 95% | 681 | 1.4% |

1.1.2 Outreach

GMRI has put considerable effort into outreach opportunities over the last 11 months. Particular efforts include:

- Various press releases;
- Poster presentations at three conferences;
- Video footage with Maine Public Broadcasting for an educational series called *Quest* (this will air on Feb 10th at 9.00pm on Maine PBS and Vermont Public TV);
- Design and distribution of outreach materials (program brochures, newsletters & posters)
- Incentive reward design and distribution – I.e. T-shirts, hats and mugs
- Mass-mailing to federal multi-species permit holders throughout Maine, New Hampshire, Massachusetts, Rhode Island, New Jersey, New York and Connecticut; this mailing reached in excess of 4000 individuals. The next mass-mailing is scheduled for January 2004.
- Web site for the NRCTP: this was launched in September and was designed to be simple, yet informative. It provides access to up-to-date program news, bi-monthly updates, newsletters and lottery winners. There are numerous links to other relevant web sites, including the online mapping site for tagged cod and web sites of all the program partners. A request was made during the meeting for more images and information on the vessels involved in the program.
- Cash lottery: GMRI has held three monthly drawings since September 2003. The next one is scheduled for late December 2003.

1.1.3 Feedback to participants

- GMRI has designed a new trip summary report. For an example, see Annex 3. These will be created for each tagging trip that takes place and will then be sent to the vessel owner. Distribution of trip summary reports will begin in January 2004.
- GMRI has developed a new report to be sent out to all individuals who report a recaptured tagged cod. For an example, see Annex 4. From January 2004 onwards, these will be mailed to all individuals who report a tagged cod.

1.2 Canada Department of Fisheries and Oceans (DFO)

- DFO began tagging cod shortly after the initial decision was made to undertake a region-wide cod tagging program. Funding was secured quickly and tagging began in 2001. By 2003 a total of 26,000 tagged cod had been released; of these, 5,591 cod were tagged by lobster fishermen fishing with traps (~65 lobster vessels).
- Since 2003, just under 5,000 tags have been released as part of the NRCTP during four separate tagging trips. The distribution of tag releases extends from Grand

Manan and Digby, south to Georges Bank and east to Browns, Roseway and LaHave Banks.

- DFO has tagged cod with both the orange DFO tag and the yellow NRCTP tag. This was done in part to test for any bias in the reporting of recaptures according to nationality and/or tag type. From the May 2003 tagging trip, returns of DFO tags (n=102) have been comparable to returns of NRCTP tags (n>80) from Canadian fishermen; this suggests that the return rate by Canadians is similar for both tag types.
- Tags released in Canadian waters have been reported by US fishermen. Specifically, fish tagged and released in the Bay of Fundy have been recaptured in nearshore New Hampshire waters; cod tagged in the Maritimes and on Browns Bank have been recaptured on Georges Bank.
- Reported recaptures of double-tagged cod (n=19) show strong evidence that tag retention is high, since 18 out of 19 double-tagged cod still had two tags present.

1.3 Island Institute

The Island Institute has been tagging on a less intense scale, focusing on nearshore Maine waters from the Canadian border south to York. Approximately 24 fishermen have been involved thus far, resulting in a total of 972 tagged cod. Three gear types have been used: hook and line, dragger and lobster traps. Tagging by region and gear type is summarized in Table 2. Ben Neal (Island Institute Area Coordinator) emphasized the enthusiasm these participants have shown at being involved with the program.

Table 2: Tagging efforts by the Island Institute.

| Tagging area | Gear type | Number of fish tagged |
|-------------------|---------------------------|-----------------------|
| Cobscook Bay | Handline | 504 |
| Cobscook Bay | Lobster gear | 2 |
| York | Recreational charter boat | 125 |
| Monhegan Island | Manual rod & reel | 84 |
| Mt. Desert Island | Small dragger | 222 |
| Isle au Haut | Lobster gear | 35 |
| Total | | 972 |

1.4 Maine Department of Marine Resources (DMR)

DMR has been focusing its tagging efforts in two areas: Cashes Ledge, Fippennies Ledge and Platts Bank (Area 1) and Jordan Basin and nearshore Downeast waters (Area 2). In addition, cod have been tagged and released in the more inshore waters of Tanta's Ledge, Hue & Cry and Jeffrey's Ledge. Tagging efforts from the two areas are summarized in Table 3. Tagging in Area 2 showed lower productivity than tagging in Area 1; one 4-day trip accounted for nearly 50% of the Area 2 total.

Table 3: DMR tagging efforts summarized for Area 1 and Area 2.

| Area 1 | Spring | Fall |
|------------------------------|---|---|
| Date range | 14 th April – 10 th July 2003 | 9 th September – present (3 rd Dec) |
| Total tagged | 6596 | 2542 |
| No. of tagging days | 26.8 | 18.2 |
| Daily tagging average | 246 | 140 |
| Additional comments | Spawning cod seen end of June-early July | - |

| Area 2 | Summer & Fall |
|------------------------------|--|
| Date range | 9 th June – present (3 rd Dec) |
| Total tagged | 2390 |
| No. of tagging days | 24.8 |
| Daily tagging average | 96 |
| Additional comments | |

DMR focused its effort on outreach during the summer months. Specifically, Area coordinators distributed the tagging posters, visited fishermen and undertook one-on-one meetings with various individuals, articles were written for newsletters and local newspapers and finally, a message was broadcast on the NOAA weather radio.

For 2004, DMR would like to officially invest tagging effort in nearshore waters around Jeffrey’s Ledge – this area is not currently addressed by the Northeast Regional Cod Tagging Program since this area was covered by UNH’s recent tagging efforts.

1.5 Cape Cod Commercial Hook Fishermen’s Association (CCCHFA)

CCCHFA has undertaken both dedicated and non-dedicated tagging trips to achieve its tagged cod total of 21,623. “Dedicated” vessels are chartered at a daily rate; “non-dedicated” vessels receive \$8/cod with a daily limit of 20 fish. Table 4 summarizes the tagging efforts to date; in total, 60 fishermen associated with 35 vessels have been involved.

Table 4: CCCHFA's tagging efforts summarized.

| Trip type | No. of vessels | No. of trips | No. tagged | Average/trip |
|----------------------|-----------------------|---------------------|-------------------|---------------------|
| Dedicated | 21 | 130 | 18,979 | 139 |
| Non-dedicated | 21 | - | 2,644 | App. 20 |
| Total | 35* | - | 21,623 | n/a |

* There was some overlap between the two categories of vessels involved.

CCCHFA has distributed its tags fairly equally between three tagging locations (Table 5): Cape Cod/East of Chatham (Area 1), Nantucket Shoals (Area 2), and Great South Channel (Area 3). CCCHFA also aims to deploy approximately 1,000 (or as many as possible) tags on Coxes Ledge (Area 4) – this area has not been fruitful to date as the cod passed through this area before funding was finalized and tagging equipment had been distributed. The goal of tagging 1,000 cod on Coxes Ledge in 2004 will be realized by the Frances Fleet from Wakefield, MA; this diverse fleet consists of both longline and charter vessels.

Table 5: CCCHFA's tagging summarized geographically and temporally.

| Tagging Area | Description | n= | Tagging months |
|--------------|--------------------------|-------|----------------------------|
| 1 | Cape Cod/East of Chatham | 5,900 | Mar – Apr & some in summer |
| 2 | Nantucket Shoals | 7,039 | Mar, May, Jun & Nov |
| 3 | Great South Channel | 7,461 | Apr, May & some in summer |
| 4 | Coxes Ledge | <50 | Late summer |

On the technical front, CCCHFA has experimented with different hook designs and has selected a Japanese, nearly barb-less hook for use on dedicated tagging trips (see section 2.1.3). In addition, when tagging during the summer months with water temperatures of 50°F, CCCHFA has found that the use of a live well may not be advantageous.

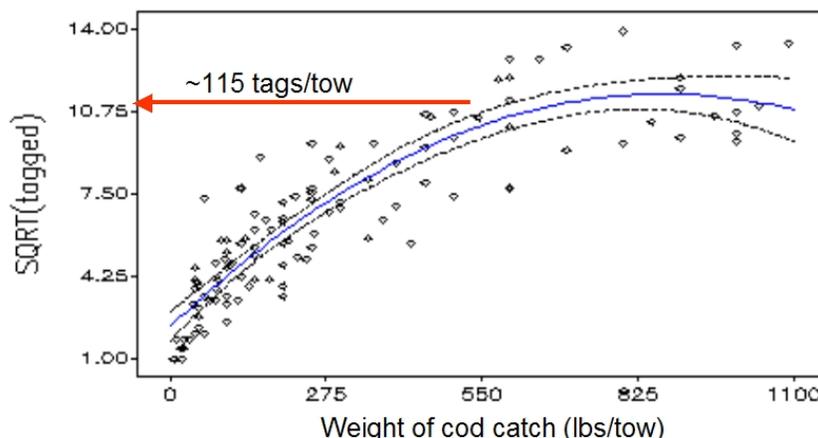
For 2004, CCCHFA anticipates involving up to 55 vessels and 100 fishermen in the tagging program; and will aim to tag 40,000 cod. Areas identified for improvement in 2004 include: improved accuracy of data collection and recording; standardization of gear, specifically, the terminal tackle; involvement of more recreational fishermen; and improve tagging rates on Coxes Ledge.

1.6 School for Marine Sciences and Technology, University of Massachusetts, Dartmouth (SMAST)

SMAST has focused its tagging effort on Georges Bank (US waters) by collaborating with the New Bedford trawl fleet. Multi-day trips have been undertaken with six vessels, which amounts to 28 tagging days in total. With a tagging average of 296 tagged cod per day, SMAST has achieved a tagged cod total of 8,299. With 12 tagging days remaining for 2003, SMAST expects to tag a total of approximately 11,000 cod for Year 1.

SMAST had previously tagged 19,972 cod for its own project, before the Northeast Regional Cod Tagging Program was initiated. As such, in addition to the standard data collected for the current program, SMAST also collects information on other species. From this data, SMAST has shown that their tagging trips on Georges Bank in Year 1 have captured cod in 152 out of 176 hauls (86%); thus, they are confident in the ability of their vessels' captains to find and target cod. This result also led SMAST to question the notion of "technician saturation", i.e. whether the goal should be to tag more cod per haul, or tag fewer cod per haul, but trawl more frequently. Figure 1 indicates that the tagging efficiency is greatest when tagging around 115 cod per haul.

Figure 1: Analysis on the number of cod tagged versus the amount of cod caught per haul.



2. Program Logistics

2.1 Tagging procedure review

2.1.1 Infection in tagged cod

A few observations of recaptured tagged cod have shown the tag to sometimes cause infected wounds. Though it was acknowledged, that collecting data on tag-site infection would likely be subjective, it was decided that the comment “infection around tag” should be used to document any future tagged cod observed in this condition. Thus, the rate of observed infection should become quantifiable. It is important that the program establishes whether infection rates are likely to play a significant role in the recapture and reporting of tagged cod.

It was suggested that Pat Foote (GMRI: Cod Tagging Administrative Assistant) try to trigger this type of information when speaking to people calling in tagged cod. Similarly, Pat could ask these callers whether the tag was still firmly lodged in the cod (i.e. prompting for information on tag integrity).

Rodney Rountree (SMAST) reiterated that to minimize the likelihood of infection, the tagging needle should be inserted underneath a fish scale, thus ensuring that the scale is not forced into the flesh at the time of needle insertion.

2.1.2 Use of live wells

It will be left up to personal judgment of the tagging crew as to whether or not to use the live well; this will depend on the fishing gear, vessel layout and weather conditions. However, **all vessels** must be equipped with some form of live well. It must be noted in the **Haul Comments** (Datasheet 1) whether the cod from each haul are being tanked or not.

It was proposed that we design an experiment to test for differences in survivability of tanked versus not-tanked tagged cod.

2.1.3 Use of circle hooks

Tom Rudolph (CCCHFA: Area Coordinator) has experimented with different hook types and has selected a Japanese, nearly barb-less hook (*Gamakatsu* - 6/0 Octopus circle, app. \$3 per pack of 6) for use on dedicated tagging trips. This hook is easy to remove and tends to snag the cod primarily in the corner of the mouth. Ben Neal (Island Institute: Area Coordinator) also suggested that this hook type tends to catch fewer pollock.

2.1.4 Use of comments on datasheets

It was recognized that trying to disseminate quality information from data “comments” is a difficult task. Therefore, these comments need to be simple and standardized. Shelly will create a list of standardized comment abbreviations for use when recording, but most importantly, when **entering** data. For example, all cod with infected wounds around the tag could be recorded as IAT (“infection around tag”). This list will be circulated as soon as possible in January 2004.

2.1.5 Freezing conditions and tagging

Based on Don Clark’s feedback, the tagging of cod need not be stopped during the winter when air temperatures drop below 0°C (32°F); these cod should be tanked immediately and then tagged. Don suggested that the cod are usually fine down to -15°C (5°F). As much as possible, avoid exposure of the gills to freezing air.

2.1.6 Tagging mortality

The Northeast Regional Cod Tagging Program needs to design and incorporate a study aimed specifically at addressing **tagging mortality**. Such a study would require additional funding and would also investigate 1) tag retention/tag loss, 2) mortality associated with tagging, and 3) survivability of cod caught by different gear types.

CCCHFA currently has an NEC grant for studying mortality in juvenile cod caught by hook gear.

2.1.7 Tag return rates

A tagging mortality study is particularly relevant to future estimations of tag return rates for this program. On this note, Mark Terceiro (NEFSC/NMFS Liaison) recommended that we introduce **high-reward tags** into the program. It is generally assumed that these tags would encourage recapture reporting rates of close to 100%, thereby providing calibration for the return rates of regular tags.

2.2 Equipment for Year 2

Year 2 equipment needs for each tagging organization were addressed. Shelly will be ordering an additional 55,000 tags from Hallprint Pty on December 5th, 2003. These tags will be the same as those used in Year 1 (yellow standard T-bar anchor tags: TBA-2) and should arrive in the US in mid-late February, 2004.

Additional tags will be ordered at a later time, should high-reward tagging take place in the future. The number of high-reward tags deployed should approximate 10% of the total tag deployment.

An additional 100 tagging guns will be ordered for Year 2, but we still have sufficient spare needle packs from Year 1.

2.3 Review of tagging locations

During Year 1 there have been tagging trips where catches of cod have been very low. This has happened often enough, particularly in Downeast Maine waters, for us to consider whether the tagging organizations should stick to their proposed tagging locations, or go to where the cod are and have productive tagging trips. To answer this question, it was re-iterated that the program does not aim to carry out a stock assessment, but instead aims to understand the migration of cod. As such, it should continue to focus on the key areas originally decided upon.

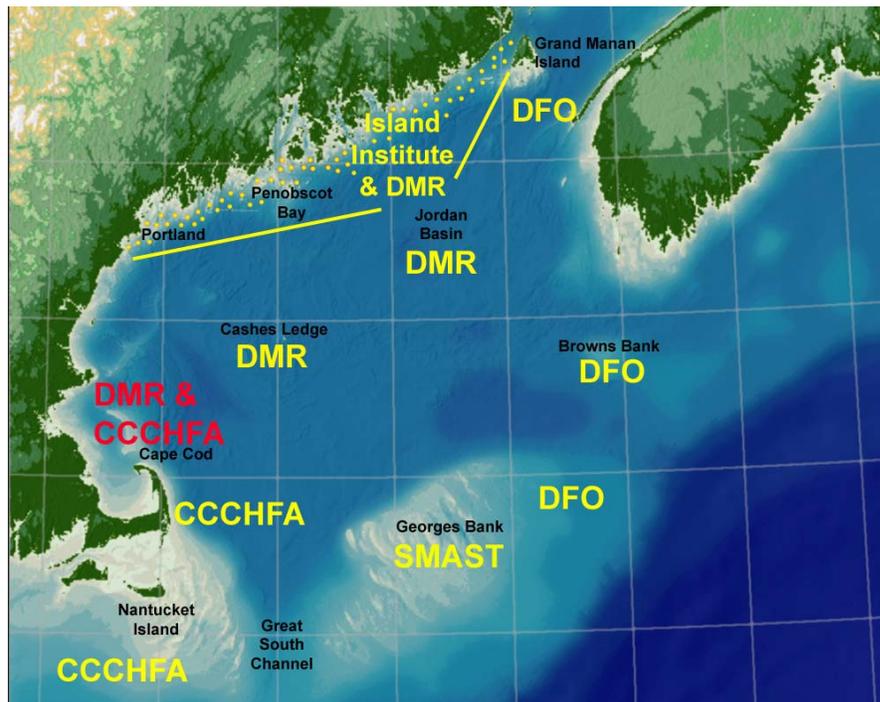
To determine whether there were any geographic holes in the design of The Northeast Regional Cod Tagging Program, the target tagging locations were presented within the context of past cod tagging studies within the Gulf of Maine and neighboring waters (Table 6). It was reiterated that we should try to obtain access to data from other studies, particularly those data from the UNH study and the US Bureau of Fisheries study; data from the latter is apparently available, but will need to be re-entered.

It was decided that the tagging organizations would continue to concentrate on the program's current tagging locations, but would add one additional release location: the nearshore waters off New Hampshire, i.e. Jeffrey's Ledge (Figure 2). This location is currently not covered by the current program, though UNH has released just under 25,000 tagged cod in these waters. In Year 2, both DMR and CCCHFA will release tagged cod in this area, though the amount will be capped to ensure that tagging effort in the primary target locations is not overly diluted.

Table 6: Tagging locations of past cod tagging studies in the Gulf of Maine and neighboring waters.

| Tagging Organization | SMAST | DFO | UNH | United States Bureau of Fisheries | Perkins et al (1997, 2000) | Hunt et al, (1998, 1993) |
|------------------------|--|--|---|--|----------------------------|--|
| Year | 2000-2003 | 2001-2003 | 1999-2003 | 1923-1932 | 1978-1983 | 1984-1997 |
| No. tagged | 19,917 | 21,055 | 24,813 | 45,000 | 4,191 | >22,000 |
| Returns | 613 | 430 | 1918 | >2900 | 304 | 2400 |
| App. % Returned | 3.08% | 2.04% | 7.73% | >6.4% | 7.25% | 10.91% |
| Where | Georges Bank, Nantucket Shoals & Gulf of Maine | Browns Bank, Georges Bank, Bay of Fundy, German Bank, Roseway Bank | Massachusetts Bay, Cape Cod Bay, Ipswich Bay, Western GOM Closed area, Saco Bay | Nantucket Shoals (1923-1924 & 1931), Massachusetts Bay (1924), Platts Bank (1924), Mt. Desert (1924 & 1931-1933), Georges Bank (1926), Browns Bank (1927), coastal waters of NY south to Atlantic City, NJ (1927-1928), Woods Hole (1931-1932) | Sheepscoot Bay | Gulf of Maine: Georges Bank, Browns Bank, Bay of Fundy |

Figure 2: The target release locations for cod tagged within the Northeast Regional Cod Tagging Program. The new location (red text) would be targeted by both DMR and CCCHFA.



2.4 Data collection and data entry

The current status of the database was reviewed and the following points were emphasized to assist in the smooth-running of future data entry and data approval.

- When entering fish length units make sure that you **commit the unit!**
- Take care to note any out-of sequence tags on both the datasheet at the time of tagging and also in the haul comments at the time of data entry.
- Really watch out for mistakes, particularly when using scroll menus with options!
- Double-check the datasheets during the tagging trip when details are still fresh in your mind.

2.4.1 Database tweaks and enhancements for Year 2

The database has been a complex project to date. Some features which were originally proposed for Year 2 had to be brought forward to Year 1 out of necessity. The purpose of this session was to decide how the database might still be improved for Year 2, within the constraints of the budget available. Four out of a choice of 13 possible database enhancements were selected for execution within Year 2. Specifically, these enhancements included:

- Additional administrative tools, e.g. data editing capabilities.
- Creating a standard location pick-list for recapture information when a precise location is not available, but an approximate location is reported.
- Tune database schema and indexes to improve performance.
- List-speed – e.g. create 10-line navigation for fish haul input page.

2.5 Bycatch – what to do with it?

The first question asked was "how significant is the bycatch?". It was determined that for some tagging organizations bycatch can be considerable during a tagging trip, while for others it is minimal. Furthermore, bycatch appears to vary according factors such as, fishing location, time of year and gear type.

The group considered whether future tagging trips should sample the bycatch. The overall consensus was that we should begin to quantify the bycatch by species, but only cod bycatch would get measured and recorded in detail. "Cod bycatch" would include any cod caught which could not be tagged: i.e. cod <36cm (14"), or cod of too poor condition to be tagged. The database committee will decide on how this data should be collected in January, 2004.

A detailed discussion took place on whether the program could consider landing the bycatch in any way. Particular options addressed were whether we could 1) sell the bycatch and put the revenue back into the program, or 2) give the bycatch to soup kitchens. Brain Hooker (NMFS/NERO representative) explained the permitting requirements for either scenario (see Section 2.6.3). In addition to permitting complications and vessels being required to use days at sea, landing the bycatch would incur additional costs for ice and labor. Overall, it was felt that landing bycatch would be a source of conflict for tagging operations and would compromise the success of dedicated tagging trips.

2.6 Contract Management

2.6.1 Unused tagging days from 2003

Earl Meredith (NOAA/CRPI) clarified that unused tagging days (and funds for these) could be rolled over into Year 2. Earl reiterated that invoicing must be complete, i.e. document as closely as possible what it is that you're invoicing for.

2.6.2 Progress reports

Earl requested that each tagging organization submit an End of Year 1 Progress Report **by the end of January 2004**. These should report on progress made and should include a financial report. Another progress report will be required 6 months into Year 2 (**June 2004**) and again, at the end of the contract period (December 2004) with a 90-day grace period (i.e., due **March 2005**). After submitting these progress reports, each tagging organization will receive an acknowledgement from NMFS which will verify the progress made.

2.6.3 Permitting requirements

Brain Hooker (NMFS/NERO representative) explained the permitting issues involved in landing or selling bycatch as discussed in the previous section. Essentially, if we were to begin landing any of the bycatch species caught, vessels involved in the program would require an **Exempted Fishing Permit** (EFP) rather than a **Letter of Acknowledgement** (LOA). In addition:

- The application process is considerably more lengthy for an EFP than for an LOA.
- An EFP requires that the vessel concerned uses a day at sea (DAS) when operating under this permit.
- An LOA requires that the vessel meets the definition of a “Scientific Research Vessel” in that it is operating under the control of a scientific institution. (CCCHFA vessels do not meet these criteria and as such, have been issued EFPs).

The notion of tagging in closed areas was discussed, with particular reference to being able to tag in the closed area of Georges Bank and in rolling closure areas. It was suggested that rolling closures represent a good opportunity to tag cod. The following comments apply more specifically to this issue.

- All vessels operating under an LOA are exempt from the Magnuson-Stevenson Act and as such are allowed to operate within closed areas, providing that the Scientific Plan outlines this need.
- Vessels operating under an LOA must have a copy of the Scientific Plan on board.
- Vessels operating under an EFP and thus, using DAS for research cannot work in a closed area.

3. Outreach

3.1 Lottery review

The Northeast Regional Cod Tagging Program began its cash lottery in September 2003. The lottery is currently held on a monthly basis. GMRI has executed the lottery three times thus far, resulting in 15 winners. Each winner receives a check for \$200.

When the Outreach Committee first decided on the lottery framework, it was decided to hold four drawings and then review the procedure. The procedure was reviewed at the current meeting:

- No change was made to the frequency with which the lottery is held, or the amount won per winner.
- No change was made to eligibility requirements. To be eligible for entry into the cash lottery, an individual has to have returned the following four pieces of information from a tagged cod: **Date, Tag #, Fish length and Location**.
- Winners are drawn from five categories. These categories were slightly revised, as shown in Table 7.

Table 7: Original and revised categories for holding the cash lottery.

| Original | Revised |
|---|---|
| 1) Gulf of Maine & Canadian waters | 1) Gulf of Maine, Browns Bank and Maritime waters |
| 2) Georges Bank | 2) Georges Bank (US & Canadian waters) |
| 3) Cape Cod & the vicinity | 3) Cape Cod & the vicinity |
| 4) New Hampshire and Massachusetts inshore waters | 4) New Hampshire and Massachusetts inshore waters |
| 5) Processing plants and markets | 5) Processing plants and markets |

- GMRI will initiate a wave of processor-oriented outreach to encourage these individuals to obtain more detailed information on the tagged cod they report. Currently, recapture location information and fish length are less reliable from processing sources.

3.2 Website

The program's web site was launched in September 2003 and was designed to be simple, yet informative, providing background information on the program's aims and methodology. GMRI updates the web site frequently, offering visitors up-to-date program news through downloadable Bi-monthly Updates and Newsletters. Lottery winners are also posted here. There are links to all Program Partner web sites and a "Links of Interest" page provides numerous links to other relevant web sites, including the online mapping site for tagged cod.

The current meeting presented itself as a good opportunity to obtain feedback from program partners on the design of the web site. The overall feedback was positive. Specific suggestions for improvement were as follows:

- GMRI requested that tagging organizations provide more images and information on the vessels involved in the program for posting to the "Photo Gallery".
- We should try to post some video footage in future months.
- Highlight which recapture data is required for reporters of tagged cod to be eligible for the cash lottery.
- The movement lines on the mapping site need to be modified – clarify which is the start (release) and which is the end (recapture).
- Provide a means of communicating suggestions back to the webmaster.
- Identify the web site to some quality search engines to improve our search ranking.

3.3 Particular areas of concern - tag returns

Fishermen have aired concerns to GMRI that certain groups of fishermen are not returning tags. Don Clark (DFO: Area Coordinator) suggested that one means of investigating this would be to compare landings from individual vessels with the number of tagged cod they report; this might give some insight into whether or not these vessels are complying with the program.

Paul Parker (CCCHFA: Director) proposed that returns from certain areas are likely to be lower as a function of the size of fish tagged. For example, since Cape Cod typically tags an undersized cod, there might be less likelihood of these fish being recaptured and reported at this point in the program, since these fish have not yet recruited to the fishery.

3.3.1 Feedback from tag returnees

Feedback from individuals reporting recaptured tagged cod has been positive. In particular, they appreciate speaking to a real person when they call the 1-866 number and not having to wait for weeks to get a response. They like the reward items offered

(T-shirts, hats, mugs), though many say that they don't need a reward, they just wanted to call in the tag.

3.3.2 *Is the message getting out?*

The program partners have put significant effort into publicizing the program and highlighting the need for fishermen to help the program succeed by reporting tagged cod. Further suggestions as to how we might improve tag returns are listed below:

- Produce a video for distribution to fishermen: this should show both fishermen and scientists talking about the program and what is needed to make it a success.
- Attend meetings at a local level throughout the tagging region and give presentations on the program.
- Continue with one-on-one vessel visits.
- Put out a "Call for Tags" press release.

4. Feedback to Participants

4.1 Trip summary reports

GMRI has designed a new trip summary report. For an example, see Annex 3. These will be created for each tagging trip that takes place and will then be sent to the vessel owner. Distribution of trip summary reports will begin in January 2004.

GMRI also proposed that we should generate an update report for each participating vessel. This update would summarize the overall tagging results by vessel, including any recaptured cod which had originally been released by that vessel.

4.2 Recaptured tagged cod report

GMRI has developed a new report to be sent out to all people who report a recaptured tagged cod. For an example, see Annex 4. From January 2004 onwards, these will be mailed to all individuals who report a tagged cod.

Day 2

5. Introduction and overview

The aim of second day of the End of Year 1 Meeting was to discuss the progress of the program with participating fishermen, other stakeholders and experienced fisheries scientists who are not currently involved in the program. The program goals were reiterated in order to establish whether the data currently collected will indeed allow the program goals to be achieved.

Day 2 began with GMRI and the tagging organizations presenting their progress reviews (summarized on pages 4-9). These followed background information on collaborative research programs presented by Earl Meredith (NOAA/CRPI).

5.1 Cooperative Research Partners Initiative presentation

In FY 1999, the Northeast Regional Office of the National Marine Fisheries Service (NMFS) developed the Cooperative Research Partners Initiative (CRPI) to formalize and expand collaborative research among New England's commercial fishing industry, marine science and fishery management communities. The goal of this initiative is to **enhance the data upon which fishery management decisions are made** as well as to **facilitate communication and collaboration among New England commercial fishermen, scientists, and fishery managers**. Through this initiative, CRPI partners are collaborating with the New England Fishery Management Council in setting research priorities to meet management and fishing industry needs.

CRPI long-term projects funded to date include:

- 1) Industry-based Survey: this is a partnership between four New England states (Maine, New Hampshire, Massachusetts, and Rhode Island); NOAA Fisheries; and the fishing industry to collect data pertinent to Gulf of Maine cod and Southern New England yellowtail flounder stocks. The purpose of this program is for the fishing industry to assist in providing higher-resolution data in near-shore areas
- 2) Study Fleet: this is a pilot project to develop and implement state-of-the-art electronic data reporting devices for use aboard groundfish fishing vessels in the Northeast. The goal of the project is to design and field test electronic reporting hardware for collecting, recording, and transferring more accurate and timely fishery-based data. The vessels that participate in the Study Fleet will represent a stratified subsample of the entire fishing fleet. These vessels will collect more detailed information for use in management decisions.
- 3) Northeast Regional Cod Tagging Program: The purpose of the **Northeast Regional Cod Tagging Program** is to monitor movements and identify distributions of cod in inshore and offshore waters of the Gulf of Maine and Georges Bank. CRPI has formed a partnership among Island Institute, Maine Department of Marine Resources (DMR), Manomet Center for Conservation Sciences, University of Massachusetts Dartmouth's School for Marine Science and Technology (SMAST), and the Cape Cod Commercial Hook Fishermen's Association (CCCHFA). These groups have been awarded contracts to coordinate regional tagging operations with the local fishing industries; manage and present tagging information on a web-based Geographic Information System (GIS), and provide outreach to the fishing community to encourage the return of tags from captured fish.

The Gulf of Maine Research Institute is serving as the central coordinating organization for the five local cod tagging projects and will provide program consistency, maximize the return tags, and compile and make data readily available.

6. Data analysis

One of the main aims of Day 2 was to establish whether the data currently being collected is the correct data bearing in mind the aims of the program. An introduction to this session was presented by Rodney Rountree (SMAST: Data Management Committee Chair) and the aims of the program were outlined by GMRI as follows:

Program aims

- 1) Identify the movement patterns of Atlantic cod throughout the Gulf of Maine and neighboring waters (Canadian and southern New England)
- 2) Use a standard tagging technique
- 3) Obtain information on growth
- 4) Identify spawning grounds
- 5) Involve stakeholders in the tagging and recapture procedure
- 6) Make data available to the public:
 - E.g. an online searchable database with a mapping interface for tracking tagged cod
 - Feedback of tagging information, e.g. recaptures
- 7) Identify future research questions based on these findings

With reference to movement patterns (Aim 1), the program also hopes to determine exchange rates among geographic areas/stocks. In order to achieve this, tagging has been conducted throughout the year and over a wide geographic area, with different tagging organizations being assigned to specific geographic areas. In order to determine exchange rates among geographic areas, we need the following:

- Accurate estimate of tagged fish released and available for recapture
- Accurate estimate of recaptured tagged fish

Quantifying the tagged fish available for recapture

The following factors confound the estimation of the number of tagged fish released and still available for recapture:

- Tag mortality – results in over estimation of tagged fish available for recapture:
 - Largely beyond the scope of the current program, but additional funding to undertake such a study will be sought (see 6.2.3).
- Tag shedding – over estimation due to loss of fish from available pool, but also “double counting” of fish that have been unknowingly retagged:
 - The double-tagging currently underway (10% of tagged cod) provides data to estimate shedding rates. Analysis design should allow determination of variation in shedding due to fish size. We don’t anticipate differences among regions/organizations, but this should also be tested for.
- Location, temporal, gear and fish size interactions with tag mortality and tag shedding:
 - Compounded by unequal and non-synoptic tagging effort?
 - Is tagging mortality the same across these variables?

Quantifying recaptures

The following factors affect the estimation of the number of tagged fish recaptured:

- Fishermen’s cooperation – the program is dependent on their cooperation
- Basic bias is in reporting rates:

- Probability of detecting a tag
- Function of tag design/placement and fishing practice
- Probability of reporting a detected tag
- Function of fishermen's willingness to cooperate:
 - Is a special high reward tag sufficient to quantify both of these components? Should we consider a separate study of tag design/placement effects? I.e., 100% cooperation in reporting does little good if few tags are detected.
- Function of size at release and recruitment to fishery
- Function of time scale for recaptures (days, months, seasons, years)

6.1 What questions can we answer with the current data?

With the data currently collected by the program partners, we can address the following:

- Movement
- Growth
- Mortality: both natural mortality and fishing mortality can be addressed
- Identification of cod assemblages
- Identification of cod spawning assemblages

6.2 Do we need to modify data collection for Year 2 to address any data gaps?

The data analysis session gave rise to numerous questions and suggestions of how we could improve the dataset, in order to be better able to achieve the program's aims. These are briefly outlined below.

6.2.1 Stock size/assessments

The Northeast Regional Cod Tagging Program does not intend to make any assessments on the size of the cod stock in the Gulf of Maine. Thus, the necessity for cod abundance and catch information which would be necessary in order to complete a quantitative stock assessment (Ralph Mayo: NMFS/NEFSC) does not apply to the current program with its key focus being cod migration (Rodney Rountree: SMAST).

6.2.2 Numbers of tagged cod released per area

Each tagging organization has set out to tag and release specific numbers of cod within their study area. However, in certain areas, too few cod have been found to achieve these goals.

6.2.3 Tagging Mortality

Additional funding will need to be obtained in order to carry out a much needed tagging mortality study. Careful design will be necessary to tap on the variety of variables which are likely to affect the survival of a tagged cod, for example:

- Combination of effects due to capture, handling, tag effects
 - Tag effects include acute stress/injury, increased susceptibility to disease, increased predation, and more subtle effects on behavior
 - Capture effects of most concern are differences in mortality due to capture among different gears, depths, locations/environments/seasons
 - Handling effects, largely controlled for by standardized tagging protocols
- Varies by fish size

6.2.4 Tag Detection

Can dedicated tagging trips be used as a baseline of 100% tag return from which to calculate a rate of return from other sources? Tom Rudolph (CCCHFA) suggested that we compare tag detection rates between tagging trips and non-tagging trips; we can assume that the detection rate is 100% on a tagging trip. Results may vary according to gear type.

6.2.5 Bias in tag returns

There is a fundamental built-in bias since one of the program's goals is to increase the participation of fishermen over the course of the two years. As such, as more individuals become involved, we are likely to see an effect in the number of tags returned. Other variables which are also likely to bias the reporting of recaptured tagged cod are outlined below.

Tag type

Is the yellow T-bar anchor tag the most suitable tag type for achieving good tag returns? The group discussed the idea of changing the tag type and also carrying out a study which investigated tag detection of different tag types.

It was decided, that we should keep to the current tag for at least two years to maintain a standard. Should the study continue beyond the predicted two years, tag type could be re-considered.

Until evidence suggests otherwise, we should assume that tag detection is constant across areas. It was suggested that willingness to report recaptured tagged cod is likely to be the key problem.

Effects of size at release on tag reporting rate

How does the size at release affect recapture rates and reporting rates? Is size at release a confounding variable for the tag reporting rate?

It was suggested that within the hook fishery there should be little delay in recapture and reporting rates of sub-legal tagged fish, since small fish are caught by hook gear; more relevant for this gear type might be the fishing area targeted. For example, during a commercial trip fishermen will aim to fish where the number of legal sized cod is maximized.

With trawl gear, however, the delay in the recapture of smaller tagged cod is likely to be greater, owing to greater gear selectivity.

Effects of fishing effort on tag reporting rate

Commercial fishing effort varies throughout the study area. Specifically, the Cashes Ledge tagging location is an area closed to commercial fishing. Consequently, some geographic areas of the program may yield fewer recaptures and thus, fewer reported tagged cod, than others. It was suggested that the program undertake some trips specifically aimed at recapturing tagged cod.

High-reward tags

High reward tags were proposed by Mark Terceiro (NMFS) as a means of determining the tag reporting rate (see section 2.1.7). It is assumed that reporting compliance on these tags will be 100% on the tag detection rate. A high-reward tag study would require us to release 5,000 – 10,000 cod with this tag type. The tag type should be the same tag-type as the program's regular tag (i.e. T-bar anchor tag), but should be visually distinct (i.e. a different color and information).

6.2.6 Resolution of recapture position data

Some return information has come from "dashboard tags", i.e. tags which have been retained but not reported until a later date, and have come with very little information on either the fish or capture location. The value of these tag returns was questioned. How can we know how accurate the position data given is?

6.2.7 Physical return of the tag reported

It was suggested that data associated with a tag number should not be used if we do not also receive the actual tag (Ralph Mayo, Loretta O'Brien: NMFS/ NEFSC). It was decided, however, that since GMRI takes note of whether the tags are mailed in or not, we can filter the database at a later date, should we obtain sufficient tag returns to be able to disregard a proportion of them. GMRI communicates with all tag reporters and always requests that they mail in their recaptured tags.

6.2.8 Cod assemblages

Routine data collection during dedicated tagging trips provides us with externally detected spawning condition information. Though this data is limited to the detection of "ripe" cod, it will afford us some insight into the movement of fish from spawning locations. Should we aim to examine this more thoroughly? One proposed means of doing so was using passive acoustic techniques to identify spawning assemblages (Rodney Rountree: SMAST). Biological samples could also be collected, providing that the number of cod being caught was sufficient to allow a sub-sample to be sacrificed.

With regard to cod assemblages, it should also be noted that the timing of when tags are released will have implications on the type of cod being tagged.

- Do the cod represent a **spawning aggregation**, which is therefore, possibly at "ground zero" (Ted Ames: Stonington Fisheries Alliance)?
- Or do the cod represent a **foraging aggregation**, which is on the move in search of food?

7. Review of Day 1 & Additional research questions

7.1 Bycatch

The problem of bycatch during the dedicated tagging trips was raised and reviewed based on Day 1's discussions (see section 2.5). The overall decision from Day 1 was presented on Day 2; the Northeast Regional Cod Tagging Program will begin to quantify bycatch in Year 2, but no bycatch will be landed in anyway.

7.2 Success of the program so far

The success of the program so far was reiterated. By the end of Year 1, the Northeast Regional Cod Tagging Program is very much on target with just over 47,000 cod tagged and released throughout the study area. This has been achieved by the hard work of the partner organizations and their associated fishermen. Overall the program is on track to have deployed 100,000 tags by the end of Year 2. The final success of the program is dependent on a good amount of quality tag return data.

7.3 Geographic holes?

In order to consider this, we should consider the hypothesis regarding cod movements in the region: essentially it is thought that there is an inshore migration of cod up the coast with an overall east-west movement.

The areas covered by each tagging organization are presented in Figure 2 and the discussion from Day 1 on this matter is summarized in section 2.3. To date, the areas proposed have been covered, though catches of fish have not always been good in each area. In addition to its original proposed areas, DMR has tagged and released some fish on Jeffrey's Ledge.

It was agreed that more tags could be placed in Massachusetts Bay area, west of the 47° line, since the Western Gulf of Maine closed area does otherwise represent a "hole" in the current program's tag distribution design. It should be noted, however that considerable numbers of tagged cod have been released around Jeffrey's Ledge by both UNH and SMAST in recent years (Rodney Rountree: SMAST). It was again highlighted that it will be important to integrate these datasets into the current regional tagging

program. In the meantime, DMR and CCCHFA will invest some tagging effort around Jeffrey's Ledge again in Year 2

It is advised, however, to put a cap on the number of tags released in any one inshore area – this could be set at e.g. 2,000 cod (Don Clark: DFO), which should ensure that tagging efforts in the original proposed areas are not excessively diluted. Furthermore, it should be possible to deploy a small number of tags in inshore waters by opportunistic tagging with the DMR Inshore Trawl Survey team (Linda Mercer: DMR).

With regard to low catch rates, it was suggested that just because catches were low in certain areas (e.g. Cashes Ledge) during Year 1, things could be very different in Year 2 and these areas should not be left out in Year 2 (Curt Rice: FV Robert Michael).

The question was raised as to whether the program has missed any spawning or foraging “holes”. Ted Ames (Stonington Fisheries Alliance) offered that about 15 years ago, spawning migrations were found in Downeast Maine inshore waters. Ted also said that this is no longer the case.

Finally, since there is historical evidence that both **residential** and **migratory** cod assemblages exist in the Gulf of Maine, the program should continue to target both.

7.4 Temporal holes?

It was suggested that where possible, cod should be tagged during at least two seasons for each tagging location to ensure a better picture of what movement is occurring, and not just one direction of travel according to one season (Don Clark: DFO).

Specifically, it was suggested that tagging on Cashes Ledge should include the month of June, while January thru March would be good months for Fippennies Ledge (Curt Rice, FV Robert Michael).

7.5 What's the word?

This question was asked of all people present to establish what the general perception is about the Northeast Regional Cod Tagging Program. The feedback obtained was as follows:

- **Ted Ames – Stonington Fisheries Alliance, ME:** In Downeast Maine, the feeling about the program is mixed, though people generally support the program's concept. The key concern is that fishermen Downeast no longer have access to the fishery, and may never again. Few people are therefore, in a position to participate. The fishery options in this area have changed from a multi-species fishery to a single-species fishery (i.e. lobster) and cod also eat lobster! Overall, however, the program has a good reputation and would likely receive better support if people Downeast had more confidence in where the management of fisheries is heading.
- **Mike Love – FV Titan (Trawl), Portland, ME:** The program is running fairly well; the Achilles heel is likely to be the tag returns and the potential these have to skew the dataset.
- **Curt Rice – FV Robert Michael (Trawl), Portland, ME:** The program has had good success so far. Its future success is dependent on more education, cooperation, and collaboration. The program should fight for more money to fund additional related studies, such as acoustic tracking of cod.
- **Michael Sosik – FV Bigger n Better (Charter), York, ME:** It is too soon to tell.
- **Ray Kane – FV Frenzy (Hook), Chatham, MA:** Fishermen in the Cape have put a lot of effort into this program and they don't want to hear that this program will only be “short-term”. If the program ends abruptly, their support will be lost; fishermen need some continuity. The climate of mistrust is a changing scene; younger fishermen are beginning to trust working with scientists.

- **Ralph Mayo – NMFS/NEFSC, Woods Hole, MA:** The program has multiple purposes. It will be important to have a reprieve after these first two years; this will allow time to analyze and peer review the data and findings. Someone should still be available to process reported tags, but in the future years, it may not be necessary to continually deploy tags. The focus of future years should be on ancillary studies.

7.6 How can we improve tag returns?

This question was asked generally, but was also specifically asked of the fishermen present. All suggestions are listed below:

- Get the results out to the public by means of flyers.
- Put together an article with both fishermen and scientists to spread the word and show collaboration. Get these articles published in the Commercial Fishing News, the Fishermen and similar newspapers.
- Attend fishery organization’s meetings and NE Charter Boats Association meetings; present the program to these audiences.
- Get more recreational fishermen and charter boats involved.
- In Downeast Maine, there are very few individuals who can help with tag returns; the program should undertake a “recapture cruise” specifically to look for tagged cod in this region. Without this, approximately 100 miles of coastline is barely being sampled.
- Lottery: increase the jackpot amount; carry out a “holiday” lottery, so fewer drawings but with a larger jackpot when it happens.

7.7 Additional studies

The ideas for additional studies came up at various points throughout the two days of this meeting. The list below includes all ancillary studies suggested, many of which would require additional funding.

- Tagging-mortality study
- Bycatch quantification
- Coloration of cod sampled:
 - use of digital imaging and video cameras to record the coloration of cod tagging during dedicated tagging trips.
- Non-intrusive sex identification using morphometric analysis
- Archival data storage tags:
 - to monitor fine-scale movements, in e.g. closed areas.
- Genetic sampling of tagged cod
- Use of bloodwork to indicate spawning condition
- Tag reporting rate: variables to consider include:
 - the sampling effort,
 - an effort index,
 - tag visibility,
 - attitude of fishermen,
 - compare vessel landings versus their level of tag reporting,
 - how do tag returns relate to outreach efforts? E.g. how does the lottery affect returns?

8. Summary

The meeting held on the 3rd and 4th December was well attended by program partners, participating fishermen and scientists from non-partner organizations. The general atmosphere over the course of the two days was positive and constructive. The input offered by those who attended made for a very productive End of Year 1 Meeting.

Key points are listed below and Table 8 summarizes the key tasks for Year 2, as identified during the course of this meeting.

- The overall take-home message is that considerable progress has been made since January 2003. The infrastructure for this large-scale, region-wide, collaborative research project is well established.
- Tagging organizations have successfully recruited over 60 fishing vessels and their crew into the program and through persistence and hard work, have tagged and released just over 47,000 cod throughout the study area.
- The program's aim of tagging and releasing approximately 100,000 Atlantic cod throughout the Gulf of Maine and neighboring waters appears to be well within our reach.
- Outreach efforts to publicize the program have been considerable; these will be continued and improved upon in Year 2.
- The ultimate success of the program in terms of results will now be largely dependent on improving our tag return rate; this is in turn dependent on the compliance of fishermen throughout the region.
- In order to maintain the current level of support we have from fishermen, the program will need to find additional funding to maintain its infrastructure beyond January 2005.

Table 8: Tasks identified for Year 2 of the Northeast Regional Cod Tagging Program.

| Tagging Organizations |
|--|
| <ul style="list-style-type: none">• Contract renewal/recruitment of tagging vessels for Year 2• Data entry |
| Gulf of Maine Research Institute |
| <ul style="list-style-type: none">• Data approval• Coordinate data management conference call to decide on sampling technique for bycatch.• Trip summary template perfection and distribution to tagging organizations for implementation in January 2004.• Mass-mailing – January 2004.• Create and distribute new tag-recapture reports for all individuals (past and future) who report a tagged cod.• Continue with current outreach efforts, but also initiate new options: e.g. video, articles, TV programs, presentations at fishery organization meetings.• Undertake a tagging trip with SMAST.• Work with NMFS/CRPI on the tasks assigned below. |
| NMFS/CRPI |
| <ul style="list-style-type: none">• Investigate our options for obtaining access to other tagging datasets from previous studies.• Investigate funding options for the implementation of a high-reward tagging scheme.• Investigate funding options for ancillary studies: top priority study is tagging mortality. |

Annex 1: Meeting Attendants

| Day 1 | Day 2 |
|-------------------------------|---|
| 1 Ben Neal (Island Institute) | 1 Ben Neal (Island Institute) |
| 2 Benadetta Sarno (Manomet) | 2 Benadetta Sarno (Manomet) |
| 3 Bill Duffy (NGI) | 3 David Martins (SMAST) |
| 4 Brian Hooker (NMFS/NERO) | 4 Don Clark (DFO) |
| 5 Darin Jones (SMAST) | 5 Earl Meredith (NMFS/CRPI) |
| 6 David Martins (SMAST) | 6 Jim Fair (CCCHFA) |
| 7 Don Clark (DFO) | 7 Jon Grabowski (GMRI) |
| 8 Don Perkins (GMRI) | 8 Kevin Kelly (DMR) |
| 9 Earl Meredith (NMFS/CRPI) | 9 Laura Taylor Singer (GMRI) |
| 10 Jim Fair (CCCHFA) | 10 Lew Incze (USM) |
| 11 Kevin Kelly (DMR) | 11 Linda Mercer (DMR) |
| 12 Laura Taylor Singer (GMRI) | 12 Loretta O'Brien (NMFS/NEFSC) |
| 13 Mark Terceiro (NMFS) | 13 Mark Terceiro (NMFS) |
| 14 Paul Parker (CCCHFA) | 14 Mary Eustace (GMRI Field Technician) |
| 15 Rodney Rountree (SMAST) | 15 Mike Love (FV Titan) |
| 16 Ross Kessler (SMAST) | 16 Mike Sosik (FV Bigger n Better) |
| 17 Sarah Pike (NMFS/CRPI) | 17 Nola Rule (FV Bigger n Better) |
| 18 Shelly Tallack (GMRI) | 18 Ralph Mayo (NMFS/NEFSC) |
| 19 Susan Hann (DMR) | 19 Ray Kane (FV Frenzy) |
| 20 Tom Rudolph (CCCHFA) | 20 Rodney Rountree (SMAST) |
| | 21 Sarah Pike (NMFS/CRPI) |
| | 22 Shelly Tallack (GMRI) |
| | 23 Susan Hann (DMR) |
| | 24 Ted Ames (Stonington Fisheries Alliance) |
| | 25 Tom Rudolph (CCCHFA) |

Annex 2: Meeting Agenda

Day 1

| | |
|--------------|---|
| 10.00 | Breakfast & Introduction |
| 10.15 | Presentations of progress to date: <ul style="list-style-type: none">• By Area• Regional update |
| 11.15 | Program Logistics <ul style="list-style-type: none">• Tagging Procedure review:<ul style="list-style-type: none">- Difficulties,- Lessons learned,- Modifications,- Year 2's Tag & Equipment Order- Overlapping of tagging areas – tag where the fish are? Or show abundance levels?• Data collection & entry:<ul style="list-style-type: none">- Review of database issues (Shelly)- Current status (Bill)- Potential Year 2 enhancements (Bill & Shelly)• Contract Management<ul style="list-style-type: none">- Rollover of unused Year 1 days into Year 2? (Earl)- Exempted Fishing Permits (EFPs) and Letters of Acknowledgment (LOAs) (Brian Hooker)- Other questions/issues• Bycatch – what to do with it:<ul style="list-style-type: none">- Quantitative data collection of other species? Indicators of cod presence?- Fishermen's suggestions:<ul style="list-style-type: none">Land bycatch put profit into the program? Give bycatch to soup kitchens? Permitting restrictions (Earl) |
| 1.00 | Working Lunch |
| 2.00 | Outreach: <ul style="list-style-type: none">• Lottery:<ul style="list-style-type: none">- Procedure review• Web site:<ul style="list-style-type: none">- Feedback- Problems- Area tagging pages?- Other materials to be posted?- Vessel images & info.• Particular areas of concern:<ul style="list-style-type: none">- Returns by certain groups/areas, e.g. gillnet, Cape Cod?- Are we getting the message out?- What's the general feedback from tag returnees? (for Pat) |
| 3.00 | Feedback to participants: <ul style="list-style-type: none">• Summary reports for vessels after trips – sample review & feedback• Returned tag reports – sample |
| 3.30 | Particulars to discuss in Day 2 arising from Day 1's discussions |
| 7.00 | Group dinner – Flatbread Pizza |

Day 2

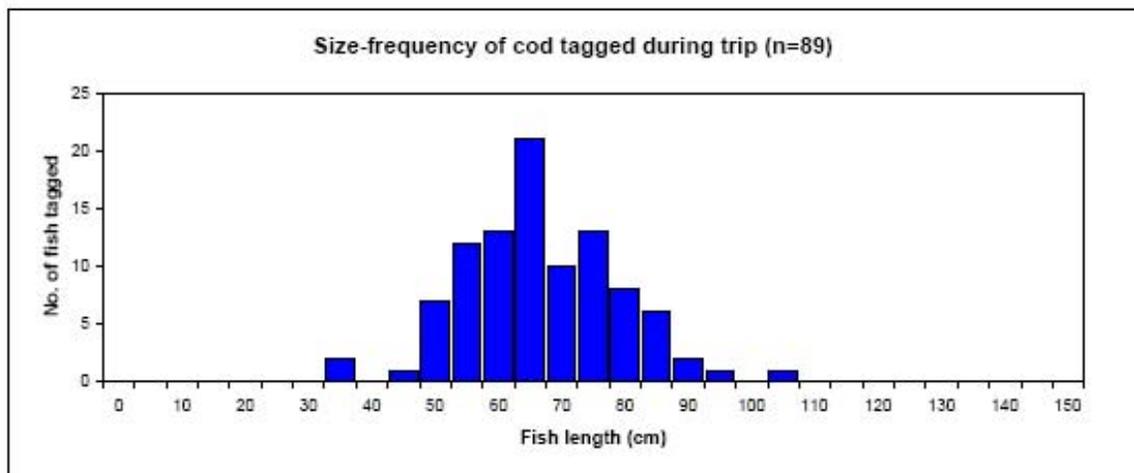
| | |
|--------------|---|
| 8.00 | Breakfast |
| 8.30 | Introduction <ul style="list-style-type: none">• Welcome & Agenda presentation (GMRI: Shelly Tallack)• Introduction of people present (All)• Overview of program (NOAA: Earl Meredith) |
| 9.00 | Presentations: <ul style="list-style-type: none">• Program as a whole (GMRI: Shelly Tallack)• Reports by area (DFO, DMR, Island Institute, CCCHFA, SMAST)• Review of Day 1's discussions (GMRI: Shelly Tallack) |
| 11.00 | Refreshment break |
| 11.30 | Data analysis (Database Committee Chair: Rodney Rountree): <ul style="list-style-type: none">• What questions can we answer with the current data?• Do we need to modify data collection for Year 2 to address any data gaps? |
| 1.00 | Lunch |
| 2.00 | Review of Day 1 Issues / Additional Research Questions <ul style="list-style-type: none">• Bycatch• What other questions would we like to address through this program?• Additional studies?• Geographic holes?• Temporal holes?• Success of program so far.....• What's the word?• Fishermen – how to improve tag returns? |
| 3.30 | Refreshment break |
| 4.00 | Summary/Wrap-up (GMRI: Shelly Tallack) |
| 5.00 | End |

Annex 3: A sample "Tagging Trip Summary Report".



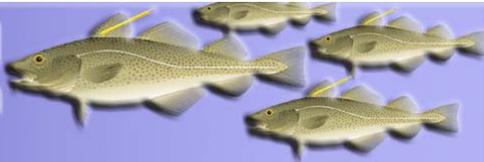
Trip Summary

| | | | | |
|---|-----------------------------|--------------------|-----------------|---------|
| | Vessel ID | FV Inheritance | 310912 | 1104992 |
| Running total of fish tagged on this vessel | | 89 | | |
| Trip Information | | | | |
| Tagging Organization | SMAST | | | |
| Trip # | 1 | | | |
| Start Date | 04/14/2003 | | | |
| End Date | 04/17/2003 | | | |
| Gear used | Trawl - 5" mesh | | | |
| Crew | Joe Rogers, Mike & Mike | | | |
| Taggers | Dave Martins & Ross Kessler | | | |
| Fishing Ground Characteristics | | | | |
| Primary tagging location(s) | Southern Flank | | | |
| Additional tagging location(s) | - | | | |
| Range of depths fished (m) | 45 to 128 | | (25 - 69 Fa) | |
| Range of water temperatures (deg C) | 3.8 - 5.4 | Bottom Temperature | (39 - 42 deg F) | |
| Tagging per Unit of Effort (TPUE) | | | | |
| No. of hauls carried out | 15 | | | |
| No. of hauls resulting in tagged fish | 10 | | | |
| Total No. of tagged fish | 89 | | | |
| Average No. of fish tagged per haul | 5.9 | | | |
| Total No. of double-tagged fish | 8 | | | |
| No. of floaters per trip | 0 | | | |
| No. of recaptures | 0 | | | |
| Range of tags deployed | 5001 to 5097 | | | |
| Biological Summary | | | | |
| Size range of fish tagged (cm) | 34 to 104 | | (13.4 - 40.9") | |
| Mean size of fish tagged (cm) | 64.68 | | (25.5") | |
| No. of fish with MILT | 0 | | | |
| No. of fish with EGGS | 0 | | | |



Annex 4: A sample “Recaptured Tagged Cod Report”.

Northeast Regional Cod Tagging Program



Gulf of Maine Research Institute, PO Box 7549, Portland, ME 04112, USA
Tel: +1(207) 772 2321, Fax: +1 (207) 772 6855, <http://www.codresearch.org>

Funded by:

NOAA Fisheries,
Northeast
Regional Office



Coordinated by:

Gulf of Maine
Research
Institute



Tagging organizations:

Canada
Department
of Fisheries
and Oceans



Island
Institute



Maine
Department
of Marine
Resources



Cape Cod
Commercial Hook
Fishermen's
Association



School for
Marine Science
and Technology
University of
Massachusetts,
Dartmouth



Manomet Center
for Conservation
Sciences



Mr. Tag Returnee
137 Pleasant St
Hyannis, MA 02601.

December 30, 2003

RE: Tagged cod #100,000

Dear Mr. Tag Returnee,

On behalf of the Northeast Regional Cod-tagging Program, I would like to thank you for supplying us with information on tagged cod #100,000.

The Northeast Regional Cod Tagging program is a large-scale tagging initiative aimed at understanding the movement of Atlantic cod throughout the Gulf of Maine and neighboring Canadian waters. The program represents a region-wide collaborative research program involving fishermen and scientists from Nova Scotia to Cape Cod. As such, your participation in the collection of this valuable data is greatly appreciated.

The information available on the fish you reported is presented on the next page. This information can also be downloaded by visiting our website, www.codresearch.org and following links to “tracking a tagged cod”.

We are pleased to present you with your reward: a Northeast Regional Cod-tagging Program T-shirt/hat/mug. This is our way of thanking you for finding a tagged cod and forwarding information to us.

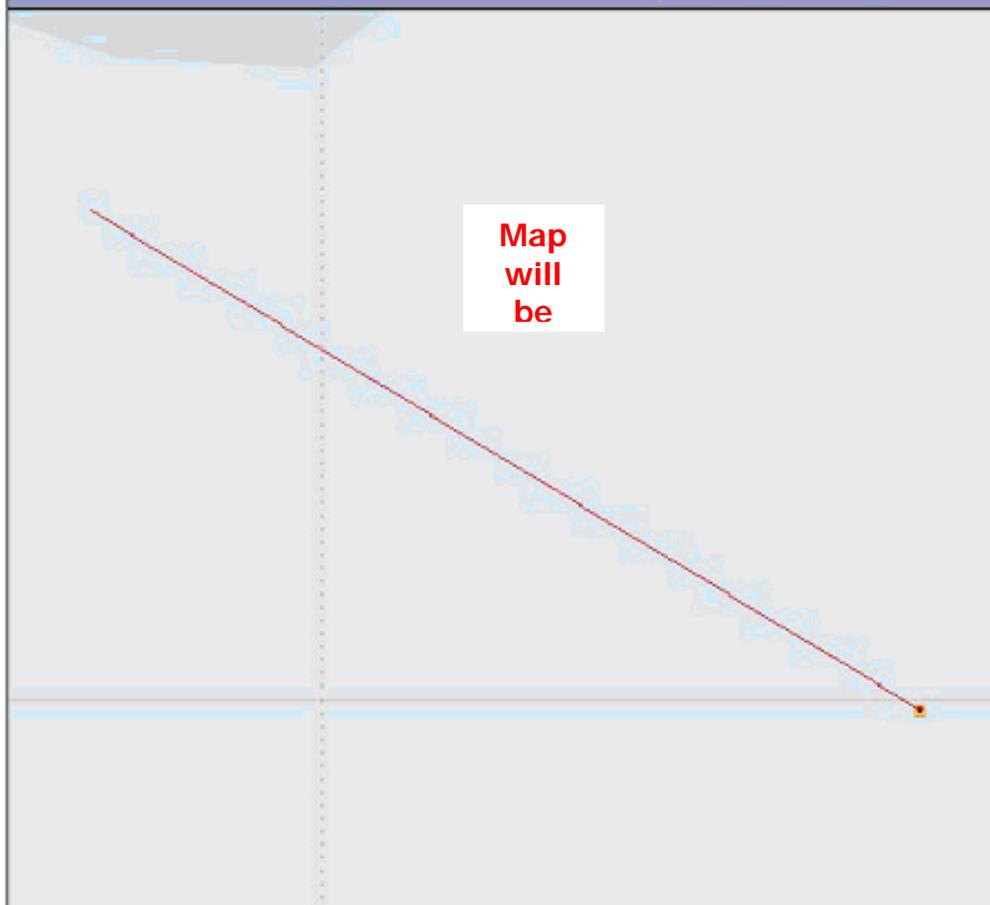
We thank you for your patience in waiting for this information. Please continue to return your tags with the following details: **Tag #, date, location, fish length**, water temperature, water depth and spawning condition. Your continued help is fundamental to the success of this program.

Sincerely,

Shelly Tallack.
Cod Tagging Program Manager

| Summary of Information for Tagged cod # 100000 | | |
|--|-------------------------|-----------------------|
| Release Information | | Recapture Information |
| | Date | |
| | Fish length | |
| | Location Lat/Lon | |
| | General Area Name | |
| | Days at liberty | |
| | Distance traveled | |
| | Growth (% increase) | |
| | No. of times recaptured | |

Northeast Regional Cod Tagging Program



Cod-Tagging Release Information for Tag Number: 100000

| | | | |
|---|------------------|------------------|---|
|  | Release date: | 04/15/2003 | MAP LEGEND ■ Release Location ● Recapture Location Depth (meters) Land 50 - 100 220 - 500 0 - 50 100 - 220 > 500 |
| | Release length: | 71.12 cm | |
| | Release Lat/Lon: | 41.125° - 67.58° | |