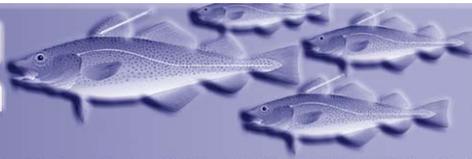


Northeast Regional Cod Tagging Program



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Year 2, Six-Month Update Meeting Summary

Date: Thursday 10th June, 2004

Venue: Gulf of Maine Research Institute & Free Range, Portland, ME.

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I. Presentations of progress to date

Each tagging organization gave a brief, verbal update on their progress since December 2003. The Gulf of Maine Research Institute, as the coordinating organization for the Northeast Regional Cod Tagging Program (NRCTP) on a regional scale, presented its progress over the last six months within the following areas: Outreach, Coordination/Implementation, Support for tagging organizations, and Data management and data summary. The details of each are summarized below.

I.1 Gulf of Maine Research Institute (GMRI)

I.1.1 Outreach

GMRI has maintained its outreach initiatives over the last six months. Particular efforts include:

- Press releases – in particular, each month announcements for the lottery winners are made and this offers a frequent opportunity for updating numerous newspapers/magazines on the progress of this program;
- Attendance and presentations at the Maine Fishermen's Forum in Rockland, ME (2-hour session, March 4-6);
- Presentations at scientific conferences, including the Benthic Ecology Meeting (oral presentation, March 25-28), Northeast Fish & Wildlife Conference (oral presentation, April 25-28), World Fisheries Congress (poster presentation, 2-6 May);
- Presentations at local fisheries meetings, e.g. New England Charterboat Captain's Association (oral presentation, May 19th).
- Continual feedback to participants reporting tags.
- Continual updating of the program's website (www.codresearch.org).

Particular outreach focuses for the immediate future were summarized as:

- The June 2004 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 4,700 individuals in January, 2004 and will likely exceed this in June 2004;
- Design and distribution of new outreach materials (program brochures, newsletters & posters) to include the new High-reward tagging element of the program;
- Press-release to announce the start of the high-reward tagging program;
- Coordinate with Amy Sinclair (Channel 13, Where's Amy?) to facilitate the capture of video footage on the cod tagging program, for airing throughout Maine;
- Regular updating of the web site, www.codresearch.org.

I.1.2 Coordination/Implementation

- The re-ordering of tagging equipment to meet the needs of the program partners for the 2004 schedule;
- High-reward tagging (as prioritized at the End of Year I meeting, December 2003):
 - delivering a budget, protocol and rationale to NFMS,
 - finalizing the new contract with NMFS,
 - establishing the methodology and datasheets,
 - updating equipment needs in particular,
 - Securing to ensure that the program partners could maximize their HR tagging efforts and achieve as close to 10% release of HR tags as possible.
- Maine Department of Marine Resources:
 - Recruitment and contracting of vessels for the 2004-2005 tagging seasons

- Further recruitment and training of technicians for 2004 tagging efforts

1.1.3 Support for tagging organizations

This element of GMRI's role since December 2003 has essentially involved:

- Site visits and assistance with training updates, in particular:
 - practical training associated with the implementation of the HR tagging study
 - Changes in the data entry procedure as a result of the HR tagging study
- Tagging trips: With considerable time on the road, less time has been available for assistance with tagging trips, but to date in 2004 Shelly Tallack (GMRI) has undertaken tagging with both the Island Institute and SMAST.

1.1.4 Data management

- On the data management front, GMRI has continued to work closely with Northern Geomatics (NGI) to implement enhancements to the database as outlined at the End of Year 1 Meeting. Specifically:
 - the database underwent some necessary indexing to improve performance and speed,
 - the number of fish viewable at any one time when entering tag information has been limited to 10 fish, thus speeding up the data entry procedure,
 - GMRI now has greater flexibility with error-checking and correcting data, and
 - considerable improvements have been made to the recapture input tool, since this is an aspect of the database which will be used indefinitely in years to come.
- Future months will involve working with partner organizations and NGI to determine the enhancements for Year 3, should the program receive funding for a further year.

1.1.5 Data summary

- By June 2004, GMRI estimated that approximately 59,000 cod had been tagged (based on bi-monthly update information from May 2004); as the meeting progressed, this estimated total was revised as being closer to **79,500 tagged cod**, based on the summaries voiced at the meeting. Thus, ~79.5% of the program's 2-year goal (100,000 tagged cod over 2 years) has been tagged and released.
- Of these 50,230 cod have been approved in the database and are accessible to the public online through the GIS mapping site (Table 1). All data from Year 1 that have been entered (a few CCCHFA trips are outstanding) have also been "approved" by GMRI. Year 2's data entry and approval is ongoing.

Table 1: Tagging achievements to date, relative to the data entered and approved.

	No. trips	No. tagged	No. recaptured
Actual	~370?	~59,000?*	1,509
Entered	341	55,406	1,302 (GMRI log)
Pending	7	~5,175	N/A
Approved/Online	334	50,230	1,032

* Revised to ~79,500 during meeting

- GMRI has most recently been focusing on the entry of recapture data to enable the generation of recapture reports for tag returnees. 1,032 recaptures have been entered into the database to date (Table 2).
- Of these recaptures, 152 have been double-tagged fish, 71 have been fish which were re-released, 6 have been high-reward tags (already!), and a total of 924 physical tags have been received by GMRI.
- The overall tag return rate (based on the release of 59,000 tagged cod) had been estimated at 2.6% from individuals reporting tags, in addition to 0.5% recaptured during tagging trips; the total was estimated at ~3.1%. These numbers are lower if the tagged cod total is in fact ~79,500.

- The method of reporting recaptures is monitored by GMRI and Figure 1 presents this data. The most widely used means of delivering tag recapture information is through the mail (55%), followed by calling the toll-free number (31%).
- Finally, geographic representation of the recaptures currently entered into the database are depicted in Fig. Some patterns in movement are becoming evident and of the recaptures reported, 118 were fish which had traveled >100 nautical miles (Fig).

Table 2: Recaptures reported to date (excluding those recorded during tagging trips); these represent just those recaptures which have been received by GMRI by means of email, telephone, mail, fax or in person. An additional 209 tags were with GMRI, but had not been electronically logged at this time.

	Fishermen	Processors	Observers	Total
DFO	72	202	1	275
Island Institute	13	4	1	18
DMR	215	41	19	275
SMAST	247	72	11	330
CCCHFA	341	26	37	404
Totals	888	345	69	1,302

Figure 1: The proportion of recaptured tags reported by mail (mini-data sheets), toll-free phone number, email (through www.codresearch.org) and in person; this data excludes tags recorded during a tagging trip.

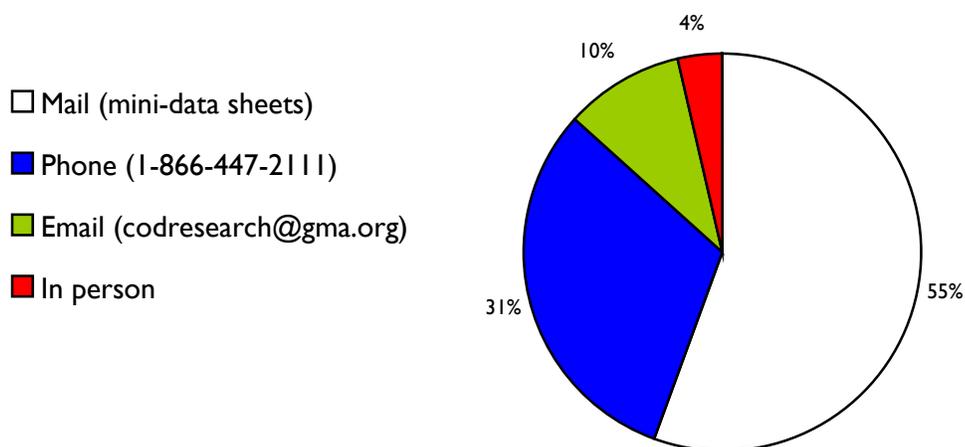


Figure 2: All recaptures entered into the database by June 9th, 2004 (n=1,032).

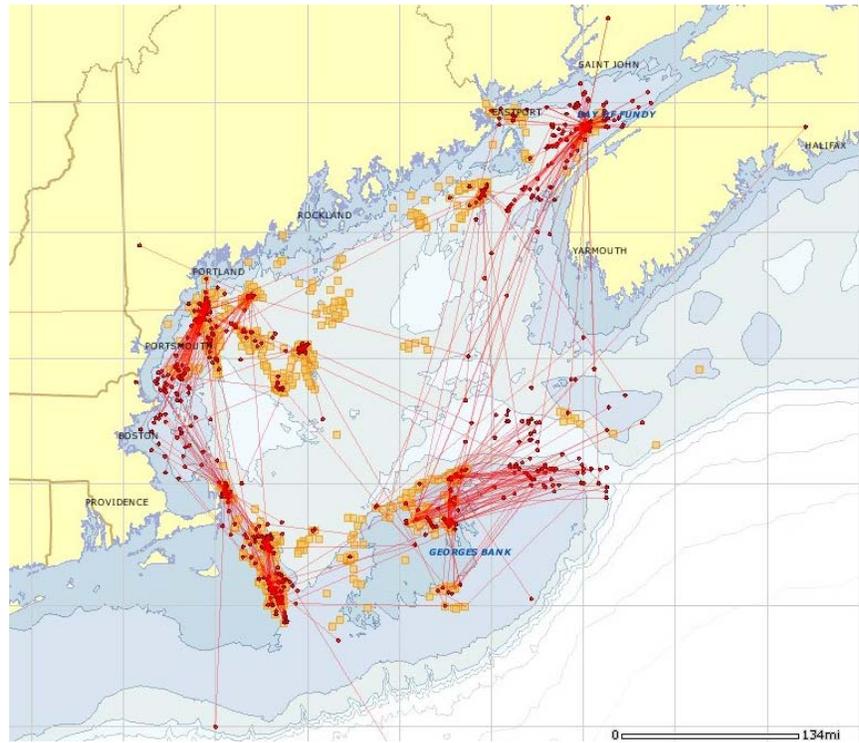
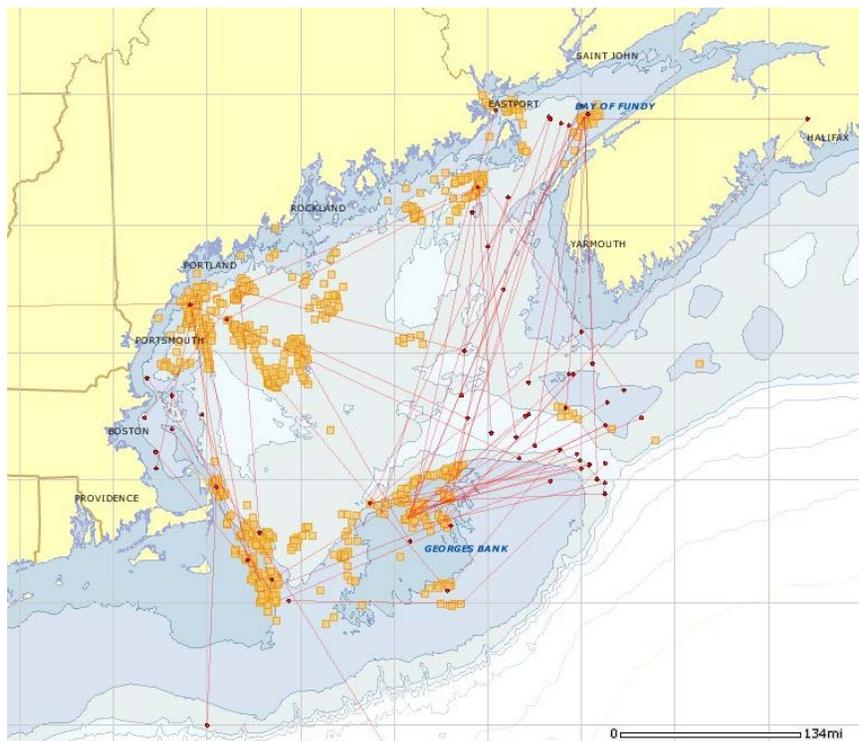


Figure 3: All recaptures entered into the database by June 9th, which had traveled >100 nautical miles (n=118).



1.2 Canada Department of Fisheries and Oceans (DFO): delivered by Don Clark

- During May 2004, DFO undertook a total of 9 tagging days in the Bay of Fundy region. The outcome was somewhat disappointing compared with the equivalent trip in May of 2003; a total of ~1,300 cod were tagged this time, compared with ~4,000 cod last year. The size range of fish for May 2004 was around 50-60cm; Don suggested that the cold water temperatures might be responsible for this skew towards smaller fish.
- The next tagging trip for DFO is planned for July, 2004.
- Tag returns: Don often receives tags from programs researching various species. Don estimates the return rate of tags from the May 2004 trip to be ~9%.

1.3 Island Institute: delivered by Ben Neal

- The Island Institute has continued its smaller-scale tagging initiatives. Ben has coordinated a total of nine tagging trips to date, with 4 different vessels. By the end of the year, the number of trips is likely to total 30.
- On average, each trip manages to release about 40 tagged cod. Since some of the vessels Ben has recruited are recreational charter vessels, and not all trips are paid trips, some of the cod caught are brought ashore by the paying client and do not get tagged.

1.4 Maine Department of Marine Resources (DMR): delivered by Kevin Kelly

- Since the End of Year 1 meeting, DMR has been expanding its tagging activity to include waters around Jeffrey's Ledge, while also persevering in the original areas, e.g. Cashes Ledge, Fippennies Ledge and downeast Maine.
- The season began slowly, with catches of cod being small. To date 2,232 tags have been deployed over a total of 17.2 tagging days.
- Kerry O'Donnell, the area-coordinator hired in February 2004 (replacement for Amy Winkle) noted that a recent, productive tagging trip (1,112 cod over 3 days) involved a large number of spawning fish; the trip took place in early June of 2004.
- DMR has exceeded the previous maximum cod size tagged (130cm) by tagging a cod of 133cm.

1.5 Cape Cod Commercial Hook Fishermen's Association (CCCHFA): delivered by Jim Fair, supplemented by Tom Rudolph

- Essentially from December 2003 until February 2004, CCCHFA tagging efforts were not overly rewarding and catch rates were low in all waters. In addition, many of the tagging vessels were iced in during February.
- Gradually the pace picked up and by the first week of May 2004, around 5,000 cod had been tagged; two weeks later this total had jumped to around 17,000 tagged cod.
- This second year of tagging has been marked by an increased observer coverage on tagging vessels, in addition to an increased number of vessels participating; around 10 of these vessels are recreational charter vessels.
- A break-down of the totals by June 2004 appear in Table 3.

Table 3: CCCHFA's tagging summarized geographically and temporally.

Tagging Area	Description	n=
1	Cape Cod/East of Chatham	~6,000
2	Nantucket Shoals	10,759
3	Great South Channel	~500
4	Coxes Ledge	~100
5	Western GOM (Stellwagen Bank)	~1,000
All		~18,400

1.6 School for Marine Sciences and Technology, University of Massachusetts, Dartmouth (SMAST): delivered by Rodney Rountree

- SMAST has continued to focus its tagging effort on Georges Bank (US waters) by collaborating with the New Bedford trawl fleet. Multi-day trips have been undertaken with five vessels, amounting to 23 tagging days in total. These tagging trips have resulted in a total of ~10,000 additional tagged cod, bringing SMAST's total up to ~18,000 tagged cod. SMAST has 30 tagging days outstanding for the remainder of year 2.
- Tagging during this first season of 2004 included two trips into closed areas: both Closed Area 1 and Closed Area 2 on Georges Bank. These trips were particularly productive with fishermen reporting that they "had never seen so many" cod. (For greater detail on these trips, see SMAST's report in the May 2004 Bi-monthly Update).

2. Review of tagging procedure and data entry: focus on high-reward tagging study

2.1 High-reward tagging

The contract to undertake a high-reward tagging study was obtained as soon as possible after Mark Terceiro (NMFS) recommended it at the End of Year 1 Meeting (December, 2003).

The high-reward tagging study began in May 2004. The first high-reward tags were released by Don Clark (DFO) during this month; within 2 days GMRI had already received the first high-reward tag return.

Shelly revised the standard tagging protocol to include this element of the program; these were printed and brought to the meeting for distribution to partner organizations.

2.1.1 High-reward tagging issues?

It was reiterated that any cod caught with tags from other programs would not be tagged with any of the current program's high-reward tags; only the regular yellow tags should be used on these fish, even if the next tag according to the datasheets is the blue high-reward one.

With regard to fish condition, the same guidelines apply to high-reward tags as to regular tags. Thus, high-reward tags will not be inserted into only the cod of best condition; they will be inserted into any "taggable" cod as determined by the standard tagging protocol criteria for regular yellow tags.

Extra equipment needs for tagging were addressed.

2.1.2 High-reward tagging reward eligibility

Prior to the meeting, Shelly had requested feedback from program partners on how high-reward tags should be rewarded. For example, should there be a flat rate of \$100 per tag returned, or could the reward value increment by \$25 per piece of information provided up to a maximum of \$100 (i.e. \$25 for each of the four critical pieces of information; Tag #, date, location and fish length).

By group consensus it was decided that only if we receive the actual tag could a check be cut, and the value would be a flat rate of \$100 to avoid confusion and to discourage people making up data to meet the maximum reward value.

2.1.3 High-reward tagging data entry

The implementation of the new high-reward tagging study has required a slight change in the way data is entered; Shelly has revised the data entry instructions and distributed these to all tagging partner organizations for implementation.

2.2 Data entry - general

2.2.1 Data backup

Additional data entry discussions revolved around the subject of data backup. Northern Geomatics confirmed that the server is backed up regularly: 1) backup to tape every night at around 11:00 pm and 2) SQL Server does an incremental backup to the disk every hour.

2.2.2 Data sheet copies

Pat Foote (GMRI) requested that all partner organizations double-check their data sheet copies before sending them in. In particular, please check the quality of the photocopy. In addition, incomplete copies

are sometimes received and it is usually the “haul comments” which are missing. John Hoey (NMFS) commented that it might also be worthwhile to have the originals scanned for long-term storage.

2.3 Non-tagged cod

All trips should be collecting data on the non-tagged cod they catch. However, for CCCHFA vessels and Island Institute vessels where no scientific personnel are on board, it is possible that this data will not be collected. Other circumstances for other tagging organizations may also mean that these fish go unrecorded.

If non-tagged cod are not recorded, **it is critical that this is recorded in the Haul comments** for that trip. Please use the standard phrase: **“Non-tagged cod not recorded”**.

When enclosing this fourth data sheet in your backup copies for GMRI, please also **highlight this sheet** for our easy detection for future data entry of non-tagged cod.

2.4 Evidence of feeding

Dave Martins (SMAST) pointed out that it would be interesting to begin noting what cod we catch are eating if it is evident. For example, when cod are feeding what they have eaten as it is still in their mouth, or has just been deposited on the measuring board! From now on, please note what is being eaten in the “fish comments” column on the data sheets.

2.5 Review of equipment needs

An update of equipment distribution to date was provided and equipment needs for future months were addressed. Table 4 summarizes what equipment each research organization proposed that they needed and then what has been distributed to date and what equipment requests were made at this meeting.

Table 4: Tagging equipment summary.

	DFO	II	DMR	CCCHFA	SMAST	GMRI	Totals
Originally proposed							
Year 1	5,000	5,000	20,000	25,000	10,000	0	65,000
Year 2	5,000	-	30,000	40,000	10,000	1,000	86,000
Total	10,000	5,000	50,000	65,000	20,000	1,000	151,000
Distributed to date							
Regular tags	10,000	5,100	29,000	59,000	25,000	1,000	129,100
HR Tags	500	200	1,500	800	600	0	3,600
Balance							
Regular tags	5,000	-100	21,000	6,000	-5,000	0	25,900
Requests for 2004-5							
Tags	-	-	-	15,000	5,000	-	20,000
Guns	-	-	-	-	4	-	4
HR Tags	-	-	-	1,000	1,000	-	2,000
HR Guns	-	-	-	-	-	-	
Needle-packs	-	-	4	-	-	-	4

2.6 Tagging mortality

CCCHFA currently has an NEC grant for studying mortality in juvenile cod caught by hook gear. Tom Rudolph (CCCHFA) raised the issue that when their study was complete they would have tagged cod which could be released as part of this program.

It was decided that these cod would be released, but that their information **would be recorded as a specific trip** (i.e. not incorporated into an actual tagging trip); this will enable us to easily identify these cod in the database as fish which had been kept in cages for some period of time.

Any cod which do not survive this experiment will have their tags removed and recorded; these tags should be returned to GMRI.

The bottom type on which the mortality study cages are being set should also be recorded.

3. Year I Reports to NMFS

SMAST, DMR, and CCCHFA had submitted Year I Reports to NMFS in the early part of 2004; GMRI and the Island Institute had not. However, of those submitted, only SMAST received confirmation that the report had been received, and the feedback was somewhat critical.

3.1 Particular comments

Rodney Rountree (SMAST): This issue has been raised to enable us to discuss how we might avoid future criticisms, which seem to have resulted from slight differences in how the program has evolved, in comparison with the scope of work outlined in the original proposals.

We need a guidance or a mechanism from NMFS to improve this procedure and to understand better what is required for reports. For example, we could continue to produce individual reports (by tagging organization) to meet budget requirements, but then submit them simultaneously so that they can be reviewed as a group to meet scientific requirements. We need a **group outline of research**, which has been revised to accommodate any changes the program has undergone on a regional scale. Should we be aiming for a group report process? Can we respond as a group to the comments from SMAST's Year I Report.

Ken Beal (NMFS): Cooperative research has to be flexible to take into account changes brought about by seasons, gear and vessel contracts etc. However, contracts (i.e. this program) are more rigid than grants (e.g. Saltonstall Kennedy) and if the scope of the program changes, these changes need to be approved before implementation; submitted reports should then address the re-approved work scope.

Harry Mears (NMFS, NE Regional Office): The program was designed on two levels: Level 1 for tagging organizations and Level 2 for the coordinating organization. As such, it should be possible to submit individual reports, but as a group, with an overview of the changes by the Level 2 organization (i.e. GMRI). The documentation of programmatic changes is evident in the Bi-monthly updates and meeting summaries; this should be sufficient information for NMFS to show how and why the program has evolved.

3.2 Action – Year 2 6-month reports

All program partners will begin their 6-month report for Year 2 and will give these to Shelly at GMRI. GMRI will then produce its Year 2 6-month report and submit all documents together. This will take place in **July, 2004**.

Shelly will also submit a very delayed Year I Report which will include an Annex containing all past Bi-monthly updates and meeting summaries, in addition to an overview of the small changes that have been made to the program design/implementation.

4. Review of presentation to the Research Steering Committee

Shelly Tallack (GMRI) had given a 45-minute progress review presentation to the Research Steering Committee (RSC) on April 30th, 2004. John Hoey (NMFS) commented that these presentations serve to keep the RSC in touch with the various research programs they have promoted. The in-depth discussion which resulted revolved around four key issues which are summarized here.

4.1 General feedback

It is evident that the tagging program is running well and all partner organizations are fulfilling their respective roles;

- The committee are generally very impressed;
- The committee's main concerns focused on whether or not the program was covering spawning grounds and resident fish – are these being sufficiently tagged? (Shelly had responded that the spawning grounds identified in the New England Aquarium recommendations had been included in the tagging areas proposed by each tagging organization, and as such, were being covered to the best of our ability.)

- The committee acknowledged/realized that now they need to make a concerted effort to address future data analysis requirements in terms of who and how.
- The committee discussed whether any changes should be implemented.
- The committee decided that the next immediate step was to begin querying the data to find out exactly what types of questions it can answer, and through this, determine whether any other changes to data collection need to take place, and what models will be most appropriate to the data.

4.2 Querying the data currently entered in the database

The RSC made a sub-committee of individuals who would be responsible for beginning to query the data. The lead person to work with Shelly on this was Les Kaufman. Soon after the RSC meeting, Les contacted Shelly with a list of queries (Table 5). The program partners general reaction was that these queries are too detailed, individual responses are summarized below.

Table 5: The six queries proposed by the Research Steering Committee (via Les Kaufman) and specific responses (R) to these by the program partners.

Queries	
1	Is net movement out of the WGOMC (in proportion to number tagged) greater or less than movement into the WGOMC (i.e., what are the effects of the closure on cod movements)? How to tag returns compare for areas with and without rolling closures?
2	Is the low rate of young returns due to a movement effect or low survival of small fish? If the latter, is it a tagging bias or simply a reflection of higher juvenile than adult mortality?
R2	Fairly easy to query.
3	Two strong movement tracks emerged from the data thus far. Are these bi-directional or unidirectional? Seasonal or year-round?
R3	Not enough time has passed for sufficient data on this
4	Are cod tagged over boulder piles and complex hard bottom less likely to move than cod tagged over lower-relief habitats?
R4	Very few boulder piles have been involved in this program to our knowledge.
5	Though cod may migrate long distances, do they home to natal grounds? Is their behavior highly localized during non-migratory seasons?
6	Given the tag return rate we have seen thus far (2.8%), if this rate remains constant or falls, will we get enough information to answer any of the important questions about cod movements in the GOM?
R6	An annual return rate is preferable.

4.2.1 Comments on querying data

Les Kaufman (BU) – from email: “The idea now is to frame questions to help us learn how to query the database. The answers we get will obviously be a lot more meaningful when there have been more returns.”

Mark Terceiro (NMFS): We need to recognize the limits of the data and not get too ambitious. We should re-visit the objectives outlined in the *Final Report on Recommendations for conducting a collaborative cod-tagging program for New England and Maritime Canada* (New England Aquarium (NEAQ), May, 2001). The data being collected are geared towards furnishing these three objectives (see Annex 3A). The first and last of these objectives have been met, the middle one is still in progress.

[On this note, the first and fourth of the “Statement of Work Recommendations have also been met (see Annex 3B); electronic tagging has not yet taken place.]

General: These queries are too detailed and specific – the study is not old enough to be able to answer these questions yet.

4.3 Additional suggestions made by the Research Steering Committee

- Re-state our hypotheses and test our ability to answer these questions with the data;

- Additional studies you might want to collect samples for during tagging trips:
 - Genetics
 - Isotope samples to tap on behavioral or diet differences
 - Record habitat at time of data collection: hypothesis might be that hard-bottom cod are less likely to travel long distances than soft-bottom cod.

4.3.1 Program partner responses

John Hoey (NMFS): we should document our decisions and focus on those, stick to our aims. We need to keep in check other researchers' enthusiasm. Our goals should be to maximize accuracy, not just offer assistance to all requests for simultaneous data collection for other research projects. If we were to assist other projects, we should make sure that they were peer reviewed proposals.

Don Clark (DFO): Probably too little time left to collect decent genetics samples.

Rodney Rountree (SMAST): Isotope sampling is usually done on juvenile fish – since the current study does not focus on juvenile fish, this would not be ideal to get involved in.

Rodney Rountree (SMAST): How do you measure habitat? Need a real, consistent method for determining the bottom type with any degree of accuracy if you are going to try to collect this type of data.

David Martins (SMAST): We could set up a camera system for assessing bottom type.

5. Data issues

By discussing current data issues, the partner organizations focused on the **data analysis needs** for the next few months, in addition to discussing whether the **current spatial distribution of tags** would likely lead to any biases when it comes to data analysis. The program partners also discussed a recent **request for cod occurrence data** by OBIS.

5.1 Data analysis needs

In addition to the querying the data for the RSC, there are more immediate needs with regard to being able to summarize our progress to date at fairly short notice for presentations, responses to summary requests, even for the bi-monthly update etc.

Currently these summaries are generated by numerous slow and laborious procedures in Excel; since the database currently houses just over 50,000 tagged cod and is likely to be increased by another 80,000 - 90,000 cod by 2005, a more efficient way of investigating the data is needed.

In recent weeks, Shelly (GMRI) and Bill Duffy (NGI) have been discussing the notion of developing an interactive summary report which would use standard queries, but in which a number of data fields would be filterable. The program partners generally agreed that this type of reporting tool would be useful to the program as a whole. Particular queries considered useful appear in Table 6. Rodney Rountree (SMAST) also suggested that it would be useful to have some basic GIS-type summary which delivered the range of movement, time at large and growth of the cod tagged by any one organization.

Action: Shelly and Bill will meet to discuss these needs further, incorporating suggestions raised by the program partners. The mapping site may also undergo some enhancements in future months to ensure that the data which is viewable is the data most interesting to visitors of this site.

Table 6: Queries proposed for the interactive summary report tool.

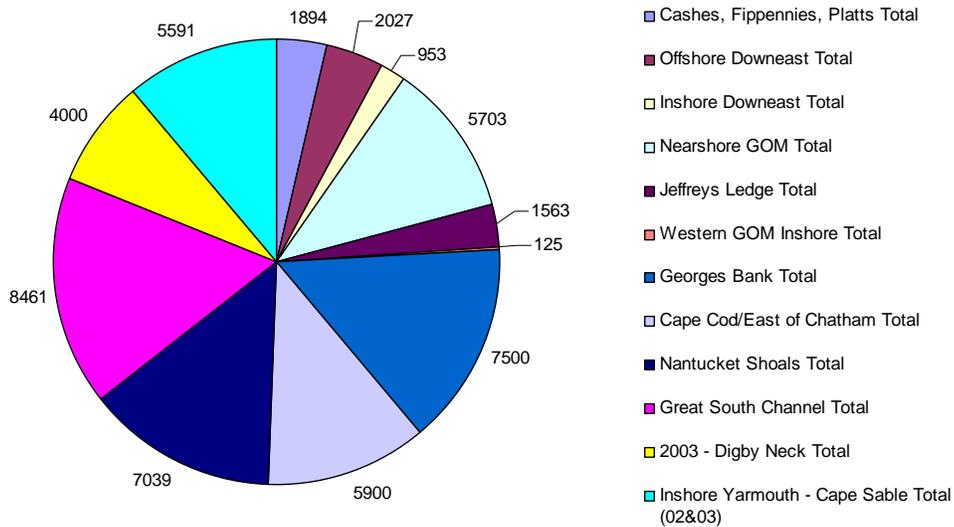
Query	Filterable by
<ul style="list-style-type: none"> • No. of fish tagged/no. double-tagged fish/ No. of high-reward fish • No. recaptured fish (reported by individuals VS during tagging trips) • No. of vessels participating • No. of trips undertaken • Size range of fish 	<ul style="list-style-type: none"> • Organization • Date • Location • Trip

5.2 Current spatial distribution of tags

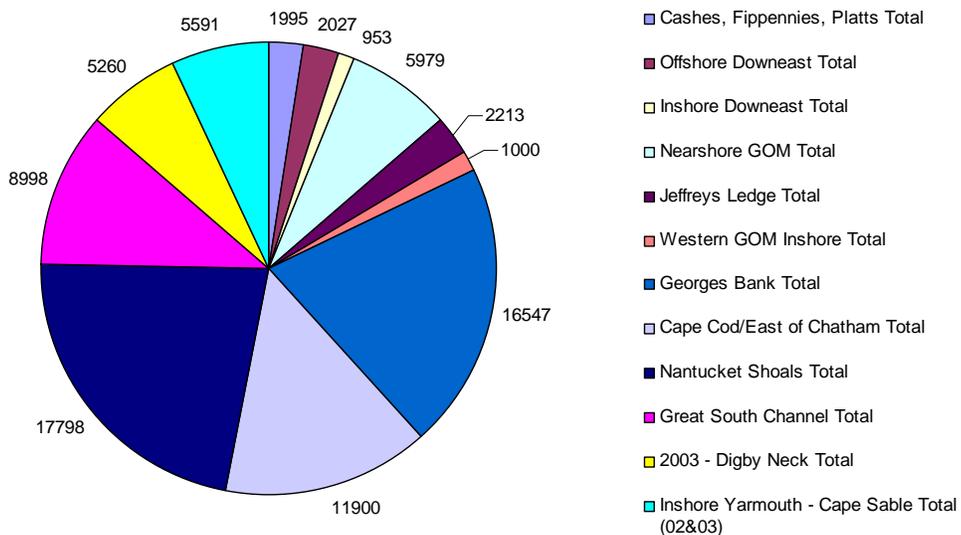
As the program has progressed, it has become evident certain areas are more conducive to capturing, tagging and releasing larger numbers of tagged cod than others. A concern aired at the End of Year I Meeting was that the relative spatial distribution of tags could cause biases in the data. At the current meeting, an update was given on approximately how many tags had been released in what areas by March 2004 and by June 2004 (Figure 4). Of note, tagging has begun in the “new” tagging area (Jeffrey’s Ledge and Inshore Western Gulf of Maine (WGOM)) which was proposed at the End of Year I Meeting.

Figure 4: The relative spatial distribution of ~50,000 tag releases by March 2004 (A), and of ~79,000 tag releases by June 2004 (B).

A)



B)



5.2.1 Feedback from program partners

Mark Terceiro (NMFS):

- The considerable variability in the numbers of tags released in each geographic area is not a problem. During analysis we can weight the recaptures by releases and by fishing effort for each area. We also need to weight the reporting rate, which is where the high-reward tagging study comes in.

Don Clark (DFO):

- We need a minimum of about 5,000 tags to be released in any one area to yield good results; 10,000 would be better. With regard to the WGOM and Jeffrey's Ledge – 10,000 tags should be enough for this area, particularly now that the inclusion of UNH data from this area is going to happen.
- There will be tagging data available for Yarmouth eastwards in the near future (data from the two years prior to this program beginning).
- The large disproportion in the number of tags released between areas is not too much of a problem, particularly since the information yielded will be strongly affected by what time of year the fish were tagged in each area. [Thus, if decent numbers of fish were released at different times of year – amounting to large overall numbers for an area – this could be good].
- The tag reporting rate will vary over the course of a year, and the course of the program.

Rodney Rountree (SMAST):

- SMAST also released ~20,000 tagged cod around Stellwagen and north of Gloucester, and in Cape Cod Bay. These data should be incorporated in future months.
- There is also a large amount of tagging data from the Nantucket area (~50,000 - 60,000 fish, mainly cod, some haddock) from a much earlier study; this data should be brought into this database also if possible, maybe by a PhD/Masters student?
- SMAST would also like to release tagged cod in the Nantucket Lightship closed area (1 trip) to investigate east-west movements of cod.
- It will require careful consideration of how to pull this data from other programs into the Northeast Regional Cod Tagging Program database; further attention will need to be paid to the assumptions involved.

5.3 OBIS – Request for cod occurrence data

At the World Fisheries Congress in Vancouver (May 2004) Shelly was approached by a representative of OBIS (Ocean Biogeographic Information System) with a request for our cod release data. The OBIS mission is to make marine biogeographic information freely available through the web.

The program partners discussed the implications of this and the overall consensus was that we wouldn't take this further. Essentially, it is unlikely that our data is really the type of data they need since our aim is to go out and find cod in areas known for cod; survey data would give a less skewed picture of cod occurrence and distribution. Specific feedback was as follows:

Rodney Rountree (SMAST): Unsure as to what use tagging data is to OBIS in comparison to trawl data – trawl data is probably more suitable.

Bill Duffy (NGI): Is our data right for them? Tagging data is not census data.

Kevin Kelly (DMR): This tagging data is what it is, it wasn't aimed for statistical sampling of species occurrence.

Don Clark (DFO): Sees no harm in giving our data to OBIS.

Mark Terceiro (NMFS): There may be a reason why NMFS data is not already there....

John Hoey (NMFS): OBIS data just shows where species have been recorded, it gives very little more. But since we would be associated with our data, it would lead to many enquiries and emails.

6. A Year 3 for the Northeast Regional Cod Tagging Program?

The program partners discussed what they would like to see happen for a year three of the program. The overall feeling was that we should make every attempt to maintain this collaborative research group (~ 25 scientists and ~150 fishermen) beyond the program's current two-year life. This program has been a great success for a variety of reasons, but specifically for its large-scale collaborative component where fishermen and scientists are working well together, both regionally and internationally.

During these discussions, John Hoey (NMFS) commented that since by the end of the first year we had addressed and fulfilled the three NEAQ aims (see Annex 3), and the Science Center and the RSC has been made aware of this progress, it may be that if we were to propose some specific ideas for research in a year 3, the RSC might be prepared to recommend that the program receive further financial support to address a number of these ideas (the RSC will receive a copy of this meeting's summary).

Harry Mears (NMFS), in agreement with John Hoey, suggested that the most current information from the NRCTP would be appropriate for discussion at the upcoming Tagging Workshop. He also reiterated, however, that the fiscal Year 2005 will have very limited funds and so it would be wise to identify where the program is now, and then put thought into what is needed for future months.

6.1 The role of tagging in Year 3

The program partners particularly addressed the role of future tagging efforts as part of this program. The comments made are summarized below:

- The continuation of some tagging may be vital; stop tagging and you will lose the interest of the fishermen involved since the tagging component of the program has a huge social implications for collaborating fishermen, in all regions (Tom Rudolph, Rodney Rountree, Don Clark).
- We need to ask the question of what tags to use? What will which type of tag tell us? What can we achieve with a smaller amount of specifically targeted tags? Where should we tag specifically? (Mark Terceiro)
- Tagging does not need to continue at the current rate (Mark Terceiro, Shelly Tallack, Tom Rudolph); if it did, there would be considerable implications for a budget for Year 3 – costly (Shelly Tallack).
- More focused tagging would be valuable (Mark Terceiro; Shelly Tallack, Tom Rudolph), e.g.
 - undertake experimental tagging and recapture efforts both in and out of closed areas;
 - focus tagging efforts on just spawning aggregations.
 - Small-scale tagging studies like these would be less expensive
- We should focus on maintaining the infrastructure of the tagging program (John Hoey). By doing this we will empower ourselves to continue tagging into future years, but instead of developing just a long-term tagging study on one species, we could be flexible by switching the tagging efforts of collaborating organizations and fishermen to focus on the “hot” species of the time.
- Acoustic/data storage tagging: These tags are more expensive, but is this now the time to be investigating their potential for this study? (Rodney Rountree). [These are relevant to the NEAQ “Statement of Work Recommendations” (see Annex 3B)].

6.2 Prioritizing research ideas for Year 3

The approach taken was to propose research ideas for a Year 3 of the Northeast Regional Cod Tagging Program. In doing so, new ideas were voiced, in addition to re-visiting the ideas presented at the End of Year 1 Meeting (December 2003) and the ideas proposed by Les Kaufman after the RSC meeting (see 4.3). The ideas considered most relevant are outlined in Table 7.

All program partners were then asked to prioritize the research ideas and comment on their choice. The actual feedback is presented in Annex 4, but a summary of the outcome is presented in Table 8 and Figure 5.

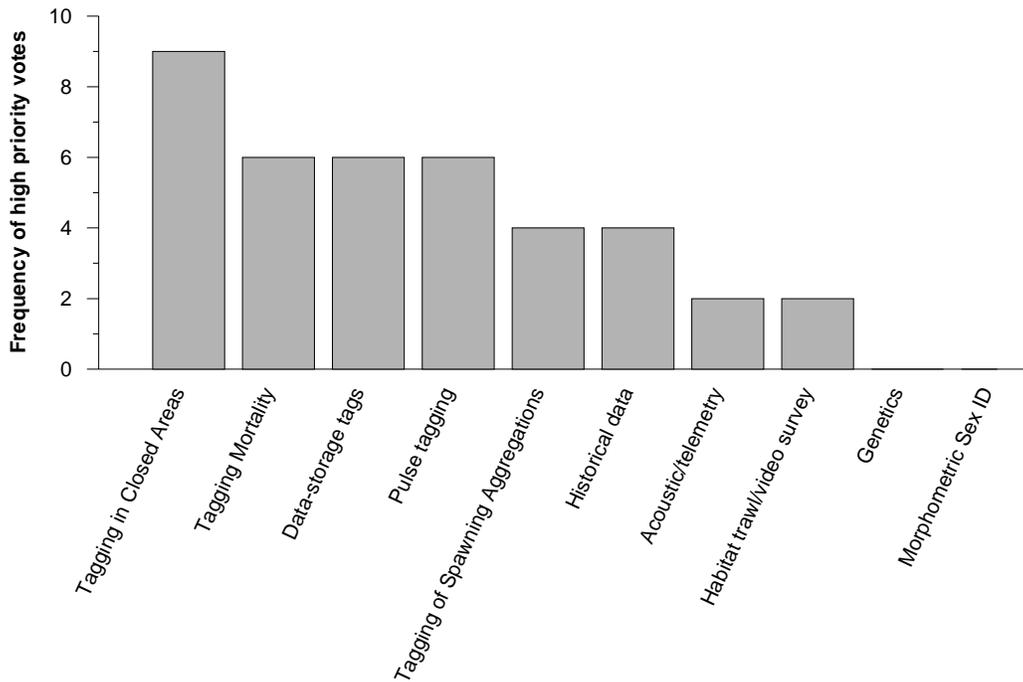
Table 7: Potential Year 3 research ideas outlined. Ideas proposed at the End of Year 1 Meeting are indicated by *; ideas proposed by the RSC are identified by **.

Idea	Description
Pulse tagging	<ul style="list-style-type: none"> • Tag with more strict control on the spatial and geographical output; this would be less expensive and could answer more specific questions about precise movements (Mark Terceiro). • This would involve a more experimental design. • The areas focused on should be specific areas where we are beginning to see trends in movement patterns and should also include areas which have boundaries in terms of management, e.g. international boundaries, or closed areas (Don Clark).
Tagging on spawning aggregations	<ul style="list-style-type: none"> • Focus tagging efforts on just spawning aggregations – this would involve fewer tags and vessels, and would therefore be less costly (Mark Terceiro).
Tagging in closed areas	<ul style="list-style-type: none"> • Undertake experimental tagging and recapture efforts both in and out of closed areas. • If we want to look at this, we will need to move fast as the closed areas as we know them are beginning to change as a result of the use of B-days etc. (Ross Kessler).
* Acoustic/telemetry tagging & data storage tagging	<ul style="list-style-type: none"> • Small-scale operation for a specific area to monitor fine-scale movements, in e.g. closed areas. • These are more expensive, but is this now the time to be investigating their potential for this study? (Rodney Rountree).
* Tagging Mortality	<ul style="list-style-type: none"> • Initiate a thorough investigation of tagging mortality which would address all variables of this program, i.e. gear type, water depth, water temperature, time of year, and handling techniques.
Habitat & Video	<ul style="list-style-type: none"> • To obtain a better understanding of the habitat supporting the cod we catch by means of videoing the bottom-type being towed (David Martins).
* Non-intrusive morphometric Sex ID of cod	<ul style="list-style-type: none"> • The ability to externally sex the cod we tag and release would be valuable. • This research would also be of value to other cod studies where internal examination is not appropriate and the fish are not necessarily observed during a spawning period.
* Historical tagging data	<ul style="list-style-type: none"> • The incorporation of historical tagging data for cod from earlier studies (UNH, S Mast, DFO, but also the much older databases for the Gulf of Maine).
* & ** Genetic studies	<ul style="list-style-type: none"> • Combining tagging efforts with the collection of genetics data; is there a genetic difference in the cod we are catching and releasing in different geographic locations, or at different times of year in the same location?

Table 8: The number of votes for each research idea, at each level of priority. The studies proposed as highest priority are shaded grey.

Research idea	Level of priority			
	High	Medium	Low	Not rated
Pulse tagging (spatially & geographically defined)	6	1	2	1
Tagging of spawning aggregations	4	7	1	0
Tagging in closed areas	9	2	1	0
Acoustic/telemetry	2	6	3	1
Data-storage tags	6	4	2	0
Tagging mortality	6	4	2	0
Habitat trawl/video survey	2	2	7	1
Non-intrusive Morphometric Sex ID	0	1	11	0
Historical data incorporation (various data sets)	4	1	6	0
Genetics	0	4	6	2

Figure 5: The frequency of high-priority votes given by program partners for each research idea.



7. Key tasks for future months

Table 9 lists the key tasks to undertake in future months, as identified during the course of this meeting.

Table 9: Tasks identified for upcoming months for the Northeast Regional Cod Tagging Program.

Tagging Organizations
<ul style="list-style-type: none">• Continuation of tagging efforts in designated areas; implement high-reward tagging component after the relevant training.• Data entry.• Six month report to NMFS (send in to GMRI in July 2004).• Re-distribute new tagging posters to all appropriate places throughout the region, e.g. docks, processing plants, fish shops, gear shops etc.
Gulf of Maine Research Institute
<ul style="list-style-type: none">• Outreach: focus on the new high-reward tagging study and re-design all posters and outreach materials accordingly.<ul style="list-style-type: none">◦ Mass-mailing – June/July 2004.◦ Continue with current outreach efforts, but also initiate new options: e.g. video, articles, TV programs, presentations at fishery organization meetings.• Create and distribute new tag-recapture reports for all individuals (past and future) who report a tagged cod.• Data management:<ul style="list-style-type: none">◦ Work with Northern Geomatics to review the components required for the proposed interactive summary report, in addition to reviewing further enhancements to the database; obtain quotes for this work.◦ Data approval – continue.• Provide feedback from this meeting to RSC; begin data querying with Les Kaufman.• Undertake tagging trips where possible.
NMFS/CRPI
<ul style="list-style-type: none">• Collaborate with GMRI to coordinate the proposed tagging workshop.

Annex I: Meeting Attendants

Attendees

- 1 Ben Neal (Island Institute)
 - 2 Bill Duffy (NGI)
 - 3 Darin Jones (SMAST)
 - 4 David Martins (SMAST)
 - 5 Don Clark (DFO)
 - 6 Harry Mears (NMFS)
 - 7 John Hoey (NMFS)
 - 8 Joachim Groeger (SMAST)
 - 9 Jim Fair (CCCHFA)
 - 10 Ken Beal (NMFS)
 - 11 Kerrie O'Donnell (DMR)
 - 12 Kevin Kelly (DMR)
 - 13 Mark Terceiro (NMFS)
 - 14 Pat Foote (GMRI)
 - 15 Rodney Rountree (SMAST)
 - 16 Ross Kessler (SMAST)
 - 17 Sarah Pike (NMFS/CRPI)
 - 18 Shelly Tallack (GMRI)
 - 19 Susan Haley (DMR)
 - 20 Tom Rudolph (CCCHFA)
-

Annex 2: Meeting Agenda

9.00 Breakfast & introduction

9.15 Presentation of progress to date:

- By Area – 5 Minutes Max – no slide show necessary!
- Regional update (GMRI)

10.15 Review of tagging procedure and data entry, with focus on High-reward Tagging

- Review of high-reward tagging & equipment needs

10.45 End of Year I Reports to NFMS

- address problems & concerns

11.15 Review of presentation to Research Steering Committee

- Issues raised
- Implications for future months

12.00 Working Lunch

3.30 Data

- Analysis needs for next few months
- Interactive summary report by Northern Geomatics?
- Request for data by OBIS (Ocean Biogeographic Information System): see www.iobis.org for overview of end product

4.00 Year 3

5.00 End

Annex 3: Original objectives and statement of work recommendations from the *Final Report: Recommendations for Conducting a Collaborative Cod-Tagging Program for New England and Maritime Canada* (New England Aquarium (NEAQ), May 2001).

A) “Program Objectives

- Develop a collaborative cod-tagging program between fishermen and scientists to build bridges and strengthen working relationships towards improved understanding of marine ecosystem functioning.
- Improve understanding of current cod distribution and movement patterns throughout Gulf of Maine, Georges Bank, Southern New England and coastal waters.
- Establish a foundation for future U.S./Canada, industry/scientific community collaborations to enhance understanding of shared marine resources (e.g., tagging programs for other species).”

B) Statement of work recommendations

“The following set of recommendations were derived from these discussions:

- 1) a large scale tagging effort, using conventional (t-bar) tags in U.S waters in the Gulf of Maine, on Georges Bank, in Southern New England waters and along coastal New England including tagging and tag retrieval inside U.S. year-round closed areas and in Canadian waters;
- 2) a pilot study using electronic tagging devices inside one closed area;
- 3) fine scale movement studies using electronic tags in inshore areas; and
- 4) a reciprocal Canadian tagging study using conventional tags.”

Annex 4: Year 3 proposed research ideas prioritized (1=high, 2=medium or 3=low) with comments by individual program partners.

CCCHFA – Tom Rudolph (& Paul Parker)			
Project ideas	Priority	Comments	
Tagging in Closed Areas	1	Originally identified objective in the NEAQ recommendations (Determination of whether closed areas are sinks or sources). Understanding of Closed Area movements will become more important as SAP's in Closed Areas come online.	
Tagging of Spawning Aggregations	1	A challenging objective recently reasserted by the RSC. Easily combined with tissue sampling for extra benefits. Offers maximum opportunity for continued industry participation.	
Habitat trawl/video survey	3	Somewhat outside the scope of a cooperative tagging program	
Tagging Mortality	2	Pricey - so less important than historical study. (Tom: Important ancillary work consistently identified as an objective by program partners. Some techniques and equipment already studied with pilot work. Might also be dovetailed in with bycatch (discard) mortality work using tagging as the indicator.)	
Acoustic/telemetry	2	Expensive and more likely to be feasible in year 4 or beyond	
Data-storage tags	2	Expensive and more likely to be feasible in year 4 or beyond	
Genetics	2	Sampling could be worked into Year 3 trips easily, so some money for extraction and later, analysis would be sensible	
Pulse tagging	1	Use of the year one and two data to identify hypotheses was an objective. Testing these hypotheses through more rigorously designed tagging deployments will yield important insights.	
Historical data	1	perhaps some more emphasis on historical data and less emphasis on tagging mortality (due to cost, experience with our current work and logistical difficulties of such studies)... (Tom: May be some innovative ways to involve fishermen in this work, especially since many are keenly interested in this historical information.)	
Morphometric Sex ID	3	Somewhat outside the scope of a cooperative tagging program	

CCCHFA – Jim Fair			
Project ideas	Priority	Comments	
Tagging in Closed Areas	1	gives the fish time to acclimate and recaptures occur when they leave the area	
Tagging of Spawning Aggregations	2	logical next step to define stock units	
Habitat trawl/video survey	2	identification of spawning/nursery habitat critical to understanding of population	
Tagging Mortality	1	mortality estimates needed for work already completed and to compare application techniques	
Acoustic/telemetry	3	not convinced that it's worth the expense for limited data	
Data-storage tags	3	useful as an adjunct to tagging spawning aggregations, etc.	

Genetics	2	samples can be taken and archived while tagging, should do spawning fish
Pulse tagging	1	should be done year three to fill gaps or add information missing from work accomplished to date
Historical data	3	important but not as part of this program
Morphometric Sex ID	3	would be valuable tool – academic challenge, but not part of this study

DFO - Don Clark

Project ideas	Priority	Comments
Tagging in Closed Areas	1	Not relevant for me, but I needed a third high priority
Tagging of Spawning Aggregations	1	We already do some of this; presumably the Georges tagging in Feb-Mar is spawning fish (?)
Habitat trawl/video survey	3	
Tagging Mortality	2	Difficult to assume it is the same amongst seasons and organizations so I am not sure would be useful
Acoustic/telemetry	3	
Data-storage tags	2	Interesting, but expensive. I am not sure it addresses the same objectives as our work to date.
Genetics	3	
Pulse tagging	1	Some rationale for this as along-term monitoring. Difficult to ensure it works - what if the fish do not show. This is what I was trying to do!
Historical data	2	Some rationale for historical comparisons, but I am not sure how a manager would alter their conclusions with this included
Morphometric Sex ID	-	

DMR – Kerrie O'Donnell

Project ideas	Priority	Comments
Tagging in Closed Areas	1	With high catches in Georges Bank closed areas and increased closed areas due to Amendment 13, this would be a timely and important question to answer.
Tagging of Spawning Aggregations	2	Important to understand, but
Habitat trawl/video survey	3	Would be nice to know, but seems less related directly related to this tagging effort
Tagging Mortality	1	This question is clearly directly related to current study, affects the rigor of its results and has been mentioned a number of times in the past year.
Acoustic/telemetry	2	Very interesting technology, but in near term worth the expense?
Data-storage tags	3	Also very interesting, but in near term worth the expense?

Genetics	2	I'm not all that familiar with this, but from other meeting participants' comments seems questionable as to how useful this information would be.
Pulse tagging	-	I'm unclear on what exactly this entails, so I won't comment
Historical data	1	Would give important perspective, relatively inexpensive
Morphometric Sex ID	3	Would be useful, but seems unrelated to this tagging effort

GMRI – Shelly Tallack

Project ideas	Priority	Comments
Tagging in Closed Areas	1	We currently tag in closed areas, but if we find the recaptures of these fish are lower, thus suggesting that the fish are not moving out of the protected areas, there would be considerable implications for future groundfish species management; carrying out specific recapture trips in the closed areas at specific times of year relative to the release of tagged cod for this study would provide a good calibration for the number of cod caught inside VS. outside a closed area, thus improving our ability to interpret the non-experimental trip recaptures from fish released in closed areas.
Tagging of Spawning Aggregations	3	We already tag spawning aggregations within the current program, though a more experimental design here could be of value
Habitat trawl/video survey	3	This would be interesting, but would be expensive on a region-wide, collaborative scale
Tagging Mortality	2	Would be good in terms of collaboration - could involve all program partners currently involved. Might be fairly costly to ensure that all variables are incorporated.
Acoustic/telemetry	2	Expensive, but could yield much more detailed view at how cod are moving, rather than just giving a release and recapture location - since so much time, money and effort has been invested to date, would it not now be appropriate to start homing in on certain movement trends and try to obtain greater resolution on what the movements/migrations involve?
Data-storage tags	1	Expensive, but could yield much more detailed view at how cod are moving, rather than just giving a release and recapture location - since so much time, money and effort has been invested to date, would it not now be appropriate to start homing in on certain movement trends and try to obtain greater resolution on what the movements/migrations involve?
Genetics	3	Least favorite based on the feedback others have given regarding the impact that the technique used has on the result
Pulse tagging	1	Beginning to ask specific questions and targeting these would be good - this would provide for continued involvement of a number of fishermen, albeit for a shorter period of time and involving less tags etc.
Historical data	2	It would be important long-term to incorporate this into the program, and it might be wise to do so before the final report writing process begins. This should be relatively in-expensive, since it would be desk-based, but it might have considerable cost implications in terms of the database.

Morphometric Sex ID 3 This would be a wonderful tool to develop, and would add an additional variable to future cod research programs where internal examination of the fish is inappropriate - however, such a study would likely require fewer vessels/fishermen, though carrying out the data collection in each area would be beneficial. It would not be possible to extrapolate this data backwards to current tagging data - so this would be more useful for FUTURE cod research.

GMRI - Laura Taylor Singer		
Project ideas	Priority	Comments
Tagging in Closed Areas	3	
Tagging of Spawning Aggregations	2	This is already being done.
Habitat trawl/video survey	3	This is already being done.
Tagging Mortality	3	
Acoustic/telemetry	1	
Data-storage tags	1	
Genetics	3	
Pulse tagging	3	
Historical data	1	
Morphometric Sex ID	3	

NMFS – John Hoey		
Project ideas	Priority	Comments
Tagging in Closed Areas	1	
Tagging of Spawning Aggregations	2	
Habitat trawl/video survey	2	
Tagging Mortality	1	
Acoustic/telemetry	3	
Data-storage tags	1	
Genetics	-	
Pulse tagging	2	
Historical data	3	
Morphometric Sex ID	3	

NMFS - Mark Terceiro		
Project ideas	Priority	Comments
Tagging in Closed Areas	1	
Tagging of Spawning Aggregations	1	
Habitat trawl/video survey	-	
Tagging Mortality	1	
Acoustic/telemetry	2	
Data-storage tags	2	
Genetics	3	
Pulse tagging	2	
Historical data	3	
Morphometric Sex ID	3	

SMAST – Rodney Rountree		
Project ideas	Priority	Comments
Tagging in Closed Areas	1	Doable and lots of management interest
Tagging of Spawning Aggregations	2	Very desirable information, but identifying spawning aggregations in the first place is difficult
Habitat trawl/video survey	3	A “trawling video” survey seems beyond the scope of a tagging project, alternatively use of drop cameras to identify habitat where fish are caught and releases would be informative. Much more conducive to hook, trap, or fixed gear fishing
Tagging Mortality	1	Needed to improve validity of overall tagging study
Acoustic/telemetry	3	Acoustic telemetry can provide important information on individual fish behavior, including understanding diel vertical migrations, but is expensive and provide high resolution data on a fine spatial scale
Data-storage tags	2	Very doable, provides important behavioral information, but is relatively expensive otherwise would be higher priority
Genetics	-	Previous genetics studies of cod suggest that this would not likely provide useful management data, expensive
Pulse tagging	1	Doable, and provides focus to specific questions generated by results in years 1 & 2
Historical data	2	Most worthwhile of the lower priority projects, some important historic data sets could be mined and compared to current tagging trends
Morphometric Sex ID	3	Would provide a very useful tool for use in the field that could help interpret tagging data, could be a subcontract to an appropriate biomedical laboratory

SMAST - David Martins

Project ideas	Priority	Comments
Tagging in Closed Areas	2	
Tagging of Spawning Aggregations	1	Definitive spatial and temporal studies linked with habitat would be very helpful for successful mgmt of cod.
Habitat trawl/video survey	1	Considering Amend. 13, past lawsuits, and present lawsuits by environmental and fishing groups against NMFS, studies documenting Essential Fish Habitat for cod are of highest priority period !
Tagging Mortality	3	
Acoustic/telemetry	2	
Data-storage tags	1	Depth and temp. preferences of cod when linked with oceanographic factors would benefit management of cod, especially if linked with spawning areas and habitat studies..
Genetics	3	
Pulse tagging	2	
Historical data	3	
Morphometric Sex ID	3	

SMAST – Darin Jones

Project ideas	Priority	Comments
Tagging in Closed Areas	2	Should conduct some follow-up monitoring trips to recapture tagged fish in closed areas if tags released there.
Tagging of Spawning Aggregations	2	Where are the spawning aggregations?
Habitat trawl/video survey	1	Needed to satisfy Scientific Committee questions
Tagging Mortality	1	Definitely needed to go along with return rates
Acoustic/telemetry	2	Very expensive
Data-storage tags	1	Would provide valuable info at a moderate cost
Genetics	3	
Pulse tagging	3	SMAST currently does “Pulse” tagging of certain areas on Georges Bank
Historical data	3	
Morphometric Sex ID	3	

SMAST - Ross Kessler

Project ideas	Priority	Comments
Tagging in Closed Areas	1	Closed areas are going to be going through change soon some sort of baseline on data could be useful
Tagging of Spawning Aggregations	2	difficult to do
Habitat trawl/video survey	3	This is already being done to 50 fathoms from Hudson Canyon to the tip of the cape
Tagging Mortality	2	
Acoustic/telemetry	-	
Data-storage tags	1	
Genetics	3	
Pulse tagging	1	Actually do-able
Historical data	3	
Morphometric Sex ID	2	