



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
Northeast Fisheries Science Center  
166 Water Street  
Woods Hole, MA 02543-1026

November 10, 2005

Mr. Paul J. Howard  
Executive Director  
New England Fishery Management Council  
50 Water Street  
Newburyport, Massachusetts 01950

Dear Paul:

The purpose of this letter is to bring to your attention two issues related to the GARM II assessment of the Gulf of Maine (GOM) cod stock. The first issue relates to a transcription error that changed the bycatch estimate in the second quarter of 2004. The second issue concerns the estimation of recreational landings from MRFSS as opposed to the mandatory Vessel Trip Reports.

### ***Transcription Error and Change in Bycatch Estimate***

The transcription error was discovered during the course of work by the Groundfish Plan Development Team. To understand the consequences of the error, it is necessary to discuss the computation of the estimate and how the derived estimate was used in the assessment model. These are discussed in the following paragraphs, respectively.

Discard estimates are based on a discard-to-kept ratio derived from trips with observers on board. The discard-to-kept ratio is multiplied by the total landings (weight) of species to obtain an estimate of total discards (weight). To account for variation across gears and seasons, these estimates are stratified accordingly, and the estimate for an entire year is based on the sum of these stratified estimates. For GOM cod, the estimates were based on observations for gillnets and trawls, by calendar year quarter. A transcription error was made for the second quarter of the 2004 otter trawl fishery wherein the discard ratio was written as 0.86 rather than the correct value of 0.086. The effect of this error was to inadvertently increase the total annual GOM cod discard estimate from 574 to 856 mt, a difference of 282 mt.

Exact estimates of bycatch, however, are not used in the computation of the total catches of GOM cod. Instead, the bycatch estimates are rounded to the nearest 500 mt. This convention was established at SARC 33 (NEFSC 2001), where concerns about the precision of the estimates suggested that GOM cod discard estimates in increments less than 500 mt were inappropriate. This convention was applied at GARM I (NEFSC 2002). The terms of reference for GARM II specified that the same methodology was to be used as in GARM I; therefore the erroneous estimate of 856 mt was raised to 1,000 mt. Had the correct estimate of 574 mt been used, the discard estimate in the 2005 assessment would have been rounded to 500 mt. The landing reported in Table F5a, p. 2-163 would therefore have been 5,398 mt instead of 5,898 mt.



We have examined the consequences of this overestimation on the GARM II estimates of fishing mortality rates and spawning stock biomass for GOM cod. Using the corrected bycatch estimate, the fishing mortality rate in 2004 on the fully-recruited ages decreases from 0.63 to 0.58, and the estimate of spawning stock biomass in 2004 increases from 18,793 mt to 20,549 mt. Neither of these adjustments results in a status change for Gulf of Maine cod. The revised ratio of  $F_{2004}/F_{MSY}$  is 2.58 ( $= 0.58/0.225$ ) rather than 2.8 ( $= 0.63/0.225$ ), and the revised ratio of  $B_{2004}/B_{MSY}$  is 0.25 ( $= 20,549/82,830$ ) rather than 0.23 ( $= 18,793/82,830$ ).

The correction of the total GOM cod catch in 2004 has implications for the projected F in 2005. As you know, the estimated F for 2005 requires an estimate of the catch in 2005 and a beginning 2005 stock size level. As the initial stock size in 2005 is higher using the adjusted (slightly lower) total catch estimate for 2004, the projected F in 2005 is lower. Without the correction, the estimated F in 2005 is 0.37; with the correction, the estimated F in 2005 is 0.35. The magnitude of the landings reduction in 2006 that would be required to achieve the target fishing mortality was originally estimated to be about 38%. With the corrected F estimates for 2005, the reduction in landings necessary is likely to be somewhat smaller, on the order of 5% lower than that associated with a drop of 38%. The exact values will be analyzed by the PDT.

To address the bycatch estimation error for 2004, we will update Northeast Fisheries Science Center Reference Document No. 05-13 on our Website, noting the correction for Table F2, p 2-160 and its implications on F and SSB as noted above. As this correction does not affect stock status determination, and results in very minor changes to Figures dependent on these numbers, no changes will be made in the Executive Summary, Section 1 or Section 3.

### ***Estimation of Recreational Landings***

Concerns have been raised regarding the use of the Marine Recreational Fishery Statistics Survey (MRFSS) data to estimate recreational landings of GOM cod. Table F4, p 2-162 lists recreational landings of cod (in both numbers and weight [mt]) derived from the MRFSS database, and also provides estimates of numbers of GOM cod landed from Vessel Trip Reports from Party/Charter vessels. The MRFSS estimates include both party/charter and other recreational vessels. A cursory examination of Table F-4 might suggest that a several fold difference exists in these estimates of recreational landings. To help clarify this apparent disparity, we conducted a more thorough comparison of the MRFSS and VTR data sets to determine if there was any basis for suggesting that the VTR data could be used as an estimator of the total recreational landings. A detailed summary of this analysis is provided in Annex 1. The results suggest that the estimates of recreational landings in the party/charter segment of the recreational fishery are nearly equivalent in 2003 and 2004, regardless of whether MRFSS or VTR data are used. In fact, the VTR-based estimates exceed the MRFSS-based estimates by 8% and 6% in 2003 and 2004, respectively.

We hope that this letter clarifies two important issues that have been raised regarding the assessment of the GOM cod stock. If you have further questions or points of clarification, we would be happy to address your concerns.

Sincerely,

A handwritten signature in black ink, appearing to read "John Boreman". The signature is fluid and cursive, with a long horizontal stroke at the end.

John Boreman, Ph.D.  
Director

Att: Annex 1

cc: F. Serchuk  
P. Rago  
R. Mayo  
T. Frady  
P. Kurkul (NERO)  
F. Blount (NEFMC)  
T. Hill (NEFMC)

## Annex 1: *Alternative estimators of recreational landings for cod in the Gulf Maine*

This note represents a comparison of alternative methods for estimating the total recreational landings of cod in the Gulf of Maine (GOM). The primary method for estimating marine recreational landings is the Marine Recreational Fisheries Statistics Survey (MRFSS). This survey comprises two parts—an intercept survey of anglers to measure catch per unit effort, and a phone survey of potential anglers to estimate total effort. The product of these two surveys provides an estimate of total catch. The MRFSS is stratified by state, coastal county, by 2-month period (termed waves), and mode of fishing. There are three modes of fishing: head boat or party charter, private or rental boat, and shore-based angling. The MRFSS is designed to provide precise estimates at highly aggregated levels (*i.e.*, on an annual basis for the entire coast). At finer spatial or temporal scales, precision declines and the uncertainty of the factors such as “area fished” increases. The intercept survey provides information on the fate of fish after capture. Fish released alive are called B2 type fish. Fish that are landed and available for inspection are called type A fish, while fish unavailable for inspection are called type B. Type B fish are divided into landed (B1) types, and those released at sea (Type B2). Type B1 fish are often landed in parts such as filets or tails. The total number caught is the sum of fish in the A, B1 and B2 categories; total landings are the sum of A and B1 fish.

Since 1995, party/charter boats fishing for hire in the GOM and Georges Bank (GB) have had to submit a Vessel Trip Report (VTR). In theory, the VTR represents a census of the recreational landings for vessels fishing in federal waters. Head boat fishing within 3 miles of shore (state waters) may be exempt from these requirements, depending on the type of permit held. Thus, VTR estimates of recreational landings should be approximately equal to estimates derived from MRFSS estimation procedures. In particular, the catches from A and B1 types should equal the landings recorded in the VTR database. In this note, we compare these two estimates for GOM cod in the period 1995 to 2004.

Table 1 represents the total catches reported through VTR and MRFSS in the GARM II report. VTR estimates of party/charter landings were reported only for the 1995 to 2000 period. These estimates were initially incorporated into an earlier cod assessment prior to the GARM I assessment in 2002. VTR estimates of recreational landings were not updated for the GOM cod assessment conducted for GARM I. Instead, the MRFSS data were considered a better estimate of the overall recreational landings since data were included from all angler groups. A direct comparison of the VTR and MRFSS estimates requires several steps to partition the MRFSS data to ensure comparability with the VTR data. These steps include: (1) considering only landings (A+B1); (2) partitioning recreational landings by regions (GB vs. GOM); and (3) extracting only those estimates based on party/charter trips. This stepwise approach is summarized in Table 2. Revised estimates of VTR Party/Charter landings (numbers in thousands of fish) are summarized in Column a. Comparison of column a in Table 2 with column d in Table 1 reveals close agreement during 1995 to 1998, but the estimates for 1999 and 2000 are 14 and 17% higher, respectively than those given in Table F4, p. 2-262. The difference is related to updating the VTR data base for these years. The original data were provided at SARC 33 in 2001 (NEFSC 2001, see Table A11 therein), but were not subsequently updated as the VTR data have not been used in the assessments to estimate total landings from all sources. It is important to note that the VTR data can be incomplete because records may be received over extended periods.

Combined MRFSS landings for GB and GOM for party/charter boats are listed in column b of Table 2. The party/charter component constitutes 23 to 83% of the total landings (column d).

The fraction of the total MRFSS cod landings from the GOM generally exceeds 60%, except in 1997 and 1998 (column e, Table 2). Assuming that the proportions of charter boat landings are equal on GB and in the GOM, the landings of party/charter boat vessels in the GOM (column f, Table 2) can be estimated as the product of the proportion of catch in the GOM (column e) and the total party/charter estimate for GB and GOM combined (column b). Comparison of the derived party/charter MRFSS landings of GOM cod with the VTR party/charter landings of GOM cod (column g, Table 2) reveals that the VTR landings are approximately 89% of the MRFSS estimates. In 2003 and 2004, the two estimates are nearly equivalent (column g). The VTR data exceeded MRFSS estimates by more than 40% in 2001, and twofold in 2002. It should be noted that the MRFSS intercepts for these 2 years were extraordinarily low, with only 68 and 70 fish actually measured (Table F4, GARM II).

It is evident that the comparisons of the two estimators yield comparable results, particularly in recent years. Any adjustment of the entire 26-yr MRFSS series based on the VTR data for the 1995-2004 period would not only have a negligible impact on the VPA assessment, but it would also increase the uncertainty of the catch-at-age matrix. Overall, the results of these analyses do not justify any change in the catch-at-age matrix for GOM cod.

#### References Cited:

NEFSC (Northeast Fisheries Science Center). 2001. Report of the 33rd Northeast Regional Stock Assessment Workshop (33rd SAW). Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. NEFSC Ref. Doc. 01-18: 281 p.

NEFSC (Northeast Fisheries Science Center). 2002. Assessment of 20 Groundfish stocks through 2001. A report of the Groundfish Assessment Review Meeting (GARM), Northeast Fisheries Science Center, Woods Hole, Massachusetts, October 8-11, 2002, NEFSC Reference Document 02-16.

Table 1. Catch data in Table F4 of GARM II report. P 2-262

Year	Catch			Landings		
	VTR P/C estimate of Numbers CAUGHT (in thousands)	Total Recreational Catch (A+B1+B2)		VTR P/C estimate of Numbers LANDED (in thousands)	Landed Recreational Catch (A+B1)	
		Numbers (in thousands)	Weight (mt)		Numbers (in thousands)	Weight (mt)
1995	393	1486	2156	247	632	917
1996	278	906	2348	174	395	1025
1997	208	585	1245	123	166	353
1998	299	782	3278	119	257	1077
1999	226	842	2642	143	284	891
2000	241	1615	4562	160	555	1567
2001		1880	6828		778	2826
2002		1421	4704		409	1354
2003		1389	7771		468	2619
2004		1041	3467		372	1239

*column*            *a*            *b*            *c*            *d*            *e*            *f*

Table 2. Comparison of VTR and MRFSS GOM cod landings, 1995-2004

Year	VTR Party/Charter Gulf of Maine Only (000s)	MRFSS, GOM + GB combined Party/Charter landings (000s)	MRFSS GOM and GB MRFSS (Party /Charter + private) landings (000s)	Ratio of Party Charter landings to total recreational landings	Fraction of total MRFSS catch in GOM	Predicted Number (000s) of MRFSS landings in GOM	Ratio of VTR Party/Charter landings in GOM to predicted MRFSS Party/Charter landings
1995	247	692	1022	0.677	0.64	443	0.56
1996	174	325	500	0.650	0.76	247	0.70
1997	124	392	474	0.827	0.35	137	0.90
1998	122	325	466	0.697	0.55	179	0.68
1999	163	251	375	0.669	0.76	191	0.85
2000	187	417	812	0.514	0.72	300	0.62
2001	332	336	1118	0.301	0.70	235	1.41
2002	217	151	644	0.234	0.64	97	2.25
2003	168	233	707	0.330	0.67	156	1.08
2004	165	225	650	0.346	0.69	155	1.06
Sum	1899	3347	6768			2140	
Ratio				0.49			0.89
<i>column</i>	<i>a</i>	<i>b</i>	<i>c</i>	$d=b/c$	<i>e</i>	$f=b*e$	$g=a/f$