

9 June 2009

**Discard Estimation for use in Weekly Sector Catch Reports**

**Appendix 2: Illustrative Examples**

List of species, stocks and statistical areas for species listed in Table 15 of Amendment 16

<b>List of species and statistical areas that define stocks</b>		
<b>Species</b>	<b>Stock area</b>	<b>Statistical areas</b>
Atlantic cod	Georges Bank	521, 522, 525, 526, 533, 534, 537 - 539, 541 - 543, 551, 552, 561, 562, 611 - 616, 621 - 629, 631 - 639
	Gulf of Maine	464, 465, 511 - 515
Haddock	Georges Bank	521, 522, 525, 526, 533, 534, 537 - 539, 541 - 543, 551, 552, 561, 562, 611 - 616, 621 - 629, 631 - 639
	Gulf of Maine	464, 465, 511 - 515
Yellowtail flounder	Georges Bank	522, 525, 551, 552, 561, 562
	Cape Cod/Gulf of Maine	464, 465, 511, 512, 513, 514, 515, 521
	Southern New England/ Mid-Atlantic (SNE)	526, 533, 534, 537 - 539, 541 - 543, 611 - 616, 621 - 629, 631 - 639
Winter flounder	Georges Bank	522, 525, 551, 552, 561, 562
	Gulf of Maine	464, 465, 511, 512, 513, 514, 515
	Southern New England/ Mid-Atlantic (SNE)	521, 526, 533, 534, 537 - 539, 541 - 543, 611 - 616, 621 - 629, 631 - 639
	unit stock	464-639
American plaice	unit stock	464, 465, 511 - 515, 521, 522, 525, 526, 551, 551, 561, 562
Redfish	unit stock	464, 465, 511 - 515, 521, 522, 525, 526, 551, 552, 561, 562
Pollock	unit stock	464, 465, 511 - 515, 521, 522, 525, 526, 537 - 539, 551, 552, 561, 562, 611, 612, 613
White hake	unit stock	464, 465, 511 - 515, 521, 522, 525, 526, 533, 534, 537 - 539, 551, 552, 561, 562, 611 - 625
Wolffish	unit stock	462 - 467, 511 - 515, 521, 522, 525, 526, 551, 551, 561, 562

Examples of stock areas for selected species

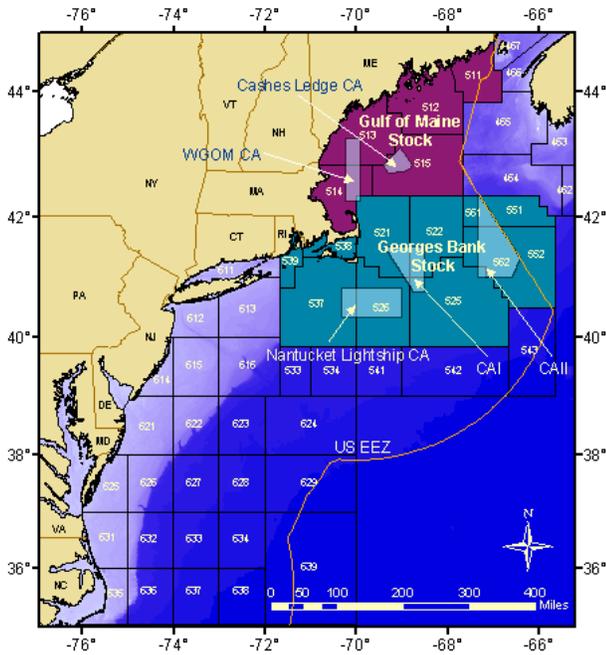


Figure 1.1. Statistical areas used to define the Gulf of Maine and Georges Bank cod stocks.

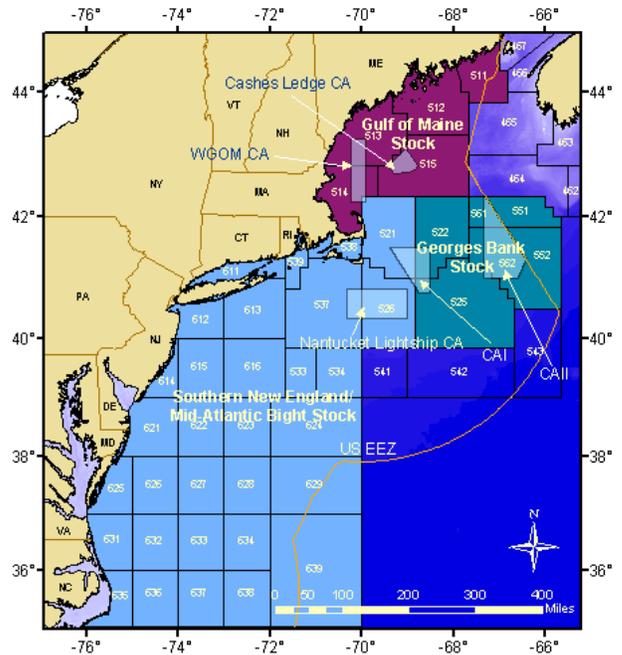


Figure 11.1. Statistical areas used to define the Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic Bight winter flounder stocks.

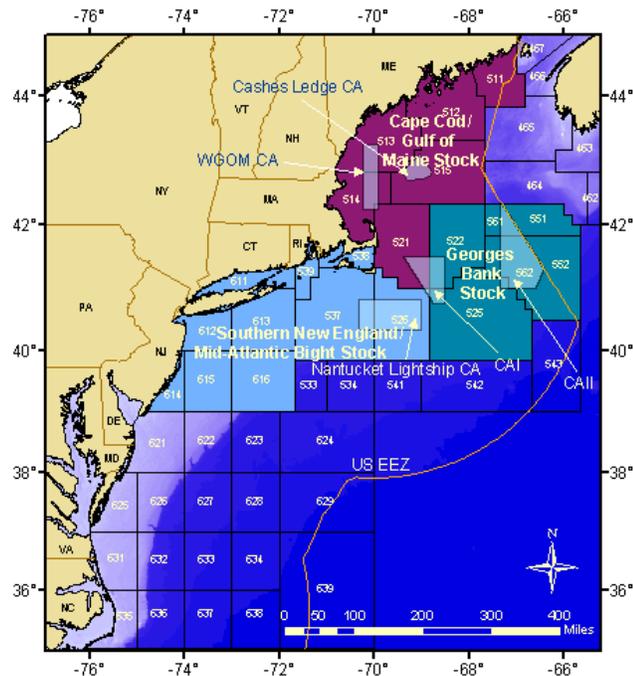


Figure 7.1. Statistical areas used to define the Cape Cod/Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic Bight yellowtail stocks.

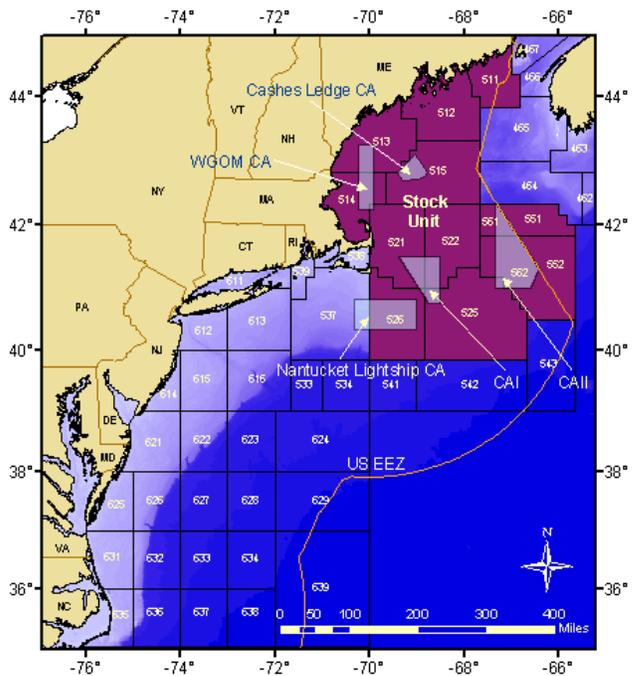


Figure 9.1. Statistical areas used to define the American plaice stock.

Example of an assumed discard rate matrix for the species listed in Table 15 of Amendment 16.

**Assumed Discard Rate Matrix: An illustrative example**

For gear types and species listed in Table 15 of Amendment 16 (page I-122).

Values in matrix represent the combined discard ratio ( $r_d$ ) derived using Equation 1

Gear type	GB Cod	GM Cod	GB Haddock	GM Haddock	GB Yellowtail Fld.	GM/CC Yellowtail Fld.	SNE/MA Yellowtail Fld.	GB Winter Fld.	GM/CC Winter Fld.	SNE/MA Winter Fld.	Witch Fld.	Am. Plaice	Pollock	White Hake	Reefish	Wolfish
Otter Trawl, L-M	0.01946	0.01746	0.01222	0.01422	0.01365	0.01565	0.01765	0.0018	0.0016	0.0019	0.00139	0.00533	0.00024	0.00036	0.00334	0.00004
Gillnet, L-M	0.01877	0.01677	0.00041	0.00061	0.00160	0.00180	0.00200	0.0002	0.0001	0.0003	0.00080	0.00026	0.03482	0.00099	0.00137	
Longline	0.14326	0.12326	0.04419	0.06419									0.00007	0.00078	0.00005	0.00004

Note: shaded cells are gear/stock combinations are not included in A16 Table 15

**Example 1. Illustrates use of VTR and Dealer data, use of conversion factors and discard estimation using an assumed discard rate**

For sectors with no at-sea monitoring program, stock discards will be calculated using an assumed discard rate

**Trip used large-mesh otter trawl gear and fished in statistical area 515**

Note: 1 subtrip

1) Uses VTR kept quantity, Dealer landings, and NMFS-provided conversion factors to convert landed weight to live weight.

Note: VTR are good faith haul weights, Dealer assumed to be exact.

2) Match VTR with all Dealer transactions for the trip, convert to live pounds, sum all species live lbs (K<sub>i</sub>)

<u>VTR</u>		<u>DEALER</u>			<u>NMFS</u>
<u>Species AREA 515</u>	<u>Qty kept</u>	<u>Landed</u>		<u>conversion</u>	
		<u>Species*</u>	<u>lbs.</u>	<u>Live lbs.</u>	<u>factors**</u>
COD	210	COD	215	252	1.17
HADD	325	HADD	320	365	1.14
FLGS	125	FLGS	120	120	1
FLDAB	230	FLDAB	235	235	1
SKWINW	110	SKWINW	115	261	2.27
CUSK	25 HC				
LOB	75	LOB	75	75	1
Total	1100		1080	1307	

HC = Home Consumption

3) Use the assumed discard rate (r<sub>ij</sub>) from matrix for Large-mesh Otter Trawl for stocks corresponding to the area fished (i.e. stat area 515)

4) Equation 2 is used here

<u>Stock</u>	<u>Assumed discard rate (r<sub>ij</sub>)</u>	<u>Dealer Kept all species Live lbs. (K<sub>i</sub>)</u>	<u>Discard Live lbs. (D<sub>ij</sub>)</u>
GB Cod	0.01946	0	0
GM Cod	0.01746	1307	23
GB Haddock	0.01222	0	0
GM Haddock	0.01422	1307	19
GB Yellowtail Fld.	0.01365	0	0
GM/CC Yellowtail Fld.	0.01565	1307	20
SNE/MA Yellowtail Fld.	0.01765	0	0
GB Winter Fld.	0.00184	0	0
GM/CC Winter Fld.	0.00164	1307	2
SNE/MA Winter Fld.	0.00194	0	0
Witch Fld.	0.00139	1307	2
Am. Plaice	0.00533	1307	7
Pollock	0.00024	1307	0
White Hake	0.00036	1307	0
Redfish	0.00334	1307	4
Wolffish	0.00004	1307	0

Note: Species/stocks that are not associated with the area fished have discards = 0

\* Species are reported by species, market category, grade, unit of measure

\*\* examples of conversion factors are given in worksheet '7-Examples of conv factors'

## Example 2. Illustrates use of VTR and Dealer data, use of conversion factors, apportionment, and discard estimation using an assumed discard rate

For sectors with no at-sea monitoring program, stock discards will be calculated using an assumed discard rate

### Trip used large-mesh otter trawl gear and fished in statistical areas 515 and 561

Note: 2 subtrips

- 1) Uses VTR kept quantity, Dealer landings, and NMFS-provided conversion factors to convert landed weight to live weight  
Note: VTR are good faith haul weights, Dealer assumed to be exact.
- 2) Match VTR with all Dealer transactions for the trip
- 3) Using VTRs for trip, calculate species percentage among statistical areas (this is used to apportion the Dealer data)
- 4) Convert Dealer landings to live pounds, apportionment of Dealer landings, and sum all species live lbs (Ki) by stock area.

<u>VTR</u>				<u>DEALER</u>			<u>NMFS</u>	<u>DEALER APPORTIONED</u>		
Species	AREA	Qty kept	species %	Landed lbs.	Species*	Landed lbs.	Live lbs.	conversion factors**	Species	Live lbs.
<b>515</b>									<b>AREA 515</b>	
COD		210	33.9%	215	COD	630	737	1.17	COD	250
HADD		325	72.2%	320	HADD	850	969	1.14	HADD	700
FLGS		125	100.0%	120	FLGS	440	440	1	FLGS	440
FLDAB		230	30.3%	235	FLDAB	765	765	1	FLDAB	232
SKWINW		110	26.2%	115	SKWINW	435	987	2.27	SKWINW	259
CUSK		25	100.0% HC	25						
LOB		75	50.0%	75	LOB	155	155	1	LOB	78
					FLYT	505	505	1	FLYT	0
Subtotal		1100		1105					<b>AREA 515 Kept all</b>	<b>1957</b>
<b>561</b>									<b>Species</b>	
COD		410	66.1%	415					<b>AREA 561</b>	Live lbs.
HADD		125	27.8%	530					COD	487
FLGS		0	0.0%	320					HADD	269
FLDAB		530	69.7%	530					FLGS	0
SKWINW		310	73.8%	320					FLDAB	533
LOB		75	50.0%	80					SKWINW	729
FLYT		500	100.0%	505					LOB	78
Subtotal		1950		2700					FLYT	505
									<b>AREA 561 Kept all</b>	<b>2601</b>
Trip Total				3805		3780	4559		<b>Trip Total</b>	<b>4559</b>

5) Use the assumed discard rate ( $r_{cj}$ ) from matrix for Large-mesh Otter Trawl for stocks that correspond to the area fished (i.e. stat area 515, 561, or all)

6) Equation 2 is used here

Stock	Assumed discard rate ( $r_{cj}$ )	Dealer Kept all species Live lbs. ( $K_i$ )	Discard Live lbs. ( $D_{ji}$ )
GB Cod	0.01946	2601	51
GM Cod	0.01746	1957	34
GB Haddock	0.01222	2601	32
GM Haddock	0.01422	1957	28
GB Yellowtail Fld.	0.01365	2601	36
GM/CC Yellowtail Fld.	0.01565	2601	41
SNE/MA Yellowtail Fld.	0.01765	0	0
GB Winter Fld.	0.00184	2601	5
GM/CC Winter Fld.	0.00164	1957	3
SNE/MA Winter Fld.	0.00194	0	0
Witch Fld.	0.00139	4559	6
Am. Plaice	0.00533	4559	24
Pollock	0.00024	4559	1
White Hake	0.00036	4559	2
Redfish	0.00334	4559	15
Wolffish	0.00004	4559	0

Note: Species/stocks that are not associated with the area fished have discards = 0

\* Species are reported by species, market category, grade, unit of measure

### Example 3. Illustrates the calculation of a $d/k_{all}$ ratio based on observed hauls from trips with unobserved hauls

For sectors with an at-sea monitoring program with 100% coverage of trips

**Trip used large-mesh otter trawl gear and fished in statistical area 515; 5 hauls with one haul unobserved**

Note: 1 subtrip

- 1) Uses At-sea monitoring data, Dealer landings, and NMFS-provided conversion factors
- 2) Sum discard pounds by species and statistical area from observed hauls (convert to Live lbs. as needed, i.e. high grading)
- 3) Sum kept pounds for all species from observed hauls (convert to Live lbs.)
- 4) Calculate Dealer Kept for all species as in Example 1
- 5) Calculate stock-specific discard rate based on observed hauls (sum of observed stock discard pounds divided by sum of observed kept pounds)

Taken from Example 1

Area 515	Observed discarded in Live lbs. ( $d_{jm}$ )						Observer kept of all species live lbs. ( $k_{all,m}$ )	DEALER
	Cod	Haddock	Witch	Plaice	Winter Skate	Lobster		Dealer Kept all species Live lbs. ( $K_i$ )
Haul 1	30	25	0	5	25	0	327	
Haul 2	50	35	10	0	15	10	235	
<b>(unobserved) Haul 3</b>								
Haul 4	60	50	5	25	20	0	155	
Haul 5	45	65	0	10	25	15	290	
<b>Total</b>	<b>185</b>	<b>175</b>	<b>15</b>	<b>40</b>	<b>85</b>	<b>25</b>	<b>1007</b>	<b>1307</b>
discard rate	0.184	0.174	0.015	0.040	0.084	0.025		

- 5) Use the stock-specific discard rate for the trip for each stock for the corresponding area fished
- 6) Equation 3 is used here

Stock	Stock discard rate (sum of $d_{jm}$ / sum of $k_{all,m}$ )	Dealer Kept all species Live lbs. ( $K_i$ )	Discard Live lbs. ( $D_{ji}$ )
GB Cod		0	0
GM Cod	0.184	1307	240
GB Haddock		0	0
GM Haddock	0.174	1307	227
GB Yellowtail Fld.		0	0
GM/CC Yellowtail Fld.	0	1307	0
SNE/MA Yellowtail Fld.		0	0
GB Winter Fld.		0	0
GM/CC Winter Fld.	0	1307	0
SNE/MA Winter Fld.		0	0
Witch Fld.	0.015	1307	19
Am. Plaice	0.040	1307	52
Pollock	0	1307	0
White Hake	0	1307	0
Redfish	0	1307	0
Wolffish	0	1307	0

Note: Species/stocks that were not observed to be discarded on the trip have a discard rate = 0.  
Species/stocks that are not associated with the area fished have discarded pounds = 0

### Example 4. Good faith approximation of sea day coverage for sectors

Data from 2009 SBRM prioritization analysis utilizing NEFOP and VTR data from July 2007 to June 2008

- 1) Uses SBRM sea days needed to achieve a 30%CV, VTR sea days from all vessels, VTR sea days from sector vessels
- 2) Calculate rescaling ratio (SBRM sea days divided by VTR sea days from all vessels)
- 3) Sum the product of the Sector's VTR sea day multiplied by the rescaling ratio over all SBRM fleets associated with A16 (Equation 4)
- 4) As a check, the non-sector vessels have been included to show that the totals add up.
- 5) Need final Sector rosters, re-calculate VTR sea days by sector and SBRM fleet

From SBRM sea day prioritization analysis				VTR sea days by sector ( $a_{is}$ ) and non-sector and SBRM fleet (f)							
SBRM fleet (f)	SBRM		Rescaling ratio ( $n_i/N_i$ )	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Non-Sector vessels	Total
	sea days ( $n_i$ )	VTR sea days ( $N_i$ )									
MA Longline	108	1,191	0.0906							1,191	1,191
NE Longline	456	1,508	0.3024	106	290	550	28	58		476	1,508
MA Large-mesh Trawl	1,459	11,531	0.1265			3,361		4		8,138	11,531
NE Large-mesh Trawl	1,233	27,836	0.0443			18,088	542	4,116	315	4,775	27,836
MA Large-mesh Gillnet	139	884	0.1576			6				878	884
NE Large-mesh Gillnet	187	9,324	0.0200	808		5,898	450	528	16	1,624	9,324
Total Number Days	3,582	52,274		914	290	27,903	1,020	4,706	359	17,082	52,274
<b>Good faith approximation of sector sea days (<math>SD_s</math>)</b>				<b>48</b>	<b>88</b>	<b>1,512</b>	<b>41</b>	<b>211</b>	<b>18</b>	<b>1,664</b>	<b>3,582</b>

Note: Along with the other caveats, in some cases, sample size is may be untenably small

### Illustrative example of NMFS-provided conversion factors

Use species, grade description, market category description, unit of measure to convert reported quantity to live weight using two conversion factors: reported quantity to landed pounds and landed pounds to live pounds.

Common name	Grade Desc.	Market Desc.	Unit of Measure	Conversion Factor CF_RPTQTY_LNDLB	Conversion Factor CF_LNDLB_LIVLB
GOOSEFISH	ROUND	MEDIUM	LB	1	1
GOOSEFISH	ROUND	SMALL	LB	1	1
GOOSEFISH	ROUND	LARGE	LB	1	1
GOOSEFISH	LIVERS	LARGE	LB	1	0
GOOSEFISH	LIVERS	MEDIUM	LB	1	0
GOOSEFISH	LIVERS	MIXED	LB	1	0
GOOSEFISH	LIVERS	RATS	LB	1	0
GOOSEFISH	LIVERS	SMALL	LB	1	0
GOOSEFISH	LIVERS	UNKNOWN	LB	1	0
GOOSEFISH	GUTTED, HEAD ON	LARGE	LB	1	1.14
GOOSEFISH	GUTTED, HEAD ON	SMALL	LB	1	1.14
GOOSEFISH	GUTTED, HEAD ON	UNKNOWN	LB	1	1.14
GOOSEFISH	CHEEKS	UNKNOWN	LB	1	0
GOOSEFISH	BELLY FLAPS	UNKNOWN	LB	1	0
GOOSEFISH	TAILS	LARGE	LB	1	3.32
GOOSEFISH	TAILS	PEE WEE (RATS)	LB	1	3.32
GOOSEFISH	TAILS	SMALL	LB	1	3.32
GOOSEFISH	TAILS	UNKNOWN	LB	1	3.32
GOOSEFISH	ROUND	UNKNOWN	LB	1	1
GOOSEFISH	ROUND	MIXED	LB	1	1
GOOSEFISH	ROUND	RATS	LB	1	1
GOOSEFISH	DRESSED	LARGE	LB	1	2
GOOSEFISH	DRESSED	MEDIUM	LB	1	2
GOOSEFISH	DRESSED	MIXED	LB	1	2
GOOSEFISH	DRESSED	RATS	LB	1	2
GOOSEFISH	DRESSED	SMALL	LB	1	2
GOOSEFISH	HEADS	UNKNOWN	LB	1	0
GOOSEFISH	TAILS	MEDIUM	LB	1	3.32
COD,ATLANTIC	CHEEKS	UNKNOWN	LB	1	0
COD,ATLANTIC	ROUND	UNKNOWN	LB	1	1
COD,ATLANTIC	ROUND	MIXED	LB	1	1
COD,ATLANTIC	GUTTED	MARKET	LB	1	1.17
COD,ATLANTIC	GUTTED	SNAPPER	LB	1	1.17
COD,ATLANTIC	GUTTED	UNKNOWN	LB	1	1.17
COD,ATLANTIC	GUTTED	WHALE	LB	1	1.17
COD,ATLANTIC	GUTTED	SCROD	LB	1	1.17
COD,ATLANTIC	DRESSED	STEAKER	LB	1	1.6
COD,ATLANTIC	GUTTED	LARGE	LB	1	1.17
COD,ATLANTIC	UNGRADED	UNKNOWN	LB	1	1
COD,ATLANTIC	SPERM	UNKNOWN	LB	1	0
COD,ATLANTIC	LIVE	UNKNOWN	LB	1	1
SKATE, WINTER	ROUND	UNKNOWN	LB	1	1
SKATE, WINTER	WINGS	UNKNOWN	LB	1	2.27