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New England Fishery Management Council
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John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

MEMORANDUM

DATE: April 29, 2009

TO: NEFMC Scientific and Statistical Committee

FROM: Phil. Haring, Monkfish PDT Chair

SUBJECT: **Monkfish PDT Report for the April 30th SSC Meeting on Monkfish Amendment 5**

The PDT met on April 28th to finalize its report to the SSC. The terms of reference for the SSC meeting are:

1. Review and provide guidance on the PDT's updated calculation of MSY, OFL reference points (using exploitable biomass rather than total biomass), and ABC. Set ABC in accordance with MSRA.

2. Review and provide guidance on the PDT's calculation of various catch targets (ACTs) using the SCALE model for fishing years 2011-2013.

TOR 1:
OFL and MSY: The PDT updated calculations of OFL and MSY using current exploitable biomass, rather than total biomass, as had been presented at the last SSC meeting. OFL is an annual limit derived as the product of current exploitable biomass and $F_{threshold}$. In this case, the most recent estimate of biomass is the one from the Data Poor Working Group (DPWG) assessment for 2006. MSY is a long-term average value derived as the product of B_{target} and $F_{threshold}$. The DPWG calculated B_{target} the average of *total* biomass 1980-2006, but for the purpose of determining MSY, *exploitable* biomass needs to be used. For the Northern area, the SCALE model input maintained a consistent selectivity pattern throughout the time series, but for the Southern area, three different selectivity patterns were applied to reflect changes in predominant gears during the period. As a result, the PDT recalculated B_{target} as exploitable biomass by applying the selectivity pattern during the most recent period to the entire time series (Table 1 and Figure 1).

The results of the calculations are shown in Table 2. **MSY values are 17,053 mt and 25,487 mt for Northern and Southern areas, respectively. OFL values are 22,729 mt and 28,263 mt, North and South.**

ABC: The SSC recommended that an interim ABC should be derived as the product of the average exploitation rate during the recent period of stable or increasing trend in biomass for each management unit and the most recent estimate of exploitable biomass. The PDT

reviewed the SCALE model results from the 2007 assessment and determined that the period 1999-2006 and 2000-2006 be used for northern and southern management areas, respectively. The starting years are those where the first increase was observed (see Table 3). The calculations produced values for **ABC of 17,485 mt (North) and 13,330 mt (South).** These resulted in buffers between OFL and ABC of 5,234 mt (North) and 14,930 mt (South), or 23% and 53% of the respective OFL values (Table 4).

	Exploitable Biomass (mt)		
	PDT 2009	DPWG 2007	
1980	74,524	86,815	
1981	82,285	95,232	
1982	92,009	105,523	
1983	101,971	115,814	
1984	110,891	124,734	
1985	118,625	132,016	
1986	122,689	134,990	
1987	124,376	135,605	
1988	122,651	133,229	
1989	117,442	127,900	
1990	104,752	115,536	
1991	96,516	108,043	
1992	87,770	98,674	
1993	77,186	88,038	
1994	68,357	80,425	
1995	66,027	79,525	
1996	64,206	67,979	
1997	63,417	67,391	
1998	63,164	67,261	
1999	62,768	66,611	
2000	65,756	69,215	
2001	71,213	74,597	
2002	74,072	77,922	
2003	80,661	85,268	
2004	86,742	86,742	
2005	93,818	93,818	
2006	98,250	98,250	
			difference
average	88,598	96,932	8,334
=Btarget proxy			

Table 1 Comparison of Southern area exploitable biomass estimates from final SCALE runs from DPWG 2007 (3 selectivity blocks) to exploitable biomass derived by applying the most recent selectivity block (2004-2006) to numbers at length output from DPWG 2007 final SCALE run and converting to weight at length.

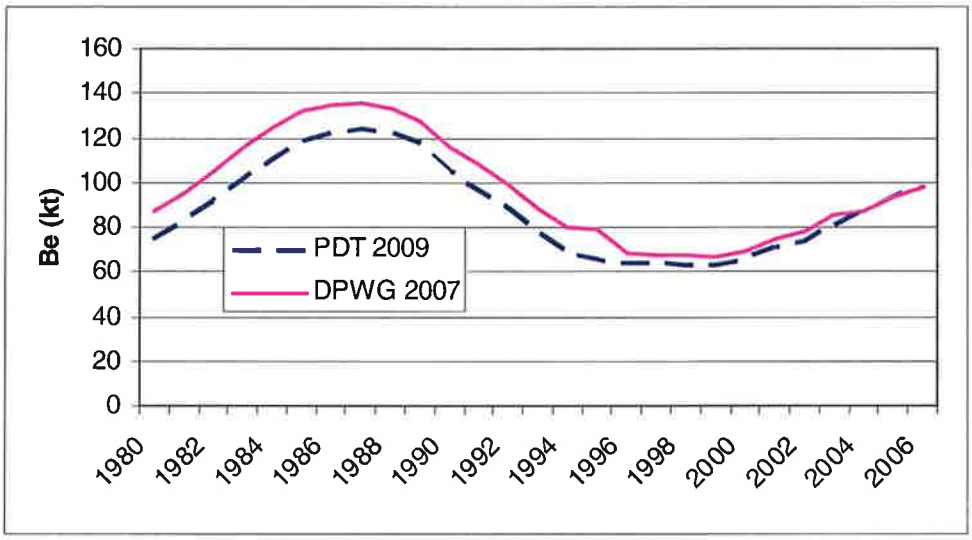


Figure 1 Comparison of Southern area exploitable biomass estimates from final SCALE runs from DPWG 2007 (3 selectivity blocks) to exploitable biomass derived by applying the most recent selectivity block (2004-2006) to numbers at length output from DPWG 2007 final SCALE run and converting to weight at length (PDT 2009).

	$F_{threshold}$	M	exploitable B_{2006} (mt)	exploitable B_{target} (mt)*	$U = F/Z*(1-e^{-Z})$	MSY proxy = $F/Z*(1-e^{-Z})*B$	OFL
North	0.31	0.30	97,940	73,484	0.2321	17,053	22,729
South	0.40	0.30	98,250	88,598	0.2877	25,487	28,263

* calculated as average of exploitable biomass (1980-2006) from SCALE using selectivity curve for 2004-2006 for entire time series

B target was defined by DPWG as average of total biomass (1980-2006)

Table 2 PDT calculations of MSY and OFL based on exploitable biomass targets.

North					South				
Year	Age-1 Recruitment	Exploitable Biomass (kt)	Total Biomass (kt)	F	Year	Age-1 Recruitment	Exploitable Biomass (kt)	Total Biomass (kt)	F
1980	20.50	110.83	127.27	0.05	1980	31.05	86.81	107.91	0.09
1981	14.77	107.23	123.28	0.05	1981	29.96	95.23	116.80	0.06
1982	15.30	104.22	119.68	0.05	1982	24.51	105.52	127.14	0.05
1983	14.84	101.03	115.55	0.05	1983	22.13	115.81	136.88	0.05
1984	13.53	98.12	111.38	0.06	1984	21.65	124.73	144.67	0.04
1985	10.42	94.16	106.18	0.08	1985	20.58	132.02	150.44	0.05
1986	15.11	88.66	99.93	0.07	1986	23.80	134.99	152.10	0.04
1987	14.15	83.50	94.26	0.09	1987	36.12	135.61	152.67	0.04
1988	17.42	76.51	87.14	0.11	1988	14.49	133.23	150.35	0.05
1989	23.66	68.89	80.34	0.15	1989	25.93	127.90	145.58	0.12
1990	27.30	60.25	73.29	0.17	1990	34.10	115.54	133.81	0.10
1991	21.38	53.53	68.36	0.18	1991	39.77	108.04	127.04	0.13
1992	23.33	49.53	66.24	0.22	1992	32.57	98.67	118.80	0.20
1993	36.49	49.15	67.62	0.34	1993	43.95	88.04	110.42	0.26
1994	33.13	46.75	66.12	0.34	1994	35.49	80.43	104.39	0.23
1995	15.48	46.35	66.26	0.41	1995	29.88	79.52	104.05	0.28
1996	20.10	44.93	65.23	0.43	1996	23.35	67.98	101.55	0.35
1997	34.47	45.51	65.33	0.32	1997	24.53	67.39	100.18	0.37
1998	40.99	49.87	69.09	0.20	1998	43.85	67.26	98.37	0.36
1999	52.82	56.78	78.25	0.20	1999	39.26	66.61	96.42	0.29
2000	52.57	61.83	88.35	0.22	2000	34.85	69.21	99.76	0.19
2001	32.21	66.90	97.95	0.30	2001	16.56	74.60	107.38	0.23
2002	26.24	70.35	103.03	0.30	2002	33.33	77.92	112.56	0.19
2003	26.10	77.35	108.33	0.32	2003	50.37	85.27	120.07	0.20
2004	27.85	83.57	110.08	0.23	2004	25.71	86.74	124.26	0.15
2005	22.79	90.33	112.87	0.16	2005	17.44	93.82	129.99	0.15
2006	27.05	97.94	118.70	0.09	2006	30.60	98.25	135.45	0.12
2007	20.50	109.52	129.62	0.06	2007	31.05	104.87	142.74	0.07
2008	20.50	119.88	139.31	0.06	2008	31.05	116.07	151.76	0.07
2009	20.50	125.40	144.02	0.05	2009	31.05	125.14	158.82	0.06

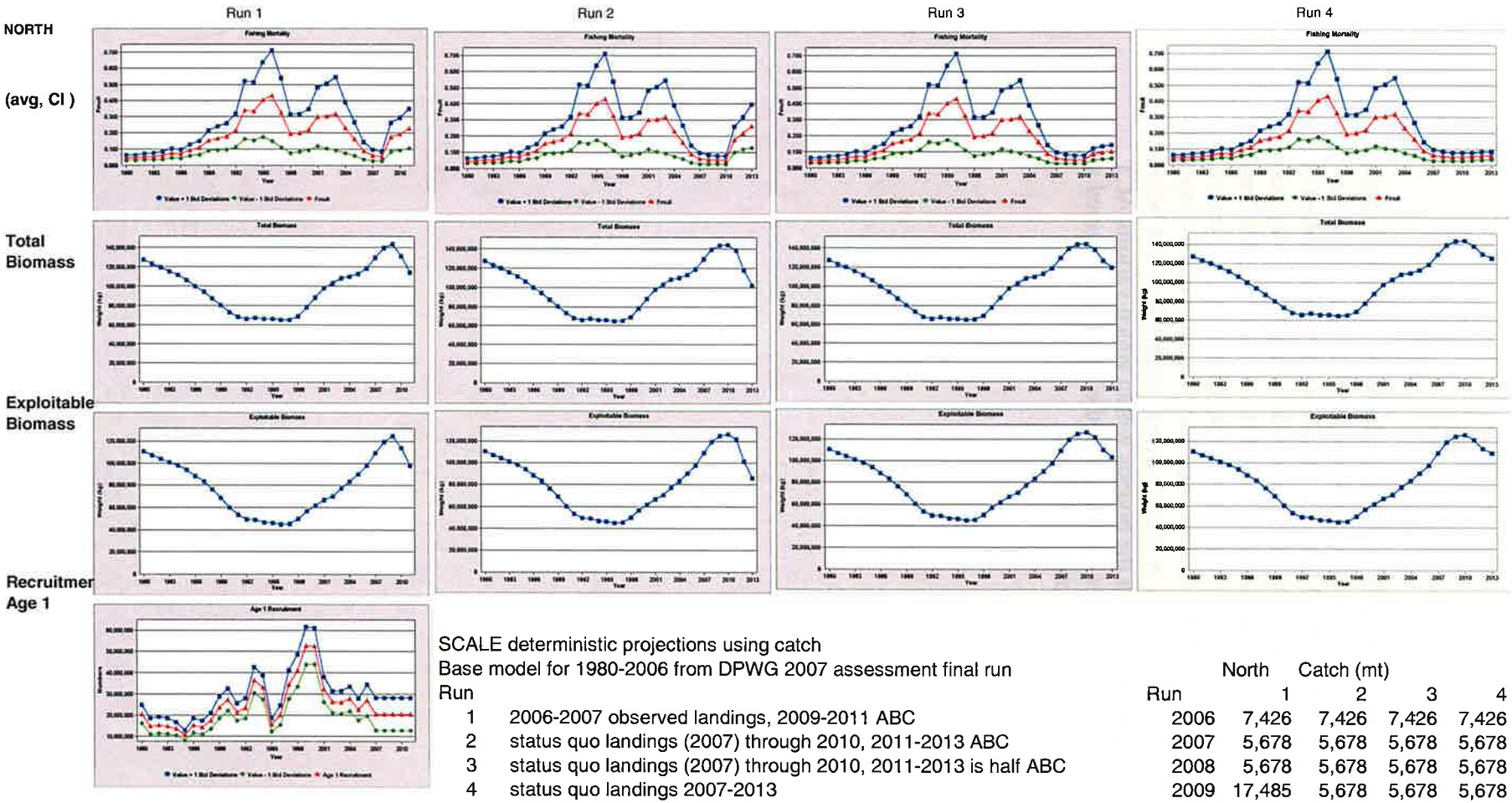
Table 3 Estimates of Age-1 recruitment, Exploitable and Total Biomass and Fishing mortality rate from the SCALE model final run (DPWG, 2007)

	Start Year	F_{abc}	U_{abc}	Exp. B_{2006} (kmt)	ABC (mt)	OFL-ABC (mt)	Buffer (OFL-ABC)/OFL
NORTH	1999	0.23	0.18	97.94	17,485	5,234	23%
SOUTH	2000	0.17	0.14	98.25	13,326	14,937	53%

Table 4 PDT Calculation of ABC and the buffers between ABC and OFL

TOR 2:

The PDT conducted several runs of the SCALE model to evaluate the impact of various catch scenarios on the trend in biomass. The results are shown in the attached figures (Figure 2 and Figure 3). Run #1 used observed landings for 2006-2007, and applied the ABC value for 2009-2011 to illustrate the effect of catch at ABC early in the projection time period. Runs 2 and 3 assume status quo catch through 2010 and catch at ABC and ½ ABC for 2011-2013. These runs reflect the fact that current specifications will remain in effect until 2011, when Amendment 5 will take effect. Run 4 uses current catch extended through 2013. Since the ACTs will likely be at or above current catch levels and below ABC, the range of inputs to these runs provides the bounds within which various ACT alternatives can be evaluated. [Note: the figures distributed at the meeting contained an editorial error that has been corrected in this version, 5/5/09)

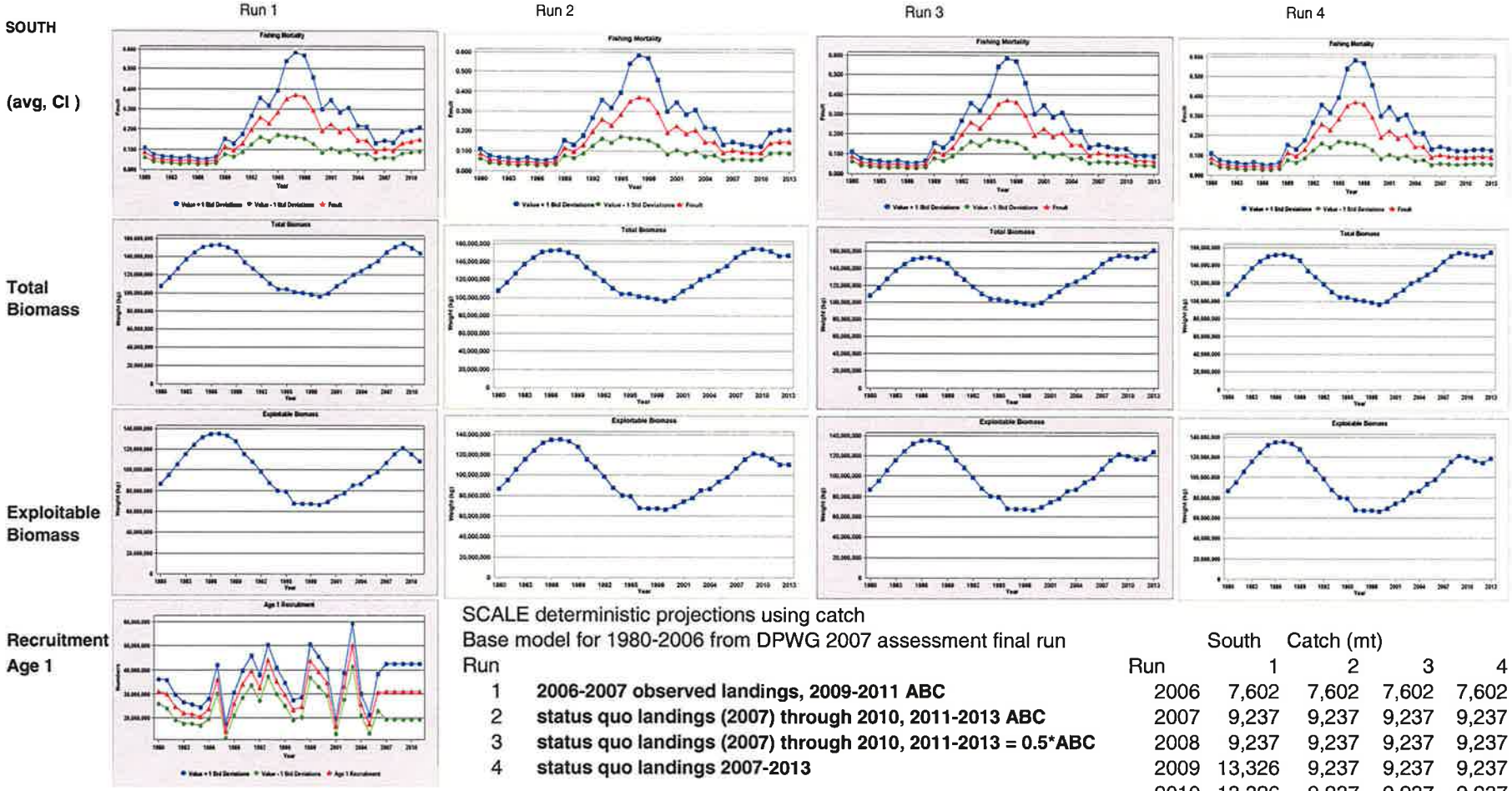


SCALE deterministic projections using catch
Base model for 1980-2006 from DPWG 2007 assessment final run
Run

1	2006-2007 observed landings, 2009-2011 ABC
2	status quo landings (2007) through 2010, 2011-2013 ABC
3	status quo landings (2007) through 2010, 2011-2013 is half ABC
4	status quo landings 2007-2013

	North	Catch (mt)		
Run	1	2	3	4
2006	7,426	7,426	7,426	7,426
2007	5,678	5,678	5,678	5,678
2008	5,678	5,678	5,678	5,678
2009	17,485	5,678	5,678	5,678
2010	17,485	5,678	5,678	5,678
2011	17,485	17,485	8,743	5,678
2012		17,485	8,743	5,678
2013		17,485	8,743	5,678

Figure 2 Updated (5/5/09) Northern area SCALE model projections using four variable catch input values.



SCALE deterministic projections using catch

Base model for 1980-2006 from DPWG 2007 assessment final run

Run	
1	**2006-2007 observed landings, 2009-2011 ABC**
2	**status quo landings (2007) through 2010, 2011-2013 ABC**
3	**status quo landings (2007) through 2010, 2011-2013 = 0.5*ABC**
4	**status quo landings 2007-2013**

	South Catch (mt)			
Run	1	2	3	4
2006	7,602	7,602	7,602	7,602
2007	9,237	9,237	9,237	9,237
2008	9,237	9,237	9,237	9,237
2009	13,326	9,237	9,237	9,237
2010	13,326	9,237	9,237	9,237
2011	13,326	13,326	6,663	9,237
2012		13,326	6,663	9,237
2013		13,326	6,663	9,237

Figure 3 Updated (5/5/09) Southern area SCALE model projections using four variable catch input values.