

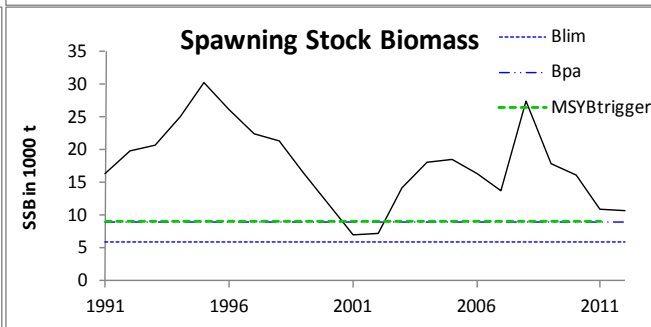
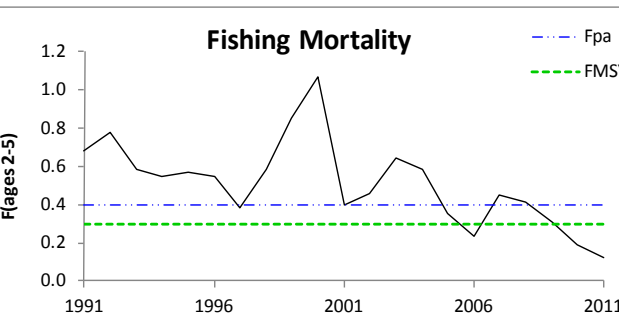
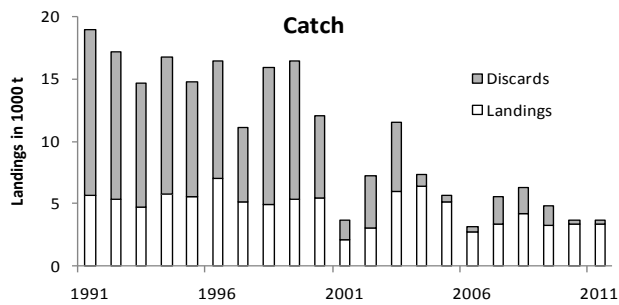
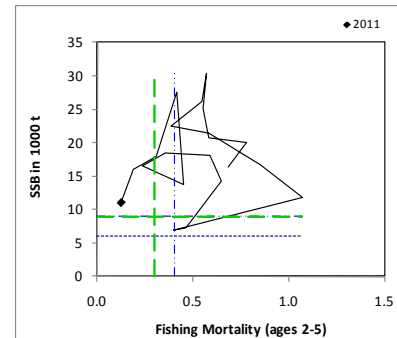
**ECOREGION Celtic Sea and West of Scotland**  
**STOCK Haddock in Division VIb (Rockall)**

**Advice for 2013**

ICES advises on the basis of the MSY approach that there should be no directed fisheries and that bycatch and discards should be minimized in 2013. Due to extremely low recruitment in recent years, SSB is predicted to decrease strongly and be below  $B_{lim}$  in 2013 and 2014.

**Stock status**

F (Fishing Mortality)			
	2009	2010	2011
MSY ( $F_{MSY}$ )	✘	✔	✔ Below target
Precautionary approach ( $F_{pa}, F_{lim}$ )	✔	✔	✔ Harvest sustainably
SSB (Spawning-Stock Biomass)			
	2010	2011	2012
MSY ( $B_{trigger}$ )	✔	✔	✔ Above trigger
Precautionary approach ( $B_{pa}, B_{lim}$ )	✔	✔	✔ Full reproductive capacity



**Figure 5.4.24.1** Haddock in Division VIb (Rockall). Summary of stock assessment (weights in thousand tonnes). Recruitment in 2012 is predicted. Top right: SSB and F for the time-series used in the assessment.

Recruitments since 2007 are estimated to be extremely weak. The spawning-stock biomass increased up to 2008 as a result of the 2001 and 2005 year classes and has decreased constantly since then. SSB has been above MSY  $B_{trigger}$  since 2003 but is now expected to decrease below  $B_{lim}$ . Fishing mortality has declined over time and is now below  $F_{MSY}$ .

**Management plans**

A management plan is under development and is currently being evaluated by ICES.

## Biology

The haddock stock at Rockall is an entirely separate stock from that on the continental shelf of the British Isles. Rockall haddock have lower growth rates and reach a lower maximum size than other haddock populations in the Atlantic.

### Environmental influence on the stock

Recruitment for the last four years has been low despite a large SSB. This may be related to rising seawater temperature on the Rockall bank. An increase in temperature leads to an acceleration of metabolic processes and an increase in the energy and food consumption. At the same time there was a significant reduction of *Calanus finmarchicus* which is the main food item for larval and juvenile haddock at Rockall. In this situation of food scarcity a negative impact on juveniles has increased predation and food competition from the grey gurnard. All these factors led to a reduction in the recruitment of Rockall haddock.

### The fisheries

Haddock in Division VIb are caught in a directed fishery and as a bycatch in demersal and gillnet fisheries. Haddock are mostly taken in fisheries deploying otter trawls, but also by pair trawlers and gillnetters. Last year the discards were significantly reduced as a result of the small number of young haddock in the population.

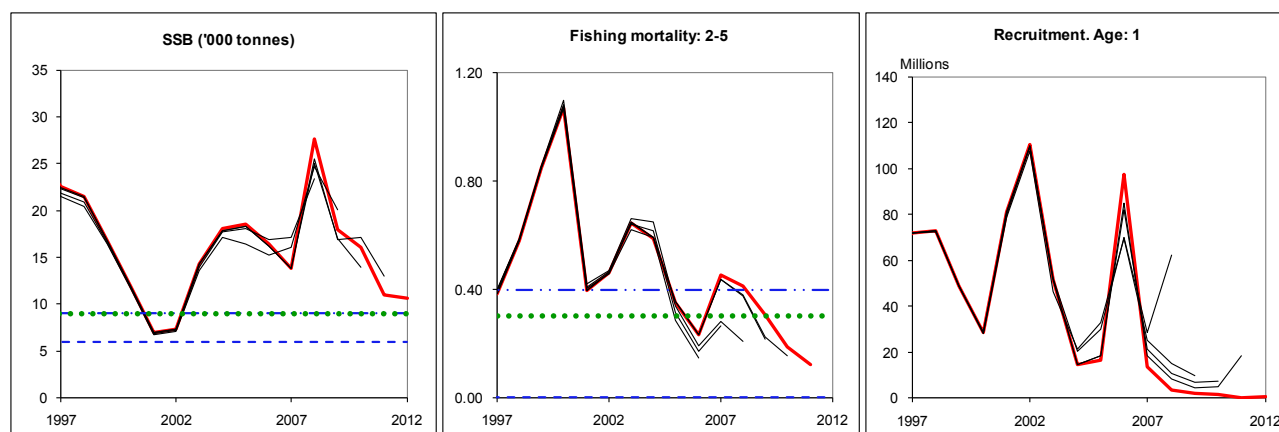
**Catch distribution** Total catches (2011) = 2.1 kt, where 1.9 kt were landings (93%) and 0.2 kt discards (7% by weight and 11% by numbers).

### Effects of the fisheries on the ecosystem

In order to protect cold-water corals, four areas (northwest Rockall, Logachev Mounds, west Rockall Mounds, and Empress of British Banks) have been closed since 2007.

### Quality considerations

An improved time-series of landings and discards is needed for this assessment. The survey used in the assessment was not carried out in 2010. The survey was resumed in 2011 in an attempt to make the assessment more robust. The effect of the new survey design needs to be further evaluated.



**Figure 5.4.24.2** Haddock in Division VIb (Rockall). Historical assessment results (final-year recruitment estimates included).

### Scientific basis

<b>Assessment type</b>	Analytical catch-at-age assessment (XSA).
<b>Input data</b>	One survey index (Rock-WIBTS-Q3).
<b>Discards and bycatch</b>	Included in the assessment.
<b>Indicators</b>	None.
<b>Other information</b>	Russian trawl-acoustic survey and the trawl survey-based assessment.
<b>Working group report</b>	<a href="#">WGCSE</a>

**ECOREGION** Celtic Sea and West of Scotland  
**STOCK** Haddock in Division VIb (Rockall)

**Reference points**

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
MSY Approach	MSY $B_{trigger}$	9000 t	$B_{pa}$
	$F_{MSY}$	0.3	Provisional proxy by analogy with North Sea haddock. Fishing mortalities close to $F_{sq}$ in 2010.
Precautionary Approach	$B_{lim}$	6000 t	$B_{lim} = B_{loss}$ , the lowest observed spawning stock estimated in previous assessments.
	$B_{pa}$	9000 t	$B_{pa} = B_{lim} * 1.4$ . This is considered to be the minimum SSB required to obtain a high probability of maintaining SSB above $B_{lim}$ , taking into account the uncertainty of assessments.
	$F_{lim}$	Not defined.	Not defined due to uninformative stock recruitment data.
	$F_{pa}$	0.4	This F is adopted by analogy with other haddock stocks as the F that provides a small probability that SSB will fall below $B_{pa}$ in the long term.

(unchanged since: 2010)

**Outlook for 2013**

Basis:  $F_{2012} = F_{sq} = F(2009-2011) = 0.21$ ; SSB (2013) = 5.76; R (2012) = 398 thousands; R (2013) = 13 432 thousands; Landings (2012) = 3.26; Total catch (2012) = 3.43.

Rationale	Human consumption (2013)	Basis	F (2013)	Catch Total (2013)	SSB (2014)	SSB <sub>2014</sub> /MSY $B_{trigger}$	%SSB change <sup>1)</sup>	%TAC change <sup>2)</sup>
MSY framework	1.7	$F_{MSY} * SSB_{2013} / MSY B_{trigger}$	0.19	1.9	3.4	0.38	-41.2	-48.5
Precautionary approach	SSB < $B_{pa}$ for all scenarios	Maintain SSB > $B_{pa}$	-	-	-	-	-	-
Zero catch	0.0	F=0	0.0	0.0	5.0	0.55	-11.8	-100.0
Other options	0.4	$F_{2012} * 0.2$	0.04	0.5	4.6	0.51	-13.6	-87.9
	1.1	$F_{0.1} (F_{2012} * 0.55)$	0.11	1.2	3.9	0.43	-32.6	-66.7
	1.6	$F_{2012} * 0.8$	0.16	1.7	3.5	0.39	-39.5	-51.5
	1.7	$F_{2012} * 0.9$	0.19	1.9	3.4	0.38	-41.2	-48.5
	1.9	$F_{2012}$	0.21	2.0	3.2	0.36	-44.7	-42.4
	2.805	-15% TAC ( $F_{2012} * 1.7$ )	0.35	3.0	2.4	0.27	-58.5	-15.0
	3.3	0% TAC ( $F_{2012} * 2.2$ )	0.45	3.6	1.9	0.21	-67.2	0.0
	3.0	$F_{pa} (F_{2012} * 1.95)$	0.4	3.3	2.1	0.23	-63.7	-9.1
	3.795	+15% TAC ( $F_{2012} * 2.9$ )	0.6	4.2	1.4	0.16	-75.8	15.0
3.1	$F_{2012} * 2.0$	0.41	3.4	2.1	0.23	-63.7	-6.1	

Weights in thousand tonnes.

<sup>1)</sup> SSB 2014 relative to SSB 2013.

<sup>2)</sup> Human consumption landings 2013 relative to TAC 2012.

Total catches have been divided into landings and discards using the average ratio of discards to catches over the period 1999–2011.

**MSY approach**

Following the ICES MSY framework implies fishing mortality at  $F_{MSY-HCR} = F_{MSY} * SSB_{2013} / MSY B_{trigger} = 0.19$ , resulting in landings of no more than 1700 t in 2013. This is expected to lead to an SSB of 3400 t in 2014, which is below MSY  $B_{trigger}$ .

However, considering the extremely low recruitment since 2007 and that SSB will be below MSY  $B_{trigger}$  in 2014 for all catch scenarios, it is not possible to identify any non-zero catch which would be compatible with the MSY approach.

Also, bycatches including discards of haddock in all fisheries in Division VIb should be reduced to the lowest possible level. Further management measures should be introduced to reduce discarding of small haddock in order to maximize their contribution to future yield and SSB.

### *Precautionary approach*

SSB in 2014 is estimated to be below  $B_{lim}$  for all scenarios. It is not possible to identify any non-zero catch which would be compatible with the precautionary approach.

### **Additional considerations**

The European Community and the Russian Federation have proposed a draft plan for the harvest control component of a long-term management plan for haddock at Rockall. NEAFC requests ICES to evaluate this component of the long-term management plan for Rockall haddock.

In 2012 SSB is at  $B_{pa}$ , but the incoming recruitment for the last five years has been extremely low. There is a high probability that the SSB will decrease to levels below  $MSY B_{trigger}$  and to  $B_{pa}$  already in 2013.

The TAC only applies to catches in the EU zone. The TAC should apply to all areas and countries having fisheries for this stock. Since 1999 part of Division VIb has been in international waters where non-EU vessels are not subject to TAC. This allows for an unregulated fishery in the Rockall area. In later years, effort and catch of non-EU fleets have significantly declined and there was no fishery without TAC in 2011, but the stock declined significantly. In addition, misreporting and discarding can lead to removals that exceed the TAC.

The forecast predicts future catches disaggregated into landing and discard components. The discard ratio averages around 60% (by weight) over 1991–2003 and 20% in the recent period (2004–2011). Some countries land the whole catch while others discard part of the catch. For the latter, discard rates on observer trips in the past were as high as 52–87% in numbers. In later years the discards ratio has declined as a result of the poor year classes and decreasing number of small haddock. It would be beneficial to develop and introduce into fisheries practices measures aimed at preventing discards of haddock. Elaboration of such measures comply with recommendations under the UNGA Resolution 61/105 that urge states to take action to reduce or eliminate fish discards (UNGA Resolution 61/105, 2007, Chapter VIII, item 60).

Haddock is taken in a mixed fishery together with monk and megrim. Some of the fisheries include substantial catches of blue whiting and non-assessed species such as grey gurnard.

### *The effects of regulations*

Following the NEAFC agreement in March 2001, an area of the NEAFC zone around Rockall was closed to fishing. In spring 2002, part of the shallow water in the EU component was also closed to trawling. The main goal of the ban was to protect young haddock distributed in shallow water. Effort in the rectangle containing the closure declined when the closure came into effect. There was also a decline in UK effort across the bank as a whole at this time, but an increase of effort in other areas of Division VIb. Spawning biomass increased in 2003–2008 but has decreased since 2009. The fishing mortality has decreased since 2004. In 2006 and 2011, mortality reached the lowest estimates for the last 20 years. Fishing mortality has decreased for small individuals (ages 1 and 2) since 2001. The recruitment has been extremely low since 2007.

### *Data and methods*

The assessment is based on catch numbers-at-age and one survey index (Rock-WIBTS-Q3). In 2011 the survey was resumed with a new gear but an analysis showed that there was no detectable difference between the older and new survey on haddock indices (ICES, 2012b). This makes this year's assessment more robust than last year. The survey area coverage was also reviewed and was extended into deeper waters in 2011. In most cases the survey areas that include areas with depths less than 200 m are regarded as the standard survey areas. The indices obtained from the standard survey area were used for assessment. New survey indexes will be used for the assessment once the time-series for the whole area of haddock distribution is of sufficient length.

Discarding occurs in part of the fishery and has been estimated and used in the assessment.

### *Uncertainties in assessment and forecast*

A main uncertainty in the assessment and forecast concerns the estimates of discards in the EU fleets. In some years, including 2011, these are directly estimated from sampling on-board Scottish and Irish vessels, and in other years are

inferred using survey length frequencies, average fishery selectivity and discarding ogives, and length frequencies from port sampling. Furthermore, in 2010 there was no discard sampling or survey, and average discard rates were applied. There are doubts on the level of agreement of age reading by international experts.

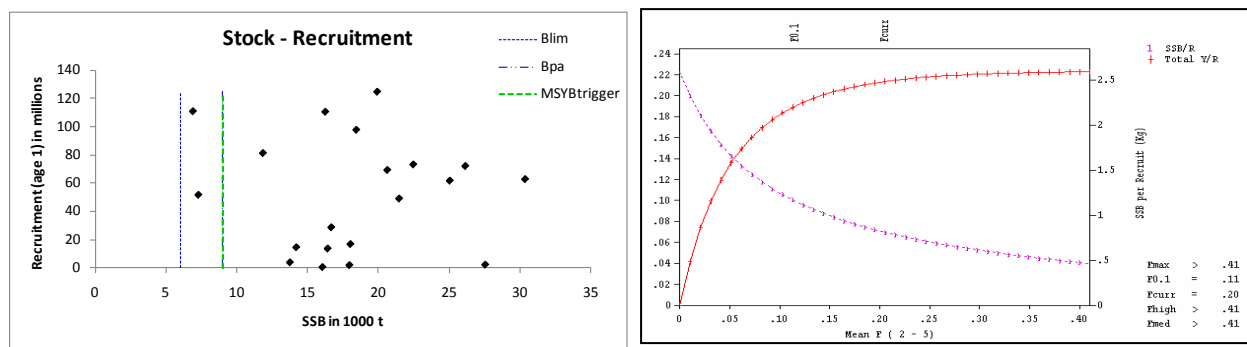
*Comparison with previous assessment and advice*

The assessment is an update of last year’s assessment with the resumption of the survey in 2011. Fishing mortality in 2010 has been revised upward by 18%, and SSB in 2010 has been revised downward by 6%, when compared with last year’s assessment.

The basis for the advice is the same as last year.

**Sources**

- ICES. 2012a. Report of the Working Group on Celtic Seas Ecosystems (WGCSE), 9–18 May 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:12.
- ICES, 2012b. Report of the International Bottom Trawl Survey Working Group (IBTSWG), 27–30 March, Lorient, France. ICES CM 2012/SSGESST:03.



**Figure 5.4.24.3** Haddock in Division VIb (Rockall). Stock–recruitment relationship (left panel) and yield-per-recruit analysis (right panel).

**Table 5.4.24.1** Haddock in Division VIb (Rockall). ICES advice, management, and landings.

Year	ICES Advice, Single-stock exploitation boundaries from 2004 onwards	Predicted catch corresp. to advice	Agreed TAC	Official landings	ICES landings
1987	Precautionary TAC	10.0		8.0	8.4
1988	Precautionary TAC	10.0		7.6	7.9
1989	<i>Status quo</i> F; TAC	18.0		6.6	6.7
1990	Precautionary TAC	5.5		8.2	3.9
1991	Precautionary TAC	5.5		5.9	5.7
1992	Precautionary TAC	3.8		4.5	5.3
1993	80% of F(91)	3.0		4.1	4.8
1994	If required, precautionary TAC	-		3.7	5.7 <sup>1</sup>
1995	No long-term gain in increasing F	5.1 <sup>2</sup>		5.5	5.6
1996	No long-term gains in increasing F	6.9 <sup>2</sup>		6.8	7.1
1997	No advice given	4.9 <sup>2</sup>		5.2	5.2
1998	No increase in F	4.9		5.1	4.5
1999	Reduce F below F <sub>pa</sub>	3.8		6.0	5.1
2000	Reduce F below F <sub>pa</sub>	< 3.5		5.7 <sup>3</sup>	5.3 <sup>4</sup>
2001	Reduce F below F <sub>pa</sub>	< 2.7		2.3 <sup>3</sup>	2.0 <sup>4</sup>
2002	Reduce F below 0.2	<1.3		3.0	3.3
2003	Lowest possible F	-		6.1	6.2
2004	Lowest possible catch <sup>5</sup>		0.702 <sup>8</sup>	6.3	6.4
2005	Lowest possible catch <sup>5</sup>		0.702 <sup>8</sup>	5.2	5.2
2006	Lowest possible catch <sup>5</sup>		0.597 <sup>8</sup>	2.8	2.8
2007	Reduce F below F <sub>pa</sub> <sup>5</sup>	<7.11	4.615 <sup>8</sup>	3.3	3.3
2008	Keep F below F <sub>pa</sub> <sup>5</sup>	<10.6 <sup>6</sup>	6.916 <sup>8</sup>	4.2	4.2
2009	No long-term gains in increasing F <sup>5</sup>	<4.3 <sup>7</sup>	5.879 <sup>8</sup>	3.8	3.8
2010	No long-term gains in increasing F <sup>5</sup>	<3.3 <sup>7</sup>	4.997 <sup>8</sup>	3.4	3.4
2011	See scenarios	-	3.748 <sup>8</sup>	1.9	1.9
2012	MSY approach	<3.3 <sup>7</sup>	3.300 <sup>8</sup>		
2013	No directed fisheries, minimize bycatch and discards	0			

Weights in thousand tonnes.

<sup>1</sup> Including misreporting.<sup>2</sup> Landings at *status quo* F.<sup>3</sup> Incomplete data.<sup>4</sup> Discards are not taken into account for the assessment, and data of the Russian fleet which lands the whole catch were adjusted to exclude fish below MLS of 30 cm.<sup>5</sup> Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits.<sup>6</sup> This corresponds to catch (= landings + discards).<sup>7</sup> This corresponds to landings.<sup>8</sup> Agreed EU TAC for Division VIb and Subareas XII and XIV.

**Table 5.4.24.2** Haddock in Division VIb (Rockall). Nominal catch (tonnes), 1994–2011, as officially reported to ICES.

COUNTRY	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 <sup>1</sup>	2011 <sup>1</sup>
Faroe Islands	-	-	-	-	-	-	n/a	n/a	-	-	-	-	2	2	16	16	42	2
France	... <sup>2</sup>	... <sup>2</sup>	-	-	-	-	5	2	-	1	-	-	-	-	-	-	-	<1
Iceland	-	-	-	+	-	167	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	956	677	747	895	704	1021	824	357	206	169	19	105	41	338	721	352	169	123
Norway	75	29	24	24	40	61	152	70	49	60	32	33	123	84	36	71	65	40
Portugal	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	-	-	-	-	-	458	2154	630	1630	4237	5844	4708	2154	1282	1669	55	198	-
Spain	-	28	1	22	21	25	47	51	7	19	-	-	5	-	-	-	-	-
UK (E,W&NI)	169	318	293	165	561	288	36	-	-	56	-	-	-	-	-	-	-	-
UK (Scot.)	2535	4439	5753	4114	3768	3970	2470	1205	1145 <sup>3</sup>	1607	411 <sup>3</sup>	332 <sup>3</sup>	440 <sup>3</sup>	1643 <sup>3</sup>	1779 <sup>3</sup>	2951 <sup>3</sup>	2931 <sup>3</sup>	1,738 <sup>3</sup>
Total	3735	5491	6818	5220	5098	5990	5688	2315	3037	6148	6306	5178	2765	3349	4221	3445	3405	1,903
Unallocated catch	1998	-379	-543	-591	-599	-851	-357	-279	299	94 <sup>5</sup>	139 <sup>5</sup>	1	0	0	0	0	0	0
WG estimate	5733	5112	6275	4629	4499	5139	5331 <sup>4</sup>	2036 <sup>4</sup>	3336 <sup>4</sup>	6242 <sup>4</sup>	6445	5179	2765	3349	4221	3445	3405	1,903

<sup>1</sup> Preliminary.

<sup>2</sup> Included in Division VIa.

<sup>3</sup> Includes UK England, Wales, and N. Ireland landings.

<sup>4</sup> Includes the total Russian catch.

<sup>5</sup> Non-official.

n/a = not available.

**Table 5.4.24.3** Haddock in Division VIb (Rockall). Summary of stock assessment.

Year Age 1 thousand	Recruitment tonnes	SSB tonnes	Catches tonnes	Landings tonnes	Discards tonnes	Mean F Total Ages 2–5
1991	110673	16293	18883	5655	13228	0.6852
1992	110396	19953	17191	5320	11871	0.7753
1993	124613	20664	14637	4784	9853	0.5827
1994	69113	25074	16756	5733	11023	0.5498
1995	61545	30389	14755	5587	9168	0.5681
1996	62632	26169	16431	7075	9356	0.5472
1997	71929	22500	11060	5166	5894	0.3826
1998	73055	21499	15846	4984	10862	0.5814
1999	48873	16713	16283	5221	11062	0.8502
2000	28468	11892	11167	4558	6609	1.0698
2001	81110	6952	3658	1918	1535	0.3974
2002	110762	7338	7269	2571	4152	0.461
2003	51510	14244	11490	5961	5521	0.6459
2004	14318	18064	7320	6400	883	0.5868
2005	16583	18479	5696	5191	505	0.353
2006	97604	16459	3142	2759	386	0.2339
2007	13432	13797	5590	3348	2242	0.452
2008	3617	27573	6321	4205	2100	0.4131
2009	1991	17991	4794	3237	1557	0.3054
2010	1667	16090	3710	3404	306	0.1872
2011	260	11007	2057	1905	152	0.1241
2012	398*	10654				
Average	54960	18054	10193	4523	5632	0.512

\* RCT3 estimates.