



## **Fish dependence – 2013 Update**

The increasing reliance of the EU  
on fish from elsewhere

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OCEAN2012 is an alliance of organisations dedicated to transforming European Fisheries Policy to stop overfishing, end destructive fishing practices and deliver fair and equitable use of healthy fish stocks.

OCEAN2012 was initiated, and is co-ordinated, by The Pew Charitable Trusts, a non-governmental organisation working to end overfishing in the world's oceans.

The steering group of OCEAN2012 consists of the Coalition for Fair Fisheries Arrangements, Ecologistas en Acción, The Fisheries Secretariat, **nef** (new economics foundation), The Pew Charitable Trusts and Seas At Risk.

**nef** (the new economics foundation) is a registered charity founded in 1986 by the leaders of The Other Economic Summit (TOES), which forced issues such as international debt onto the agenda of the G8 summit meetings. It has taken a lead in helping establish new coalitions and organisations such as the Jubilee 2000 debt campaign; the Ethical Trading Initiative; the UK Social Investment Forum; and new ways to measure social and economic well-being.



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# Preface

This is an update of the *Fish Dependence* report published in 2010 and updated in 2011 and 2012. It includes figures for self-sufficiency levels and fish dependence days in 2013 for all EU27 member states.

This updated report includes:

- comparisons between this year's results with results from previous reports, illustrating the extent to which the EU is dependent on fish from other regions; and
- a table with estimates of how levels of self-sufficiency would vary if 43 European stocks were restored to their maximum sustainable yield (MSY) based on **nef's** Jobs Lost at Sea report.

Due to the lag in data reporting, the 2010 and 2011 reports were based on 2006 and 2007 data. A shortening of this lag allowed last year's report to use 2009 data instead of 2008 data. The results for this year are based on 2010 data. This applies to all countries with the exception of aquaculture data for Belgium, Lithuania and Slovakia which is from 2009.

The updated information is explained in the relevant sections. The most significant updated information in this report concerns the methods we used to address the limited availability of information on catches in non-EU waters by EU member states.

In the coming years, it is our intention to provide an annual update and so we would welcome suggestions on how to improve the content and look of this work.

# Executive summary

About two thirds of European Union (EU) fish stocks are overfished, which means they deliver far less fish than if they were allowed to recover, yet fish consumption throughout Europe remains high. The EU has been able to maintain and even expand its levels of consumption by sourcing fish from other regions of the world, both through the catches of its distant-water fleet and imports. This report highlights Europe's reliance on fish products originating from external waters for its fish supplies, and provides pointers towards a more sustainable future for dwindling global fish stocks.

**nef** (the new economics foundation) has estimated the degree of self-sufficiency in fish consumption achieved by the EU as a whole and for each of its member states; self-sufficiency is defined as the capacity of EU member states to meet demand for fish from their own waters. We have expressed the degree of self-sufficiency in the form of a 'fish dependence day'. Based on a member state's or a region's total annual fish consumption, the fish dependency day is the date in the calendar when it will start to depend on fish from elsewhere because its own supplies have been depleted.

For the EU as a whole, fish dependence day is now 8 July, indicating that almost one-half of fish consumed in the EU is sourced from non-EU waters. Last year, it was 6 July; the year before, it was 2 July. Compared to 2011 and 2012, this is positive news as the EU marginally reduces its reliance on fish from non-EU waters by two days and overall its levels of fish dependence show a trend towards stabilisation around early July. Whilst it is still too early to say, we hope the fact that levels of dependence are not increasing marks a change in the trend and a sign that overfishing is diminishing in EU waters. All else being equal, this would manifest itself as improving self-sufficiency. Currently, however, the level of EU self-sufficiency is too low and the degree of overexploitation in EU waters too high. From 2000 to last year's assessment, the EU's fish dependence day had fallen earlier and earlier in the year until 2007, and is still three and a half weeks earlier than in 2000.

Restoring 43 out of 150 stocks to their maximum sustainable yield would increase the EU's self-sufficiency levels by more than two months (73 days), moving its fish dependence day to 19 September. If directed only to human food consumption, rebuilding European stocks could provide for the annual consumption of 160 million people; of which 90 million would be EU27 citizens.

Member states with little or no access to EU waters, such as Austria, Slovakia, and Slovenia, evidently become fish dependent early in the year. More surprising, however, is that many member states with greater access to EU waters are also fish dependent early in the year. These include Spain, Portugal, Italy, Germany, and France – all of whom source more than one-half of their fish from non-EU waters.

Our calculations include domestic aquaculture (fish farming) in EU countries, a growing enterprise that has served to marginally offset the overexploitation of EU fish stocks but has not itself been responsible for reversing the trend in fish dependence that has taken place over the past years. Nonetheless, if we discount aquaculture, the EU's fish dependence day moves forward to 13 June; for big aquaculture producers such as Spain, France, Italy, and Greece, their respective national fish dependence day would occur more than one month earlier. Similarly, restoring EU fish stocks would result in significant gains in self-sufficiency levels.

In a context of finite resources and growing populations, the current EU model is unsustainable. The EU's high levels of fish dependence have implications for the sustainability of fish stocks globally, which are also overfished, and for the communities that depend on them.

The main message of this report is that rising fish consumption in a context of overexploited stocks is environmentally unviable and socially unfair. The EU has highly productive waters that have the potential to sustain a long-term and stable supply of fish, jobs, and related social and economic benefits, but only if its fish resources are managed responsibly. We have started to see some positive signs in fish stocks recovery but are still very far from where we should be.

The reform of the EU's Common Fisheries Policy (CFP) offers a perfect opportunity to put the structures in place to turn this situation around. To transform the management of the EU's marine resources, the new CFP needs to provide a policy framework that will restore marine ecosystems to healthy levels and deliver a fair allocation of resources. At a minimum this will require the following actions.

- Set a clear target to restore EU fish stocks to MSY levels.
- Reduce capacity in line with the available resources; improve data collection, transparency, and reporting; and prioritise scientific advice in determining catch quotas.
- Create a context in which being profitable is aligned with doing the right thing, by making access to resources conditional on social and environmental criteria.
- Promote responsible consumption among all EU consumers, and implement measures that are conducive to more responsible fishing outside EU waters.
- Use public funds to deliver social and environmental goods by investing in environmentally constructive measures, research, and stakeholder involvement, as well as enforcing sustainable quotas and practices.

In order for this to happen, policymakers need to look beyond the short-term costs that could result from reform and prioritise the long-term benefits that healthy marine resources will provide.



Photo: Corey Arnold

# Introduction

Fisheries play a pivotal role in human health and well-being: fish are crucial to the global food supply, providing almost one-fifth of animal protein consumption worldwide.<sup>1</sup> Indeed, fisheries are likely to become even more important as populations continue to increase and the pressures on scarce land for agriculture continue to grow, pushing more people towards fisheries as a ‘last-resort’ activity.

There is only so much fishing that our oceans can sustain. So for fisheries policies to be sustainable, they need to acknowledge and respect the ecological limits of the marine ecosystems on which they depend. Ultimately, what drives fisheries is fish consumption and that consumption needs to be commensurate with the biocapacity of the oceans.

EU waters are potentially rich and productive seas capable of delivering a long-term and stable supply of fish, together with jobs and other benefits for coastal communities. But years of poor fisheries management and overexploitation have reduced the biocapacity of its waters. The EU currently consumes much more than its waters produce and increasingly depends on fish from other countries to satisfy its demand.

In a context of finite resources and a growing population, the EU model is neither sustainable nor replicable on a global scale. Unsustainable levels of fish consumption are putting pressure on EU waters, and beyond. Having overfished its own stocks, the EU is now increasing its dependence on non-EU fish to meet demand (i.e. its fish dependence). This is reducing the long-term productivity of marine ecosystems elsewhere and is also undermining the potential of poorer regions to meet their own domestic demand.

The main goal of this report is to illustrate the extent to which the EU – despite its potentially abundant and productive seas – has become increasingly dependent on fish from elsewhere. We highlight the implications of this trend for the EU and its member states and make the case for the EU to increase its self-sufficiency (i.e. when domestic supply matches domestic demand) and decrease its fish dependence through the restoration of its own fish stocks and more responsible consumption. While fish dependence is not in itself a measure of sustainable fishing, the reduction of fish dependence implicitly requires moving towards more sustainable fisheries management.

Arguments in favour of self-sufficiency are often misrepresented as arguments against trade and the needs of industry and the market, but that is not the aim of this report. International trade is extremely beneficial and has massive potential to improve people's lives across the world. However, it needs to take place in a fair way and within the limits of the ecosystem. The continuing and increasing reliance of the EU on fish imports is not due to a lack of natural endowment but rather the result of gross mismanagement of its own fish resources.

In the following section we give context to our research. We summarise current trends with respect to the state of fish stocks, levels of fish consumption, and EU strategies to source fish from abroad. If fish stocks were restored (to MSY), we look at how this would affect self-sufficiency. We also assess the contribution that aquaculture makes to national self-sufficiency.

Later in the report we describe our methodology for estimating the degree of fish self-sufficiency in EU member states and share the results of our calculations. We then discuss the implications of our findings and end with a series of conclusions and recommendations.

# Background

EU fish stocks are unhealthy, producing far less than they could if they were managed in a sustainable way. Indeed, 78 per cent of EU-assessed stocks under total allowable catches (TACs) are estimated to be overfished.<sup>2</sup>

## Declining fish stocks

EU catches have steadily declined since 1993 at an average rate of 2 per cent per year; almost all demersal stocks have declined in recent years.<sup>3</sup> The total landings from EU fisheries in the northeast Atlantic Ocean and the Mediterranean Sea have decreased by 30 per cent over the past decade.<sup>4</sup>

On a global level, the United Nations Food and Agriculture Organization (FAO) reports that 30 per cent of stocks are overexploited or depleted, with another 57 per cent fully exploited.<sup>5</sup> Only 13 per cent of stocks monitored by FAO are considered able to produce more than the current level of catches; the lowest level since 1970.<sup>6</sup> Around the world, 27 per cent of fisheries were judged to have collapsed by 2003, meaning that their annual harvests had fallen to less than 90 per cent of their historical maximum yields.<sup>7</sup> If the current trend continues, some scientists have predicted that 100 per cent of commercial stocks could collapse by 2048.<sup>8</sup>

Overexploitation of natural resources is synonymous with lost 'rents', the maximum economic yield that could be derived from fisheries compared to current revenues.<sup>9</sup> The World Bank has estimated the annual cost of global overfishing at US\$50 billion, totalling US\$2 trillion over the past three decades.<sup>10</sup> The costs of overfishing in 43 European fish stocks across the North Atlantic have recently been estimated at €3.2 billion per year (in 2010 terms);<sup>11</sup> restoring these stocks would supply enough fish to meet the current annual demand for 155 million EU citizens, therefore reducing the need to source fish from other countries.<sup>12</sup>

## Rising levels of consumption

While the productivity of EU fish stocks has decreased, fish consumption remains at levels beyond what EU waters are able to support. In 2010, the total catch in EU waters amounted to nearly 4 million tonnes, which is about 39 per cent of the EU's total fish consumption (approximately 10 million tonnes).<sup>13,14</sup> On average, each European citizen consumes 22.1 kg of seafood products per year (as of 2009), which is 20 per cent above the annual global average of 18.4 kg per capita.<sup>15</sup> Portugal (with 61.5 kg per capita), Spain (43.2kg), Lithuania (40.7 kg), France (33.8 kg), and Finland (36.7 kg) have the highest consumption rates in the EU.<sup>16</sup> Together, these five countries alone account for about a third of EU fish consumption.<sup>17</sup> The FAO predicts that per capita fish consumption for EU15 countries will continue to increase by 17 per cent from 1989 to 2030, while for EU27 + Norway the FAO predicts it will rise by 9 per cent over the same period.<sup>18</sup>

In the EU only two countries maintained their levels of fish consumption from 1961 to 2005: Portugal, which has continued to consume the most fish in the EU27; and the United Kingdom (UK), which ranked 10th in the EU27 in 2005.<sup>19</sup> All other countries increased their consumption. For example, France, Germany, Spain, Finland, and the Netherlands, among others, increased their consumption by between 50 and 100 per cent. Others increased their consumption even faster, for example Italy (up to 108 per cent), Ireland (217 per cent) and Cyprus (304 per cent). Not all of these increases are direct human consumption but may be used in aquaculture (where inputs tend to outweigh fish production outputs, particularly for carnivorous species, such as salmon).

**Table 1: Fish consumption per capita for EU member states**

(kg/capita/year)	2007
Portugal	61.5
Spain	43.2
Lithuania	40.7
Finland	36.7
France	33.8
Sweden	32.0
Malta	31.0
Luxembourg	26.3
Belgium	25.0
Italy	25.0
Ireland	22.4
Denmark	21.9
Cyprus	21.4
UK	21.1
Greece	20.5
Netherlands	19.7
Latvia	17.5
Estonia	16.5
Germany	15.3
Austria	13.7
Poland	10.9
Slovenia	10.1
Czech	9.8
Slovakia	8.0
Romania	5.4
Hungary	5.1
Bulgaria	4.6
<b>Europe</b>	<b>22.1</b>
<b>World</b>	<b>18.4</b>

**Source:** Fishery and Aquaculture Statistics. FAO Yearbook 2010 [http://ftp.fao.org/FI/CDrom/CD\\_yearbook\\_2010/booklet/ba0058t.pdf](http://ftp.fao.org/FI/CDrom/CD_yearbook_2010/booklet/ba0058t.pdf)



At the global level, fish consumption has grown at a rate of 3.6 per cent per year since 1961, rising from 9 kg per capita per year half a century ago to 16 kg in 1997.<sup>20</sup> Since 1997, this global growth has slowed; however, in 2009, fish consumption reached a record high with 18.4 kg per capita, according to FAO estimates.<sup>21,22</sup> It can be expected that pressures on fish stocks are only likely to increase as the global population continues to grow, reaching a projected nine billion people between 2040 and 2050.<sup>23</sup>

### Sourcing from abroad

Due to its heavily overexploited fish stocks, the EU has increased its fish consumption by sourcing more fish from abroad. Fish is caught by the EU's distant-water fleet, which operates in other countries' and international waters; it is also, increasingly, imported.

The distant-water fleet is relatively small compared to the EU's total number of vessels. In 2006, the EU had 718 vessels fishing in non-EU waters, out of a total of 88 000 vessels; yet this small number makes up almost one-quarter of the EU fishing capacity in tonnage.<sup>24</sup> Spain accounted for over one-half of these vessels; most of the others are from France, Portugal, Italy, Latvia, Lithuania, and the Netherlands, which owns some of the largest freezing trawlers.<sup>25,26</sup> Over the 2001–2005 period, estimates of the catch size of the EU distant-water fleet ranged from 1.06 million to 1.2 million tonnes, equivalent to 19–21 per cent of total EU catches.<sup>27,28</sup> These vessels predominantly operate in third countries' exclusive economic zones (EEZs), under fisheries agreements, and in international waters, yet their catch is classed as EU produce.

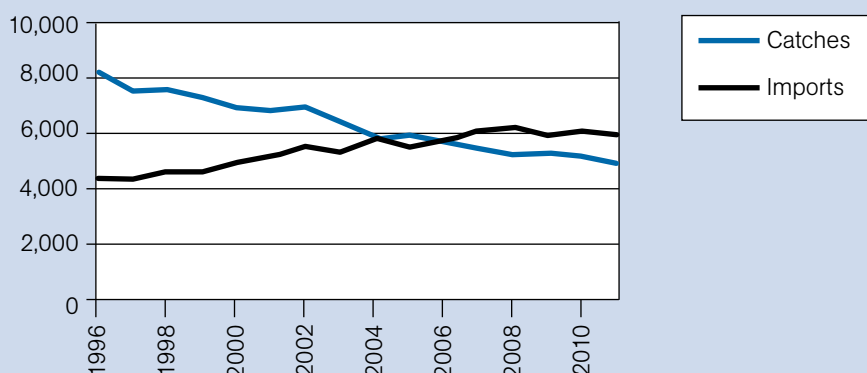
The EU is the world's largest market for fish and has become increasingly reliant on imports to meet its needs. Over the last ten years it has, on average, imported 3.8 million tonnes more fisheries products than it has exported.<sup>29</sup> These imports help meet its demand for human consumption and processing, as well as animal feed and aquaculture. In terms of value, the EU imported US\$23 billion worth of fish and fisheries products from non-EU suppliers in 2007, an increase of 11 per cent on 2006.<sup>30</sup> Data from the EU indicate that imports in tonnes accounted for between 59 per cent in 2006 and 57.5 per cent in 2008 of the EU's apparent consumption (including domestic aquaculture), while if domestic aquaculture is excluded, this figure rises to 67 per cent in 2006 and 65 per cent the following year.<sup>31,32,33</sup>

In addition to being a net importer of fish, production in the EU continues to fall. This is mostly due to a decline EU catches, which are 27 per cent lower in 2010 compared to 2000 (Appendix: Table 1).<sup>34</sup> The declining catches – rising imports trend is illustrated in Figure 1.

### Aquaculture production

Aquaculture is often presented as a solution to overfishing as a means of increasing production in a way that is decoupled from wild stocks. As global fish stocks have declined, aquaculture production has risen. Table 2 shows

**Figure 1: EU27 catches (landings) and imports, 1995–2010 (kilotonnes live weight)**



Source: Imports are EU15 for 1995–1998. Eurostat. <sup>35</sup>

**Table 2: EU aquaculture production (2010) in quantity and as EU share.**

<b>2010 aquaculture production</b>		
	<b>Total production (tonnes)</b>	<b>% of EU27 production</b>
EU27	1,274,000	100
France	255,000	18
Greece	121,000	9
Ireland	46,000	4
Italy	153,000	12
Spain	255,000	20
UK	201,000	16
Ireland	47,000	3.62

**Note:** Figures rounded.

**Source:** Eurostat Statistics Database, except France which is sourced from the FAO's Fisheries Global Information System (FIGIS)<sup>36</sup>

the EU's aquaculture production in 2010. Aquaculture production increased in the EU up to 1997 as wild catches declined; since then, however, aquaculture production has remained stable at around 1.25–1.43 million tonnes.<sup>37</sup> EU aquaculture supplies less than 13 per cent of fish consumed in the EU. More than 90 per cent of EU27 production takes place in EU15 countries, with five nations (Spain, France, Italy, the UK, and Greece) supplying 70 per cent of production.

It is hoped by the industry and some policymakers that increases in aquaculture production will compensate for the decline in wild fish catches. But while there is likely to be a constructive role for aquaculture, there are three main reasons why its potential is limited. First and foremost among these is that most marine fish aquaculture is not usually decoupled from wild stocks, and is typically highly dependent on them for fish feed. The precise conversion of wild fish to aquaculture in tonne-for-tonne terms depends on the composition of fishmeal and the species being produced. The production of certain species requires large quantities of wild catch as feed, at a conversion rate greater than 1.00.<sup>38,39</sup> Examples include salmon (conversion rate: 3.15); marine finfish (5.16) (species include flounder, halibut, sole, cod, hake, haddock, redfish, sea bass, congers, tuna, bonito and billfish); marine shrimp (2.81); trout (2.46); and tilapia (1.41).<sup>40,41,42</sup>

With current practices, production of these groups puts great pressure on wild fish stocks. Indeed, the Department of Environment, Food and Rural Affairs (Defra), the UK government's agricultural and environmental body, has stated that an increased reliance on these groups of species is unviable and instead points to lower-trophic-level species, such as molluscs.<sup>43,44</sup>

If the direction of aquaculture is determined by consumption behaviour, with a preference for carnivorous and resource-intensive fish, then aquaculture will

**Table 3: Aquaculture production by the four main EU producers.**

<b>Quantity of production ('000 tonnes)</b>	<b>Spain</b>	<b>France</b>	<b>Italy</b>	<b>UK</b>
Mariculture	29.1	7.4	29.8	134.1
Freshwater	26.0	38.4	42.4	16.8
Molluscs and crustaceans	208.0	189.2	175.0	30.5
Hatcheries/nurseries (million juveniles)	84,380	58.0	0.0	215.9

**Source:** *Review of the EU Aquaculture Sector and Results of Costs and Earnings Survey* (2009). Definition of data collection needs for aquaculture. Reference no. FISH/2006/15-Lot 6.

drive the depletion of fish stocks even further. Consequently, the only viable means of offsetting depleted fish stocks and maintaining the same quantity of supply is to increase the production of seafood, such as molluscs and crustaceans, effectively replacing wild fish with farmed molluscs.

EU aquaculture appears to be following this scenario. With EU waters providing fewer fish, EU aquaculture mainly produces molluscs and crustaceans. The EU produces 152,983 tonnes of marine fish but 4.5 times that amount of shellfish (682,292 tonnes of crustaceans and molluscs). This disparity can be seen clearly in Table 3, which details EU aquaculture production categorised as mariculture, freshwater, shellfish production and nurseries. Globally, marine fish contribute less than 2.5 per cent of total aquaculture production versus 45 per cent freshwater fish (e.g. tilapia), and 24 per cent molluscs.<sup>45</sup>

The second reason why aquaculture's potential may be limited is its links to a wide range of environmental impacts.<sup>46,47</sup> These include the introduction of alien species;<sup>48</sup> environmental impacts from genetically modified and escaped fish;<sup>49</sup> <sup>50-51</sup> habitat modification and pollution;<sup>52</sup> antibiotic use and other problems with intensive farming practices;<sup>53</sup> and an unsustainable use of resources.<sup>54</sup>

Thirdly, EU aquaculture's prioritisation of more resource-efficient groups, such as molluscs, will do little to satisfy the diversity of fish products often demanded by consumers.

In conclusion, aquaculture, on balance, adds to the global supply of fish. It has a part to play in the move to optimally manage wild fish stocks, but only to a limited extent in the case of carnivorous species. Without an improvement in the abundance of wild fish stocks, aquaculture's potential for growth is predominantly in resource-efficient, non-carnivorous species. This business-as-usual approach will see the continued depletion of wild fish stocks and – as is already being seen – the eventual replacement for consumption purposes of wild fish with farmed molluscs and crustaceans.

The trend for fish dependence, with its reliance on fish stocks from external sources, cannot be replicated and should not continue.



# Methodology

In order to reveal the EU's dependence on fish from non-EU waters, we have estimated self-sufficiency levels for all EU countries. We express these in terms of fish dependence days.

Self-sufficiency levels are calculated as a ratio of domestic supply (production) over domestic demand (consumption):

$$\text{Self-sufficiency} = \frac{\text{domestic supply}}{\text{domestic demand}}$$

A country that is able to produce as much as it consumes will have a ratio of 1.00 or more. A ratio of less than 1.00 means that some consumption depends on non-EU resources, which can be interpreted as an indicator of dependence on the resources of other countries. Taken over several years, such ratios allow us to identify trends in the EU's dependence on other nations' resources. Therefore, both the degree of self-sufficiency and the changes in the ratio over time are important. A decreasing ratio means that more consumption is being supplied from outside the EU; an increasing ratio means that the EU is becoming more self-sufficient.

The self-sufficiency of a country (or the EU) increases if production increases and/or if consumption decreases. Increases in production can come from higher catches in national and EU waters and/or from higher aquaculture production.

The degree of self-sufficiency can be represented as a fraction of a year and then converted into a fish dependence day: the day in a year when a country will have consumed its entire annual supply of fish resources if it uses only production from its own waters. After this date the nation becomes dependent on sourcing its products from elsewhere, hence the date is termed the 'fish dependence day'.

For example, a degree of self-sufficiency of 0.4 means that a member state's fish resources provide the equivalent of 146 days of consumption in quantitative terms (365 days x 0.4). Counting 146 days from 1 January, we can say that a country with a self-sufficiency rating of 0.4 depends on other countries' resources from 26 May onward for the rest of the year. Therefore, the earlier the date, the more dependent the member state.

In order to obtain fish dependence days for all EU member states, we took the following steps.

- i.** Domestic supply: we calculated domestic supply by gathering data on total catch per nation in EU waters and trade balances.
- ii.** Domestic demand: we calculated domestic demand by gathering data on total catch in all regions and trade balances, i.e. exports minus imports.
- iii.** Self-sufficiency: we calculated the degree of self-sufficiency as the ratio of domestic supply over domestic demand.
- iv.** Fish dependence days: we converted the degree of self-sufficiency into calendar days by multiplying by 365 and finding the corresponding fish dependence day in the calendar year.

## i) Domestic supply

Domestic supply is defined as catches in EU waters plus aquaculture production. At national level this includes catches by the national fleet in its own national waters and those of other EU member states, plus all domestic aquaculture production (mariculture, freshwater aquaculture, and any other form). Catches by EU vessels in non-EU waters are excluded, since these depend on non-EU resources.

In equation form, domestic supply is calculated as:

$$\text{domestic supply} = \text{catches in national and EU waters}^{55} + \text{aquaculture production}$$

Data for catches from the EU and member states were available through Eurostat (see Appendix: Table 1 for sample statistics).<sup>56,57</sup> However, it was not possible to obtain data on catches by member states disaggregated by the source location, i.e. whether the fish were sourced from national and EU waters or non-EU fishing grounds. We therefore used an alternative estimate of domestic supply as:

$$\text{domestic supply} = \text{fish production (total catches in all waters + aquaculture)} - \text{catches in non-EU waters}$$

In the absence of data on non-EU catches by member states, the catch by a member state was estimated using a number of methods. Any data provided by a member state's fisheries ministry were taken as the default, most robust estimate. In one form or another (either as a proportion of total catches, a static point estimate, or a time series of values) this applied to Spain, France, Sweden, and Denmark. The second best estimate was that obtained from catches in FAO areas around the world by each country, with the exclusion criteria of any overlap with EU waters. Thirdly, the non-EU catch was estimated using fleet tonnage capacity as a proxy for the share that a country had in total EU27 external fishing, both of which were provided in a European Commission report.<sup>58</sup> A combination of the latter two was applied to all countries, with the condition that the maximum of either was used.

The third approach used a share of gross tonnage that each nation has in the total EU external fleet and the assumption that the gross tonnage for all member states translates into proportional shares of catches (Appendix: Table 2 presents data on the tonnage of member states' external fleets and the EU as a whole).<sup>59</sup> For example, our estimates show that the EU caught 1.2 million tonnes in external waters, so if a member state had 10 per cent of the EU's external fleet capacity in terms of gross tonnage, we assumed that it was responsible for 10 per cent of the 1.2 million tonnes caught in non-EU waters (120 000 tonnes).

Therefore, catches in non-EU waters for each member state (MS) were calculated as:

$$\text{catches in non-EU waters by MS fleet} = \text{catches in non-EU waters by EU fleet} \times \text{MS share of EU tonnage capacity}$$

Our estimate of 2006 non-EU catch was derived from a simple average of the previous five years' external catch:  
1 198 847 tonnes (varying from 1.06–1.30 million tonnes).

Our estimate for the 2007 non-EU catch was taken as a fixed 21 per cent of the total EU catch in that year, derived from a conservative estimate from a European Commission report.<sup>60,61</sup> This equals approximately 1.08 million tonnes.

Our estimate for 2009 and 2010 non-EU catches were also a fixed 21 per cent of the total EU catch, derived as above.<sup>62</sup> This equals approximately 1.06 million tonnes.

For almost all countries (though not for the EU27 as a whole), we used the second method, based on catches by FAO fishing area obtained from Eurostat.<sup>63</sup> This involved extracting data on catches by the EU and its member states for FAO fishing areas throughout the globe, then looking at which of these areas were outside the EU's EEZ. Where there was not a perfect overlap between the EU's EEZ and an FAO sub-division, we conservatively assumed all catches were made in the EU EEZ (conservative, because a lower external catch means higher self-sufficiency).

This exercise revealed some estimates of external catches that were higher than those derived based on the European Commission reports.<sup>64,65</sup> These higher values are more directly linked to fishing activity (i.e. they are reported catches in a specific area, rather than a fleet-based estimate calculated using tonnage capacity and total fleet catches in all non-EU areas) but can still be considered conservative as we did not include any catches from regions that even partially overlap EU waters. We used estimates derived from this approach most notably for Germany, the Netherlands, and the UK.

There were a number of exceptions to both of these methods. For Denmark we used national data obtained from its fisheries ministry. For Spain and France we used different estimates from their fisheries ministries, described in the *Caveats with data and methodology* section.

## ii) Domestic demand

Domestic demand is defined by apparent consumption within a country. It encompasses all demand for fish products by a country, whether these are used for human consumption or animal feed, or are wasted. Apparent consumption is measured as total production (catches and aquaculture), plus imports, minus exports. In equation form that is:

$$\text{apparent consumption}^{66} = \text{total production (total catches in EU and non-EU waters + aquaculture)} + \text{imports} - \text{exports}$$

Data for catches for the EU and member states – the same as was used for domestic production – were taken from Eurostat statistics (see Appendix: Table 1 for sample data).<sup>67</sup> Our trade data were taken from Eurostat pocketbooks (see Appendix: Table 3 for sample data).<sup>68</sup> These trade data cover trade in all fish and aquaculture products.



### iii) Self-sufficiency

The degree of self-sufficiency was calculated by dividing domestic supply by domestic demand. As noted earlier, this represents the proportion of consumption in a region (the EU) or nation (EU member state) that is supplied by its own resources. In equation form, this is calculated as:

$$\text{Self-sufficiency} = \frac{\text{domestic supply}}{\text{domestic demand}}$$

This is equivalent to:

$$\text{Self-sufficiency} = \frac{\text{catches in EU waters} + \text{aquaculture production}}{\text{apparent consumption}}$$

Net trade (imports minus exports) is included in the domestic demand denominator and not in domestic supply because trade is not production. A positive trade balance (i.e. exports greater than imports) increases the degree of self-sufficiency by reducing the proportion of production that is consumed domestically, and therefore should be included in domestic demand.

### iv) Fish dependence days

The final step of the methodology was to convert self-sufficiency ratios into days. This was done simply by multiplying the self-sufficiency fraction by 365 and deriving the corresponding date in the year.

### Caveats with data and methodology

While all data used in our estimates were taken from official sources such as the FAO, Eurostat, and the European Commission, the datasets used had several limitations that could have affected our results. A key point to highlight is that while all results have derived from official data sources, our calculations have been restricted at times by the limited quality and availability of data. Additional information on the share of national catches derived from national, EU, international and other non-EU waters, would help strengthen our results, but this information is either unavailable or difficult to access. This is partly due to poor reporting of fisheries data and a lack of transparency among EU member states. While our results are far from perfect, it is worth pointing out that they are based on the best available information and can be considered as providing the best picture currently available. As explained in the following sections, our estimates are conservative, which means that real levels of self-sufficiency are likely to be lower than the results show.

#### i) Member state catches in EU waters

The Rule of Origin criteria dictates that fish caught by an EU vessel outside EU waters be classified as EU produce, unlike produce caught in the same location under another vessel's flag.<sup>69</sup> This means that all EU catches by the EU fleet in non-EU waters are classified as EU production, even if they come from other countries' waters. This makes it difficult to distinguish between what is caught in a country's own territorial waters (defined as a country's EEZ) and catches in other member states' EEZs or EU waters.

The absence of official data that divides catches between national waters, EU waters, international waters, and non-EU waters led us to make several assumptions that could affect the results at member state level.

#### ii) EU catches in non-EU waters

Catches by the EU's external fishing fleet in our estimates should be considered the minimum amount of fish caught by EU vessels in non-EU waters.

The total non-EU catch by the EU external fleet and its gross tonnage is based on the 718 vessels of the EU external fleet that conduct at least 90 per cent of their activity outside EU waters. For example, in the Mediterranean the EEZ only extends to 12 nautical miles from the coast, which means that vessels fishing beyond this limit are fishing in international waters. But it is unlikely that the 718 vessels composing the external fleet include those vessels operating in the Mediterranean, particularly since these 718 vessels must spend at least 90 per cent of their activity outside the EU. Where vessels from Mediterranean EU



countries operate beyond their EEZ for less than 90 per cent of their activity, their catch is counted as national catch when it should be regarded as sourced from non-EU waters.

This suggests that the total amount of non-EU catches is much larger than the figures on which we have based our results.

### iii) Share of national catch sourced from non-EU waters

As already described, estimating non-EU catch involved a number of methods. The third one was based on the assumption that every country's share of EU external fleet capacity (in gross tonnage) is a reflection of its share of non-EU catches. A country that makes up 2 per cent of the EU external fishing fleet tonnage capacity would, we assume, be responsible for 2 per cent of total catches by the EU external fishing fleet (equivalent to 21 293 tonnes). This quantity was then subtracted from the total catches by that country to obtain its catches in EU waters.

Using capacity as a proxy for catch-size appropriation is equivalent to assuming that all vessels catch the same amount relative to their tonnage. This could result in underestimated attribution of the share of external catches commanded by countries with low-capacity vessels, relative to the average, as well as overestimates for those countries with above-average capacity vessels. Also, it does not take any transhipment (i.e. shipping to intermediate destinations) into consideration.

In order to validate our estimates of share of national catches coming from non-EU waters, we tried to obtain information at national level for each member state, but we could only obtain national data for Spain and France. Data from the Spanish Ministry for Fisheries suggests that 54 per cent of Spanish catches are made in non-EU waters, matching the estimates derived using our methodology (when including aquaculture production in Spanish catches).<sup>70</sup> The fraction of Spanish catches sourced from outside the EU in 2005 was 54 per cent, which is equivalent to 0.55 million tonnes when the entire Spanish fleet caught 0.99 million tonnes.<sup>71</sup> Using our method, where 52 per cent of the external fleet's capacity is Spanish and there were 1.06 million tonnes of EU external catches in total, we also arrived at 0.55 million tonnes (for 2005). Likewise, for France, the official statistics and our own were similar.<sup>72,73</sup> For both countries we used the figures from national sources rather than our estimates, although we view the findings as supporting our methodology.



Finally, using our methods based on the European Commission reports for estimating non-EU catch (described in the Methods section) implied, in the case of Malta alone, that non-EU catches were larger than total catches; this is clearly impossible. We therefore used our second method, using catches by Malta in FAO areas, which in all years is zero (this is the opposite of most countries, where the larger of the two results was used).

iv) **Lack of data on catches within the EEZs of member states**

Under the CFP, EU waters are regarded as a common resource that can be exploited by any member state. Without data on catches within a member state's own waters we cannot comment on how self-sufficient a member state is within its own EEZ. This means that fishing by member states in other nations' waters will increase their self-sufficiency as long as these waters are inside the EU. Spain is clearly a significant beneficiary of this since a large part of its fleet operates in waters outside Spanish jurisdiction but still within EU waters. This does not, however, affect the self-sufficiency of the EU as a whole.

v) **Illegal, unreported, and unregulated (IUU) fishing and bycatch**

Our results do not take into account IUU fishing, discards, and bycatch. Estimates of the scale of IUU fishing are only available for specific stocks or fleets, making it impossible to include it in this analysis. However, high levels of discards and bycatch should have little impact on the analysis as all discards and most bycatch do not enter the market. Yet, it is worth noting that official data sources on total catches are estimated from recorded landings and, given that landings do not include bycatch or discards, the catch data used in our analysis underestimate the true catch that takes place, further supporting our assertion that our results are conservative.

vi) **Trade data**

Data on trade are readily available from the Eurostat pocketbook on fisheries statistics 1990–2006, but unfortunately this information is no longer published.<sup>74</sup> Instead, all trade data for 2009 have been extracted from the Eurostat external trade database.<sup>75</sup> Trade codes include all seafood products, including live fish, frozen fish, fishmeal, fish oils, and processed fish, and are exactly the same as those used by Eurostat in previous editions of the fisheries statistics pocketbook.

vii) **Contemporary data**

Finally, it is worth noting that there is a delay of around three to four years for data reporting. However, a shortening of this delay has allowed us, for this 2012 update, to use data from 2009. Previously we used 2006 data for the 2010 report, and 2007 data for the 2011 report. Therefore, the 2008 data has been skipped in between these reports for the sake of publishing the most recent data on fish dependence. As in other years, we make the assumption in this report that similar conditions hold for 2012 as they did in the data years (i.e. 2009). Given that the trend is of increasing dependence year on year, this is likely to make the EU and its member states appear less dependent than it may actually be.

viii) **Aquaculture trade**

When constructing the self-sufficiency dates that exclude aquaculture from the catch data, we were unable to remove trade in aquaculture products. This was because of a lack of trade data sufficiently detailed to distinguish at the 10-digit-code specificity required at EU level. This is something that could be further explored in future editions of this report, but it would require updating dates for all previous years if we wanted to make them comparable.

ix) **Aquaculture**

The formula used to estimate self-sufficiency levels includes aquaculture as a measure of domestic production. Higher levels of aquaculture production will increase self-sufficiency if it contributes a net gain in seafood produced. This is limited, however, if aquaculture is dependent on more fish than it produces.

The dependence of aquaculture on wild fish stocks is already captured in the wild catches and trade components of the formula. However, our methodology does not capture the fact that EU aquaculture production is dominated by molluscs and that the current trend is one in which we are replacing wild fish with farmed molluscs. Neither does it capture the diminished choices available to the consumer.

In other words, if we depleted all wild fish stocks and replaced them with the equivalent quantity of farmed molluscs, self-sufficiency levels would remain the same. Similarly, if we replaced 200 species of wild fish with just one species of farmed mollusc, as long as the aggregate quantities of fish – seafood – produced remained the same, the self-sufficiency level would not change.

Consequently, we present the results with and without aquaculture production. Removing aquaculture production from the equation results in a decrease in self-sufficiency (i.e. fish dependence will come earlier in the year) as shown in Table 6. That said, due to the way in which trade data are collected, aquaculture could not be removed from trade data, which means that each tonne of traded fish product is equivalent, regardless of whether it is wild or farmed.

# Results

When analysing the ratio of domestic supply over domestic demand, we arrived at estimates of the degree of self-sufficiency of the EU and its member states (Table 4) and their corresponding fish dependence days (Table 5).

Table 4 shows that the EU's degree of self-sufficiency is now 52 per cent, which represents a slight improvement on previous years.

Fish dependence in the EU as a whole shows that its fish stocks support just under one-half of its consumption; its fish dependence day falls on 8 July, two days later than in 2009 and the same date as for 2006. Member states differ in their levels of self-sufficiency. Unsurprisingly, inland countries or those with

**Table 4: Degree of self-sufficiency for the EU and its member states.**

	1990	1995	2000	2005	2006	2007	2008	2009	2010
EU27		0.871	0.59	0.563	0.518	0.5	0.512	0.511	0.518
Belgium*	-	-	0.161	0.215	0.287	0.206	0.165	0.137	0.133
Bulgaria	-	-	0.401	0.234	0.267	0.402	0.337	0.378	0.438
Czech Republic	-	-	0.314	0.313	0.353	0.326	0.308	0.306	0.351
Denmark	1.125	1.197	0.999	0.85	0.787	0.618	0.750	0.835	0.713
Germany	0.328	0.295	0.28	0.421	0.341	0.32	0.302	0.271	0.265
Estonia	-	-	1.106	7.072	30.835	2.505	2.417	4.214	2.923#
Ireland	2.431	2.197	1.876	1.916	1.776	1.536	1.813	1.453	1.554
Greece	0.635	0.676	0.66	0.597	0.657	0.598	0.583	0.602	0.679
Spain	0.461	0.397	0.404	0.343	0.356	0.349	0.370	0.397	0.371
France	0.679	0.565	0.564	0.466	0.468	0.449	0.439	0.386	0.375
Italy	0.491	0.472	0.393	0.34	0.343	0.329	0.291	0.302	0.284
Cyprus	-	-	0.819	0.137	0.264	0.228	0.190	0.198	0.220
Latvia	-	-	1.094	1.442	1.437	1.339	1.285	1.128	1.190
Lithuania	-	-	-0.444	0.244	0.233	0.446	0.385	0.392	0.249
Hungary	-	-	0.332	0.379	0.482	0.513	0.502	0.499	0.539
Malta ^	-	-	-	-	-	-	0.253	0.022	0.335
Netherlands	1.602	0.887	1.022	1.716	1.681	1.213	1.071	0.562	0.814
Austria	0.057	0.057	0.061	0.039	0.041	0.039	0.035	0.036	0.036
Poland	-	-	0.529	0.494	0.467	0.545	0.429	0.545	0.428
Portugal	0.516	0.383	0.205	0.112	0.318	0.317	0.303	0.244	0.325
Romania	-	-	0.237	0.122	0.138	0.16	0.148	0.146	0.076
Slovenia	-	-	0.207	0.177	0.155	0.159	0.142	0.177	0.117
Slovakia	-	-	0.072	0.095	0.102	0.121	0.100	0.106	0.073
Finland	0.603	0.643	0.7	0.669	0.679	0.745	0.785	0.804	0.782
Sweden	0.862	1.053	1.402	1.096	1.35	0.995	1.020	1.096	1.278
UK	0.577	0.674	0.636	0.643	0.592	0.538	0.595	0.638	0.700

**Note:** \*Includes Luxembourg. ^ Estimates for Malta were calculated by excluding any potential non-EU catch. # Consumption for Estonia in 2010 was calculated as population multiplied by the estimate of per-capita consumption from the FAO Fishery and Aquaculture Statistics Yearbook 2010. This approach was used because under the normal methodology the consumption estimate was unrealistic (that is, negative). - indicates that estimates could not be made, typically due to lack of data, particularly trade balances.

**Table 5: Fish dependence days for the EU and its member states**

	1990	1995	2000	2005	2006	2007	2008	2009	2010
EU27	-	-	04-Aug	25-Jul	09-Jul	02-Jul	05-Jul	06-Jul	08-Jul
Belgium*	-	-	28-Feb	20-Mar	15-Apr	17-Mar	01-Mar	19-Feb	18-Feb
Bulgaria	-	-	27-May	27-Mar	08-Apr	27-May	02-May	18-May	9-Jun
Czech Republic	-	-	25-Apr	25-Apr	09-May	30-Apr	22-Apr	22-Apr	9-May
Denmark	> year	> year	31-Dec	07-Nov	15-Oct	14-Aug	30-Sep	01-Nov	18-Sept
Germany	30-Apr	18-Apr	13-Apr	03-Jun	05-May	27-Apr	20-Apr	20-Apr+	7-Apr
Estonia	-	-	> year	> year	> year	> year	> year	> year	> year#
Ireland	> year	> year	> year	> year	> year	> year	> year	> year	> year
Greece	20-Aug	04-Sep	29-Aug	06-Aug	28-Aug	07-Aug	31-Jul	08-Aug	5-Sept
Spain	18-Jun	26-May	28-May	06-May	10-May	08-May	15-May	25-May	16-May
France	06-Sep	26-Jul	25-Jul	20-Jun	20-Jun	13-Jun	09-Jun	21-May	18-May
Italy	29-Jun	22-Jun	24-May	05-May	06-May	30-Apr	16-Apr	21-Apr	14-Apr
Cyprus	-	-	27-Oct	19-Feb	07-Apr	25-Mar	10-Mar	14-Mar	22-Mar
Latvia	-	-	> year	> year	> year	> year	> year	> year	> year
Lithuania	-	-	01-Jan	30-Mar	27-Mar	12-Jun	20-May	24-May	1-Apr
Hungary	-	-	02-May	19-May	26-Jun	07-Jul	02-Jul	02-Jul	16-Jul
Malta ^	-	-	-	-	-	-	02-Apr	08-Jan	3-May
Netherlands	> year	20-Nov	> year	> year	> year	> year	25-Jan	25-Jul	25-Oct
Austria	21-Jan	21-Jan	23-Jan	15-Jan	15-Jan	15-Jan	13-Jan	14-Jan	14-Jan
Poland	-	-	13-Jul	30-Jun	20-Jul	19-Jul	05-Jun	18-Jul	6-Jun
Portugal	08-Jul	20-May	16-Mar	11-Feb	02-Apr	26-Apr	20-Apr	30-Mar	29-Apr
Romania	-	-	28-Mar	14-Feb	20-Feb	28-Feb	23-Feb	23-Feb	28-Jan
Slovenia	-	-	17-Mar	06-Mar	26-Feb	27-Feb	21-Feb	06-Mar	12-Feb
Slovakia	-	-	27-Jan	04-Feb	07-Feb	14-Feb	06-Feb	08-Feb	27-Jan
Finland	09-Aug	23-Aug	13-Sep	02-Sep	05-Sep	29-Sep	13-Oct	21-Oct	13-Oct
Sweden	11-Nov	> year	> year	> year	> year	30-Dec	> year	> year	> year
UK	30-Jul	04-Sep	21-Aug	23-Aug	04-Aug	16-Jul	05-Aug	21-Aug	13-Sept

**Notes:** \*Includes Luxembourg. ^ Estimates for Malta were calculated by excluding any potential non-EU catch. # Consumption for Estonia in 2010 was calculated as population multiplied by the estimate of per-capita consumption from the FAO Fishery and Aquaculture Statistics Yearbook 2010. This approach was used because under the normal methodology the consumption estimate was unrealistic (that is, negative). - indicates that estimates could not be made, typically due to lack of data, particularly trade balances.

little access to the sea (i.e. Austria, Slovenia, Slovakia, Romania, and the Czech Republic) become fish dependent much earlier in the year, relative to the EU average. On the other hand, Estonia, Latvia, Ireland, and Sweden appear to be self-sufficient and are able to produce more fish than they consume.

Others, however, have access to potentially enormously productive waters, yet their dependence does not seem to reflect this, due mostly to the state of their fisheries and their levels of consumption. In fact, many become fish dependent strikingly early in the year: Portugal becomes dependent on 29 April; Spain on 16 May; France on 18 May; Italy on 14 April; others like Greece and UK come a bit later on 5 and 13 September respectively. After becoming fish dependent last year for the first time since the 1990s, the Netherlands remains dependent on non-EU fish, although its fish dependence day occurs three months later in 2010 (25 October) compared to 2009 (25 July). It is worth noting however that the wide ranging figures for the Netherlands over the past two years are most likely to respond to the quality of the data or changes in records of imports and exports figures, rather than to changes in consumption or fishing patterns.

While the degree of self-sufficiency is important, because it reflects the current state of affairs, trends are also important because they reflect the longer-term

**Table 6: Fish dependence days for the EU and its member states, excluding aquaculture from domestic supply.**

	1990	1995	2000	2005	2006	2007	2008	2009	2010
EU27	-	-	14-Jul	03-Jul	14-Jun	07-Jun	11-Jun	11-Jun	13 June
Belgium*	-	-	25-Feb	19-Mar	15-Apr	16-Mar	01-Mar	18-Feb	17 Feb
Bulgaria	-	-	22-Apr	01-Mar	16-Mar	23-Apr	29-Mar	31-Mar	24 Apr
Czech Republic	-	-	30-Jan	27-Jan	03-Feb	30-Jan	26-Jan	26-Jan	30 Jan
Denmark	> year	> year	31-Dec	13-Nov	13-Oct	10-Aug	26-Sep	30-Oct	15 Sept
Germany	09-Apr	31-Mar	24-Mar	21-May	25-Apr	13-Apr	04-Apr	04-Apr	24 Mar
Estonia	-	-	> year	> year	> year	> year	> year	> year	> year#
Ireland	> year	> year	> year	> year	> year	> year	> year	> year	> year
Greece	03-Aug	18-Jul	27-Jun	23-May	15-Jun	22-May	11-May	12-May	31 May
Spain	01-May	27-Apr	18-Apr	30-Mar	25-Mar	24-Mar	08-Apr	10-Apr	03 Apr
France	22-Jun	19-Jun	21-Jun	14-May	15-May	07-May	28-Apr	08-Apr	06 Apr
Italy	03-May	12-May	06-Apr	27-Mar	30-Mar	23-Mar	09-Mar	14-Mar	09 Mar
Cyprus	-	-	25-Oct	24-Jan	12-Feb	10-Feb	28-Jan	25-Jan	25 Jan
Latvia	-	-	> year	> year	> year	> year	> year	> year	> year
Lithuania	-	-	01-Jan	27-Mar	23-Mar	09-Jun	17-May	19-May	26 Mar
Hungary	-	-	24-Feb	07-Mar	29-Mar	31-Mar	01-Apr	28-Mar	25 Mar
Malta ^	-	-	-	-	-	-	19-Jan	2-Jan	04 Feb
Netherlands	>1 year	13-Nov	>1 year	>1 year	>1 year	>1 year	29-Jan	10-Jul	10 Oct
Austria	04-Jan	03-Jan	04-Jan	02-Jan	02-Jan	02-Jan	02-Jan	02-Jan	02 Jan
Poland	-	-	30-Jun	07-Jun	27-May	27-Jun	13-May	03-Jul	18 May
Portugal	04-Jul	18-May	22-Mar	09-Feb	10-Apr	23-Apr	17-Apr	27-Mar	25 Apr
Romania	-	-	13-Feb	22-Jan	24-Jan	25-Jan	19-Jan	15-Jan	11 Jan
Slovenia	-	-	20-Feb	04-Feb	29-Jan	29-Jan	23-Jan	28-Jan	25 Jan
Slovakia	-	-	17-Jan	23-Jan	23-Jan	29-Jan	23-Jan	28-Jan	19 Jan
Finland	11-Jul	14-Aug	06-Sep	24-Aug	29-Aug	24-Sep	08-Oct	16-Oct	08 Oct
Sweden	31-Oct	>1 year	>1 year	>1 year	>1 year	30-Dec	> year	> year	> year
UK	17-Sep	26-Aug	05-Aug	03-Aug	13-Jul	22-Jun	11-Jul	26-Jul	19 Aug

**Source:** Data used were Eurostat data or national data, where available. Aquaculture was excluded from production but included in the trade data.

**Notes:** \*Includes Luxembourg. ^ Estimates for Malta were calculated by excluding any potential non-EU catch. # Consumption for Estonia in 2010 was calculated as population multiplied by the estimate of per-capita consumption from the FAO Fishery and Aquaculture Statistics Yearbook 2010. This approach was used because under the normal methodology the consumption estimate was negative. - indicates that estimates could not be made, typically due to lack of data, particularly trade balances.

implications. We see that most countries and the EU as a whole show a decline in self-sufficiency from 1990 to 2010; that is, the EU and its leading member states are shown to be increasingly dependent on resources from outside EU waters. The EU27 member states have reduced their degree of self-sufficiency by 41 per cent compared to 1995.

In just ten years the EU27 fish dependence day has moved forward in the calendar by almost one month – from 4 August in 2000 to 8 July in 2010 (this year's estimates, due to data reporting delays). At current levels of consumption, if EU citizens were to rely solely on fish caught in EU waters, the EU would consume its domestic supply by 8 July. This means that the EU depends on fish from other parts of the world for almost half of the year.

There are worrying signs for increasing dependence for several countries. In particular, the Netherlands' self-sufficiency has halved in the last five years, becoming fish dependent on 25 October 2010 compared to 2005 where its dependence day was 7 August 2006. Over the same period Germany, France and Italy's self-sufficiency have decreased by 51 days, 32 days and 20 days respectively.

**Table 7: Comparison of fish dependence days for selected EU member states with and without overfishing**

	With overfishing (2010)	Without overfishing (2010)	Difference (days)
EU27	08-Jul	19 Sept	73
Belgium*	18-Feb	24 April	65
Denmark	18-Sept	31 December	104
Germany	7-Apr	19 June	73
Spain	16-May	22 June	37
France	18-May	12 July	56
Lithuania	1-Apr	29 April	28
Netherlands	25-Oct	> year	146
Poland	6-Jun	07 August	62
Portugal	29-Apr	16 May	17
Finland	13-Oct	> year	170
UK	13-Sept	> year	156

**Source:** Data used were Eurostat data, or national data where available, and aquaculture was excluded from production but included in the trade data. Difference days have been rounded.

**Notes:** \* Includes Luxembourg

For 2010, Denmark and Poland increased their dependence by 44 days and 43 days, respectively, compared to 2009. Spain's dependence comes 9 days earlier, France 4 days, Italy 6 days and Germany 2 days.

However, there are also signs of improvement. Portugal has increased its sufficiency by 79 days over the last five years, Finland by 42 days and Lithuania by 33 days. Notable improvements in sufficiency in 2010 compared to 2009 can be seen for Greece (28 days), UK (23 days), Bulgaria (22 days) and Czech Republic (17 days). The Netherlands has also increased its sufficiency by 3 months, from 25 July to 25 October, although it is still not fully sufficient as it was prior to 2009.

Excluding aquaculture from domestic production further reduces the degree of self-sufficiency, as can be seen in Table 6. Removing aquaculture from production makes the trend of declining self-sufficiency more apparent, moving the EU fish dependence day forward by a little more than a month in the 2000–2010 period (though a 2-day improvement on 2009), and by more than one month for the main EU aquaculture producers such as Spain, Italy, France, and Greece (more than three months).

The impacts of overfishing are highly significant in diminishing the long-term catches that can be sustained by European fleets. A recent paper by **nef** found that overfishing in 43 North East Atlantic stocks amounted to an annual loss of 3.5 million tonnes of fish in 2010 for all countries (mostly the EU27, Norway, and Iceland), equivalent to €3.2 billion.<sup>76</sup> Importantly, the study does not look at Mediterranean stocks or any of the more than 100 other stocks in European waters, meaning that the estimated costs of overfishing are not exhaustive and are likely to be much higher.

The 3.5 million tonnes lost were calculated using a static comparison of the MSY that could be taken from each of these stocks compared to their current, overfishing-reduced landings in 2010. Applying the same method to the landings used in this updated report for 2009, shows an annual loss of 3.67 million tonnes due to overfishing.

Overfishing these stocks imposes a severe constraint on how self-sufficient the EU and its member states can hope to be, given current levels of consumption. By imputing the potential that rebuilding stocks have to meet current

consumption, and trading this off against the fish that are currently caught outside of EU waters (either imports or external catches) because domestic production is too low, we find striking results. The EU27 loses around 2 million tonnes per year from overfishing just these stocks, which if rebuilt could increase the EU27's self-sufficiency in 2010 from 0.518 to 0.717. This would delay the EU27's fish dependence day by over two months, from 8 July to 19 September.

However, the picture for member states is more varied. Rebuilding these 43 stocks would make the UK, Denmark and Finland entirely self-sufficient, and in strong exporter positions. The Netherlands would also regain its self-sufficiency. Other countries that stand to gain substantially include: Germany, which could potentially become fish dependent more than two months later (19 June versus 7 April); Belgium also two months later (24 April versus 18 February), France nearly two months later (12 July versus 18 May), Poland 62 days later (7 August versus 6 June), and Spain 37 days later (22 June versus 16 May). These results can be seen in Table 7. It is important to bear in mind that these results are not exhaustive estimates of the costs of overfishing. For example, while stocks and catches in the Mediterranean have declined substantially in the last few decades, the costs of overfishing to Greece and Italy are zero and relatively small for Spain because none of the 43 stocks studied are in the Mediterranean.

# Discussion and implications

Fish dependence is a powerful concept that illustrates how far overconsumption outstrips domestic resources. As we have shown, one way to illustrate this trend is to represent a country's degree of self-sufficiency as a calendar day – the day in the year when a country has consumed its own supply and must begin sourcing its products elsewhere, hence the term 'fish dependence day'. For the EU, this date is currently 8 July, after which the EU depends on foreign resources (or 13 June if we do not include domestic aquaculture in our calculations).

## Interpretation of results

Many factors affect a country's degree of self-sufficiency. These include the size of the fleet, fish catch, external catch relative to total catch, area and productivity of national waters, fish consumption per capita, the scale of imports and exports, and domestic aquaculture production.

Naturally landlocked countries or those with small fleets (relative to consumption demand) will have a lower degree of self-sufficiency. Those nations with high levels of fish consumption and substantial external fishing, such as Spain and Portugal, reach their fish dependence days earlier in the year. Others with a higher proportion of catches in EU waters and lower levels of consumption, such as Denmark, have a dependence date later in the year. Some EU countries, including Ireland, Sweden, Latvia, and Estonia, are actually self-sufficient.

Aquaculture increases fish production and therefore improves self-sufficiency levels. But this is only the case when it results in a net gain in production; for example, if fish outputs are bigger than fish inputs (i.e. fishmeal). This is not always the case, as we have seen with carnivorous species. Our results show that the inclusion of aquaculture delays the date of fish dependence by slightly more than three weeks. But overall, aquaculture production has not altered the trend of increasing fish dependence.

The EU is naturally endowed with potentially rich and productive seas and it has the capacity to significantly increase its self-sufficiency levels both by managing its marine ecosystems in a sustainable way and by changing its consumption patterns. It is therefore important to emphasise that the trends found here are not an unavoidable problem, rather the consequence of poor management of EU fish resources and consumption patterns.

## Fish dependence and sustainability

It is worth highlighting that the degree of self-sufficiency we have calculated is not a direct commentary on the sustainability of fisheries. For example, according to our results, the Netherlands was a self-sufficient country until 2009, but this does not mean that it has fished sustainably in its own waters until now. Indeed, our estimates for the costs of overfishing show that the Netherlands stands to benefit from an extra 146 days of self-sufficiency from rebuilding these stocks.<sup>77</sup> However, the sustainability of a country's fisheries is not directly investigated in this report. A direct commentary on sustainability requires detailed knowledge of the carrying capacities of all species and stocks, while our estimates concern only 43 of more than 150 European stocks, and none in the Mediterranean.<sup>78</sup>



Despite this, we believe there is substantial evidence to suggest that increasing dependence on other countries is a powerful indicator of unsustainable fisheries and overexploitation of EU resources. Our self-sufficiency ratios are an easy-to-understand way of highlighting the impact that the EU's increasing fish dependence is having on other countries.

Ultimately, our results are consistent with other evidence on the effects of unsustainable trends in global fisheries. The EU model is not replicable at a global scale and is therefore unsustainable.

## **Implications of the EU's fish dependence**

### **Food security in developing countries**

The interdependence of countries is becoming increasingly complex, not least in the food market.<sup>79,80</sup> A significant proportion of EU fish imports come from developing countries. At a global level, more than half of the US\$57.7 billion worth of fish products traded in 2004 came from developing countries.<sup>81</sup> The fish-product trade is more valuable to developing countries than those of tea, rice, cocoa, and coffee combined.<sup>82</sup> It is clear, therefore, that notions of self-sufficiency directly impact the interdependence and patterns of global trade.

But while there are potentially large economic benefits from trade, the current rules of the game are not necessarily working for poorer countries. It is challenging for developing countries to get good returns on their resources. Trade fuels economic development in the exporting countries and revenues from fish exports may, potentially, help combat hunger in these countries.<sup>83</sup> But trade can lead to problems of food insecurity, largely because fish is a major source of protein in developing countries.<sup>84</sup>

The emergent picture is non-uniform across and within countries. In at least some cases, the net effects of the fish trade are completely unclear, showing neither decreased food security nor economic development. That said, there are other cases where the outcomes of trade are clearer. While fish for export are generally different, higher-value species than those consumed locally, there is evidence that in some cases fish supply is being diverted away from vulnerable people in developing countries. For example, in the decade from 1978/80 to 1988/90, per capita fish consumption in developed regions increased (by 27.7 per cent in North and Central America and 23 per cent in Europe and Asia), while in developing regions it fell (by 2.9 per cent in Africa, 7.9 per cent in South America, and more than 25 per cent in at least 24 countries, including Burundi, Libya, Mali, Costa Rica, and Colombia).<sup>85</sup> Moreover, there is worrying evidence that this decline is not being offset by other forms of animal protein, despite the region potentially benefiting economically from trade.<sup>86</sup> How this diversion occurs is not straightforward; it may be due to a combination of local people and exporters targeting the same species, or the knock-on effect of the exploitation of particular but exclusive stocks.

In summary, in order to combat cases of unsustainable trade that unfairly damage developing countries, trade regimes need to be more environmentally and socially aware.<sup>87,88,89</sup> The positive macroeconomic impact of exporting fish products and natural resources must be used to drive development, yet also weighed against the potential negative consequences for those who depend on those resources in poor communities. Consumption within sustainable limits is an important component of any positive trade. The EU, for the sake of its own food security, employment, and ecological health, must replenish its own fish stocks, with any excess demand being satisfied by well-regulated and mutually beneficial trade with developing countries.

### **Vulnerability of the EU fishing industry**

As EU fish stocks dwindle, the gap between supply and demand within Europe continues to widen. This is putting jobs in the fishing industry at risk and also undermining the processing industry that depends on fisheries. The lower productivity of EU stocks in recent years means that fishing is becoming an increasingly costly enterprise. The amount of effort and fuel needed to land one tonne of fish is higher than it needs to be, and higher than it would be if stocks were at a sustainable level. It is estimated that UK trawlers invest 17 times more effort than they did 118 years ago to land an equivalent catch.<sup>90</sup>

The prospect of further increases in fuel price can only exacerbate this trend. Fuel is currently subsidised in many countries, and this is often essential if fishing operations are to be economically viable. Such subsidies will be more difficult to justify and maintain, however, as climate change and rising oil prices begin to make an impact and the pressure to cut carbon emissions intensifies. For example, the increasing dependence of the EU processing industry on imports is pushing up societal and environmental costs such as climate change impacts and environmental damage.

In order to maintain competitiveness with non-EU producers and processors, the EU fishing industry must use its resources more efficiently. Contrary to the current position, this requires a large reduction in fishing capacity and for the EU to set levels of fish stocks beyond the MSY for as long as it takes them to recover.

Undersupply for the growing European market is not likely to be a problem in the immediate future. The average fish price in European markets is higher than anywhere else in the world except Japan, which makes Europe a lucrative and attractive market for exporters. In the long-term, however, unless we start improving the productivity of EU waters, the prospects for the EU fishing industry look bleak.

Some companies, such as the Spanish-based companies Pescanova and Calvo, have responded to shortages in EU fish stocks by sourcing fish directly through their own fleet or through joint ventures in developing countries.<sup>91</sup> While this is a natural response to a challenging economic environment from a business strategy point of view, it only serves to increase our dependence on fish from elsewhere.

#### **The way forward and opportunities for change**

There are many benefits associated with replenishing fish stocks. A high degree of self-sufficiency helps to deliver increased food security, improved resource management, a healthier environment, and long-term employment and social stability for fishing communities. A decrease in the degree of self-sufficiency means the opposite, which is why the EU's fish resources and fisheries sector are both in such a parlous state.



This situation is reversible, however. The current state of EU fisheries must be set against a backdrop of once rich and productive EU waters of considerable economic and cultural significance.<sup>92,93,94</sup> We need to moderate current levels of fish consumption and restore EU fish stocks, both of which would reverse our increasing levels of fish dependence. The current reform of the CFP offers a unique opportunity to do just that.

To transform the management of our marine resources, we need the new CFP to provide a policy framework that will restore marine ecosystems to healthy levels and deliver a fair allocation of resources within the EU and internationally. As a minimum this will require the following actions.

- Set a clear target to restore EU stocks to their MSY level and beyond.
- Reduce capacity to reconcile it with available resources; improve data collection, transparency, and reporting; and prioritise scientific advice in determining catch quotas.
- Create a context in which being profitable is aligned with doing the right thing, by making access to resources conditional on social and environmental criteria.
- Promote responsible consumption among all EU consumers, and implement measures that are conducive to more responsible fishing outside EU waters.
- Use public funds to deliver social and environmental goods by investing in environmental measures, research, stakeholder involvement, and control and enforcement, rather than the current situation of funding the overcapacity of the fishing fleet through modernising vessels and failing to control overfishing i.e. access to fisheries stocks.

In order for this to happen, policymakers need to look beyond the short-term costs that could result from reform and instead give priority to the medium- and long-term benefits that healthy marine resources will provide. But action will also be required at other levels. Businesses need to respond to the current challenges by adopting business models that secure their viability in the future and protect the scarce resources on which they depend. EU citizens, meanwhile, need to exercise their consumer power to move towards patterns of consumption that match what our oceans are able to produce.

# Conclusions

The EU and many of its leading member states remain highly dependent on fish resources from other countries. This is down to two main driving factors: EU stocks are in poor health – well below their maximum potential - and EU demand for fish continues to increase as EU citizens eat more fish than their waters can produce.

We have seen that the EU now relies on foreign resources for almost half of its fish consumption, that this dependence – while showing some signs of stabilisation - has increased with respect to 2000 levels , and that the impact of aquaculture in reducing this trend is limited. The EU's fish dependence day is 8 July. Certain member states, such as Spain, France, Italy, and Portugal, reach their fish dependence days much earlier than this, despite their access to productive EU waters.

In the context of a steadily growing population, the trend towards the fishing of stocks to depletion before moving on to another resource (either through targeting distant-water fishing grounds or importing produce) is unsustainable, environmentally ruinous, and potentially damaging for poorer countries and their development. Many of the costs of EU fish mismanagement are being exported, with direct consequences on the fish stocks of non-EU countries, simply to meet EU demand. Change is desperately needed if we are to break this pattern – the EU needs to focus efforts on restoring its own marine ecosystems and to move towards consumption levels that are commensurate with ecosystem capacity.

The imminent CFP reform is an ideal opportunity to create a robust policy framework that restores the EU's marine resources and protects them for future generations. To this end, **nef** is an active member of the OCEAN2012 coalition, which is dedicated to transforming European fisheries policy, to stop overfishing, to end destructive fishing practices, and to deliver fair and equitable use of healthy fish stocks.

If we are to get this reform of the CFP right, the EU needs to champion the goals of sustainable fishing inside and outside the EU, end destructive fishing practices, and deliver fair and equitable use of healthy fish stocks. All of these policies are consistent with reversing the EU's trend towards increased dependence on other countries' resources.

# Appendix

This section includes supporting tables and data that were used in the text or calculations.

**Table A1: Total fisheries production in the EU (catch + aquaculture) in tonnes live weight**

Member state	1995	2000	2005	2006	2007	2008	2009	2010
EU27	9,253,885	8,187,779	6,902,605	6,733,723	6,486,666	6,428,211	6,360,739	6,216,117
Austria	3,322	3,286	2,790	2,863	2,889	2,440	2,492	2,517
Belgium	36,474	31,673	25,002	23,143	24,667	22,735	22,295	22,991
Bulgaria	12,627	10,652	8,578	10,803	13,336	14,022	16,891	18,686
Cyprus	9,772	69,360	4,267	5,725	5,425	5,788	4,767	5,506
Czech Republic	22,608	24,129	24,697	25,077	24,723	24,559	24,183	24,410
Denmark	2,043,638	1,577,683	949,646	895,763	684,184	727,837	811,877	860,343
Estonia	132,345	113,384	100,138	87,584	100,225	101,519	98,076	95,857
Finland	171,774	170,935	145,642	162,335	177,705	164,596	168,223	163,161
France	956,367	969,097	839,994	831,097	795,813	737,743	668,623	667,034
Germany	302,925	271,585	330,368	335,521	340,809	324,087	289,254	270,592
Greece	184,361	194,762	198,461	211,286	208,266	203,769	204,735	192,010
Hungary	16,674	19,987	21,270	22,229	22,946	22,394	20,537	24,513
Ireland	419,110	329,228	327,660	264,968	267,527	250,217	316,292	365,069
Italy	611,522	518,680	479,000	489,540	467,631	393,623	415,326	387,358
Latvia	149,719	136,728	151,160	140,955	156,001	158,518	163,728	165,368
Lithuania	59,082	80,985	141,726	156,775	190,874	185,766	176,117	142,983
Malta	5,539	2,820	2,072	8,513	9,833	8,009	6,776	8,717
Netherlands	502,596	571,005	620,578	512,093	467,011	463,369	437,655	352,228
Poland	454,483	253,481	193,167	181,346	186,746	179,328	260,397	179,681
Portugal	274,509	196,694	225,967	236,990	260,561	230,648	205,554	230,578
Romania	69,105	17,099	13,337	15,772	16,496	17,906	17,151	7,185
Slovakia	3,567	2,255	2,648	2,980	3,193	2,733	2,584	2,431
Slovenia	2,956	3,037	2,573	2,500	2,465	2,190	2,716	1,710
Spain	1,392,876	1,375,722	988,019	1,038,567	1,023,023	1,171,061	1,029,290	992,654
Sweden	412,145	343,374	262,240	276,804	243,619	238,935	211,953	222,677
UK	1,003,788	900,136	841,605	792,493	790,698	774,420	783,248	809,858

**Source:** Eurostat, European Commission. Fishery Statistics 1995-2008. Eurostat Pocketbooks. 2009 Edition. Eurostat database ([epp.eurostat.ec.europa.eu/portal/page/portal/fisheries/data/database](http://epp.eurostat.ec.europa.eu/portal/page/portal/fisheries/data/database)).

**Notes:** Aquaculture production figures for 2010 were not available through Eurostat for France, Belgium, Lithuania and Slovakia. For France, alternative figures were sourced from the FAO's Fisheries Global Information System. The data for Belgium, Lithuania and Slovakia were carried over from 2009.

**Table A2: EU external catches in tonnes product weight (2000-2010)**

Member state	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU27	1,425,747	1,453,102	1,327,485	1,237,280	1,233,664	1,184,674	1,144,539	1,087,730	1,086,920	1,064,241	1,038,194
Denmark	231,538	171,737	146,103	137,995	122,656	102,112	76,461	91,261	69,722	59,150	48,452
Germany	29,468	28,555	27,547	26,514	24,848	35,912	35,698	82,042	96,539	70,942	58,023
Estonia	20,788	16,355	16,597	16,000	17,374	35,540	34,336	32,632	32,608	31,927	31,146
Ireland	9,288	44,094	20,707	13,118	10,355	15,868	5,149	6,874	8,096	9,950	11,765
Greece	0	0	0	0	0	11,847	11,445	10,877	10,869	10,642	10,382
Spain	576,011	591,759	459,887	462,754	417,120	414,690	401,585	398,542	496,139	410,792	398,990
France	116,819	116,819	116,819	116,819	116,819	116,819	116,819	116,819	116,819	116,819	116,819
Italy	1,980	4,579	4,029	5,141	4,494	35,540	34,336	32,632	32,608	31,927	31,146
Latvia	3,397	3,330	2,742	29,189	26,507	47,387	45,782	43,509	43,477	42,570	41,528
Lithuania	15,176	102,734	30,524	18,010	14,193	118,467	114,454	108,773	108,692	106,424	103,819
Netherlands	16,922	49,568	15,487	35,536	59,324	44,204	59,262	73,714	84,147	66,226	50,773
Poland	58,195	36,326	26,864	16,117	19,323	23,693	22,891	21,755	21,738	33,061	20,764
Portugal	27,166	28,496	31,822	33,828	27,351	94,774	91,563	87,018	86,954	85,139	83,056
Finland	0	0	0	81	0	0	0	0	0	0	0
Sweden	31,337	24,634	39,757	76,474	34,814	51,418	54,333	7,816	6,838	5,971	0
UK	31,907	30,713	23,866	26,796	23,886	23,693	28,738	30,737	36,110	38,675	43,630

**Source:** Study on the European External Fleet (2008) (Contract FISH/2006/02) © European Communities.

**Table A3: Trade Balance (exports minus imports) in tonnes product weight (1990-2010)**

Member state	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU27*			-3,473,420	-3,512,615	-3,496,412	-3,863,059	-3,450,097	-3,714,624	-4,103,370	-4,276,001	-4,012,273	-4,007,893	-3,789,831
Austria	-68,450	-55,048	-50,896	-53,532	-50,340	-53,697	-61,384	-68,630	-67,300	-72,135	-68,280	-65,813	-66,723
Belgium			-164,870	-135,352	-134,721	-140,864	-146,917	-91,388	-55,376	-95,076	-114,694	-140,590	-150,062
Bulgaria	209,856	-227,867	-15,934	-17,941	-17,777	-22,930	-23,258	-27,896	-29,526	-19,821	-27,611	-27,828	-23,998
Cyprus			-15,310	-17,450	-16,231	-16,941	-20,267	-26,934	-15,965	-18,364	-24,631	-19,285	-19,546
Czech Republic			-52,692	-54,728	-49,453	-48,258	-52,929	-54,090	-45,914	-51,020	-55,061	-54,905	-45,059
Denmark	126,568	336,026	-1,178	16,410	-179,969	-419,503	-158,631	-167,658	-219,909	-385,273	-150,145	-89,608	-277,748
Estonia			47,779	98,070	86,099	7,476	63,492	90,824	83,994	73,120	73,007	82,378	96,050
Finland	-111,706	-95,418	-73,669	-90,123	-84,261	-82,673	-83,505	-72,422	-77,023	-60,918	-45,049	-40,951	-45,487
France	-531,132	-528,131	-543,271	-618,728	-623,014	-593,755	-648,241	-712,905	-698,654	-715,732	-677,611	-769,758	-798,478
Germany	-790,976	-642,276	-601,508	-525,041	-558,205	-526,061	-463,031	-400,098	-429,771	-510,195	-430,004	-521,188	-530,523
Greece	-72,220	-70,757	-79,800	-110,206	-122,784	-95,156	-77,953	-117,481	-90,990	-121,889	-127,089	-117,750	-75,619
Hungary			-41,692	-48,818	-46,779	-39,422	-30,162	-35,173	-25,128	-21,768	-22,256	-20,580	-20,999
Ireland	115,887	227,208	152,964	212,351	223,396	197,110	208,137	154,195	118,334	96,702	116,633	105,389	137,709
Italy	-625,928	-607,538	-696,826	-762,164	-747,941	-792,388	-804,953	-833,740	-841,081	-856,909	-845,278	-855,954	-865,868
Latvia			61,472	85,338	81,548	73,595	65,071	75,865	76,277	71,708	68,957	56,354	61,280
Lithuania			-43,219	-45,265	-21,018	-5,713	-10,107	-2,933	-1,695	4,553	-14,269	-1,710	-14,413
Malta			-15,029	-20,313	-14,191	-27,636	-18,616	-15,572	-25,230	-35,484	-23,594	-303,874	-17,338
Netherlands	89166	-66446	12,427	30,102	42,717	120,780	312,953	259,998	194,608	103,116	109,289	-222,667	-17,953
Poland			-182,600	-168,028	-135,174	-142,579	-150,848	-154,013	-145,659	-116,188	-188,313	-156,670	-191,836
Portugal	-128622	-182805	-239,920	-249,865	-237,871	-254,338	-231,553	-968,838	-275,977	-289,961	-242,871	-289,394	-222,989
Romania			-55,138	-64,559	-77,059	-73,416	-84,465	-96,314	-98,823	-86,334	-103,387	-100,104	-87,894
Slovakia			-21,033	-21,629	-21,217	-20,105	-26,271	-25,359	-23,822	-23,184	-24,612	-21,721	-30,986
Slovenia			-11,603	-13,304	-12,247	-11,402	-12,041	-11,771	-13,563	-13,073	-13,226	-12,644	-12,872
Spain	-439092	-525095	-602,475	-651,936	-666,633	-772,470	-723,247	-680,926	-759,318	-764,351	-653,336	-528,691	-608,345
Sweden	-50821	20870	98,479	73,817	42,189	22,186	23,177	23,265	67,756	1,879	11,364	24,011	48,455
UK	-607411	-448919	-472,032	-533,195	-471,262	-396,764	-414,947	-433,763	-506,695	-405,264	-465,686	-384,133	-284,469

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Written by: Aniol Esteban and Rupert Crilly

2013 Update by: Roslyn Wood

Edited by: [www.irjjo.com](http://www.irjjo.com)

Design by: the Argument by Design – [www.tabd.co.uk](http://www.tabd.co.uk)

Special thanks to: all the people who contributed time and assistance to this project.

If you have any feedback, comments or suggestions to improve this report we would love to hear from you.

E-mail: [info@neweconomics.org](mailto:info@neweconomics.org)

## new economics foundation

3 Jonathan Street  
London SE11 5NH  
United Kingdom

Telephone: +44 (0)20 7820 6300

Facsimile: +44 (0)20 7820 6301

E-mail: [info@neweconomics.org](mailto:info@neweconomics.org)

Website: [www.neweconomics.org](http://www.neweconomics.org)

Registered charity number 1055254

© March 2013 nef (the new economics foundation)

ISBN 978 1 908506 35 1