



Fish dependence

The increasing reliance of the EU
on fish from elsewhere

nef is an independent think-and-do tank that inspires and demonstrates real economic well-being.

We aim to improve quality of life by promoting innovative solutions that challenge mainstream thinking on economic, environmental and social issues. We work in partnership and put people and the planet first.

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 Environment Group, the conservation arm of The Pew Charitable Trusts, a non-governmental organisation working to end overfishing in the world's oceans.

The founding members of OCEAN2012 are the Coalition for Fair Fisheries Arrangements (CFFA), the Fisheries Secretariat (FISH), **nef** (new economics foundation), the Pew Environment Group and Seas At Risk (SAR).

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.



Contents

Executive summary	2
Introduction	4
Background	5
Methodology	9
Results	14
Discussion and implications	17
Conclusions	21
Appendix	22
Endnotes	24

Executive summary

EU fish stocks are in an unprecedentedly poor state yet fish consumption throughout Europe remains high. The EU has been able to maintain and expand its levels of consumption by sourcing fish from other countries, both through the catches of its distant-water fleet and imports. This report highlights Europe's increasing 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 European countries 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 nation or region's total annual fish consumption, the fish dependency day is the date on the calendar when it would start to depend on fish from elsewhere because its own supplies were depleted.

For the EU as a whole this is 9 July, indicating that almost one-half of EU fish consumption depends on fish from non-EU waters. We also found that, since 2000, the EU's fish dependence day has occurred earlier and earlier in the year and is now nearly a month sooner, revealing an increasing level of fish dependence.

Member states with little or no access to EU waters, such as Austria, Slovakia and Slovenia, obviously become fish dependent early in the year. Surprisingly, though, this is also the case for some countries with greater access to EU waters. These include Spain, Portugal, Italy, Germany and France – all countries that 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 halted or reversed the upward trend in fish dependence. If we discount aquaculture, the EU's fish dependence day moves forward to 14 June; for big aquaculture producers such as Spain, France, Italy and Greece, their fish dependency day would occur more than a month earlier than that.

In a context of finite resources and growing populations, the current EU model is unsustainable. The EU's increasing 'fish dependence' has implications for the sustainability of fish stocks in other countries, 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 declining stocks is a model that 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.

The reform of the EU's Common Fisheries Policy (CFP) offers a unique 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 internationally. As a minimum this will require the following actions.

- Reducing capacity to reconcile it with available resources; improving data collection, transparency and reporting; and prioritising scientific advice in determining catch quotas.
- Creating a context in which being profitable is aligned with doing the right thing, by making access to resources conditional on social and environmental criteria.
- Promoting responsible consumption among all EU consumers, and implementing measures that are conducive to more responsible fishing outside EU waters.
- Using 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. These aims contrast with the current funding of overcapacity in the fishing fleet, through modernising vessels, and failure to control overfishing, such as 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 give priority to the long-term benefits that healthy marine resources will provide.



Photo: Corey Arnold

Introduction

Fisheries play a pivotal role in human health and wellbeing: fish are crucial to the global food supply, providing one-fifth of animal protein consumption worldwide. 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.

European Union 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. This is reducing the long-term productivity of marine ecosystems elsewhere and is also undermining the potential of poorer countries to meet their own domestic demand.

The main goal of this report is to illustrate the extent to which the EU – in spite of its rich and productive seas – is increasingly dependent on fish from elsewhere. We highlight the implications of this trend for the EU and other countries and make the case for the EU to increase its self-sufficiency (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 both 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. 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 countries, 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, 88 per cent of EU-assessed stocks are fished beyond their maximum sustainable yield (MSY) and 30 per cent beyond safe biological limits.¹

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.² The total landings from EU fisheries in the northeast Atlantic and the Mediterranean have decreased by 30 per cent over the past decade.³

On a global level, the United Nations Food and Agriculture Organization (FAO) reports that around 28 per cent of stocks are overexploited or depleted, with another 52 per cent fully exploited.⁴ 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.⁵ If the current trend continues, some scientists have predicted that 100 per cent of commercial stocks could collapse by 2048.⁶

Overexploitation of natural resources is synonymous with lost 'rents', the economic yield that could be derived from fisheries compared to current revenues.⁷ The World Bank has estimated the annual cost of global overfishing at \$50 billion, totalling \$2 trillion over the past three decades.⁸

Rising levels of consumption

While the productivity of EU fish stocks has decreased, fish consumption in the EU continues to increase and remains at levels beyond what EU waters are now able to produce. In 2006 the total catch in EU waters amounted to over 5.4 million tonnes,⁹ which is only just more than half of the total fish consumption of over 9.3 million tonnes.¹⁰ On average, each EU15 citizen consumes 25.6kg of fish products per year (as of 2005),¹¹ which is 63 per cent above the global average of 16.3kg *per capita*. Portugal (with 55.4kg *per capita*), Spain (42.7kg), France (34.3kg) and Finland (33.0kg) have some of the highest consumption rates in the EU.¹² Together, these four countries alone account for 37 per cent of EU fish consumption.¹³ 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.¹⁴

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 UK, which ranked 10th in the EU27 in 2005.¹⁵ All other countries increased their consumption. Five countries (France, Germany, Finland, Austria and Bulgaria) 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). Spain and the Netherlands have increased their consumption by 57 and 79 per cent, respectively.¹⁶

At the global level, fish consumption has grown at a rate of 3.6 per cent per year since 1961, rising from 9.0kg *per capita* per year half a century ago to 16.0kg in 1997.¹⁷ Since 1997 this global growth has slowed; consumption reached 16.3kg in 2005, according to FAO estimates.¹⁸ That said, it can be expected

that pressures on fish stocks are only likely to increase as the global population continues to grow, reaching a projected 9 billion people between 2040 and 2050.¹⁹

Sourcing from abroad

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

In 2006 the EU had 718 vessels fishing in non-EU waters. Spain accounted for over one-half of these; most of the others came from France, Portugal, Italy, Latvia and Lithuania.²⁰ Estimates of the 2006 catch size of the EU distant-water fleet range from 1.06 million to 1.2 million tonnes,²¹ equivalent to 19–21 per cent of total EU catches.²²

The EU distant-water fleet predominantly operates in other countries' waters, under bilateral and multilateral fisheries agreements; in third countries' exclusive economic zones (EEZs); and in international waters. Its catch is classed as EU produce. However, the EU is the world's largest market for fish and has become increasingly reliant on imported fish to meet its needs. In 2006 it imported four million tonnes more than it exported²³. These imports help meet its demand for human consumption and processing, as well as animal feed and aquaculture.

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 2006.²⁴ Data from the EU indicates that imports account for between 59 per cent²⁵ (including domestic aquaculture) and 67 per cent²⁶ (excluding domestic aquaculture) of the EU's apparent consumption* by quantity. Yet, as the EU's imports increased, in the same year (2007) the quantity of EU fish production fell by 3 per cent. This is on top of a 28 per cent drop in production in the 12 years from 1995 to 2006 (Appendix: Table A1).²⁷

Aquaculture production

Aquaculture has a significant impact on fish consumption patterns. It is often presented as a solution to overfishing. As global fish stocks have declined, aquaculture production has risen. A similar pattern can also be observed in the EU up to 1997, since when aquaculture production has remained stable at around 1.25–1.28 million tonnes.²⁸ 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, UK and Greece) supplying 76 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 a number of reasons why its potential is limited.

First and foremost among these is that most marine fish aquaculture is dependent on wild fish catches for fish feed. The precise conversion of wild fish to aquaculture in tonne-for-tonne terms depends on the composition of fish meal and the species being produced. The production of certain species requires large quantities of wild catch as feed, at a conversion rate greater than one.²⁹ Examples include salmon (conversion rate: 3.15); marine finfish (5.16) (species include flounder, halibut, sole, cod, hake, haddock, redfish, seabass, congers, tuna, bonito and billfish); marine shrimp (2.81); trout (2.46); and tilapia (1.41).³⁰

With current practices, production of these groups puts great pressure on wild fish stocks. Indeed, the Department of Environment, Food and Rural Affairs (Defra³¹), the UK government's agricultural and environmental body, has stated³² that an increased reliance on these groups of species is unviable and points instead to lower-trophic-level species such as molluscs.

Table 1: Fish Consumption per capita for EU countries

(kg/capita/year)	2005
Portugal	55.6
Spain	41.2
Lithuania	36.8
France	35.3
Finland	31.9
Malta	30.7
Sweden	28.9
Luxembourg	26.0
Belgium	24.9
Denmark	24.7
Italy	24.7
Cyprus	23.2
Ireland	22.5
Greece	21.2
United Kingdom	20.6
Netherlands	19.2
Estonia	16.4
Germany	14.8
Austria	13.5
Latvia	12.4
Czech Republic	10.5
Slovenia	9.6
Poland	9.5
Slovakia	8.1
Romania	5.2
Hungary	5.1
Bulgaria	4.2
EU-15	25.6
World	16.4

Source: Fishery and Aquaculture statistics. FAO yearbook 2007
<ftp://ftp.fao.org/docrep/fao/012/i1013t/i1013t.pdf>

* Apparent consumption = catches + imports - exports

Table 2: EU aquaculture production (2006) in quantity and as EU share

	2006 aquaculture production	
	Total production (tonnes)	% of EU27
EU27	1,280,000	100.00
EU15	1,180,000	92.19
Spain	295,000	22.98
France	238,000	18.52
Italy	174,000	13.53
UK	172,000	13.39
Greece	113,000	8.82
Ireland	53,100	4.14

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. NB. Figures rounded.

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

This is certainly the case with EU aquaculture. 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, below, which details EU aquaculture production categorised into mariculture, freshwater and shellfish production. 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.³³

The second reason why aquaculture's potential may be limited is its links to a wide range of environmental impacts.³⁴ These include the introduction of alien species;³⁵ environmental impacts from genetically modified and escaped fish;³⁶ habitat modification and pollution;³⁷ antibiotic use and other problems with intensive farming practices;³⁸ and unsustainable use of resources.³⁹

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.

Table 3: Aquaculture production by the four main EU producers

Quantity of production	Spain	France	Italy	UK
Mariculture ('000 tonnes)	29.1	7.4	29.8	134.1
Freshwater ('000 tonnes)	26.0	38.4	42.4	16.8
Molluscs and crustaceans ('000 tonnes)	208.0	189.2	175.0	30.5
Hatcheries/nurseries (million juveniles)	84,380	58	0	215.88

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.

In conclusion, aquaculture, on balance, adds to the global supply of fish. It has a part to play in the move to optimally managed 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 the eventual replacement – as is already being seen – 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 one or more. A ratio of less than one means that some consumption depends on non-EU resources, and as such it 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 our 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 the opposite.

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 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 termed the 'fish dependence day'.

For example, a degree of self-sufficiency of 0.4 means that a country's resources provide the equivalent of 146 days of consumption in quantity 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.

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

- i** Domestic supply: calculate domestic supply by gathering data on total catch per nation in EU waters, aquaculture production and trade balances.
- ii** Domestic demand: calculate domestic demand by gathering data on total catch in all regions and trade balances (exports minus imports).
- iii** Self-sufficiency: calculate degrees of self-sufficiency as the ratio of domestic supply to domestic demand. and
- iv** Fish dependence days: convert 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 a national level this includes catches by the national fleet in its own national waters and in 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:

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

Data for catches[†] from the EU and member states were available through Eurostat⁴⁰ (see Appendix, Table A1 for sample statistics). However, it was not possible to obtain data on catches by member states disaggregated by the source location. That is, 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 the share of gross tonnage that each nation has in the total EU external fleet⁴¹ and assuming that the gross tonnage for all member states translates into proportional shares of catches (Appendix, Table A2 presents data on the tonnage of member states' external fleets and the EU as a whole). For example, if the EU total catches in non-EU waters in 2006 amounted to 1.06 million tonnes and a member state had 10 per cent of the EU's external fleet capacity in terms of gross tonnage, then we assumed that it was responsible for 10 per cent of 1.06 million tonnes of external catch in 2006: that is 106,000 tonnes.

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

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

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 for animal feed or wasted. Apparent consumption is measured as total production (catches + aquaculture), plus imports, minus exports. In equation form that is:

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

* Figure for total catches in all fishing regions is measured in tonnes, includes aquaculture and covers the period of one year. It relates only to EU waters, but is not distinguished by member state EEZs. Ideally we would have liked to restrict domestic production to fish catches by a country within its own EEZ but under the Common Fisheries Policy fleets are allowed to fish in other EU states' waters without registering the origin of the catch. The consequences of this will be discussed under the 'caveats' section.

† Official data sources on catches represent recorded landings. Since landings do not include bycatch, illegal, unreported or unregulated (IUU) fishing or discards, official catch data is in effect a large underestimation of the 'real catch' that takes place.

‡ 'Total catches' includes aquaculture production and wild catches by the EU and all member states, available through Eurostat. From this figure, for each country, the estimated external catch (derived above, in footnote † is subtracted. Trade data includes aquaculture trade as well as wild catch, and is in all fishery products, regardless of processing method.

Data for catches for the EU and member states – the same as was used for domestic production – were taken from Eurostat statistics⁴² (see Appendix, Table A1 for sample data). Our trade data was taken from Eurostat pocketbooks⁴³ (see Appendix, Table A3 for sample data). This trade data covers 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 above, 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 domestic supply because trade is not production. A positive trade balance (i.e. exports larger 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 are 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 not available or difficult to access. This is partly due to poor reporting of fisheries data and 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. They can be considered as providing the best picture currently available. As explained in the sections below, 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 Origin⁴⁴ 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. 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 which 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 operating in the Mediterranean, particularly since these 718 vessels must spend at least 90 per cent of their activity outside the EU. Catch by vessels from Mediterranean EU countries operating beyond their EEZ 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

Non-EU catches for each member state were calculated based on the assumption that every country's share of EU external fleet capacity (in gross tonnage) was a reflection of its share of non-EU catches. For example, the UK makes up 2 per cent of the EU external fishing fleet tonnage capacity and we assumed that it is 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 total UK catches to obtain UK 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 transshipment into consideration.

In order to validate our estimates of share of national catches coming from non-EU waters, we tried to obtain information at the national level for each member state, but we could only obtain national data for Spain and France. Data from the Spanish ministry for fisheries⁴⁵ suggested that 54 per cent of Spanish catches were made in non-EU waters, matching the estimates derived using our methodology (when including aquaculture production in Spanish catches). That is, the fraction of Spanish catches sourced from outside the EU was 54 per cent,* which is equivalent to 0.55m tonnes in 2005 when the entire Spanish fleet caught 0.99m tonnes. Using our method, where 52 per cent of the external fleet's capacity is Spanish and there were 1.06m tonnes of EU external catches in total, we also arrived at 0.55m tonnes. Likewise, for France the official statistics⁴⁶ and our own were similar†. For both countries we used the figures from national sources rather than our estimates, although we view the findings as support for our methodology.

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.

* This figure of 54% was used time-independently in order to follow Spanish national data as closely as possible.

† We calculated France's figure by summing its national catch using data from the referenced report (from p. 23 onwards: 'État du secteur des pêches français') on catches in different areas, which came to 116,819 tonnes in 2008. For the same reason as for Spain, see E above. we used this figure time-independently to represent France's external catch in all years of our analysis.

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**

The trade data we used was drawn from Eurostat⁴⁷ based on trade codes and covers all fish products, including live fish, frozen fish, fish meal, fish oils and processed fish. Any products that were excluded from these statistics are likely to lead to more conservative self-sufficiency results. That is, because the EU is predominantly a net importer, excluding certain fish imports will lead to a higher degree of self-sufficiency than is actually the case.

vii) **Contemporary data**

Finally, it is worth noting that there will be a delay of around three years before the data we have relied upon becomes available for analysis. As a consequence, most of our datasets are from 2006/07. We therefore make the assumption that similar conditions hold for 2010. Given that the trend is of increasing dependence year on year, this is likely to make the EU 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 ten-digit code specificity required at the EU level.

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 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 E. That said, due to the way in which trade data is 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 just over 50 per cent, and that this ratio has been decreasing consistently since its formation. EU15 has also shown declining self-sufficiency, from just over 67 per cent in 1990 to just under 52 per cent in 2006, around a 15 per cent drop in 16 years.

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

	1990	1995	2000	2005	2006
EU27		0.871	0.590	0.563	0.518
EU15	0.671	0.670	0.588	0.560	0.519
Austria	0.057	0.057	0.061	0.039	0.041
Belgium			0.161	0.215	0.287
Bulgaria			0.401	0.234	0.267
Cyprus			0.819	0.137	0.264
Czech Republic			0.314	0.313	0.353
Denmark	1.125	1.197	0.999	0.850	0.787
Estonia			1.106	7.072	30.835 [†]
Finland	0.603	0.643	0.700	0.669	0.679
France	0.679	0.565	0.564	0.466	0.468
Germany	0.328	0.295	0.280	0.421	0.341
Greece	0.635	0.676	0.660	0.597	0.657
Hungary			0.332	0.379	0.482
Ireland	2.431	2.197	1.876	1.916	1.776
Italy	0.491	0.472	0.393	0.340	0.343
Latvia			1.094	1.442	1.437
Lithuania			-0.444	0.244	0.233
Malta*			-1.367	-1.102	-0.556
Netherlands	1.602	0.887	1.022	1.716	1.681
Poland			0.529	0.494	0.467
Portugal	0.516	0.383	0.205	0.112	0.318
Romania			0.237	0.122	0.138
Slovakia			0.072	0.095	0.102
Slovenia			0.207	0.177	0.155
Spain	0.461	0.397	0.404	0.343	0.356
Sweden	0.862	1.053	1.402	1.096	1.350
UK	0.577	0.674	0.636	0.643	0.592
Croatia			1.000	0.536	0.634

* Clearly it is impossible for a country to have a negative ratio. This discrepancy arises from estimates of a country's external catch being greater than the country's total catch. This is predominantly a problem for countries with small total catches, such as Malta, which are therefore more sensitive to inconsistencies in the data.

[†] This figure is much larger than other EU countries because net consumption for 2006 (971 tonnes/year) is an underestimate. Average net consumption from previous years is about 22,000 tonnes, which would change the degree of self-sufficiency to 2.331. Countries with a small population such as Estonia are more sensitive to inconsistencies with the data

Fish dependence in the EU as a whole shows that its fish stocks support just above one-half of its consumption; its fish dependence day falls on 9 July. Member states differ in their levels of self-sufficiency. Unsurprisingly, inland countries or those with 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, the Netherlands 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 2 April; Italy on 6 May; Spain on 10 May; and France on 20 June.

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 5: Fish dependence days in the EU

Country	1990	1995	2000	2005	2006
EU27	-	-	4 Aug	25 Jul	9 Jul
EU15	2 Sept	2 Sept	3 Aug	24 Jul	9 Jul
Austria	21 Jan	21 Jan	23 Jan	15 Jan	15 Jan
Belgium	-	-	28 Feb	20 Mar	15 Apr
Bulgaria	-	-	27 May	27 Mar	8 Apr
Cyprus	-	-	27 Oct	19 Feb	7 Apr
Czech Republic	-	-	25 Apr	25 Apr	9 May
Denmark	>1 year	>1 year	31 Dec	7 Nov	15 Oct
Estonia	-	-	>1 year	>1 year	>1 year
Finland	9 Aug	23 Aug	13 Sept	2 Sept	5 Sept
France	6 Sept	26 Jul	25 Jul	20 Jun	20 Jun
Germany	30 Apr	18 Apr	13 Apr	3 Jun	5 May
Greece	20 Aug	4 Sep	29 Aug	6 Aug	28 Aug
Hungary	-	-	2 May	19 May	26 Jun
Ireland	>1 year	>1 year	>1 year	>1 year	>1 year
Italy	29 Jun	22 Jun	24 May	5 May	6 May
Latvia	-	-	>1 year	>1 year	>1 year
Lithuania	-	-	1 Jan	30 Mar	27 Mar
Malta	-	-	>1 year	Undefined*	Undefined*
Netherlands	>1 year	20 Nov	>1 year	>1 year	>1 year
Poland	-	-	13 Jul	30 Jun	20 Jul
Portugal	8 Jul	20 May	16 Mar	11 Feb	2 Apr
Romania	-	-	28 Mar	14 Feb	20 Feb
Slovakia	-	-	27 Jan	4 Feb	7 Feb
Slovenia	-	-	17 Mar	6 Mar	26 Feb
Spain	18 Jun	26 May	28 May	6 May	10 May
Sweden	11 Nov	>1 year	>1 year	>1 year	>1 year
UK	30 Jul	4 Sept	21 Aug	23 Aug	4 Aug
Croatia	-	-	-	15 Jul	20 Aug

Notes:

- indicates that estimates could not be made, typically due to lack of data, particularly trade balances.

* indicates that estimates were unrealistic due to consumption being greater than catches minus external catches, aquaculture production and imports (data limitation). Aquaculture included in the catch data. Dates not available for some countries prior to joining the EU.

Table 6: Fish dependence days in the EU – excluding aquaculture from domestic supply

Geo/time	1990	1995	2000	2005	2006
EU27	-	-	14 Jul	3 Jul	14 Jun
Austria	4 Jan	3 Jan	4 Jan	2 Jan	2 Jan
Belgium	-	-	25 Feb	19 Mar	15 Apr
Bulgaria	-	-	22 Apr	1 Mar	16 Mar
Cyprus	-	-	25 Oct	24 Jan	12 Feb
Czech Republic	-	-	30 Jan	27 Jan	3 Feb
Denmark	>1 year	>1 year	31 Dec	13 Nov	13 Oct
Estonia	-	-	>1 year	>1 year	>1 year
Finland	11 Jul	14 Aug	6 Sep	24 Aug	29 Aug
France	22 Jun	19 Jun	21 Jun	14 May	15 May
Germany	9 Apr	31 Mar	24 Mar	21 May	25 Apr
Greece	3 Aug	18 Jul	27 Jun	23 May	15 Jun
Hungary	-	-	24 Feb	7 Mar	29 Mar
Ireland	>1 year	>1 year	>1 year	>1 year	>1 year
Italy	3 May	12 May	6 Apr	27 Mar	30 Mar
Latvia	-	-	>1 year	>1 year	>1 year
Lithuania	-	-	1 Jan	27 Mar	23 Mar
Malta	-	-	>1 year	Undefined*	Undefined*
Netherlands	>1 year	13 Nov	>1 year	>1 year	>1 year
Poland	-	-	30 Jun	7 Jun	27 May
Portugal	4 Jul	18 May	22 Mar	9 Feb	10 Apr
Romania	-	-	13 Feb	22 Jan	24 Jan
Slovakia	-	-	17 Jan	23 Jan	23 Jan
Slovenia	-	-	20 Feb	4 Feb	29 Jan
Spain	1 May	27 Apr	18 Apr	30 Mar	25 Mar
Sweden	31 Oct	>1 year	>1 year	>1 year	>1 year
UK	17 Sept	26 Aug	5 Aug	3 Aug	13 Jul

Notes:

- indicates that estimates could not be made, typically due to lack of data, particularly trade balances.

* indicates that estimates were unrealistic due to consumption being greater than catches minus external catches, aquaculture production and imports (data limitation). Aquaculture included in the catch data. Dates not available for some countries prior to joining the EU.

implications. We see that most countries and the EU as a whole show a decline in self-sufficiency from 1990 to 2006. That is, the EU and its leading nations are shown to be increasingly dependent on resources from outside EU waters. The EU15 countries have reduced their degree of self-sufficiency by 23 per cent compared to 1990, while the EU27 has reduced its self-sufficiency by 12 per cent compared to the year 2000.

In other words, in just seven years the EU27 fish dependence day moved forward in the calendar by nearly a month – from 4 August to 9 July. 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 9 July. This means that the EU depends on fish from other parts of the world for almost one-half of the year.

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 around three weeks to 14 June, and by more than a month for the main EU aquaculture producers such as Spain, Italy, France and Greece.

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 from elsewhere, hence the term 'fish dependence day'.

For the EU this date is currently 9 July, after which the EU depends on foreign resources – or 14 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 and the Netherlands, 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. fish meals). 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 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 by both managing its marine ecosystems in a sustainable way and changing 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 is a self-sufficient country, but this does not mean that it fishes sustainably. 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, which requires data on breeding rates, population levels and parameters, migratory zones, predation pressures, and so on.

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.⁴⁸ A significant proportion of EU fish imports come from developing countries. At a global level more than one-half of the \$57.7 billion of fish products traded in 2004 came from developing countries.⁴⁹ The fish-product trade is more valuable to developing countries than those of tea, rice, cocoa and coffee combined.⁵⁰ It is clear, therefore, that notions of self-sufficiency directly impact on 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 the 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.⁵¹ But trade can lead to problems of food insecurity, largely because fish is a major source of protein in developing countries.⁵²

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).⁵³ Moreover, there is worrying evidence that this decline is not being offset with other forms of animal protein,⁵⁴ despite the region potentially benefiting economically from trade. How this diversion occurs is not straightforward; it may be due to a combination of locals 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.⁵⁵ 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.⁵⁶

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 set levels of fish stocks beyond the Maximum Sustainable Yield (MSY) for as long as they need in order 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 from elsewhere. 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.⁵⁷ 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.⁵⁸ 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 EU Common Fisheries Policy (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.

- Reducing capacity to reconcile it with available resources; improving data collection, transparency and reporting; and prioritising scientific advice in determining catch quotas.
- Creating a context in which being profitable is aligned with doing the right thing, by making access to resources conditional on social and environmental criteria.
- Promoting responsible consumption among all EU consumers, and implementing measures that are conducive to more responsible fishing outside EU waters.
- Using 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 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 are becoming increasingly dependent on fish resources from other countries. This is down to two main driving factors: EU stocks are in poor health 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 one-half of its consumption, that this dependence has been increasing, and that the impact of aquaculture in reducing this trend is limited. The EU's fish dependence day is 9 July. Certain member states, such as Spain, France, Italy and Portugal, reach their fish dependence days much earlier, 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, end destructive fishing practices, and deliver fair and equitable use of healthy fish stocks.

OCEAN2012 is committed to shaping a Common Fisheries Policy that:

- enshrines environmental sustainability as the overarching principle, without which economic and social sustainability is unobtainable;
- ensures decisions are taken at the most appropriate levels and in a transparent way, ensuring effective participation of stakeholders;
- delivers sustainable fishing capacity at EU and regional level;
- makes access to fisheries resources conditional on environmental and social criteria; and
- ensures public funds are only used in a way that serves the public good and alleviates social impacts in the transition to sustainable fisheries.

If we are to get this reform of the CFP right, the EU needs to champion these 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
EU27	9,275,222	8,192,623	6,895,356	6,689,494	:
EU15	8,336,744	7,458,504	6,229,710	6,035,648	5,716,488
Austria	3,322	3,286	2,790	2,863	2,889
Belgium	36,477	31,678	24,983	23,143	24,667
Bulgaria	12,627	10,652	8,578	10,803	13,307
Cyprus	9,772	69,360	4,267	5,725	5,425
Czech Republic	22,608	24,129	24,697	25,077	24,723
Denmark	2,043,638	1,577,683	949,648	895,752	684,181
Estonia	132,345	113,585	100,136	87,584	100,225
Finland	171,874	171,822	146,092	162,334	177,404
France	955,920	970,241	840,349	830,597	795,313
Germany	302,925	271,585	330,352	335,521	293,758
Greece	184,361	194,762	198,461	211,286	208,266
Hungary	16,674	19,987	21,270	22,229	22,946
Ireland	417,012	327,484	322,547	264,235	279,650
Italy	611,522	518,680	479,000	489,540	467,631
Latvia	149,719	136,728	151,160	140,955	156,001
Lithuania	59,082	80,985	141,726	156,775	190,874
Malta	5,539	2,820	2,072	8,513	9,834
Netherlands	522,048	571,005	622,636	478,327	467,011
Poland	454,483	253,481	193,166	174,933	:
Portugal	268,852	198,656	218,463	236,990	260,504
Romania	69,105	17,099	13,352	15,773	16,497
Slovakia	3,567	2,255	2,648	2,980	4,071
Slovenia	2,956	3,037	2,573	2,500	2,465
Spain	1,402,906	1,378,193	990,579	1,035,762	1,020,908
Sweden	412,145	343,374	262,236	276,804	243,619
UK	1,003,742	900,055	841,574	792,492	790,687
Croatia	20,275	27,944	45,787	51,432	53,089
Turkey	652,585	582,386	546,063	662,073	772,471
Iceland	1,627,585	2,003,603	1,669,464	1,353,317	1,425,413
Norway	2,801,970	3,190,864	3,054,339	2,965,221	3,208,595

Source: Eurostat, European Commission. Fishery Statistics 1995-2008. Eurostat Pocketbooks. 2009 Edition

Table A2: EU external fleet in number of vessels, gross tonnage (GT) and power (kW)

Member state	Number of vessels	% of total number	Gross Tonnage (GT)	% of total GT	kW	% of total kW
Spain	424	59	241,534	52	331,459	49
France	100	14	51,435	11	104,874	16
Portugal	73	10	39,445	8	58,640	9
Italy	52	7	14,833	3	39,393	6
Greece	18	3	3,119	1	6,835	1
Lithuania	12	2	45,078	10	42,269	6
Estonia	10	1	12,215	3	19,923	3
UK	9	1	9,989	2	16,306	2
Latvia	7	1	18,089	4	18,066	3
Germany	5	1	10,342	2	13,271	2
Poland	4	1	9,978	2	12,606	2
Malta	2	0	7,569	2	8,245	1
Denmark	1	0	2,223	0	3,961	1
Cyprus	1	0	51	0	270	0
Total	718	100	465,900	100	676,568	100

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 (1990–2006)

Member state	1990	1995	2000	2005	2006
EU-27*	–	–	-3,395,321	-3,455,598	-3,907,940
EU-15*	-3,064,433	-2,698,679	-3,139,874	-3,393,246	-3,767,721
Austria	-68,450	-55,048	-50,896	-68,639	-67,318
Belgium	–	–	-164,870	-91,389	-57,525
Bulgaria	-209,856	-227,867	–	–	–
Cyprus	–	–	-15,309	-26,934	-15,965
Czech Republic	–	–	-52,691	-54,098	-45,032
Denmark	126,568	336,026	-1,178	-167,686	-241,938
Estonia	–	–	47,779	90,493	85,910
Finland	-111,706	-95,418	-73,669	-72,295	-76,910
France	-531,132	-528,131	-543,131	-711,651	-694,961
Germany	-790,976	-642,276	-601,522	-403,100	-578,925
Greece	-72,220	-70,757	-79,850	-116,066	-92,090
Hungary	–	–	-40,137	-34,859	-23,864
Ireland	115,887	227,208	152,964	154,195	115,425
Italy	-625,928	-607,538	-696,826	-834,104	-834,603
Latvia	–	–	61,472	75,854	76,244
Lithuania	–	–	-43,215	-2,953	-1,581
Luxembourg	–	–	-8,929	-7,047	-7,609
Malta	–	–	-15,029	-15,363	-19,276
Netherlands	89,166	-66,446	12,427	259,871	193,745
Norway	638,183	1,058,941	1,202,659	1,405,249	1,295,630
Poland	–	–	-174,198	-154,792	-148,081
Portugal	-128,622	-182,805	-239,920	-966,388	-260,984
Romania	–	–	-55,123	-96,241	-98,565
Slovakia	–	–	-29,283	-25,359	-26,297
Slovenia	–	–	-11,603	-11,931	-13,634
Spain	-439,092	-525,095	-602,475	-683,718	-751,947
Sweden	-50,821	20,870	98,479	23,004	71,798
UK	-607,411	-448,919	-472,032	-433,771	-506,180

Source: Eurostat, European Commission. Fishery Statistics 1990-2006. Eurostat Pocketbooks. 2007 Edition

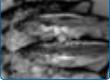
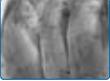
Endnotes

- 1 European Commission (2009) Green Paper: Reform of the Common Fisheries Policy, COM (2009)163, April 2009.
See: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0163:FIN:EN:PDF>
- 2 European Commission (2009) COM(2008) 453 Final communication from the Commission to the European Parliament and to the Council on promoting the adaptation of the European Union fishing fleets to the economic consequences of high fuel prices. Brussels, Belgium.
See: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0453:FIN:EN:PDF>
- 3 European Commission (2008) Directorate-General for Maritime Affairs and Fisheries 'CFP Reform'. Green Paper: Reform of the Common Fisheries Policy, COM (2009)163. Brussels, Belgium.
- 4 The State of World Fisheries and Aquaculture 2008. FAO Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations, Rome, 2009.
See: <http://www.fao.org/docrep/011/i0250e/i0250e00.htm>
- 5 Worm, B., Barbier, E.B., Beaumont, N., Duffy, E., Folke, C., Halpern, B.S., Jackson, J.B.C., Lotze, H.K., Micheli, F., Palumbi, S.R., Sala, E., Selkoe, K.A., Stachowicz, J.J. & Watson, R. (2006) Impacts of biodiversity loss on ocean ecosystem services. *Science*, 314 (5800), p787.
- 6 *Ibid.*
- 7 The State of World Fisheries and Aquaculture 2008. FAO Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations, Rome, 2009.
See: <http://www.fao.org/docrep/011/i0250e/i0250e00.htm>
- 8 World Bank (2008) *Sunken Billions: The Economic Justification for Fisheries Reform*.
See: <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTARD/0,,contentMDK:21930578~pagePK:148956~piPK:216618~theSitePK:336682,00.html>
- 9 Eurostat statistics © European Communities (1990–2006).
See: <http://epp.eurostat.ec.europa.eu/portal/page/portal/fisheries/data/database>
- 10 *Ibid.*
- 11 Laurenti, G. (comp) 1961–2005 Fish and fishery products: World apparent consumption statistics based on food balance sheets. Food and Agriculture Organization of the United Nations, *Fish and Fishery Products*. FAO Yearbook / annuaire / anuario 2007. Rome, FAO, 2009.
See: <ftp://ftp.fao.org/fi/stat/summary/applybc.pdf>
- 12 *Ibid.*
- 13 **nef** calculations using catch and trade data from Eurostat database (<http://epp.eurostat.ec.europa.eu/portal/page/portal/fisheries/data/database>) and European Commission (2008) Study on the European External Fleet. Contract FISH/2006/02 final report.
See: http://ec.europa.eu/fisheries/publications/studies/external_fleet_2008_en.pdf
- 14 Food and Agriculture Organization of the United Nations (2007) Future Prospects for Fish and Fishery Products. 4. Fish consumption in the European Union in 2015 and 2030.
See: <ftp://ftp.fao.org/docrep/fao/010/ah947e/ah947e.pdf>
- 15 FAO statistics, accessed 20 May 2010. See: <http://faostat.fao.org/site/610/default.aspx#ancor>
- 16 *Ibid.*
- 17 Global and regional food consumption patterns and trends: Availability and consumption of fish. World Health Organisation.
See: http://www.who.int/nutrition/topics/3_foodconsumption/en/index5.html
- 18 Laurenti, G. (comp) 1961–2005 Fish and fishery products: World apparent consumption statistics based on food balance sheets. Food and Agriculture Organisation of the United Nations, *Fish and Fishery Products*. FAO Yearbook / annuaire / anuario 2007. Rome, FAO, 2009.
See: <ftp://ftp.fao.org/fi/stat/summary/applybc.pdf>
- 19 UN Secretariat – Department of Economic and Social Affairs (2009) *2008 Revision of World Population Prospects*. Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. See: <http://esa.un.org/unpp/>
- 20 European Commission (2008) *Study on the European External Fleet*. Contract FISH/2006/02 final report. See: http://ec.europa.eu/fisheries/publications/studies/external_fleet_2008_en.pdf
- 21 *Ibid.*
- 22 Eurostat statistics © European Communities (1990–2006).
See: <http://epp.eurostat.ec.europa.eu/portal/page/portal/fisheries/data/database>
- 23 Eurostat Pocketbook 2007. Fisheries Statistics 1990–2006 © European Communities (2007).
See: <ec.europa.eu/fisheries/publications/fishyearbook2007.pdf>
- 24 FAO Newsroom (2008) Half of world fish trade sourced from developing countries.
See: <http://www.fao.org/newsroom/en/news/2008/1000850/index.html>
- 25 Eurostat – includes EU aquaculture production. Eurostat statistics © European Communities (1990–2006). See: <http://epp.eurostat.ec.europa.eu/portal/page/portal/fisheries/data/database>
- 26 *Ibid.* Excludes EU aquaculture production.

- 27 Eurostat statistics © European Communities (1990–2006).
See : <http://epp.eurostat.ec.europa.eu/portal/page/portal/fisheries/data/database>
- 28 Eurostat statistics, © European Communities (1990–2006). See: <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tag00075&plugin=1>
- 29 Multiple references:
Volpe, J.P. (2005). Dollars without sense: the bait for big-money tuna ranching around the world. *BioScience* 55 (4): pp301–302.
James, M.A. & Slaski, R.J. (2009) *A Strategic Review of the Potential for Aquaculture to Contribute to the Future Security of Food and Non-food Products and Services in the UK and Specifically England*. Report commissioned by the Department for the Environment and Rural Affairs, UK.
- 30 Multiple references:
Ibid.
Naylor, L., Goldberg, R.J., Primavera, J.H., Kautsky, N., Beveridge, M.C.M., Clay, J., Folke, C., Lubchenco, J., Mooney, H. & Troell, M. (2000) Effect of aquaculture on world fish supplies. *Nature* 405: pp1017–23.
See: http://www.nature.com/nature/journal/v405/n6790/fig_tab/4051017a0_T2.html
Volpe, J.P. (2005) Dollars without sense: the bait for big-money tuna ranching around the world. *BioScience* 55 (4): pp301–02.
- 31 Defra (Department for Environment, Food and Rural Affairs). See: <http://ww2.defra.gov.uk/about/>
- 32 James, M.A. & Slaski, R.J. (2009) *A Strategic Review of the Potential for Aquaculture to Contribute to the Future Security of Food and Non-food Products and Services in the UK and Specifically England*. Report commissioned by Defra, UK.
- 33 The State of World Fisheries and Aquaculture 2004. FAO Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations, Rome, 2009.
See: <http://www.fao.org/docrep/007/y5600e/y5600e00.htm>
- 34 Multiple references:
Goldberg, R.J., Elliot, M.S. & Naylor, R.L. (2001) *Marine Aquaculture in the United States: Environmental Impacts and Policy Options*. (Arlington, Virginia: Pew Oceans Commission).
Scottish Executive Central Research Unit (2002) *Review and Synthesis of the Environmental Impacts of Aquaculture*. The Scottish Association for Marine Science and Napier University. Scottish Executive Central Research Unit. (Edinburgh: The Stationery Office).
- 35 Pérez, J.E., Alfonsi, C., Nirchio, M., Muñoz, C. & Gómez, J.A. (2003) The introduction of exotic species in aquaculture: A solution or part of the problem? *Interciencia* 28 (4): pp234–8.
- 36 Multiple references:
Anderson, L. & Greenpeace Genetic Engineering Campaign (2005) *Genetically Engineered Fish – New Threats to the Environment*. Amsterdam: Greenpeace.
See: <http://www.greenpeace.org/usa/press-center/reports4/genetically-engineered-fish>
Naylor, R., Hindar, K., Fleming, I.A., Goldberg, R., Williams, S., Volpe, J., Whoriskey, F., Eagle, J., Kelso, D., & Mangel, M. (2005) Fugitive salmon: Assessing the risks of escaped fish from net-pen aquaculture. *BioScience* 55 (5): p427.
Greenpeace and Gene Watch UK (2007). *GM Contamination Register*.
See: <http://www.gmcontaminationregister.org>
- 37 Marine Biological Association (2008). *Species and Habitats: Sensitivity assessment rationale*. Marine Life Information Network (MarLIN) website. (Plymouth: Marine Biological Association of the UK).
- 38 Tetraault, I. (2006) *Seafood Watch Seafood Report: Farmed Tilapia*. Monterey: Monterey Bay Aquarium. See: <http://www.montereybayaquarium.org/>
- 39 Multiple references:
Brown, P.B. & Smith, K. (2007) Soybean use – aquaculture (fact sheet) Urbandale: Soybean Meal Information Centre.
See: <http://www.soymeal.org/pdf/aqua.pdf>
Deutsch, L., Gräslund, S., Folke, C., Troell, M., Huitric, M., Kautsky, N. & Lebel, L. (2007) Feeding aquaculture growth through globalization: Exploitation of marine ecosystems for fishmeal. *Global Environmental Change* 17: pp238–49
Huntington, T.C. (2004) *Feeding the Fish: Sustainable fish feed and Scottish aquaculture*. Report to the Joint Marine Programme (Scottish Wildlife Trust and WWF Scotland) and RSPB Scotland. Hampshire: Poseiden Aquatic Resource Management.
Ng, W.K. (2003) The potential use of palm kernel meal in aquaculture feeds *Aquaculture Asia* **8 (1)**: pp38–9.
- 40 Eurostat statistics © European Communities (1990–2006).
See: <http://epp.eurostat.ec.europa.eu/portal/page/portal/fisheries/data/database>
- 41 European Commission, Contract FISH/2006/02 (2008) Study on the European external fleet. Final report.
- 42 Eurostat statistics © European Communities (1990–2006).
See: <http://epp.eurostat.ec.europa.eu/portal/page/portal/fisheries/data/database>
- 43 Eurostat Pocketbook 2007, Fisheries Statistics data 1990–2006. Eurostat statistics © European Communities (2007) Cat. no. KS-DW-07-001-EN-N.
See: ec.europa.eu/fisheries/publications/fishyearbook2007.pdf
- 44 World Trade Organisation on Rule of Trade: technical information.
See: http://www.wto.org/english/tratop_e/roi_e/roi_info_e.htm
- 45 See: http://www.mma.es/secciones/calidad_contaminacion/indicadores_ambientales/banco_publico_ia/pdf/PESCapturas.pdf
- 46 Ministère de l'Alimentation de l'Agriculture et de la Pêche. État du secteur des pêches français. Document préparatoire aux Assises de la pêche établie par Ifremer / IRD / Muséum d'histoire naturelle / FranceAgriMer.

- 47 Eurostat Pocketbook 2007, Fisheries Statistics data 1990–2006. Eurostat statistics © European Communities (2007) Cat. no. KS-DW-07-001-EN-N. See: ec.europa.eu/fisheries/publications/fishyearbook2007.pdf
- 48 Multiple references:
 Simms, A., Moran, D. & Chowla, P. (2007) *The UK Interdependence Report* (London: new economics foundation). See: <http://www.neweconomics.org/publications/uk-interdependence-report>
 FAO (2003) *Report of the Expert Consultation on International Fish Trade and Fish Security*. FAO Fisheries Report No. 708. Rome: Food and Agriculture Organisation. See <ftp://ftp.fao.org/docrep/fao/006/y4961e/Y4961E00.pdf>
- 49 FAO Newsroom (2004) Fish trade a success story for developing countries, but is the field level enough? See: <http://www.fao.org/newsroom/EN/news/2004/37147/index.html>
- 50 *Ibid.*
- 51 FAO newsroom (2006) Fish exports by developing countries help combat hunger, but better management needed. See: <http://www.fao.org/newsroom/en/news/2006/1000301/index.html>
- 52 The State of Food and Aquaculture 2002. Food and Agriculture Organization of the United Nations, Rome, 2009. See: http://www.fao.org/DOCREP/004/y6000e/y6000e05.htm#P121_21299
- 53 World Resources Institute (1994) *World Resources 1994–95*, pp. 352–353 (New York: Oxford University Press).
- 54 Kent, G. (1997) Fisheries, food security and the poor. *Food Policy*, 22(5), 393–404. See: <http://www.fao.org/newsroom/en/news/2006/1000301/index.html>
- 55 Multiple references:
 Schorr, D. (2004) Healthy Fisheries, Sustainable Trade: Crafting New Rules on Fishing Subsidies in the World Trade Organisation (Godalming: WWF). See: www.wto.org/english/forums_e/ngo_e/posp43_wwf_e.pdf
 Bradshaw, C.J.A., Giam, X. & Sodhi, N.S. (2010) Evaluating the relative environmental impact of countries *PLoS ONE* 5(5): e10440. doi:10.1371/journal.pone.0010440.
 Holland, D.S. (2007) Managing environmental impacts of fishing: Input controls versus outcome-oriented approaches. *International Journal of Global Environmental Issues*, 7(2-3), pp255–272.
- 56 Thurstan, R.H., Brockington, S. & Roberts, C.M. (2010) The effects of 118 years of industrial fishing on UK bottom trawl fisheries. *Nature Communications*, 1(2) p15.
- 57 See: El Pais.com: negocios. Españoles que cultivan fuera. 4th October 2009 www.elpais.com/articulo/economia/global/Espanoles/cultivan/fuera/elpepueconeg/20091004elpnegeco_4/Tes
- 58 Multiple references:
 Starkey, D.J., Holm, P. & Barnard, M. (2008) *Oceans past: Management insights from the history of marine animal populations*. Earthscan, Sterling, USA.
 Barrett, J., Beukens, R., Simpson, I., Ashmore, P., Poaps, S. & Huntley, J. (2000) What was the Viking Age and When did it Happen? A View from Orkney. *Norwegian Archaeological Review*, 33 (1).
 Thurstan, R.H., Brockington, S. & Roberts, C.M. (2010) The effects of 118 years of industrial fishing on UK bottom trawl fisheries. *Nature Communications*, 1(2) p15.

Fish Dependence Day Calendar

JAN		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
FEB		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28				
MAR		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
APR		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
MAY		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
JUN		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
JUL		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
AUG		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
SEP		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
OCT		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
NOV		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
DEC		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

One of the other things we do



The [centre for well-being](#) at **nef** (the new economics foundation) aims to enhance individual and collective well-being in ways that are environmentally sustainable and socially just. Set-up in 2006, the centre builds on **nef**'s established well-being programme and significantly expands our work in this area.

We all want good lives for ourselves, our families and our communities. But despite unprecedented increases in economic prosperity over the last half century, evidence suggests that in critical ways our well-being has failed to improve.

The Centre for Well-being at **nef** seeks to understand, measure and enhance people's experience of their lives. In particular, we aim to answer the question 'how would policy look if its main aim was to promote equitable and sustainable well-being?'

Grounded firmly in the latest scientific research, our understanding of well-being is nuanced and dynamic. We aim to influence all levels of policy and practice, from developing innovative new indicators for national governments and international agencies, to helping practitioners understand how to promote well-being in the most effective and sustainable ways.

To find out more contact us at well-being@neweconomics.org or visit www.neweconomics.org

For more information please call 020 7820 6300

Fish dependence day calendar

JAN		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
FEB		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28			
MAR		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
APR		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
MAY		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JUN		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
JUL		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
AUG		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
SEP		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
OCT		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
NOV		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
DEC		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Written by: Aniol Esteban and Rupert Crilly

Edited by: Martin Cottingham

Design by: the Argument by Design – www.tabd.co.uk

Special thanks to: Markus Knigge, Beatrice Gorez, Helene Bourse, Uta Bellion, Mike Walker, Eleanor Moody, Andy Wimbush, OCEAN2012, and 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

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
Website: www.neweconomics.org

OCEAN2012

c/o Pew Environment Group
Square du Bastion 1A
1050 Brussels
Belgium
www.OCEAN2012.eu
Telephone: +32 2 274 1620
e-mail: info@OCEAN2012.eu

Registered charity number 1055254
© July 2010 **nef** (the new economics foundation)
ISBN 978 1 904882 79 4