



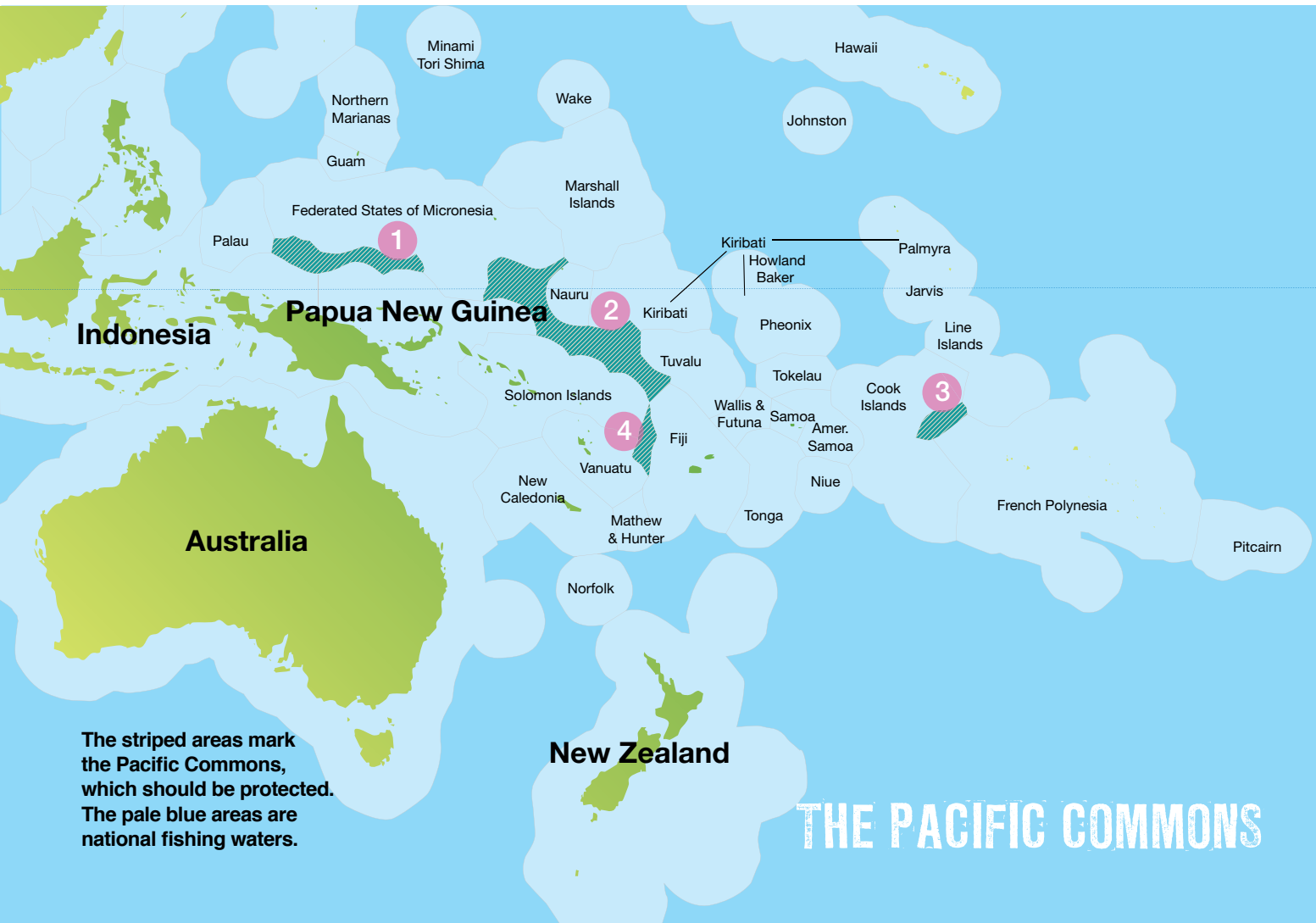
**TINNED
TUNA'S
SECRET
CATCH**

JANUARY 2011

GREENPEACE

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TINNED TUNA IN THE UK AND BEYOND

The UK is the second largest consumer of tinned tuna in the world, consuming the equivalent of more than 778 million tins in 2008 alone.¹ Eating more tinned tuna than anyone else in Europe, the UK accounts for 36% of the EU import market.²

Around 70% of the UK's tinned tuna is sold through supermarkets and 30% through the catering sector.³ Retailers and suppliers in this country must therefore take considerable responsibility for the global environmental consequences of current fishing practices for tuna.

Slick marketing campaigns may attempt to make tuna fishing look like a quaint cottage industry, but the truth is that the tuna trade is very big business. Tinned tuna is worth around \$2.7 billion per annum worldwide,⁴ with UK tinned tuna sales worth \$446 million.⁵ Suppliers Princes (owned by Japanese multinational Mitsubishi) and John West (owned by Thai Union Frozen Products following their recent acquisition⁶ of MW Brands) – continue to dominate the UK market. Among the retailers' own brands, Tesco sells the largest volume. As of November 2010 Princes accounts for 35.9% of the standard tinned tuna market value in the UK and 37.1% of the volume, while John West comes second with 33.6% of the market value and 29.8% of the volume.⁷

79% of European consumers consider the environmental impacts of seafood to be an important factor in their purchasing decisions.⁸

Fishing practices used by the global tinned tuna industry are contributing to sharp declines in populations of marine animals including top predators like sharks and rays, and even rare and endangered sea turtles. Tuna stocks themselves are in trouble – not only because of overfishing, but also due to the widespread catching of juveniles which have not yet had the chance to reproduce. Consumer pressure has forced the tuna industry to make virtually all tinned tuna in the UK 'dolphin friendly', but this alone is insufficient to ensure that the industry is ecologically sustainable in the long term.

Worldwide, up to 90% of stocks of large predatory fish have already been wiped out.⁹

The only way to protect marine ecosystems and guarantee sustainable stocks of fish like tuna is to change the way oceans are used and managed. This change must include reducing fishing to sustainable levels, reforming fishing practices and setting aside large areas as marine reserves – national parks at sea – where no fishing takes place to allow stocks to recover. The creation of a large scale network of marine reserves is now widely recognised as essential by marine scientists.¹⁰ In 40 studies examining the percentage of the world's oceans that should be protected, the majority indicated a range between 20% and 50%.¹¹ For example, the Pacific Commons – areas of the high seas between the Pacific Island Nations – should be off-limits to fishing as a marine reserve [see opposite].

A GROWING FAD

The majority of tinned tuna worldwide is caught through purse seining on fish aggregation devices (FADs) which are natural or artificial floating objects, often equipped with satellite-linked sonar devices. Tuna instinctively gather around the FADs, allowing them to be scooped up in vast nets known as purse seines [see opposite page]. These purse seines consist of a huge curtain of net that encircles a school of tuna and then closes when a line is pulled. Usually, FADs trail netting which seems to add to their attractiveness to tuna and can snag turtles, sharks and other creatures, causing injury and death.¹²

It is estimated that around 70% of the total global purse seine catch is taken using FADs.¹³ But FADs do not just lure the tuna that fishermen want to catch. On average, every time a FAD is used, 1kg of every 10kg catch will be unwanted juvenile tuna, sharks, rays – sometimes even marine turtles and even the occasional whale or dolphin – and a wide variety of other species, collectively known as bycatch.¹⁴ The bycatch associated with purse seining on FADs is up to 10 times greater than the bycatch associated with setting nets around freely associating schools of tuna in the open water. The combination of FADs and purse seining is deadly. Globally, it is estimated that FAD associated bycatch may now be as high as 182,500 tonnes annually.¹⁵ This global bycatch would fill the equivalent of nearly 1 billion tins of tuna every year.¹⁶

FADs are death traps for juvenile tuna. According to the University of Hawaii's pelagic fishing programme, FADs fished by purse seine nets are a major contributor toward yellowfin and bigeye tuna stocks being pushed towards depletion.¹⁷ The overfishing of both bigeye and yellowfin is exacerbated by the number of juveniles of both species killed as bycatch, including in fisheries where the target species is actually skipjack. In response to Greenpeace questions, one of the UK's leading supermarkets admitted that around 2% of its tinned tuna is young bigeye that is caught in the same purse seine nets as skipjack. Given that

yellowfin and bigeye are of high commercial value, it is not only environmentally destructive, but also short-sighted in economic terms to be killing their young.

There is growing evidence that FADs may seriously disrupt the life cycles of even those tuna that are not caught. In May 2008, scientists reported that FADs appear to pull tuna and other fish away from their migratory routes, causing them to become undernourished, with potentially serious broader ecological consequences.¹⁸

'The capture of juvenile individuals of large tuna species such as bigeye and yellowfin as a result of the indiscriminate nature of floating fish aggregation devices (FADs) remains a very significant concern to me.'

MIKE MITCHELL, TECHNICAL DIRECTOR OF THE SEAFOOD COMPANY AT THE FOODVEST GROUP (INCLUDING YOUNGS AND FINDUS)

There are more sustainable alternatives to purse seining on FADs. Pole and line fishing, in which the tuna are caught one at a time, can massively reduce bycatch. Similarly, purse seining on freely associating schools of tuna – i.e. not on FADs – has a vastly reduced rate of bycatch. As an overriding principle though, whatever form of tuna fishing is utilised, it must be conducted at sustainable levels.

**HOW'S MY
FISHING?
VISUALISING
PURSE SEINING
ON FADS**

A UK PROBLEM

The UK is the second biggest tuna market in the world, consuming **778,000,000 TINS** in 2008 alone

THE UK IS THE LARGEST CONSUMER OF TINNED TUNA IN EUROPE



- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8

- 1 SAINSBURY'S
- 2 MARKS & SPENCER
- 3 WAITROSE
- 4 THE CO-OPERATIVE
- 5 TESCO
- 6 ASDA
- 7 MORRISON'S
- 8 JOHN WEST
- PRINCES

HOW'S MY FISHING?

70% OF TUNA PURSE SEINE FISHING USES FADS
... and rising

THE SOLUTIONS:
POLE AND LINE
MARINE RESERVES
PURSE SEINING WITHOUT FADS



TINNED TUNA TRADE GLOBAL VALUE \$2.7 BILLION
per annum

182,500

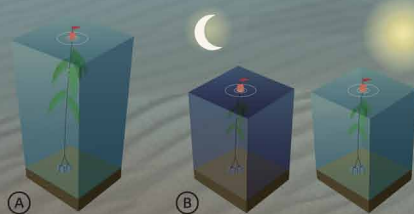
Tonnes of FAD bycatch per year globally.
That's equivalent to almost

1 BILLION TINS OF BYCATCH



HOW DO FADS ATTRACT FISH?

- A Shelter and protection theory**
Small fish are attracted by the body of the FAD and its mooring, as they offer some protection from predators.
- B Orientation theory**
Fish use FADs as physical reference point. Some tuna species leave FAD at night and return during the day.



WHAT'S THE CATCH?

The fish that most purse seines are trying to catch



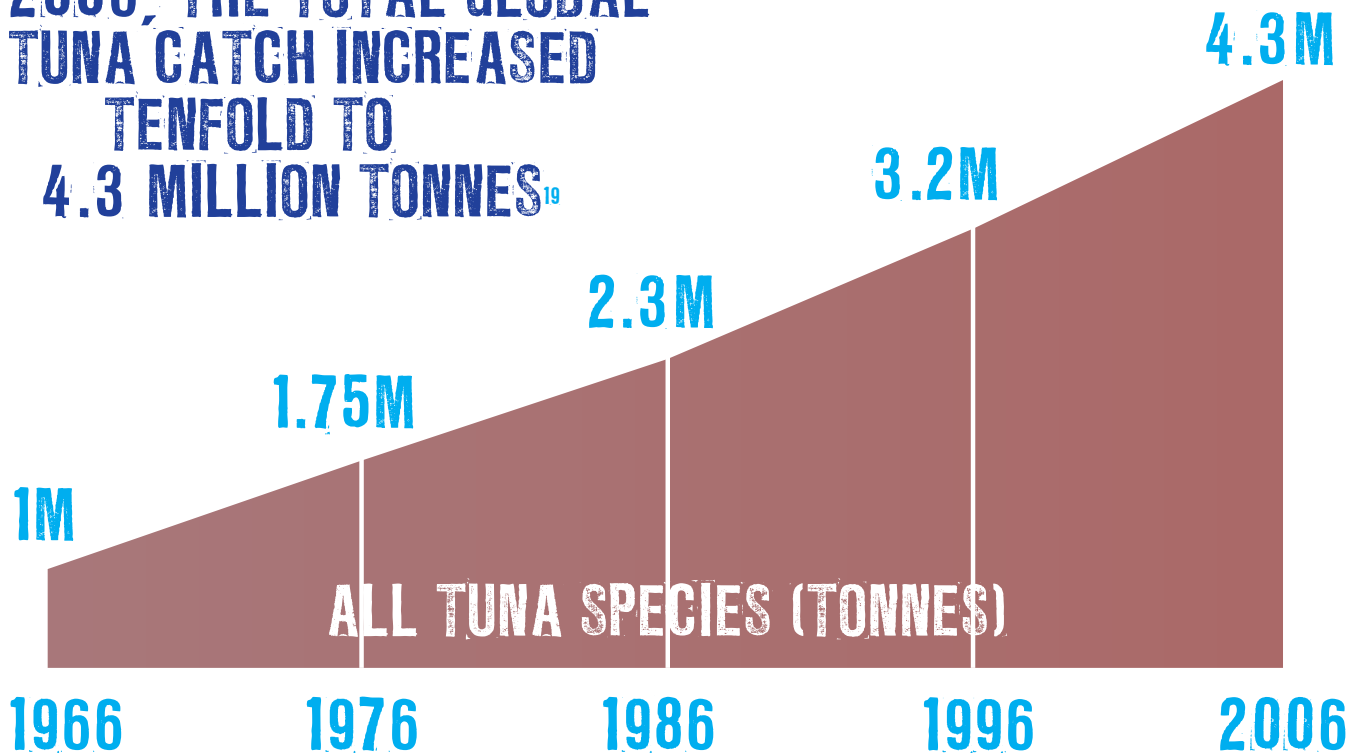
WHAT'S BYCATCH?

non target species caught by indiscriminate fishing



DWINDLING TUNA STOCKS

BETWEEN 1950 AND 2006, THE TOTAL GLOBAL TUNA CATCH INCREASED TENFOLD TO 4.3 MILLION TONNES¹⁹



‘Taking an overall view, at present it is clear that the global catch level for tuna will not be sustainable unless action is taken.’

JOHN WEST / MW BRANDS²⁰

What we call tuna is really a number of different predatory fish of varying species, colour and size, widely distributed across the oceans of the world. Most tinned tuna sold in the UK is a small species called skipjack, though the larger, more commercially valuable yellowfin and albacore tunas are also sold in tins. Even bigeye tuna – which is listed as vulnerable on the International Union for Conservation of Nature (IUCN) Red List meaning that it is ‘facing a high risk of extinction in the wild in the medium-term future’²¹ – is found in tins in the UK. Recent genetic testing showed that tinned tuna on sale across Europe containing overfished tuna species such as bigeye and yellowfin is widespread.²² Yellowfin is the main type of tuna sold fresh by UK retailers despite being regarded

as overfished.²³ Bluefin tuna – on the brink of commercial extinction²⁴ – is never sold in tins, but is still traded by some premium London restaurants.²⁵ Years of being badly managed and overfished has left tuna stocks in crisis. The majority of tuna stocks are in decline and appear set to continue on this downward trajectory as fishing rates are very high. By 2006, of the 23 commercially exploited tuna stocks identified:

- **AT LEAST NINE WERE CLASSIFIED BY TUNA MANAGEMENT BODIES AS FULLY FISHERD**
- **A FURTHER FOUR WERE CLASSIFIED AS OVEREXPLOITED OR DEPLETED**
- **THREE WERE CLASSIFIED AS CRITICALLY ENDANGERED**
- **THREE WERE ENDANGERED, AND**
- **THREE WERE VULNERABLE TO EXTINCTION.²⁶**

INCREASING FISHING PRESSURE

Globally, yellowfin tuna stocks are in serious decline,²⁷ all four regional stocks of yellowfin are declining and continue to be fished at a high rate.^{28 29 30 31}

Yellowfin tuna is overfished in a region of the Western Central Pacific Ocean, where the majority of yellowfin catches are taken. All bigeye stocks with the exception of the Atlantic stock are being fished at a dangerously high rate and catches of juvenile bigeye in purse seine FAD fisheries is a major problem for stock recovery.^{32 33 34 35} The spawning population of bigeye tuna in the Western and Central Pacific has now been overfished down to an estimated 17% of the unfished³⁶ levels.

Yet the real picture could be far worse than these formal stock assessments. Regional fisheries management organisations (RFMOs), the bodies set up under international law to regulate fishing on the high seas, generally apply a narrow approach to overfishing which does not take full consideration of the ocean ecosystem into account. All too often, RFMOs merely satisfy industry's desire to take the maximum amount of tuna from the oceans in the short term. RFMOs completely ignore interactive ecosystem dynamics because of their single species focus in stock assessments. As one frustrated industry insider, John Burton, CEO of World Wise Foods, told Greenpeace, 'Many of the RFMOs are just not doing their job at all. It's absurd that some of them have not even assessed tuna stocks, they should do so as a matter of urgency. RFMOs must be reformed so the fishing industry and the public can have confidence that fish stocks are being managed sustainably'.

Even previously healthy fisheries are now under pressure. Without more regular monitoring and effective management of tuna fishing, even stocks of the healthiest remaining species, like skipjack – the most widespread but least commercially valuable tuna – could suffer.^{37 38 39 40}

The increasing pattern of tuna overexploitation and its associated bycatch is exacerbated by the enormous increase in the capacity of tuna purse seine fleets and the proliferation of FADs. Larger boats with greater capacity are chasing fewer and fewer fish. The UK's own fishing industry body, Seafish, has recognised that pressure from increased fishing and more vessels with larger holds has put tuna stocks under severe strain.⁴¹ The Spanish owned tuna purse seiner, 'Albatun Tres',⁴² for example is described as a 'super, super seiner' because of its unprecedented capacity. The Albatun Tres is owned by a company called Albacora, which has a fleet of the largest purse seiners in the world, each between 105m and 116m long. Fishing in the Indian and Pacific Oceans to supply the European market, each ship can catch around 3,000 tonnes of tuna in a single fishing expedition, almost double the entire annual catch that some Pacific Island nations make in their own waters.⁴³

The number of tuna vessels continues to increase worldwide. For example, the US flagged tuna purse seine fleet in the South Pacific more than tripled in size between 2006 and 2009, from 12 to 39 vessels.⁴⁴

'The balance of power between the fishing fleets and tuna has shifted too far in favour of the fleets.'
PROFESSOR CALLUM ROBERTS, UNIVERSITY OF YORK

SHIFTS IN THE MARKET SINCE 2008

‘The industry has fundamentally changed – there is now huge and growing demand for more sustainable canned tuna products.’

JOHN BURTON, CHAIRMAN & CEO, WORLD WISE FOODS LTD

The tinned tuna industry has come a considerable way since Greenpeace launched its 2008 tinned tuna league table⁴⁶ in the UK – but there is still much more to be done. Of the nine major tinned tuna brands and retailers surveyed by Greenpeace for this report, all have taken positive steps to improve their environmental performance since 2008, though there is still a huge difference between the best and worst performed.

Sainsbury’s, Marks & Spencer and Waitrose all now refuse to source their own brand tuna from purse seining on FADs, instead preferring to stock 100% pole and line caught skipjack. Sainsbury’s achievement is particularly commendable, given the sheer volume of own brand tuna sold by the company.

‘The scale of moving all of our tinned tuna to 100% pole and line caught was a massive investment, but we were convinced it was the most sustainable alternative. We did not pass the cost of doing this on to our customers as they expect us to do the right thing.’

ALLY DINGWALL, AGRICULTURE AND FISHERIES MANAGER, SAINSBURY’S

Outside the major brands, Fish4Ever is a smaller UK based tuna supplier which uses pole and line to source its entire range of tinned tuna and which is currently stocked by both ASDA and Waitrose.⁴⁷

‘We know that fish sustainability is a big concern for our customers and we want to make it as easy as possible for them to buy delicious food that they can trust every time they walk into an M&S store. Our move to pole & line fulfilled that commitment.’

RICHARD LUNEY, WILD FISH AND AQUACULTURE MANAGER, MARKS & SPENCER

Most other retailers and brand suppliers have set percentage targets for pole and line. It is also clear from a recent Greenpeace survey of tinned tuna companies that there is interest in the commercial potential for FAD-free purse seine tuna to offer another more sustainable alternative for the market. Yet although the trend in the UK tinned tuna market is undoubtedly positive, some of the largest volume retailers and brand suppliers – including Tesco and Princes – continue to rely on purse seining on FADs for the vast majority of their tinned tuna.

Sainsbury’s, Marks & Spencer and ASDA are also publicly supporting the establishment of large scale marine reserves in general and are backing the call for the Pacific Commons to be made a no-take zone in particular. From a situation of near silence on marine reserves in 2008, now virtually all retailers and brand suppliers surveyed are positively engaged with the issue. The coming test for the sector will be to demonstrate that this support can be turned into positive action creating pressure for change. Already, for example, Sainsbury’s, Marks & Spencer and ASDA have all said that they will not source any fish from the Pacific Commons while the Co-op has been actively campaigning for marine reserves in partnership with the Marine Conservation Society (MCS).⁴⁸

‘M&S supports the establishment of large scale no-take marine reserves and believes that the retail sector has a crucial role to play in supporting this initiative.’

RICHARD LUNEY, WILD FISH AND AQUACULTURE MANAGER, MARKS & SPENCER

Also encouraging is that it is now accepted best practice within the industry to try to avoid sourcing the most vulnerable species of tuna – though some companies do still continue to source both bigeye and yellowfin tuna for use in tins.

General standards of labeling have also improved, with brand suppliers and retailers now often displaying the species and method of catch in

particular. Reliability and transparency in labeling is crucial. On the downside, some brands – including Princes and Tesco’s own label – make sustainability claims that are not reliable. The claim made on Tesco’s tin states that ‘Tesco is fully committed to fishing methods which protect the marine environment and its species.’ According to the leading environmental law organization ClientEarth, such statements are ‘...likely to lead the average consumer to believe that the product has been sourced from a fish stock which does not result in bycatch or damage to other marine species. Where other marine species have been caught as bycatch and or harmed by fishing techniques used to source products labelled in this way, the use of a logo that states “protects the marine environment” or equivalent either deceives or is likely to deceive the average consumer’.⁴⁹ The same statement is made on Princes’ tins.

Ultimately, change in the stores and on the shelves is only significant if it brings real change in the oceans. By creating demand for more sustainable tuna products, shifts in the UK market have complemented political reform on the part of the Pacific Island Nations who exercise control over some of the world’s richest tuna grounds. During 2010, the eight Pacific Island (PNA)⁵⁰ countries – Papua New Guinea, Solomon, Palau, Marshall Islands, Federated States of Micronesia, Kiribati, Nauru and Tuvalu – committed to making up to 50% of the purse seine tuna fisheries in their waters FAD-free. This commitment is now being implemented and FAD free tuna from these Pacific waters should be available sometime in 2011.

TUNA LEAGUE TABLE 2011
JOINT BEST: SAINSBURY’S
AND MARKS & SPENCER,
2ND WAITROSE, 3RD THE
CO-OPERATIVE, 4TH TESCO,
5TH ASDA, 6TH MORRISONS,
7TH JOHN WEST/MW BRANDS,
WORST: PRINCES



KILLED FOR TINNED TUNA

Killed alongside the skipjack tuna that finds itself in your tin is almost the entire cast list of Finding Nemo.⁵²

CHARLES CLOVER

Many fisheries suffer from a scarcity of available data, but it is broadly accepted that purse seining on FADs has much higher levels of bycatch than when the devices are not used. Some of this bycatch will be juvenile and vulnerable tuna, but also included in the nets will be sharks, rays and possibly turtles and even cetaceans.

Research presented to the Western and Central Pacific Fisheries Commission (WCPFC) Science Committee in 2009 showed that the use of FADs led to significant bycatch of juvenile bigeye and yellowfin tuna, marlin, barracuda, whale sharks, silky sharks, and olive ridley turtles.⁵³

Bycatch from purse seining on FADs is recognised as a problem by global fisheries and the tuna industry, with bycatch workshops being held by various RFMOs and also by the International Seafood Sustainability Foundation – an industry alliance that represents a large majority of the world's tinned tuna producers.⁵⁴

SHARKS AND RAYS

Sharks and rays are being killed in vast numbers by tuna fishing. More than three-quarters of the oceanic pelagic shark and ray species are now classified as threatened or near threatened by the IUCN. Many of these species are caught regularly in purse seine nets set on FADs targeting tuna.⁵⁵ The low reproductive productivity of many species makes them highly vulnerable to overexploitation.⁵⁶

Silky sharks and oceanic whitetip sharks show particularly high levels of bycatch in tuna purse seine fisheries.⁵⁷ Both are IUCN red listed. Silky sharks are listed as near threatened worldwide, and in the Eastern Central and Southeast Pacific, and Northwest and Western Central Atlantic they are

listed in the higher category of vulnerable. Whitetips are red listed as vulnerable worldwide, and as critically endangered in the Northwest and Western Central Atlantic. Whale sharks, IUCN red listed globally as vulnerable,⁵⁸ are also caught incidentally in purse seine nets.⁵⁹

Cutting fins off sharks, often while they are still alive and then throwing the shark back in the ocean, is also still in practice on some tuna fishing boats. According to the Shark Trust, until relatively recently shark bycatch was considered a nuisance, and sharks were cut loose and allowed to swim away.⁶⁰ However, as shark fins have become increasingly valuable in countries where shark fin soup is a delicacy, fewer sharks are being released. It is to the credit of some major tuna suppliers that they have sought to prohibit this practice.

JUVENILE TUNA AND THREATENED TUNA SPECIES

Significant levels of bycatch of juvenile tuna threaten the long term health of these stocks, as tuna are taken out before reaching breeding maturity. Due to the tendency of young bigeye and yellowfin tuna to swim in surface waters and to mix with similar sized schools of skipjack tuna, the main target fish, they are particularly vulnerable to being caught in FAD purse seine fisheries. Thus FADs are a major factor in pushing yellowfin and bigeye stocks towards depletion.⁶¹

The International Commission for the Conservation of Atlantic Tuna's (ICCAT) manual on purse seines identifies the direct impact of this FAD-dominated fishing technique on 'fishing of juvenile specimens associated with floating objects, as this is not a selective technique insofar as the size of the specimens caught'.⁶² The same manual states that reliance on 'FADs has had an impact on catch figures, size of the specimens caught and the composition of species, with large quantities of juvenile tuna specimens (basically yellowfin and bigeye) being observed in landings and an increase of bigeye tuna catches'.

BEYOND DOLPHIN FRIENDLY

TURTLES

A new study shows that the 85,000 turtles officially recorded as killed annually in global fisheries may be a gross underestimate, with the true figure more like 8,500,000 individuals.⁶³

Long lining, gillnet and trawl fisheries are the main causes of turtle mortality, but purse seines using FADs may also be responsible for the deaths of turtles, particularly if best practice mitigation techniques are not employed. Research from the Pacific region shows 750-2,500 purse seine turtle deaths annually between 1994-2004.⁶⁴ Fishing with FADs may cause severe problems for local turtle populations,⁶⁵ and turtles are found entangled in nets both below the FADs and on top of them when the animals climb up to rest.⁶⁶

Six of the seven sea turtle populations worldwide feature in the IUCN Red List of threatened species and all five Pacific sea turtles are listed as critically endangered, endangered or vulnerable.

Turtles are all protected under the Convention on International Trade in Endangered Species (CITES) Appendix 1 and zero bycatch should be the goal of every fishery that comes into contact with these species. According to a paper produced for the International Seafood Sustainability Foundation (ISSF), a mindset exists within the tuna industry that resists change that would protect endangered species if this could result in a smaller tuna catch.⁶⁷ The summary of a 2009 bycatch workshop with tuna fisheries experts and skippers of purse seine vessels noted with regard to bycatch mitigation techniques that 'if it is good for turtles but bad for fishing, it won't be adopted'.⁶⁸

For each 1,000 tons of yellowfin tuna caught in FAD sets over three years, fishermen caught nearly 111,000 other individual animals, including sharks, rays, marlins and sea turtles.⁶⁹

It was in order to solve the problem of dolphins being caught and killed in the hunt for tuna that FADs were first introduced in the East Tropical Pacific region. Previously, dolphins had been targeted by tuna fishing boats armed with purse seine nets because tuna schools commonly associated with dolphin pods in this region. FADs gave fisherman an alternative way to target tuna without having to set their nets around dolphins. Fishing fleets in other oceans have also increasingly adopted the use of FADs as an easy way to find and catch tuna.

Virtually all tinned tuna sold in the UK is certified by the Earth Island Institute (EII) as dolphin friendly or dolphin safe.⁷⁰ The EII was one of the organisations to pioneer dolphin safe certification in response to the setting of tuna fishing nets on schools of dolphins in the East Pacific. The prevalence of the EII certification demonstrates that the tuna industry is able to adapt and respond to environmental concerns.

In the course of Greenpeace's recent investigation in Ghana, allegations were made which, if true, indicate that some leading tuna brands may be in breach of EII standards, despite dolphin friendly claims and EII certification. [See page 13 for Greenpeace's Ghana investigation.]

'The real problem is giving ourselves high fives for solving the tuna dolphin problem when we've just created other problems.'⁷¹

**ASSOCIATE PROFESSOR TIMOTHY ESSINGTON,
UNIVERSITY OF WASHINGTON**

THE ECONOMICS OF CATCH TECHNIQUES

Some supermarkets and brand suppliers show reluctance to shift practices away from unsustainable purse seining using FADs, on the basis of expense.

However, UK supermarkets Sainsbury's, Waitrose and Marks & Spencer have moved to using more sustainable methods with minimal bycatch such as pole and line. They have done so even where this method has proven more expensive, with pole and line carrying a price premium of up to 25%, if passed entirely to consumers.⁷² These companies have led the way by deciding not to pass the extra cost of sourcing pole and line on to their customers, but in so doing have established a competitive advantage in a valuable sector. They have shown what can be done – setting a standard to be met by their market competitors.

‘The environment continues to be one of our customers’ top concerns, and even the most budget conscious want to know that the food they’re buying has been sourced in the most responsible way. We believe our leading approach to sourcing of tinned tuna demonstrates Sainsbury’s commitment to offering the best value and values.’

ALLY DINGWALL, AGRICULTURE AND FISHERIES MANAGER, SAINSBURY’S⁷³

According to evidence given to the Office of Fair Trading, supermarkets will absorb costs in order to foster competition among tuna brands, so there is no reason why costs cannot be absorbed in order to achieve environmental objectives.⁷⁴

Historically, the experience of the shift to dolphin friendly tuna in the US demonstrates that the tuna industry can absorb the cost of moving to more sustainable practices. According to one study, ‘prices did not obviously increase after the change in production practices and labelling’ to accommodate dolphin safety.⁷⁵ The tinned tuna industry made the change without passing on the cost to consumers.

Some within the industry argue that fishing by any means other than purse seining on FADs is relatively inefficient.⁷⁶ These arguments are based on the assessment that pole and line is less efficient for an industry that measures its efficiency in terms of ‘catch per unit of fishing effort.’⁷⁷ Yet such a narrow economic formula fails to take into account the ecological impact of FAD bycatch as well as the longer term economics associated with loss of juvenile tunas. Recent economic modelling of the Pacific tuna fisheries forecast large economic losses of approximately \$3.4 billion if the current trends of overexploitation continue in the region.⁷⁸ On the other hand, one study of the Ghanaian FAD-dominated tuna purse seine industry concluded that bioeconomically, pole and line tuna fishing is more profitable than fishing with purse seines.⁷⁹ It is also socio-economically more productive, offering greater employment opportunities for local fishermen.

Measures of efficiency used by the tuna industry are often wholly inadequate, failing to take account of the wider ecosystem impacts of fishing with FADs, and the ecosystem benefits provided by the species removed.⁸⁰

GREENPEACE INVESTIGATIONS: TINNED TUNA FROM GHANA

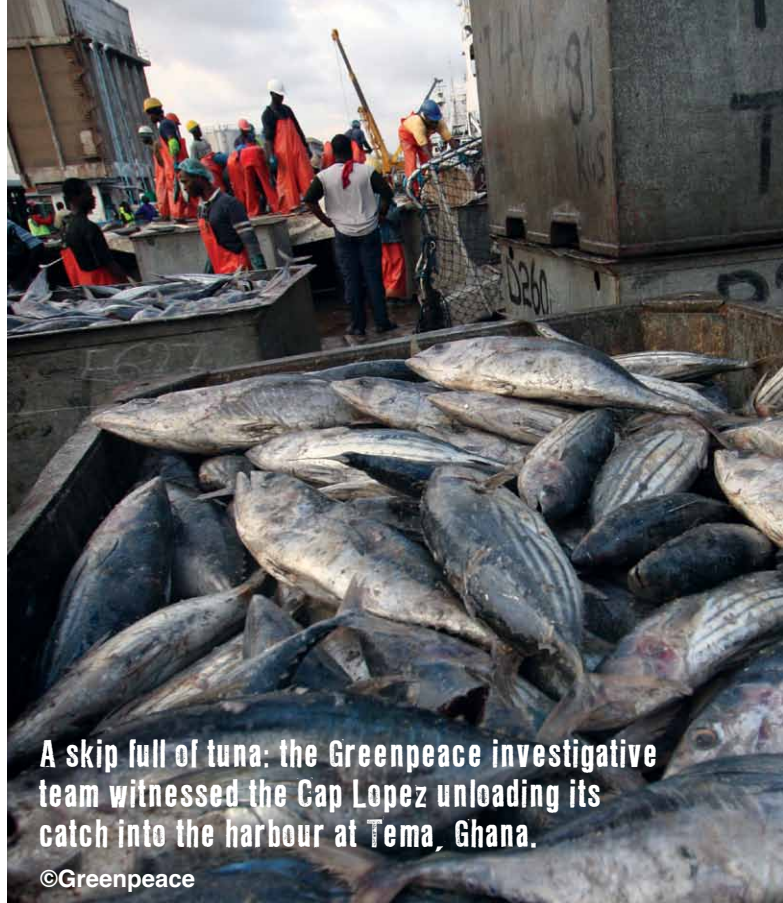
As Charles Clover described in *The End of the Line*, finding out exactly what else is caught and killed in the hunt for tuna for tins can be very tricky.⁸¹ Documenting levels of bycatch on tuna purse seiners is notoriously difficult. As the ISSF acknowledges, 'in some regions of the world we just don't have clear answers'. But the ISSF also admits that it is well known that 'the fishery on fish aggregating devices... which targets skipjack' is the one 'in which the bycatches of other species are greatest'.⁸²

In November 2010, having previously requested access and been denied, Greenpeace sent an investigative team to Ghana to seek local access to a purse seiner catching skipjack with FADs. The investigative team was seeking to document the origins and chain of custody of Tesco own brand tinned tuna. The team was accompanied by a technical crew from Hugh Fearnley-Whittingstall's Keo Films, which was also investigating sustainability claims around tinned tuna.

The investigation centred on the Tema Tuna Ventures (TTV) tuna purse seine fleet based in Tema, Ghana's biggest port. Ghana is an attractive base for the tuna industry as the Gulf of Guinea is one of the best fishing and breeding grounds for tuna species globally, whilst the country is relatively politically and economically stable.

Greenpeace tracked a Tesco tuna tin back to the Pioneer Cannery in Tema. The Pioneer Cannery is operated by MW Brands, tuna suppliers to Tesco and owners of the John West brand. Pioneer produces approximately 800,000 cans of tuna per day – about 40,000 tonnes per annum. MW Brands own a fleet of five industrial tuna fishing purse seiners with an annual haul of around 26,500 tonnes. These boats are based in Tema, operated by their subsidiary TTV.⁸⁵

The Ghanaian fleet doesn't restrict itself to the coastline of Ghana. Tuna migrate on the basis of ocean temperatures, and when the Greenpeace



A skip full of tuna: the Greenpeace investigative team witnessed the Cap Lopez unloading its catch into the harbour at Tema, Ghana.

©Greenpeace

investigation took place, the TTV vessel Cap Lopez and its sister ship the Drago were travelling to the waters of Gabon, about 650nm from Tema, and Liberia.

There is no mandatory observer programme for the boats in question, so there is no reliable bycatch data. However, in one interview, two workers associated with the operation described in vivid terms the levels of bycatch. One said that the boats not only catch sharks, but also marine turtles and even dolphins. These claims have been subsequently denied by the company. Although there is only limited scientific data available for the areas and no observer programme for the boats, according to local Ghanaian environmental NGOs, the bycatch⁸⁶ and consumption of turtles taken by fishermen remains a problem.^{87 88}

THE GREENPEACE INVESTIGATION TO FULLY DOCUMENT THE LEVELS OF BYCATCH ASSOCIATED WITH PURSE SEINING ON FADS IS ONGOING

TIME FOR CHANGE

THE USE OF FADS FOR INDUSTRIAL PURSE SEINE TUNA FISHERIES SHOULD BE BANNED.

PURSE SEINE VESSELS SHOULD HAVE 100% OBSERVER COVERAGE.

RETAILERS AND TUNA BRANDS SHOULD PREFER FISH CAUGHT USING MORE SUSTAINABLE METHODS OF CATCHING TUNA.

GOVERNMENTS MUST ESTABLISH A LARGE SCALE GLOBAL NETWORK OF MARINE RESERVES WHERE NO FISHING IS ALLOWED.

MARINE RESERVES: LIKE NATIONAL PARKS AT SEA

The creation of a large scale network of marine reserves is now widely recognised as essential by marine scientists.⁸⁹ In 40 studies examining how much sea should be protected, the majority indicated a range between 20% and 50%.⁹⁰

Greenpeace is calling for 40% of the world's oceans to be protected as marine reserves.⁹¹ As one study explained, 'strategically placed marine reserves can benefit migratory species [such as tuna] through... improved habitat quality and feeding opportunities, greater survival of offspring, and protection at aggregation sites and migration bottlenecks.'⁹²

However, even with the recent creation of large new marine reserves in American Pacific waters⁹³ and the UK's decision to make the Chagos Archipelago⁹⁴ in the Indian Ocean a marine reserve, protected areas cover just over 1% of the world's oceans,⁹⁵ with a pitiful 0.08% of the oceans designated as no-take marine reserves.⁹⁶ This contrasts with nearly 15% of protected area coverage on land.⁹⁷

Important progress has been made by Pacific Island Nations themselves who declared that areas in the Pacific Commons – high seas between the islands with abundant tuna and other marine life – should be off-limits to fishing. Making tuna fishing sustainable is critical not only to the environment, but also to the economic future of the Pacific Island Nations, which presently obtain too little of the economic benefit from adjacent waters that are mainly exploited by long distance fleets from deep water fishing countries. Marine reserves over the Pacific Commons will not only allow fish stocks to recover, but could also provide a boost for developing economies in the region.

'The Pacific Commons are an innovative mechanism for sustainable development of the Pacific Islands and UK tinned tuna buyers should do all that they can to support it.'

LIAM CAMPLING, SCHOOL OF BUSINESS & MANAGEMENT, QUEEN MARY, UNIVERSITY OF LONDON, AND CONSULTANT TRADE POLICY ANALYST TO PACIFIC ISLANDS FORUM FISHERIES AGENCY

[See page 2 for a map of the Pacific Commons.]

WHAT SUPERMARKETS AND TUNA BRANDS CAN DO

STOP BUYING TUNA CAUGHT FROM PURSE SEINING USING FADS

By rejecting tuna from purse seining with FADs retailers can encourage best practice in the tuna fishing industry.

PURCHASE TUNA CAUGHT USING MORE SUSTAINABLE METHODS

Sainsbury's, Waitrose and Marks & Spencer have committed to 100% pole and line fisheries for tinned tuna, which is currently regarded as the most sustainable form of fishing for tuna.⁹⁸ Other UK retailers and tuna brands must now follow this lead by prioritising tuna caught by low impact methods like pole and line or trolling (another line based fishing method). It is of course crucial that the pole and line fisheries are themselves managed at sustainable levels. Retailers and tuna brands can also prioritise tuna caught without the use of FADs and seek to develop the market for 'FAD-free' purse seined tuna as a more sustainable product.

'It is considered that purse seined skipjack caught from free swimming schools, caught FAD free could represent a sustainable alternative, however for this to work systems need to be established to prove reliable segregation on board vessels and traceability from vessel through to processor through to retailer, these issues present challenges for the industry.'

JOHN BURTON, CHAIRMAN & CEO, WORLD WISE FOODS LTD

ONLY PURCHASE TUNA FROM HEALTHY STOCKS

As a general rule, retailers should only source from stocks that are being fished in sustainable ways at sustainable levels. Retailers and fish producers should not buy from overfished bigeye, yellowfin or albacore tuna stocks.

SUPPORT THE CREATION OF MARINE RESERVES

Retailers and tuna brands should endorse the imperative of the creation of a global network of large scale marine reserves, and should publicly support the call for the Pacific Commons to be set aside as off-limits to fishing and ensure they are not selling any tinned tuna caught in this area.

LABEL WITH CARE AND ACCURACY

A sustainable seafood sector is underpinned by accurate labelling. All UK retailers and tuna brands must ensure their product labels at least clearly identify the species, origins and catch method. Any questionable sustainability claims should be removed immediately.

By changing the way tinned tuna is caught and setting up marine reserves to protect ocean ecosystems and allow fish stocks to recover from overfishing, we can bring an end to the extent of the damage that current tuna fishing practices cause to the marine environment.

'Migratory species, especially large pelagics like billfish, tunas and sharks, are among the most economically valuable of fish but present approaches to management are failing them badly. We desperately need to offer greater protection to this spectacular but vulnerable fauna or some species might disappear altogether. Establishing fully protected reserves in areas where those species are most under pressure from fisheries could help maintain their long-term survival.'⁹⁹

**THE SOLUTIONS EXIST,
BUT WE MUST ACT
NOW**

**TIME AND TUNA ARE
RUNNING OUT**

REFERENCES

1. FAO Globefish – EU country profile June 2009. Calculation is based on 185g tins and 144,000 tonnes of canned tuna imports into the UK in 2008. www.globefish.org/tuna-june-2009-eu.html [accessed 13.12.10]
2. Ibid.
3. Seafish, 'Yellowfin tuna – a global and UK supply chain analysis', 2009. www.seafish.org/pdf.pl?file=seafish/Documents/Yellowfin%20tuna_Global%20and%20UK%20supply%20chain%20analysis.pdf [accessed 14.12.10]
4. Glitner Bank, *Tuna Seafood Industry Report*, August 2007, p. 32. www.islandsbanki.is/servlet/file/store156/item49463/version2/Glitnir_Seafood_Industry_Report_-_Tuna_B.pdf [accessed 6.12.10]
5. T. West, 'Convenience Store', *The Grocer*, 'Cash in: Tinned food faces heavy competition, but it's still a growth category', 29 October 2010. www.thegrocer.co.uk/articles.aspx?page=independentarticle&ID=213544 [accessed 14.12.10]
6. http://tuf.listedcompany.com/misc/newsletter/Newsletter_November_December_2010_EN.pdf [accessed 7.12.10]
7. AC Nielsen Scantrack data 52 WE 13.11.10, correspondence with Nielsen 13.12.10
8. Seafood Choices Alliance, 'Constant Cravings: The European Consumer and Sustainable Seafood Choices', 2005. www.seafoodchoices.com/resources/documents/EUConsumer2005.pdf
9. R.A. Myers and B. Worm, 'Rapid Worldwide Depletion of Predatory Fish Communities', *Nature*, 423, 2003, 280-3. [accessed 6.12.10]
10. www.york.ac.uk/media/environment/documents/pg/marine_reserves_consensus-1.pdf and 'Turning the Tide - Addressing the Impact of Fisheries on the Marine Environment'. www.rcep.org.uk/reports/25-marine/documents/Turningthetide.pdf, paragraphs 8.59 and 8.63 [accessed 14.12.10]
11. F.R. Gell and C.M Roberts, 'Benefits beyond Boundaries: The Fishery Effects of Marine Reserves', *Trends in Ecology and Evolution*, 18, 2003, 448-55
12. ISSF Meeting on mitigation of by-catches in the Tuna Purse Seine Floating Object Fisheries – Final Report AZTI Sukarrieta, Spain, 24-27 November 2009. www.iss-foundation.org/FileContents.phx?fileid=e7f00ec6-01eb-4ba7-9ede-42f229199955, p15 [accessed 16.12.10]
13. J. Hallier and D. Gaertner, 'Drifting fish aggregation devices could act as an ecological trap for tropical tuna species'. http://hal.ird.fr/docs/00/26/91/72/PDF/Hallier_GaertnerMEPS7180_Prev2.pdf
14. D. Bromhead et al (2003). 'A review of the impacts of fish aggregating devices (FADs) on tuna fisheries', Final Report to the Fisheries Resources Research Fund, Bureau of Rural Sciences, Canberra, ACT, Australia, pp. 122. <http://adl.brs.gov.au/brsShop/data/PC12777.pdf> [accessed 9.12.10]
15. Calculation based on the FAO estimates that total purse seine catches were 2.607.201 MT in 2007. 70% FAD with 10% bycatch. Greenpeace International, 'A Growing FAD': Kobe-II Bycatch Workshop, Brisbane 23-25 June 2010. It had previously been estimated that total bycatch from the use of FADs amounted to some 100,000 tonnes every year: T. Dempster and M. Taquet 'Fadbase and Future Directions for Ecological Studies of Fad-Associated Fish', 2005. www.spc.int/coastfish/news/Fish_News/112/Dempster_112.pdf [accessed 15.12.10]
16. 987,325,000 tins of tuna (i.e. almost 1 billion 185g tins)
17. University of Hawaii, 'The Associative Dynamics of Tropical Tuna to a Large-Scale Anchored Fad Array', 2008 http://www.soest.hawaii.edu/PFRP/biology/holland_itano_png.html
18. J. Hallier and D. Gaertner, 'Drifting fish aggregation devices could act as an ecological trap for tropical tuna species', 2008. http://hal.ird.fr/docs/00/26/91/72/PDF/Hallier_GaertnerMEPS7180_Prev2.pdf
19. Seafish, 'Yellowfin tuna - a global and UK supply chain analysis', 2009. www.seafish.org/pdf.pl?file=seafish/Documents/Yellowfin%20tuna_Global%20and%20UK%20supply%20chain%20analysis.pdf [accessed 14.12.10]
20. MW Brands email to Greenpeace, December 2010
21. www.iucnredlist.org/apps/redlist/static/categories_criteria_2_3 [accessed 16.12.10]
22. <http://www.greenpeace.org/international/en/press/releases/Greenpeace-genetic-tinned-tuna-tests-reveals-trail-of-fishy-secrets-/> [accessed 21.12.10]
23. www.iss-foundation.org/tsm [accessed 16.12.10]
24. <http://assets.panda.org/downloads/onthebrinktunacollapse.pdf> [accessed 21.12.10]
25. <http://endoftheline.com/blog/archives/390> [accessed 21.12.10]
26. J. Maguire et al, 'The state of world highly migratory, straddling and other high seas fishery resources and associated species', 2006. www.fao.org/docrep/009/a0653e/a0653e00.htm IUCN assessments are now out of date, but given the subsequent increased catching capacity the status of the species is likely to have deteriorated since assessment.

27. Seafood Watch Seafood Report, 'Yellowfin tuna'. www.montereybayaquarium.org/cr/cr_seafoodwatch/content/media/MBA_SeafoodWatch_YellowfinTunaReport.pdf Seafood Watch Seafood Report, 'Bigeye tuna'. www.montereybayaquarium.org/cr/cr_seafoodwatch/content/media/MBA_SeafoodWatch_BigeyeTunaReport.pdf Western Pacific Fisheries Management Council, Press release, 21 August 2007. www.wpcouncil.org/press/2007.08.21%20Press%20Release%20on%20WCPFC%20SC3.pdf and www.iss-foundation.org/tsm
28. WCPFC (2009). The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Scientific Committee Fifth Regular Session, 10–21 August 2009, Port Vila, Vanuatu. Western and Central Pacific Fisheries Commission (WCPFC), Kolonia, Pohnpei. www.wcpfc.int/doc/summary-reportpre-edited-version
29. WCPFC (2010). The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Scientific Committee Sixth Regular Session, 10–19 August 2010, Nuku'alofa, Tonga. Summary Report. Western and Central Pacific Fisheries Commission (WCPFC), Kolonia, Pohnpei. www.wcpfc.int/node/2751
30. IATTC (2010). The Fishery for Tunas and Billfishes in the Eastern Pacific Ocean in 2008. Fisheries Status Report No 7. Inter-American tropical Tuna Commission (IATTC), La Jolla California, USA. www.iattc.org/PDFFiles2/FisheryStatusReports/FisheryStatusReport7ENG.pdf
31. IOTC (2009). Report of the Eleventh Session of the IOTC Working Party on Tropical Tunas, Mombasa, Kenya, 15–23 October 2009. Indian Ocean Tuna Commission (IOTC), Victoria, Seychelles. www.iotc.org/files/proceedings/2009/wppt/IOTC-2009-WPTT-R%5BE%5D.pdf
32. WCPFC (2010). The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Scientific Committee Sixth Regular Session, 10–19 August 2010, Nuku'alofa, Tonga. Summary Report. Western and Central Pacific Fisheries Commission (WCPFC), Kolonia, Pohnpei. www.wcpfc.int/node/2751
33. ICCAT (2010). Report of the Standing Committee of Research and Statistics, Madrid, Spain, October 4–8, 2010. International Commission for the Conservation of Atlantic Tunas (ICCAT), Madrid, Spain. www.iccat.int/Documents/Meetings/Docs/2010_SCRS_ENG.pdf
34. ICCAT (2008). Report of the 2007 ICCAT Bigeye Tuna Stock Assessment Session, Madrid, Spain, 5–12 June 2007. SCRS/2007/013. Collect. Vol. Sci. Pap. ICCAT; 62(1): 97–239. www.iccat.int/Documents/SCRS/DetRep/DET_bet.pdf
35. IATTC (2009). The Fishery for Tunas and Billfishes in the Eastern Pacific Ocean in 2008. 80th Meeting of the Inter-American tropical Tuna Commission (IATTC), La Jolla California, USA, 8–12 June 2009. Document IATTC-80-05, p94–6. www.iattc.org/PDFFiles2/IATTC-80-05-Tunas-and-billfishes-in-the-EPO-2008.pdf
36. 'Unfished' refers to the virgin stock biomass, i.e. the long term average biomass value expected in the absence of fishing mortality.
37. IOTC (2009). IOTC Report of the Twelfth Session of the Scientific Committee, Victoria, Seychelles, 30 November–4 December, 2009 IOTC-2009-SC-R[E]. www.iotc.org/files/proceedings/2009/sc/IOTC-2009-SC-R%5BE%5D.pdf
38. ICCAT (2008). Skipjack executive summary. In: Report of the 2008 ICCAT yellowfin and skipjack stock assessments meeting. Florianópolis, Brazil, 21–29 July 2008. SCRS/2008/016 – YFT & SKJ Assessment. www.iccat.int/Documents/SCRS/ExecSum/SKJ_EN.pdf
39. IATTC (2010). Fishery Status Report 7. Tunas and billfishes in the Eastern Pacific oceans in 2008. Inter-American Tropical Tuna Commission. La Jolla, California 2010. www.iattc.org/PDFFiles2/IATTC-80-05-Tunas-and-billfishes-in-the-EPO-2008.pdf
40. WCPFC 2010. The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific. Ocean Scientific Committee Fifth Regular Session Port Vila, Vanuatu 10–21 August 2009. Summary report. <http://www.wcpfc.int/meetings/2009/5th-regular-session-scientific-committee>
41. Seafish, 'Yellowfin tuna – a global and UK supply chain analysis', 2009. www.seafish.org/pdf.pl?file=seafish/Documents/Yellowfin%20tuna_Global%20and%20UK%20supply%20chain%20analysis.pdf [accessed 14.12.10]
42. <http://www.fishupdate.com/news/fullstory.php/aid/11061> [accessed 20.12.10]
43. WCPFC Area Catch Value Estimates 2009. <http://ffa.int/node/425#attachments> [accessed 16.12.10]
44. www.nts.gov/events/forum_fishing_vessel_safety/Background/2010%2004%2030%20DHS%20Distant%20Water%20Tuna%20Fleet%20Report.pdf [accessed 14.12.10]

45. Prof. Callum Roberts quoted in The Los Angeles Times on 19 June 2008. www.latimes.com/business/la-fi-w-tuna20-2008jun20,0,1769339.story
46. www.greenpeace.org.uk/oceans/the-tuna-retailers-league-table-2008 [accessed 17.12.10]
47. <http://www.fish-4-ever.com/> [accessed 21.12.10]
48. <http://www.co-operative.coop/magazine/ethical-living/archive/save-our-seas/> [accessed 21.12.10]
49. ClientEarth, Environmental Claims on Supermarket Seafood, 2011
50. PNA: Parties to the Nauru Agreement. The Nauru Agreement is a subregional agreement on terms and conditions for tuna purse seine fishing licences in the Pacific islands region. www.ffa.int/system/files/%252Fhome/ffaadmin/%252Ffiles/ffa/Nauru%20Agreement.pdf
51. FFA (Pacific Islands Forum Fisheries Agency) Fisheries Trade News Volume 3: Issue 4 April 2010. www.ffa.int/node/334
52. C. Clover *The End of the Line*, Ebury Press, London, 2005, pp.179–180.
53. H.H. An et al (2009). 'Effects of set type on catch of small-sized tuna by the Korean tuna purse seine fishery in the WCPO'. Scientific Committee Fifth Regular Session, 10-21 August 2009, Port Vila, Vanuatu. Western and Central Pacific Fisheries Commission (WCPFC), Kolonia, Pohnpei. WCPFC-SC5-2009/FT-WP-02
54. www.iss-foundation.org/aboutus [accessed 16.12.10]
55. M.D. Camhi et al (2009). The Conservation Status of Pelagic Sharks and Rays. Report of the IUCN Shark Specialist Group Pelagic Shark Red List Workshop. Tubney House, University of Oxford, UK, 19–23 February 2007 http://cmsdata.iucn.org/downloads/ssg_pelagic_report_final.pdf
56. N.K. Dulvy et al, 2008, 'You can swim but you can't hide: the global status and conservation of oceanic pelagic sharks and rays', *Aquatic Conservation: Marine and Freshwater Ecosystems*, 18: 459-482 (2008). <http://onlinelibrary.wiley.com/doi/10.1002/aqc.975/pdf> [accessed 16.10.12]
57. M.D. Camhi et al (2009). The Conservation Status of Pelagic Sharks and Rays. Report of the IUCN Shark Specialist Group Pelagic Shark Red List Workshop. Tubney House, University of Oxford, UK, 19-23 February 2007. http://cmsdata.iucn.org/downloads/ssg_pelagic_report_final.pdf
58. www.iucnredlist.org/
59. M.D. Camhi et al (2009). The Conservation Status of Pelagic Sharks and Rays. Report of the IUCN Shark Specialist Group Pelagic Shark Red List Workshop. Tubney House, University of Oxford, UK, 19-23 February 2007. http://cmsdata.iucn.org/downloads/ssg_pelagic_report_final.pdf
60. <http://www.sharktrust.org/content.asp?did=34462>
61. University of Hawaii, 'The Associative Dynamics of Tropical Tuna to a Large-Scale Anchored Fad Array', 2008. http://www.soest.hawaii.edu/PFRP/biology/holland_itano_png.html
62. www.iccat.int/Documents/SCRS/Manual/CH3/CHAP%203_1_1_PS_ENG.pdf [accessed 16.12.10]
63. 'The total reported global marine turtle bycatch was ~85,000 turtles, but due to the small percentage of fishing effort observed and reported (typically <1% of total fleets), and to a global lack of bycatch information from small scale fisheries, this likely underestimates the true total by at least two orders of magnitude', Wallace et al, 2010. 'Global patterns of marine turtle bycatch'. <http://onlinelibrary.wiley.com/doi/10.1111/j.1755-263X.2010.00105.x/full> [accessed 9.12.10]
64. From 2,400-8,600 caught in this fishery annually over the same period. Molony (2005). WCPFC. Estimates of the mortality of non-target species with an initial focus on seabirds, turtles and sharks. WCPFC–SC1 EBWP–1
65. D. Bromhead et al, 'Review of the impact of fish aggregating devices (FADs) on Global Tuna Fisheries', 2003
66. J. Franco et al , Design Of Ecological Fads, 2009. www.iotc.org/files/proceedings/2009/wpeb/IOTC-2009-WPEB-16.pdf
67. IUCN Red List Categories: Vulnerable: high risk of extinction in the wild; Endangered: very high risk of extinction in the wild; Critically Endangered: extremely high risk of extinction in the wild. www.iucn.org/about/work/programmes/species/red_list/about_the_red_list/ [accessed 16.12.10]
68. ISSF Meeting on mitigation of by-catches in the Tuna Purse seine Floating Object fisheries – Final Report AZTI Sukarrieta, Spain, 24-27 November 2009. www.iss-foundation.org/FileContents.phx?fileid=e7f00ec6-01eb-4ba7-9ede-42f229199955 [accessed 16.12.10]
69. M. Hall, Inter-American Tropical Tuna Commission reported in Forbes. http://www.forbes.com/2008/07/24/dolphin-safe-tuna-tech-paperplastic08-cx_ee_0724fishing_2.html
70. For more detailed discussion of this issue see Greenpeace UK, *Recipe for Disaster*, www.seafoodchoices.com/resources/documents/RecipeForDisaster_GreenpeaceUK.pdf

71. Reported in Forbes. www.forbes.com/technology/2008/07/24/dolphin-safe-tuna-tech-paperplastic08-cx_ee_0724fishing_2.html
72. www.oft.gov.uk/shared_of/mergers_ea02/2010/Thai-Union.pdf, p6, para 28
73. Email to Greenpeace from Sainsbury's, December 2010
74. www.oft.gov.uk/shared_of/mergers_ea02/2010/Thai-Union.pdf, p6, para 22
75. L. Mitchell, 'Dolphin-Safe Tuna Labeling' in E. Golan et al *Economics of Food Labeling*, Agricultural Economic Report No. (AER793), January 2001, p.25
76. www.oft.gov.uk/shared_of/mergers_ea02/2010/Thai-Union.pdf, page 6, para 28
77. <http://stats.oecd.org/glossary/detail.asp?ID=295> [accessed 15.12.10]
78. T. Kompas et al, 'Bioeconomic losses from overharvesting tuna' *Conservation Letters*. Vol 3. 2010, pp177–183.
79. M.B. Bortier-Verstraaten (2002) 'A Bioeconomic Analysis Of The Ghanaian Tuna Fishery (1980–2000)' www0.nfh.uit.no/dok/IFM/thesis/bortier2002.pdf [accessed 15.12.10]
80. An approach exemplified in the TEEB (The Economics of Ecosystems and Biodiversity) reports. www.teebweb.org/InformationMaterial/TEEBReports/tabid/1278/Default.aspx 15.12.10]
81. C. Clover, *The End of the Line*, Ebury Press, London, 2005, ch.11.
82. International Seafood Sustainability Foundation, Status Of The World Fisheries For Tuna. www.iss-foundation.org/FileContents.phx?fileid=21ffdf11-dcb4-4da7-9b8a-0cbafd85139b [accessed 16.12.10]
83. <http://www.mwbrands.com/production-sites> [accessed 21.12.10]
84. www.mwbrands.com/fleet
85. www.mwbrands.com/node/39
86. <http://www.beyinbeachresort.com/Files/Background%20Report%20-%20Sea%20Turtle%20Conservation%20on%20the%20West%20Coast%20of%20Ghana.pdf>, p16 [accessed 21.12.10]
87. <http://news.bbc.co.uk/1/hi/world/africa/843082.stm> [accessed 17.12.10]
88. <http://www.fredd66.com/SMTF/2008%20season%20report.htm> [accessed 21.12.10]
89. www.york.ac.uk/media/environment/documents/pg/marine_reserves_consensus-1.pdf and 'Turning the Tide – Addressing the Impact of Fisheries on the Marine Environment'. www.rcep.org.uk/reports/25-marine/documents/Turningthetide.pdf, paragraphs 8.59 and 8.63 [accessed 14.12.10]
90. F.R. Gell and C.M.Roberts, 'Benefits beyond Boundaries: The Fishery Effects of Marine Reserves', *Trends in Ecology and Evolution*, 18, 2003, 448-55.
91. Greenpeace Emergency Oceans Rescue Plan, 2010. <http://www.greenpeace.org/international/en/publications/reports/Emergency-Oceans-Rescue-Plan/>
92. C. Roberts et al, 'The role of marine reserves in achieving sustainable fisheries', *Phil. Trans. R. Soc. B* (2005) 360, pp. 123-132, p.125
93. 'Marine Reserves, Saving the Seas, Why George Bush has created three giant marine reserves in the Pacific', *The Economist*, 10 January 2009. www.economist.com/node/12916869 [accessed 14.12.10]
94. 'Protect Chagos – UK Designates World's Largest Marine Reserve'. www.protectchagos.org/blog/uk-designates-world%E2%80%99s-largest-marine-reserve/ [accessed 14.12.10]
95. Conference Of The Parties To The Convention On Biological Diversity, marine and coastal biodiversity, October 2010. www.cbd.int/cop/cop-10/doc/advance-final-unedited-texts/advance-unedited-version-marine-and-coastal-en.doc [accessed 14.12.10]
96. www.protectchagos.org/blog/chagos-becomes-a-no-fishing-zone/ [accessed 14.12.10]; www.zsl.org/conservation/news/chagos,761,NS.html [accessed 16.12.10]
97. Conference Of The Parties To The Convention On Biological Diversity, marine and coastal biodiversity, October 2010. www.cbd.int/cop/cop-10/doc/advance-final-unedited-texts/advance-unedited-version-marine-and-coastal-en.doc [accessed 14.12.10]
98. Correspondence from supermarkets, November-December 2010
99. C. Roberts et al 2002, 'Fishery Benefits of Fully Protected Marine Reserves: Why Habitat and Behavior are Important', *Natural Resource Modeling*, 15(4), 487-507, 2002, p.503. <http://www.hutten.org/fw/docs/384.pdf>

THIS REPORT UPDATES THE 2008 GREENPEACE REPORT 'TINNED TUNA'S HIDDEN CATCH'

[HTTP://WWW.GREENPEACE.ORG.UK/FILES/PDFS/OCEANS/TINNED_TUNA_FINAL.PDF](http://www.greenpeace.org.uk/files/pdfs/oceans/tinned_tuna_final.pdf)

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**FADS ON THE BOW
OF A PURSE SEINER
IN GHANA WAITING
TO BE DEPLOYED**

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