Research in
AGRICULTURE, LIVESTOCK and FISHERIES
ISSN : P-2409-0603, E-2409-9325
An Open Access Peer-Reviewed International Journal

Article Code: 0250/2019/RALF
Article Type: Review Article

Res. Agric. Livest. Fish.
Vol. 6, No. 3, December 2019: 397-404.

OVERFISHING: PRESSURE ON OUR OCEANS

Daniel Jonathan Bardey

University of Brighton Alumni, 10 Mickle Street, Tooradin, Australia, 3980.

***Corresponding author:** Daniel Jonathan Bardey; E-mail: dbardey92@gmail.com

ARTICLE INFO

Received
04 October, 2019

Revised
14 December, 2019

Accepted
24 December, 2019

Online
31 December, 2019

Key words
Overfishing
Ocean
Resources
Fisheries
Sustainable

A B S T R A C T

An increased demand for fish, combined with ever-growing global populations our oceans cannot keep up with the rate at which we are fishing our seas. As coastal fisheries declined, fishing started to expand into using open oceans as a resource leading to an 80% decline in bluefin tuna (*Thunnus thynnus*) and swordfish (*Xiphias gladius*) in just 5 years. Though overfishing for specific species can be beneficial, and even more surprisingly it's encouraged. Off the coast of America, a new threat has been growing in recent years, the red lion fish (*Pterois volitans*). This species originally native to coral reefs in the South Pacific has recently found a new home the Atlantic Ocean. Target fishing the Lionfish will not only help reduce population size, minimize the chances of the Lion fish causing greater ecological damage on the Atlantic Ocean. Is moving public perception and demand towards invasive the next steps in protecting our fisheries?

To cite this article: Bardey D J, 2019. Overfishing: pressure on our oceans. Res. Agric. Livest. Fish. 6 (3): 397-404.

OVERFISHING: PRESSURE ON OUR OCEANS

Since the dawn of time man has settled by water, whether by sea or river, relying on marine environments as an essential resource for food, water and transport. Even today according to the, The Food and Agricultural organization of the United Nations (FAOUN) (2019) over 1 billion people are still largely dependent on fish as their primary source of protein, with many of these being in developing countries with urbanized coastal areas. Globally in fish provided 4.5 billion people with almost 15% of their intake of animal protein (Béné*et al* 2015). Claim that in 2016 alone 171 million tons of fish was caught, from combined sources of aquaculture (the farming of aquatic organisms) and capture production (Fig. 1). This food fish supply is increasing at a rate 3.2% each year since 2005, far out pacing the world population growth 1.6% (FAOUN 2018).

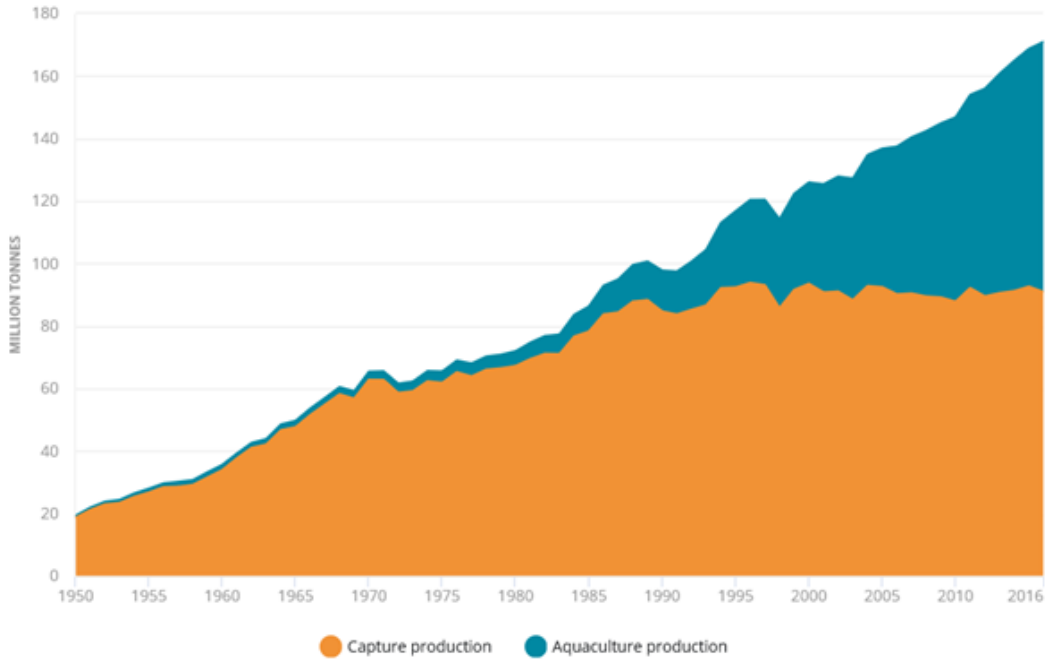

Figure 1. Total tonnes of fish caught each year 1950 – 2016 (FAOUN, 2019)

An increased demand for fish, combined with ever-growing global populations sees our oceans struggle to keep up with the rate at which we are fishing our seas. As local small-scale coastal fisheries declined, fishing has started to expand on a huge commercial scale into open oceans leading to huge impacts on wildlife populations of fish species. For example, the bluefin tuna (*Thunnus thynnus*) has seen a decline of 96.4% since 2012 (International Scientific Committee for Tuna and Tuna-like Species 2016).

Fishing techniques and legislation is still poorly regulated, leading to many fish being caught as bycatch. Bycatch is classed as the unintentional catchment of fish, while target fishing for particular species. Though by catch can also refer to the catchment of undersized fish and juveniles. The fish caught as bycatch generally have little monetary value in the fishing market, and are often discarded (Segar & Segar, 2006). One native species greatly affected by bycatch is the undulate ray (*Raja undulate*) which is now one of the North Atlantic's most endangered marine species. The distribution of *raja undulate* is patchy and the species is only abundant in a few localised areas, primarily areas in which commercial fish are found. With the use of trawl nets vast amounts of *Raja undulate* were caught as bycatch and taken back in shore, having little value on the fishing market they would be discarded.

Due to the vast number of rays being caught and discarded, and an increased amount of fishing in the areas found lead to a steep decline of *Raja undulate,* from 1981 to 2005 an 80 per cent loss was recorded (Ellis *et al*, 2012). The Europe Union took notice of the falling number of rays and in 2008 it became law that fisherman are prohibited from targeting, retaining or landing undulate rays caught in EU waters in attempts to protect the species, and that any rays caught are to be return unharmed to the sea, though currently there is no species-specific management for *Raja undulate* (International Union for Conservation Nature, 2008). Additionally, to this, *Raja undulate* are now protected and listed as an important species as part of the UK biodiversity action plan (Joint Nature Conservation Committee, 2014).

Though the above may be easy to regulate with legal fisherman, a great deal of fishing is still not recorded. One problem is in the Balearics, off the Spanish coast where it is estimated that over half of the fishing-taking place is not being declared. This potentially means that actual catches from fisheries may by 2.3 times higher than official figures. Xavier Pastor, the vice president of Oceana (the largest international advocacy organization focused solely on ocean conservation) stresses that "*In order to properly manage fishing activity, it is necessary to know the actual amount that is being captured. Otherwise, it is impossible to know the extent of the resources and how to extract the maximum amount without compromising their survival"* (Carreras *et al,* 2015).

A 2-year study in the Balearics Oceana estimate that an extra 248,000 tonnes of fish should be added to the official landings, adding in sales of black-market fish, and those discarded overboard. Oceana also argues one of the main reasons for overfishing is that the industry has changed over the years, going from an activity carried out mainly by traditional fishermen to that of trawling boats with bigger nets and greater industrial technology. Though it is no surprise that the amount of fishing has increased with population growth, fishermen in the Balearics has decreased from 5000 to around 700 since the 1950's and the amount of fish captured has sharply inclined (World fishing and aquaculture, 2015).

While a great deal of fishing can go unregistered, it is the choices in fish that we eat which are causing issues for our ocean's resources Two of the most popular choices of fish in the west are tuna and cod, both a staple of many packed lunches and Friday night fish and chip dinners. But with these species in such harsh decline, why are not banning the sale of altogether? Or inflating market prices so people choose to eat sustainably?

Fish market prices are among some of the drivers that affect fishermen's behaviors, and the selection of target species, making decisions based on potential profits (Brown, 2000). Therefore fishing trends are often for large bodied species, such as tuna and cod (Srinivasan *et al,* 2010). A journal published by Tsikliras and Polymeros (2015) came up with hypothesis that large fish, like tuna, are specifically targeted for their size because of their price on the fishing market. They sought to compare the mean price of 42 species of fish from 1996 – 2010 and compared this to the total lengths of fish caught, with the mean price of fish ranging from 0.01 (For Sprat, *Sprattus sprattus*) to 9.17 (For Bluefun tuna, (*Thunnus maccoyii*) euros/KG. What they found is that larger individuals were consistently attaining higher market prices, compared to their medium and small-sized counterparts, indicating that market forces are the stimulant for the target of larger fishes. As these 'big ones' are removed at a higher rate the stock biomasses will be the first to decline.

So, while these popular bigger fish are attaining higher prices on the fishing markets, making them a target for fisherman, why have we not switched to eating cheaper and more sustainable fish? Some organizations, such as the Marine Conservation Society (MCs) (2019) have recently been trying to sway the public's dining choices through the campaign of the 'Good Fish Guide'. This is a national campaign that encourages people to switch the dish of fish for their supper to a sustainable option. Either by educating people to buy fish from a sustainable source, such as ensuring the fish has been pole and line caught, rather than via trawl netting, to counter bycatch or by informing them on which fish is a better more sustainable choice when out dining. The distribution of pocket guides to numerous aquariums, fishmongers and seafood restaurants gives the public clear and easy suggestions on what to eat. Figure 2 is an example of one the pocket guides produced by the MCS.

Figure 2. The Good fish guide pocket card (Marine Conservation Society, 2014)

While eating sustainably may be a simple choice we can make at a local level, on a global combined scale it may potentially be effective. In some parts of the world food equals status, every February China welcomes in its new year, with dancing lions, dumplings, red packets of money and this year, a new unlikely tradition to their meals; lobsters from the state of Maine, USA. This newfound demand in being snapped up by Chinas middle class, who have developed an increased cosmopolitan taste. Though Spiny Lobsters used to be quite abundant in the China Sea, overfishing has destroyed their Chinese habitat and driven up prices, so imported lobsters from America are still a bargain, even with the logged air miles (Business Insider, 2015). The owner of Maine based The Lobster Company Wholesale, Stephanie Nadeau, claims that *"In 2009 China bought virtually no lobster from Maine. Now the Chinese New Year is the busiest time of year - even busier than Christmas".* Sending 45 tonnes of lobster to China each week in the run up to New Year (South China Morning Post, 2015). There are more locally sourced lobsters, such as the ones found off the coast of Hong Kong, but there is little demand due to their small weight of around 450g. Compared to the weight of a Maine lobster, which can grow up to 4800g, makes the Hong Kong lobster seem like a second-class resource *(*BBC news, 2015). Last year, the USA estimate that $90.5 Million of Lobster was sent to China, a huge increase from $15.2 Million exported in 2013 (Figure 3). This demand goes back to what Tsikliras and Polymeros (2015) had previously concluded upon.

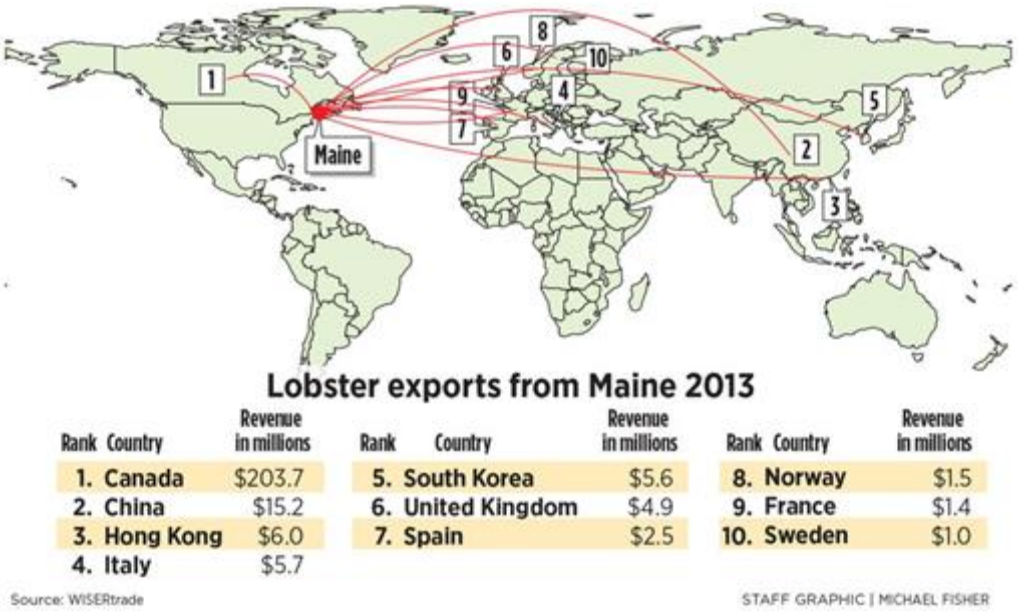

Figure 3. Maine Lobster exports 2013 (Portland Press, 2015)

Though overfishing for specific species can be beneficial, and even more surprisingly it's encouraged. Off the coast of America, a new threat has been growing in recent years, the red lion fish (*Pterois volitans).* This species originally native to coral reefs in the South Pacific has recently found a new home the Atlantic Ocean. While originally the Atlantic Ocean would have been too cold for this fish to survive, through the help of climate change, our seas are warming to accommodate new species. But this fish is an invasive species, with no natural predators, the ability to consume 20 small wrasses in just 30 minutes and the capability of laying 25,000 eggs every 4 days. It is no surprise, that these fish are now affecting the ecosystems of the Atlantic Ocean and spreading at faster rate than in their natural habitat (Figure 4) (Pusack*et al* 2016).

In recent years, this over-population of fish is now being a new resource of cheap sustainable food. Target fishing the Lionfish will not only help reduce population size, minimise the chances of the Lion fish causing greater ecological damage on the Atlantic Ocean. Experts in the Southern province of Sancti Spiritus, Cuba are encouraging locals to fish and consume the Lion fish. Yessica Portal is currently responsible for managing this invasive species, and says, "*the only way to eradicate this fish is by its capture by man".* It is to note, that these fish are potentially harmful to humans as they are classed as the second most venomous fish in the ocean, but are not lethal, because of this coastal communities and commercial fishermen in Cuba are receiving training in how to handle the fish, and recently has become popular among tourists due to its unique look (Cuba Headlines 2015). While currently it is a popular dish among locals and tourists, Swedish chef Asa Johansson can not only see the importance of using this fish to reduce the threats to fish in the Atlantic ocean, but also to help subsidise species currently being over fished. She also suggests that by making this fish available in four to five-star restaurants would increase its popularity and therefore demand, making it a popular choice on the seafood menu (Telegraph, 2015).

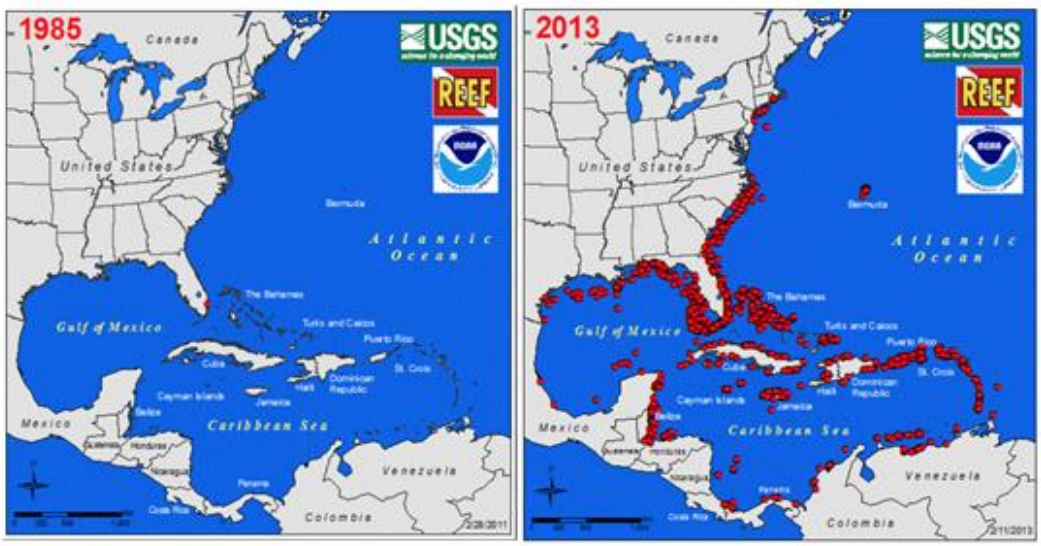

Figure 4. The spread of *Pterois volitans* in the Atlantic Ocean from 1985 – 2013 (REEF, 2014)

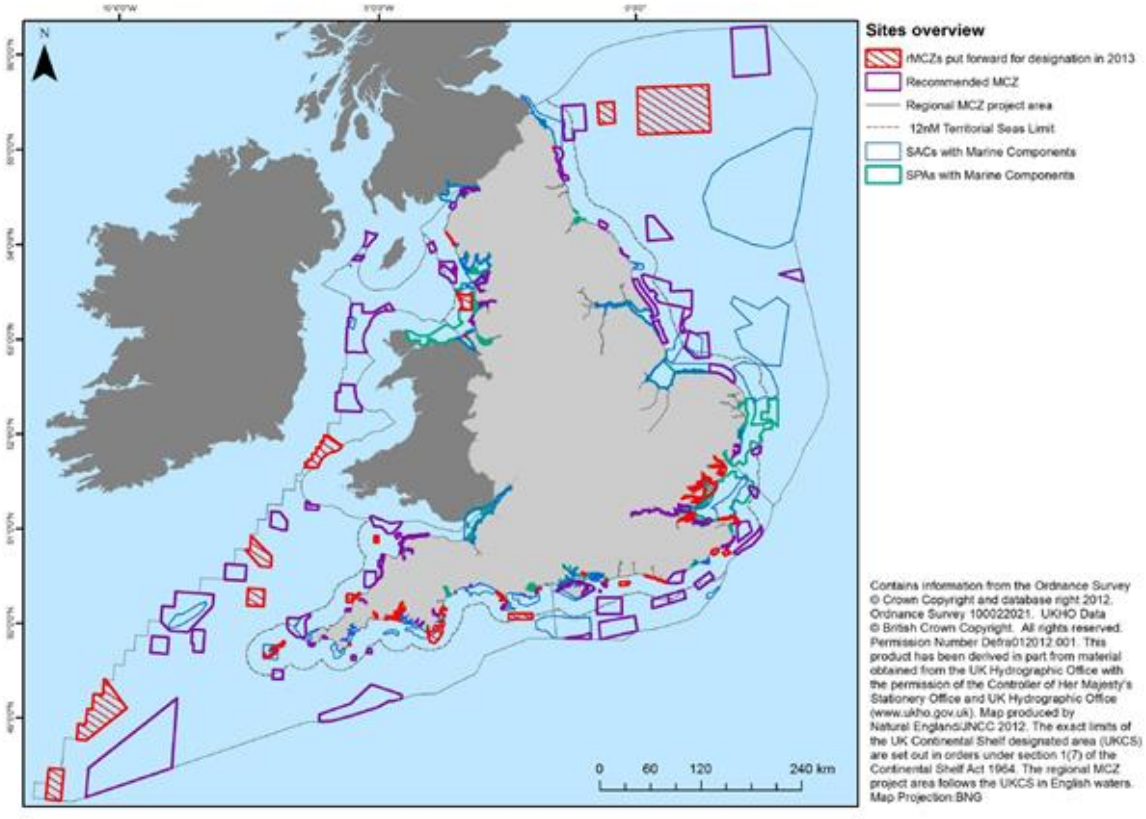

Figure 5. Locations of the 41Marine Protected Zones in the UK (Joint Nature Conservation Committee, 2019)

While overfishing is currently straining many of our ocean's resources, we need to start looking at other more sustainable fish for our dietary requirements. Whether by substituting the fish we eat or by turning to newly available less popular resources of fish to fill our needs. But some of our aquatic species will not stand a chance of survival, without proper legislation protecting them. The efforts in protecting our oceans supplies are down to us as individuals to make better choices, but also to pressure governments, both national and global to help protect our seas, by being stricter on fishing laws and regulations or helping conserve threatened species. One way is to implement marine conservation zones to protect our seas. As of 31st May 2019, there are only 41 protected zones (Figure 5) in the United Kingdom (Joint Nature Conservation Committee2019, Department for Environment, Food and Rural Affairs 2019) a small amount compared to the 28.6 million hectares of protected land in United Kingdom (Joint Nature Conservation Committee 2019). If we do not act now, who knows what will become of our oceans, and their ability to sustain us in the future.

REFERENCES

1. Brown G M, 2000. Renewable natural resource management and use without markets. Journal of economic literature, 38(4): 875-914.
2. Béné C, Barange M, Subasinghe R, Pinstrup-Andersen P, Merino G, Hemre G I and Williams, M2015,'*Feeding 9 billion by 2050–Putting fish back on the menu*'. Food Security, *7*(2): 261-274.
3. Business Insider, UK 2015, 'Maine lobster is booming in China'. [Online] Available from: http://uk.businessinsider.com/maine-lobster-is-booming-in-china-2015-2?r=US [accessed 24th February 2015].
4. Carreras M, Coll M, Quetglas A, Goñi R, Pastor X, Cornax MJ, Iglesias M, Massutí E, Oliver P, Aguilar R, Au A, Zylich K, and Pauly D 2015. Estimates of total fisheries removal for the Balearic Islands (1950-2010). Fisheries Centre Research Reports, University of British Columbia, Vancouver.
5. Cuba Headlines 2015. '*Experts encourage fishing and consumption of lionfish that inhabits Cuban coast'*. [Online] Available from: http://www.cubaheadlines.com/2015/02/12/p6/experts-encourage-fishing-and-consumption-of-lionfish-that-inhabits-cuban-coast.html [accessed 24th February 2015]
6. Department for Environment, Food and Rural Affairs 2019, Marine conservation zone designations in England. [Online] Available from: https://www.gov.uk/government/collections/marine-conservation-zone-designations-in-england#2019-mcz-designations-and-factsheets [accessed 4th October 2019]
7. Ellis JR, McCully SR and Brown MJ, 2012. An overview of the biology and status of undulate ray Raja undulata in the north-east Atlantic Ocean, Journal of Fish Biology, 80(5): 1057-1074.
8. Food and Agriculture Organisation of the United Nations, 2018. The state of world fisheries and aquaculture 2018. [Online] Available from: http://www.fao.org/documents/card/en/c/I9540EN/[accessed 4th October 2019]
9. International committee for Tuna and Tune-like species in the North Pacific Ocean (2016) 2016 Pacific Bluefin Tuna Stock Assessment Executive Summary. [Online] Available from: http://isc.fra.go.jp/pdf/Stock_assessment/EXECUTIVE_SUMMARY_ISC_2016_Pacific_Bluefin_Tuna_Stock_Assessment.pdf[accessed 4th October 2019].
10. International Union for Conservation of Nature, 2008, IUCN Red List Categories and Criteria. [Online] Available from: http://www.iucnredlist.org/details/full/161425/0 [accessed 24th February 2015].
11. Joint Nature Conservation Committee, 2014, Marine conservation zones. [Online] Available from: http://jncc.defra.gov.uk/page-4525 [accessed 24th February 2015].
12. Joint Nature Conservation Committee, 2014, UK BAP priority species and habitats. [Online] Available from: http://jncc.defra.gov.uk/page-5705 [accessed 24th February 2015].
13. Joint Nature Conservation Committee, 2019, Marine Protected Area Mapper. [Online] Available from: https://jncc.gov.uk/our-work/ukbi-c1-protected-areas/[accessed 4th October 2019].
14. Joint Nature Conservation Committee, 2019, Protected Areas. [Online] Available from: https://jncc.gov.uk/our-work/marine-protected-area-mapper/ [accessed 4th October 2019].

15. Lion Fish Hunting, 2015. Lionfish Facts. [Online] Available from: http://lionfish.co/lionfish-facts/ [accessed 24th February 2015].
16. Marine Conservation Society, 2019. Good fish guide, A guide to choosing sustainable seafood. [Leaflet] Available from: https://www.mcsuk.org/media/seafood/PocketGoodFishGuide.pdf[accessed 4th October 2019].
17. Marine Stewardship council. 2014. The oceans today - fish as food. [Online] Available from: http://www.msc.org/healthy-oceans/the-oceans-today/fish-as-food [accessed 24th February 2015]
18. McAuley K, Rapheal T, J. BBC news, 2015, Chinese feast: Year of the Lobster?[Online] Available from: http://www.bbc.co.uk/news/magazine-31541092 [accessed 24th February 2015]
19. Portland Post Herald, 2015, From Down East to the Far East, Lobster exports expand. [Online] Available from: http://www.pressherald.com/2015/01/04/from-down-east-to-the-far-east-lobster-exports-expand/
20. Pusack TJ, Benkwitt CE, Cure K and Kindinger TL, 2016. Invasive Red Lionfish (Pterois volitans) grow faster in the Atlantic Ocean than in their native Pacific range. Environmental Biology of Fishes, 99(6-7): 571-579.
21. Purvis A, The Telegrpah, 2015. Fighting the Caribbean's lionfish invasion. [Online] Available from: http://www.telegraph.co.uk/travel/destinations/centralamericaandcaribbean/saintlucia/11384301/Fighting-the-Caribbeans-lionfish-invasion.html [accessed 24th February 2015].
22. Segar DA and Segar, ES 2007, Introduction to ocean sciences, W W Norton & Co, New York; London.
23. South China Morning Post, 2015, Maine lobstermen happy to serve China's Lunar New Year appetite for lobster. [Online] Available from: http://www.scmp.com/news/china/article/1717237/maine-lobstermen-happy-serve-chinas-lunar-new-year-appetite-lobster [accessed 24th February 2015].
24. Srinivasan UT, Cheung WWL, Watson R and S umaila UR, 2010. Food security implications of global marine catch losses due to overfishing. Journal of Bioeconomics, 12(3): 183-200.
25. Stringer, B. Huffington Post. 2014. How Much of England's Countryside is protected? [Online] Available from: http://www.huffingtonpost.co.uk/barney-stringer/planning-laws_b_5087013.html [accessed 24th February 2015].
26. Thompson, Ken, 2010. Do We Need Pandas? The Uncomfortable Truth about Biodiversity. Foxhole, Totnes: Green Books.
27. Reef, 2015, Lionfish Research Program. [Online] Available from: http://www.reef.org/lionfish
28. World fishing and aquaculture, 2015, Overfishing in the Balearics. [Online] Available from: http://www.worldfishing.net/news101/industry-news/overfishing-in-the-balearics [accessed 24th February 2015].