

The intersection of business and biology

Tobin Turner

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Chapter 1

About

This is a little talk about my interest in the intersection of business and biology.

Chapter 2

Motivation

Like father, like daughter.



Chapter 3

An unexpected influence

Bryce Stewart, PhD, University of York



Chapter 4

Real life case study

∴ {.rmdimportant}

Living it out.

∴



Marine Conservation Begins at Home: How a Local Community and Protection of a Small Bay Sent Waves of Change Around the UK and Beyond

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The Firth of Clyde, on the west coast of Scotland, was once one of the most productive fishing grounds in Europe. However, successive decades of poor management and overfishing led to a dramatic loss of biodiversity and the collapse of finfish fisheries. In response, concerned local residents on the Isle of Arran, which lies in the middle of the Clyde, formed the Community of Arran Seabed Trust (COAST) in 1995. After 13 years of campaigning, a small (2.67 km²) area in Lamlash Bay became Scotland's first no-take zone (NTZ) in 2008, and only the second in the UK. Since protection, biodiversity has increased substantially, along with the size, age and density of commercially important species such as the king scallop, *Pecten maximus*, and the European lobster, *Homarus gammarus*. Arguably more important, however, is the influence the Lamlash Bay NTZ and COAST have had on UK marine protection in general. Most notably, detailed research has created a case study that clearly demonstrates the benefits of protection in an area where little such evidence is available. This case has been used repeatedly to support efforts for increased protection of UK waters to help rebuild marine ecosystems and enhance their resilience in an uncertain future. In Scotland specifically, lobbying by COAST led to the designation of a much larger marine protected area (MPA, >250 km²) around the south of Arran, one of 30 new MPAs in the country. Evidence from Lamlash Bay has supported development of strong protection for these MPAs, seeing off lobbyist efforts to weaken management. Arran's conservation success has been recognized internationally and is inspiring greater involvement of local communities around the UK, and further afield, to take the destiny of their coastal waters into their own hands. Successful marine conservation begins at home.

Keywords: marine protected areas, marine reserve, community based conservation, ecosystem – based management, fisheries, marine biodiversity, Lamlash Bay, Isle of Arran

Chapter 5

The importance of science, rigor

∴ {.rmdimportant}

Study something you love. And that tastes great.

∴

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Benefits of closed area protection for a population of scallops

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ABSTRACT: Despite the current interest in using closed areas for fisheries management, few studies have actually examined the benefits for invertebrate fisheries such as scallops. This study details the dynamics of a population of great scallops *Pecten maximus* (L.), within a closed area and an adjacent fished area off the Isle of Man, over a 14 yr period (1989 to 2003). Scallop densities were very low in both areas when the closed area was set up, but increased at an accelerated rate over time within the closed area. Scallop densities also increased on the adjacent fishing ground, but not to the same extent. Consequently, the density of scallops above the minimum legal landing size (110 mm SL) was more than 7 times higher in the closed area than in the fished area by 2003. There was also a shift towards much older and larger scallops in the closed area and, correspondingly, lower estimates of total mortality. Experimental dredging of 2 plots within the closed area confirmed that fishing drove these differences in population dynamics and structure. These patterns of scallop density, age and size structure resulted in the exploitable biomass (adductor muscle and gonad) of scallops being nearly 11 times higher in the closed area than in the fished area by 2003, and the reproductive biomass was 12.5 times higher. This is significant for fisheries management because the build up of high densities of large *P. maximus* individuals enhanced local reproductive potential and therefore the likelihood of export of larvae to the surrounding fishing grounds. Along with these direct benefits of closed area protection, juvenile scallops had higher survival and individual growth rates in the closed area, apparently in response to reduced fishing disturbance. Although juvenile scallops are not subject to direct removal by fishing, protection during this critical phase therefore appeared to assist the recovery of the closed area population. In summary, this study joins a growing number indicating that the use of closed areas offers a range of benefits over more traditional methods of managing fisheries. Fisheries for relatively sedentary and long-lived species such as *P. maximus* appear to be particularly suitable for this type of management.

KEY WORDS: Closed areas · Marine reserves · Fisheries management · Fishing effects · Larval export · *Pecten maximus*

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INTRODUCTION

Research into the use of closed areas for fisheries management has increased at an almost exponential rate over the last decade as traditional management methods continue to fail (Mosquera et al. 2000, Pauly et al. 2002). This interest is due to a range of perceived benefits offered by closed area management for both target species and the environment. Perhaps not surprisingly, numerous studies have now shown that

closed area protection can increase the abundance and mean size of target species (Mosquera et al. 2000, Halpern & Warner 2002, Halpern 2003). This is thought to enhance local reproductive output and therefore lead to export of larvae to surrounding areas that are open to fishing (Roberts et al. 2001, Gaines et al. 2003, Gell & Roberts 2003, Grantham et al. 2003). For mobile species, there can also be spillover of juveniles/adults to adjacent areas through emigration or density-dependent dispersal (Lizaso et al. 2000, McClanahan &

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Chapter 6

Dollars, Pounds, Euros...

It's actually all about economics.

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RESEARCH



The Brexit deal and UK fisheries—has reality matched the rhetoric?

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Abstract

Fisheries management has been a strongly contested aspect of the UK's position in the EU since UK accession, with the fishing industry frequently questioning both the efficacy and fairness of arrangements. During the campaign for UK exit (Brexit) from the EU, and the subsequent negotiations of a new legal and political relationship from 2016 to 2020, senior UK political leaders strongly committed to deliver radically changed fisheries arrangements with respect to the three central issues: regulatory autonomy; access to waters; and quota shares, all while maintaining minimal trade impacts. The Trade and Cooperation Agreement diverges from this Brexit rhetoric. While some regulatory independence has been achieved, UK fisheries management continues in a state of interdependence and significant EU access to UK waters remains, even in the 6–12 nautical mile territorial waters. While the UK gained an increase in quota shares which is estimated to reach 107 thousand tonnes of landed weight annually by 2025 (an increase of 21.3% for quota species and 16.9% for all species, or 17.8% and 12.4% by value), this pales in comparison to the UK Government's stated ambitions for zonal attachment (achieving 68% by weight and by value - a potential shortfall of 229,000 tonnes / £281 million). This modest change explains the negative reaction of the fishing industry and claims of betrayal in the face of the UK Government's announcement of a "successful" deal. The stark delivery gap between rhetoric and reality means the UK government faces a challenging start to managing fisheries outside of the Common Fisheries Policy.

Keywords Fisheries management · Seafood · Trade · Politics · Zonal attachment

Introduction

Achieving sustainable management of fisheries can be considered a "wicked" socio-ecological problem (Jentoff and Chuenpagdee 2009), but the challenges involved are dramatically amplified when fish stocks cross jurisdictional boundaries. Achieving sustainable and equitable management in this arena requires international cooperation, but this situation

also frequently leads to political conflict (Pomeroy et al. 2007; Jensen et al. 2015; Steinsson 2016). Politicising the management of fisheries can raise the public interest and attention on what is often otherwise a very small sector of the economy and employment (House of Commons 2017a, European Commission 2020), but also risks raising expectations beyond what is feasible in terms of sustainability (avoiding overfishing) or the economy (impacts on larger sectors). In the North East Atlantic, management of many shared fish stocks has largely been conducted through the European Union's (EU) Common Fisheries Policy (CFP) since 1973; however, many in the United Kingdom (UK) fishing industry have long felt this arrangement was biased against them (Phillipson and Symes 2018; Hatcher 2020). The UK vote to leave the EU in 2016 therefore relied heavily on using fishing as a totemic issue for the UK Government to get voter support, but did this approach of politicising the issue deliver on the expectations the industry had?

The UK prides itself on being a maritime nation with a rich history connected to the sea (Redford 2014). Indeed, many coastal communities have been shaped by fishing (Stead 2005), and fish and chips is said to be the national dish (Murtcott 2013). From the 1950s to the 1970s, the British fishing

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Chapter 7

A self-serving plug

Data reveals all.

REVIEW

ECOLOGY

Big data approaches lead to an increased understanding of the ecology of animal movement

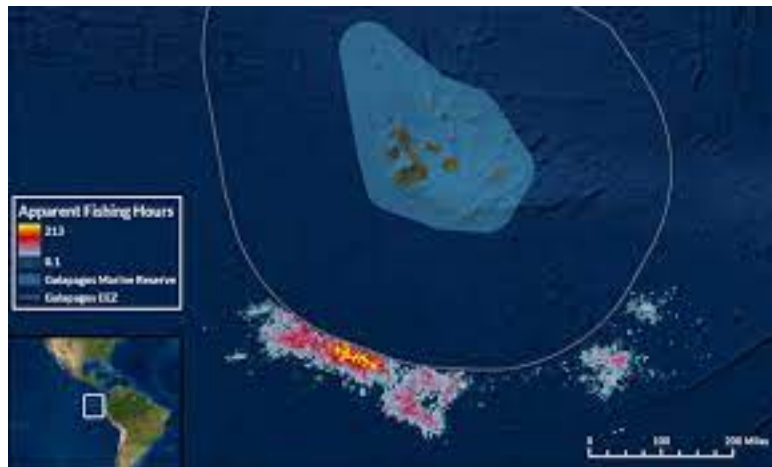
Ran Nathan*, Christopher T. Monk, Robert Arlinghaus, Timo Adam, Josep Alós, Michael Assaf, Henrik Baktoft, Christine E. Beardsworth, Michael G. Bertram, Allert I. Bijleveld, Tomas Brodin, Jill L. Brooks, Andrea Campos-Candela, Steven J. Cooke, Karl Ø. Gjelland, Pratik R. Gupte, Roi Harel, Gustav Hellström, Florian Jeltsch, Shaun S. Killen, Thomas Klefoth, Roland Langrock, Robert J. Lennox, Emmanuel Lourie, Joah R. Madden, Yotam Orchan, Ine S. Pauwels, Milan Říha, Manuel Roeleke, Ulrike Schlägel, David Shohami, Johannes Signer, Sivan Toledo, Ohad Vilk, Samuel Westrelin, Mark A. Whiteside, Ivan Jarić

Nathan *et al.*, *Science* **375**, eabg1780 (2022)

Chapter 8

Galapagos Marine Park

Rubber meets road.



Chapter 9

Next chapter

Where does this take you? (and me?)